

Comba

mBDA Indoor Series

EAWS DIGITAL BAND SELECTIVE REPEATER

USER MANUAL

mBDA-EAWS QE: 1-0-2

Comba Telecom Inc.

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0.3 HISTORY

Change No.	ENU	Details Of Change
1	1-0-0	This user manual first created in Aug 2014.
2	1-0-1	Minor updates per revised QIG 1-0-2 in Mar 2015
3	1-0-2	Update the WEB photos in May 2018

0.4 GLOSSARY OF TERMS

ALC	Automatic Level Control
ATT	Attenuation
BDA	Bi-direction Amplifier
BS	Base Station
BTS	Base Transceiver Station
DL	Downlink
DT	Donor Terminal
FOU	Fiber Optical Unit
GUI	Graphic User Interface
ID	Identification
LNA	Low Noise Amplifier
MCU	Main Control Unit
MT	Mobile Terminal
MTBF	Mean Time Between Failures
MBDA	Master Unit
NC	Normally Closed
NF	Noise Figure
NO	Normally Open
OMC	Operation & Maintenance Center
OMT	Operation & Maintenance Terminal
PA	Power Amplifier
POI	Point of Interconnects
PSU	Power Supply Unit
RF	Radio Frequency
RFU	Radio Frequency Unit
RU	Remote Unit
SMA	Sub-Miniature "A" Connector
TX/RX	Transmit/Receive
UL	Uplink
VAC	Volts Alternating Current
VSWR	Voltage Standing Wave Ratio
WCDMA	Wideband Code Division MBDAItiple Access

0.5 SAFETY NOTICES AND ADMONISHMENTS

This document contains safety notices in accordance with appropriate standards. In the interests of conformity with the territory standards for the country concerned, the equivalent territorial admonishments are also shown.

Any installation, adjustment, maintenance and repair of the equipment must only be carried out by trained, authorized personnel. At all times, personnel must comply with any safety notices and instructions.

Specific hazards are indicated by symbol labels on or near the affected parts of the equipment. The labels conform to international standards, are triangular in shape, and are colored black on a yellow background. An informative text label may accompany the symbol label.

Hazard labeling is supplemented by safety notices in the appropriate equipment manual. These notices contain additional information on the nature of the hazard and may also specify precautions.

Warning Notices:

These draw the attention of personnel to hazards that may cause death or injury to the operator or others. Examples of use are cases of high voltage, laser emission, toxic substances, point of high temperature, etc.

WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

For compliance with the general/uncontrolled population RF exposure limits, each individual antenna used for this transmitter must be installed to provide a separation distance greater than 40cm or more from all persons during normal operation and must not be co-located with any other antenna for meeting RF exposure requirements.

Alert Notices:

These draw the attention of personnel to hazards that may cause damage to the equipment. An example of use is the case of static electricity hazard.

Caution notices may also be used in the handbook to draw attention to matters that do not constitute a risk of causing damage to the equipment but where there is a possibility of seriously impairing its performance, e.g. by mishandling or gross maladjustment. Warnings and Cautions within the main text do not incorporate labels and may be in shortened form.

The application antenna and RF cable are not provided. Since the antenna and RF cable are excluded, if it needs to use the antenna, the antenna gain should not exceed 10 dBi, the installation height of antenna for AWS 1710-1755 MHz band operations is limited to 10 meters above ground, for compliance with Section 27.50. And the RF cable should be complied 50 ohms.

End of Section

1 GENERAL INFORMATION

The mBDA Indoor Series Digital Band Selective Repeater (hereinafter called “mBDA Indoor Series”) is designed for indoor network. It can wireless transmit, three-way amplify BTS uplink and downlink signals and enlarge coverage range. Digital band selective technology effectively amplifies the desired BTS signals and provides superior out-of-band rejection, avoid cell interference and improve call quality.

The certified bands of FCC for this product as below and all of the bands can be chosen to be an combination flexibly.

Band	Downlink (DL)	Uplink (UL)	FCC ID
700MHz Upper C	746-757	776-787	PX8MBDA-200S
700MHz Lower ABC	728-746	698-716	
850MHz	869-894	824-849	
1900MHz	1930-1995	1850-1915	
2600MHz	2620-2690	2500-2570	
AWS	2110-2155	1710-1755	
EAWS	2110-2180	1710-1755	PX8MBDA-EAWS (Applying)
800MHz (ESMR)	862-869	817-824	PX8MBDA-800

Main Features

- It supports six wideband channels; each channel can turn off separately. Operation band is 3MHz-20MHz adjustable.
- High power bandwidth linear PA ensures signals no distortion amplification.
- The system gain is compensated automatically according to the temperature variation within the enclosure, which ensures stable operation under ambient temperature.
- Has off-line isolation testing, downlink VSWR alarm, downlink input filed intensity and output power testing function, which is convenient for installation and commissioning.
- Supports multi-band expansion, convenient for configuration and upgrade.
- Monitoring master unit software remote download function enables remote software upgrade.
- Local Operation and Maintenance Terminal (OMT): operating status and parameters can be set or monitored by OMT PC locally.
- Operation Maintenance Center (OMC): system working parameters and communication configuration can be set or inquired remotely through the build-in WCDMA modem. If alarm is generated, the equipment will dial up to OMC automatically.
- Build-in Li-ion battery ensures that alarm information can automatically report to OMC in case of equipment power failure.
- Designed for all weather outdoor installation – waterproof, damp-proof and omni-sealed.

The figure below shows the enclosure of the mBDA indoor series..



Figure 1:mBDA indoor series

NOTE: RF module is slot independent.

End of Section

2 EQUIPMENT DESCRIPTION

2.1 SYSTEM DIAGRAM

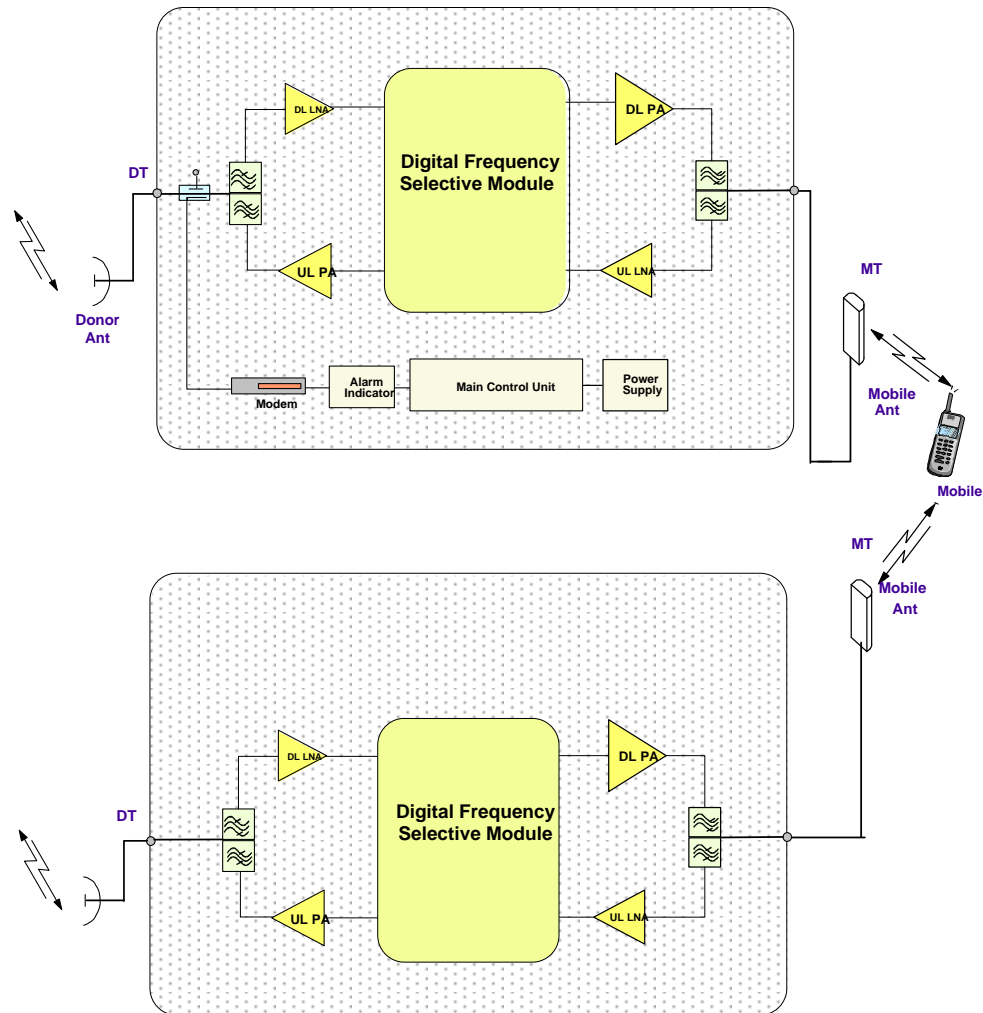


Figure 2: 2 Bands System Diagram for Example

In the downlink, the BTS signals are received by donor antenna of the repeater. After the duplexer, the signals are sent to the LNA module for pre-amplification and digital RF integrated module for digital filtering and frequency conversion. Then the DL signals will be sent to downlink PA to amplify power and filter via duplexer. After amplification, the signals are transmitted via the MT port to the service antenna.

In the uplink, the mobile signals are received by the service antenna. After the MT port integrated duplexer, the signals are sent to the LNA, integrated module for digital filtering, then to PA for power amplification and to duplexer. After that, the uplink signals are sent to the donor antenna for transmission back to the BTS.

2.2 EQUIPMENT LAYOUT

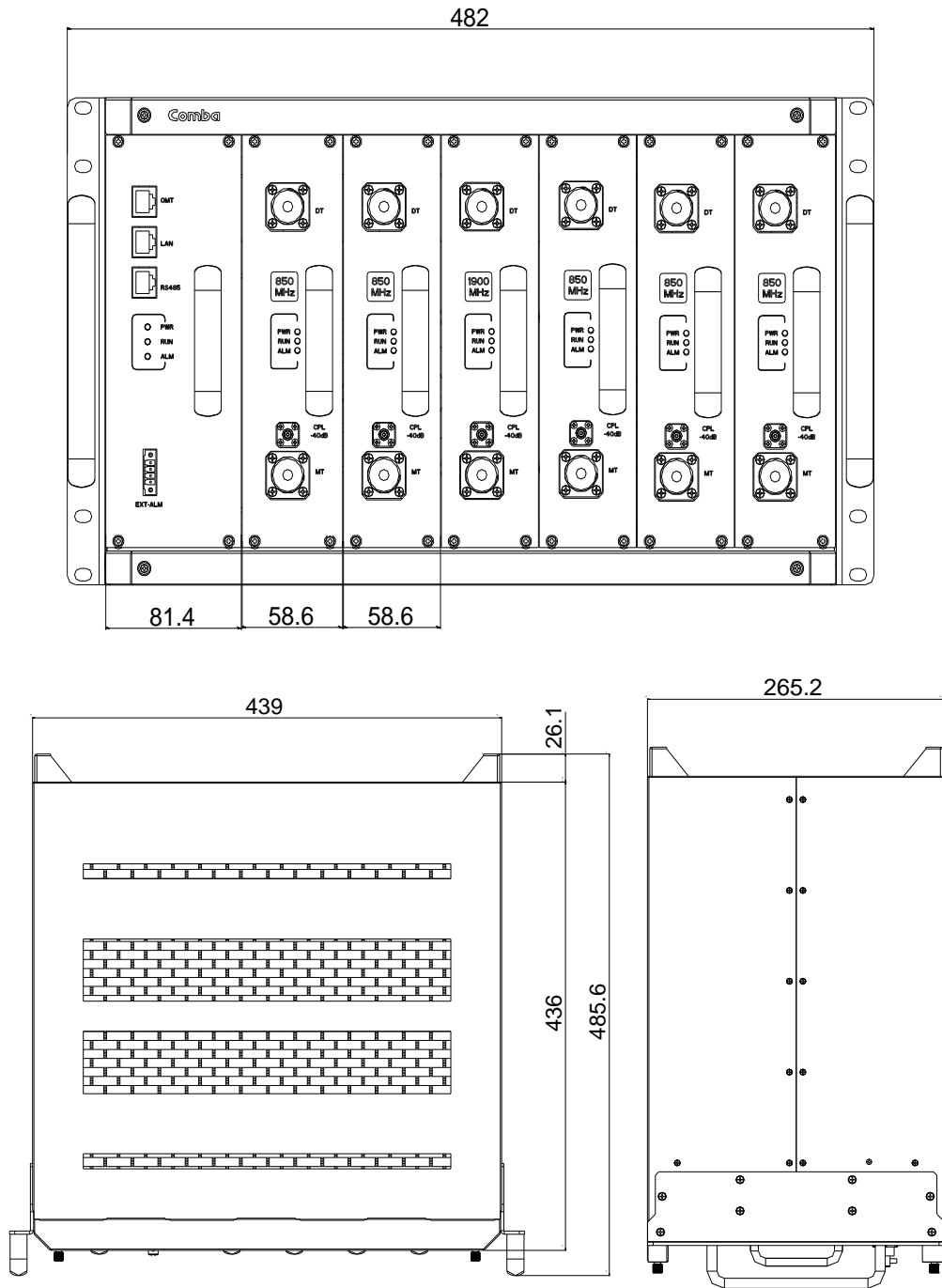


Figure 3: Layout of mBDA

2.3 EQUIPMENT CONSTITUTION


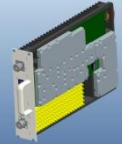
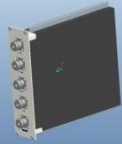
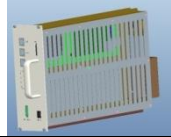


mBDA consists of the following parts:

Table 1: mBDA Components

Module	Description
mBDA-RACK	There are total 7 slots in the main chassis, where six slots for RF Units and Combiner Units, first slot is for Power & Monitoring Unit.
mBDA-PMU	Power & Monitoring Unit (PMU) converts the input voltage into stable DC to supply power for each RF module and provides monitor control.
mBDA-RFU	RF Unit processes UL/DL signal and amplifies the signal for coverage.

2.4 KIT OF PART

Table 2: KOP

Item	Qty	Image
Rack	1	
RF Unit (RFU) (Packing separately)	1~6	
Combiner Unit (CB) (Optional and Packaged separately)	0~2	
Power & Monitoring Unit (PMU) (Packing separately)	1	
Power Supply Cable (13 Feet 1 inch)	1	
Communication Cable	1	

End of Section

3 INSTALLATION

3.1 WARNINGS AND ALERTS

Radio Frequency Energies

There may be situations, particularly for workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

High Voltage

The equipment has been designed and constructed to prevent practicable danger, as far as reasonably possible. Any work activity on or near equipment involving installation, operation or maintenance must be free from danger, as far as reasonably possible.

Where there is a risk of damage to electrical systems involving adverse weather, extreme temperatures, wet, corrosive or dirty conditions, flammable or explosive atmospheres, the system must be suitably installed to prevent danger.

Protective Earthing

For the purpose of protecting individuals from electrical risk, the equipment provided must be safety in design and properly maintained and used.

Handling Precautions

This covers a range of activities including lifting, lowering, pushing, pulling, carrying, moving, holding or restraining an object or person. It also covers activities that require the use of force or effort, such as pulling a lever, or operating power tools.

Electrostatic Discharge (ESD)

Observe standard precautions for handling ESD-sensitive devices. Assume that all solid-state electronic devices are ESD-sensitive. Ensure the use of a grounded wrist strap or equivalent while working with ESD-sensitive devices. Transport, store, and handle ESD-sensitive devices in static-safe environments.

3.2 SITE PLANNING CONSIDERATIONS

3.2.1 SITE PLANNING

Site Considerations

There may be situations, particularly for workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

Installation Location

Mounting surface shall be capable of supporting the weight of the equipment.

In order to avoid electromagnetic interference, a proper mounting location must be selected to minimize interference from electromagnetic sources such as large electrical equipment.

Environmental

Humidity has an adverse effect on the reliability of the equipment. It is recommended to install the equipment in locations having stable temperature and unrestricted air-flow.

The installation location for the system should be well ventilated. The equipment has been designed to operate at the temperature range and humidity level as stated in the product specifications.

Powering

The power & monitoring unit (PMU) provides power to all modules within the equipment. Depending on the product variant, it is recommended that the PMU operates on a dedicated AC circuit breaker or fused circuit.

Grounding Requirement

Verify that the equipment has been well grounded. This includes antennas and all cables connected to the system. Ensure lightning protection for the antennas is properly grounded.

Cable Routing

Depending on equipment configuration, a variety of types of cables are connected to the equipment: coaxial cables, power cable, communication cable, and commissioning cable. Where applicable, ensure cables are properly routed and secured so that they are not damaged.

Manual Handling

During transportation and installation, take necessary handling precautions to avoid potential physical injury to the installation personnel and the equipment.

3.2.2 SYSTEM INSTALLATION CHECKLIST

- Working space available for installation and maintenance for each mounting arrangement. Ensure unrestricted airflow.
- Ensure earthing point is within reach of the ground wire. (2m; 6 ft. 10 in.).
- Ensure a power source is within reach of the power cord and the power source has sufficient capacity.
- Where appropriate, ensure unused RF connectors are terminated.
- Where appropriate, ensure unused optical fiber connectors are protected.
- Do not locate the equipment near large transformers or motors that may cause electromagnetic interference.
- Reduce signal loss in feeder cable by minimizing the length and number of RF connections.
- Ensure the equipment will be operated within the stated environment (refer to datasheet).
- Where appropriate, confirm available of suitably terminated grade of RF.
- Observe handling of all cables to prevent damage.

3.3 INSTALLATION PROCEDURES

3.3.1 GOODS INWARDS INSPECTION

mBDA was factory tested, inspected, packed, and delivered to the carrier with utmost care. Do not accept shipment from carrier which shows damage or shortage until the carrier's agent endorses a statement of the irregularity on the face of the carrier's receipt. Without documentary evidence, a claim cannot be processed.

Open and check each package against the packing list. For any shortage, contact Comba Telecom Systems. Do not remove items from packing materials until installation.

3.3.2 TOOLS

See Appendix A for a full list of tools required for installation and maintenance.

3.3.3 ASSEMBLING

mBDA consists of one Rack and three different modules including PMU ,RFUs and CBs (CB is optional). All the units are packed separately. Follow the steps below to assemble.



Figure 4: mBDA Screen

Note: PMU must be installed in the leftmost slot; RF Units are independent and can be installed in any of the remaining six slots.



Figure 5: mBDA with 4 RFU and Combiners Configuration (example)

PMU must be installed in the leftmost slot. When assembling an mBDA system with DT Combiner and MT Combiner modules, CBs and RFUs can be installed in any of the remaining six slots.

With typical configuration of quad band RFU plus two CB, we recommend inserting CBs and RFUs in the order as shown in Figure 2 to have a better internal cabling. Starting from the left, the mBDA rack should have PMU, DT Combiner (mBDA-CB-ABPK4ID1), the certified RFUs which can choose 700U MHz, 700L MHz, 800MHz (ESMR) , 850MHz, 1900MHz, 2600MHz, AWS and EAWS and MT Combiner (mBDA-CB-ABPK4ID2).

Step1: The rack with cover plates is shown in Figure 3. Please remove the cover plates before installing related modules.



Figure 6: mBDA Rack

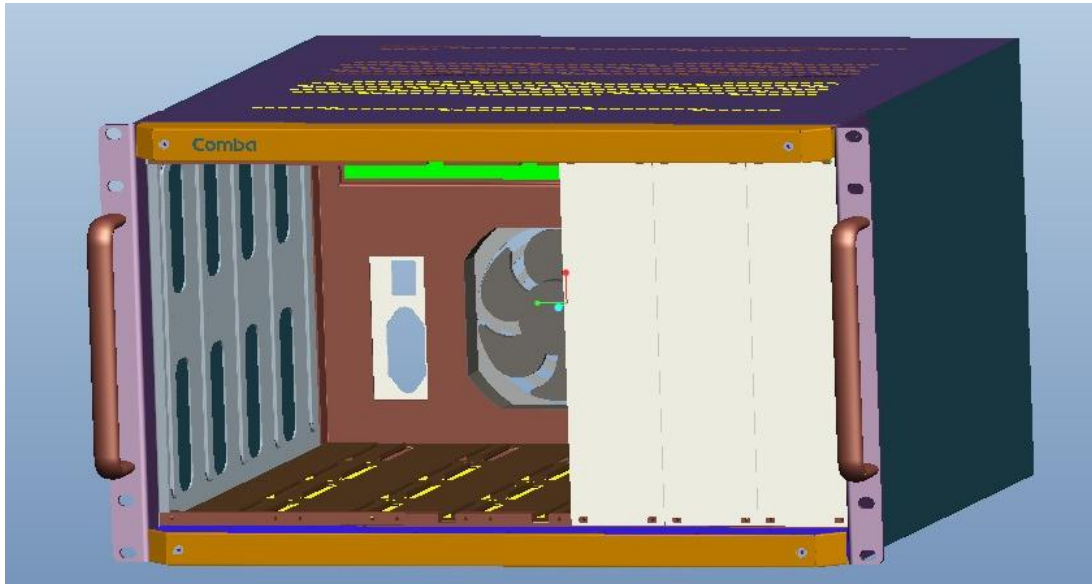


Figure 7: Remove Cover Plates

Step 2: PMU installation: Insert PMU and fasten the screws.

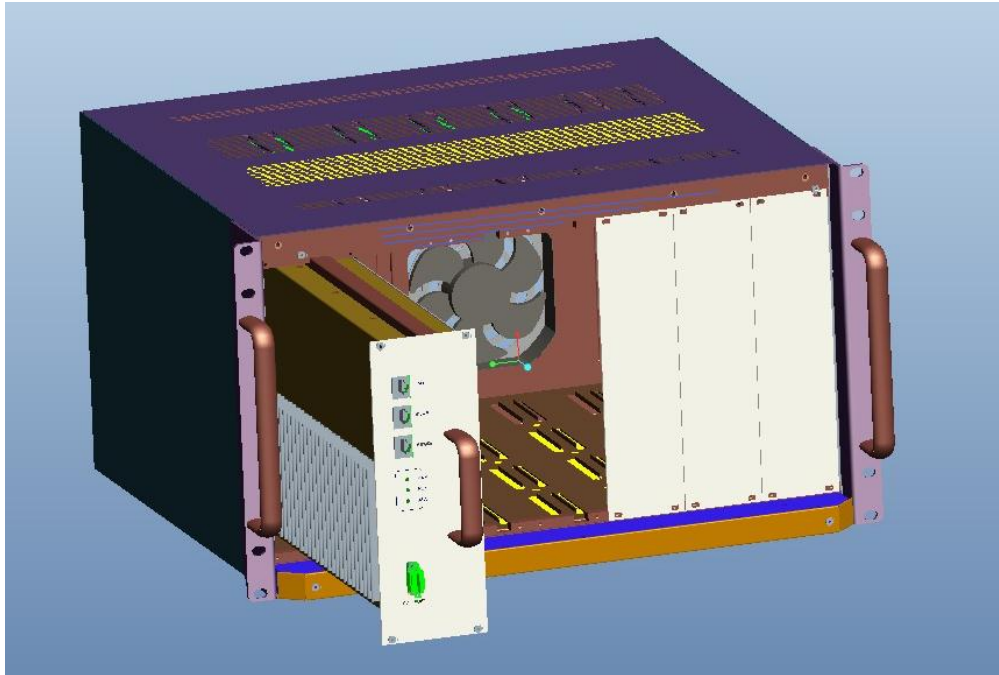


Figure 8: PMU Installation

Step 3: Combiner Installation: When Combiners are required, insert Combiners and fasten the screws (see below Figure)

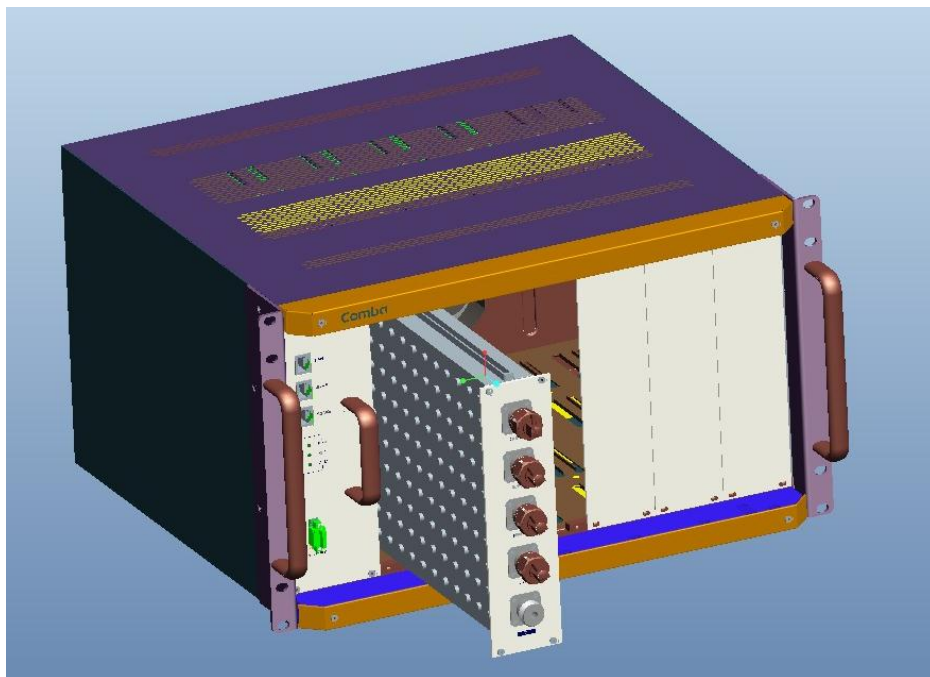


Figure 9: Combiner Installation

Step 4: RF Units installation: Insert RFUs into any slot and fasten the screws.

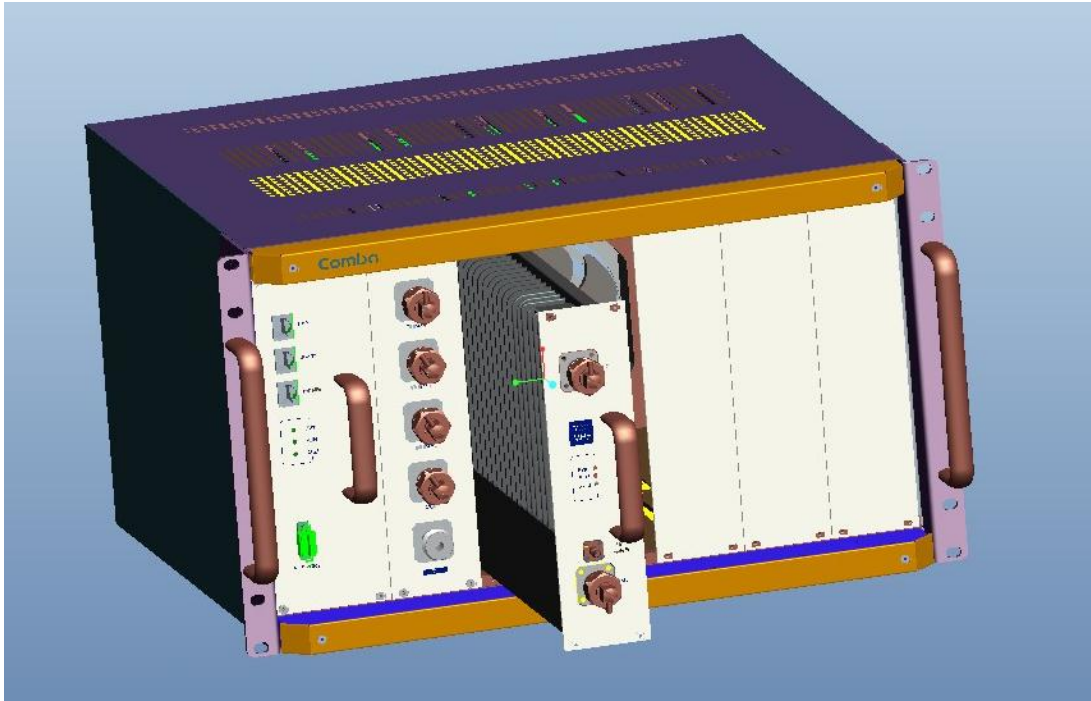


Figure 10: RF Unit Installation

Note: Make sure the DIP switch (located towards the rear of the RFU) is set to the ON position (see below Figure)

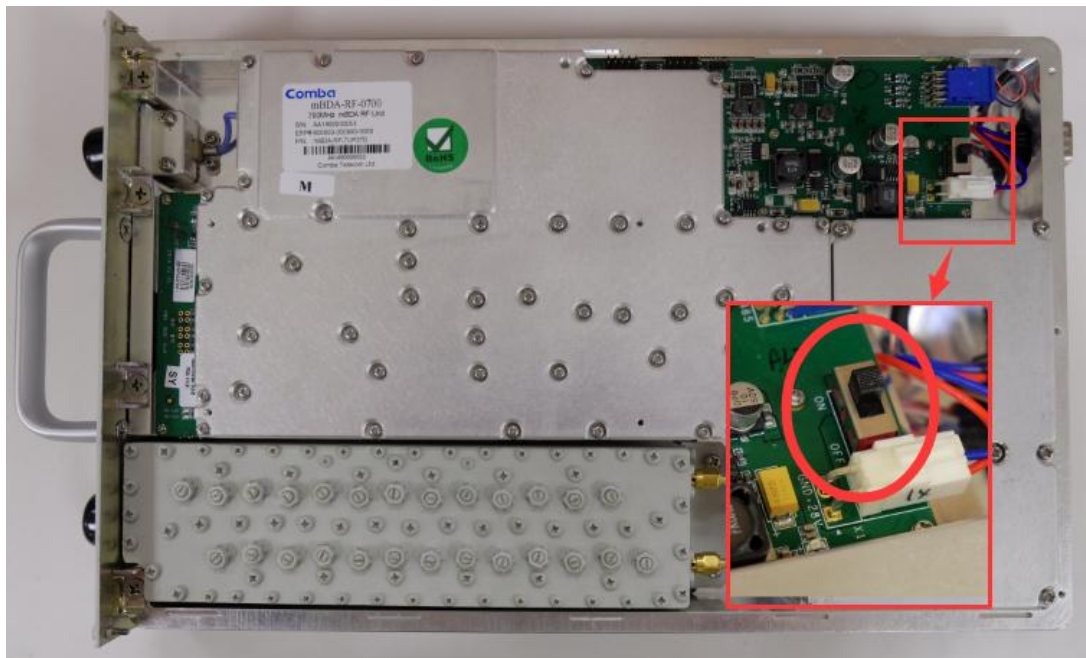


Figure 11: Completed mBDA with Six RFU Installation

Step 5: Finish Installation.

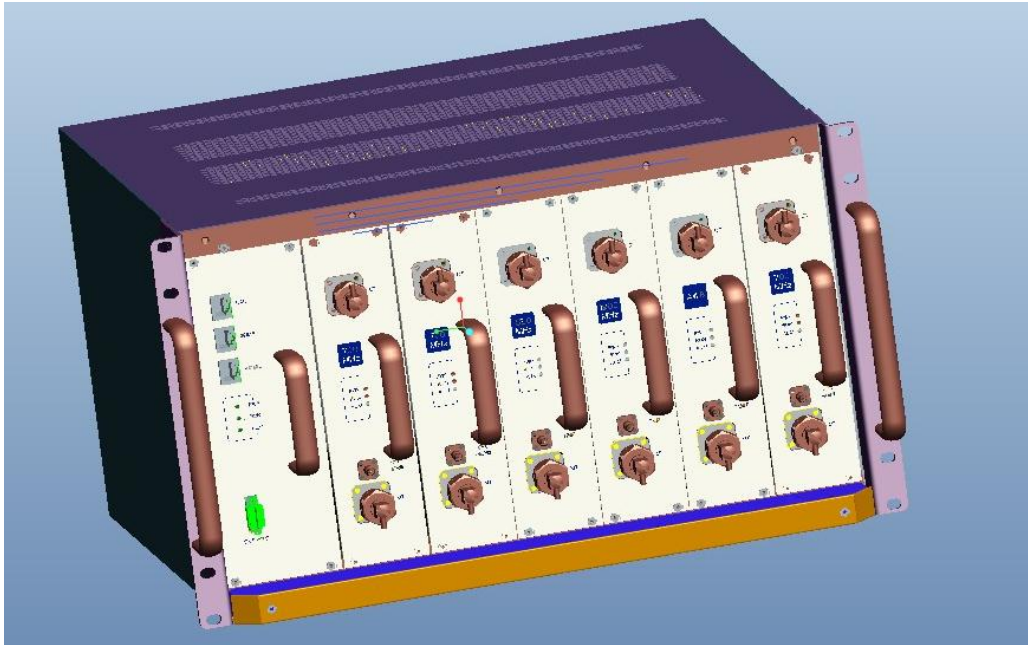


Figure 12: Completed mBDA with Six RFU Installation



Figure 13: Completed mBDA of Four RFU and Two Combiners Installation

3.3.4 mBDA IN NORMAL EQUIPMENT CABINET

mBDA is an indoor type device. It can be installed in normal equipment cabinet, the installation procedures are shown as below:

Step 1: Make sure the equipment cabinet is available with pallet, and the pallet is fixed steadily (Equipment Cabinet nuts, screws and pallet are not provided.). Use cabinet nuts, screws and pallet as recommended by rack manufacturer.

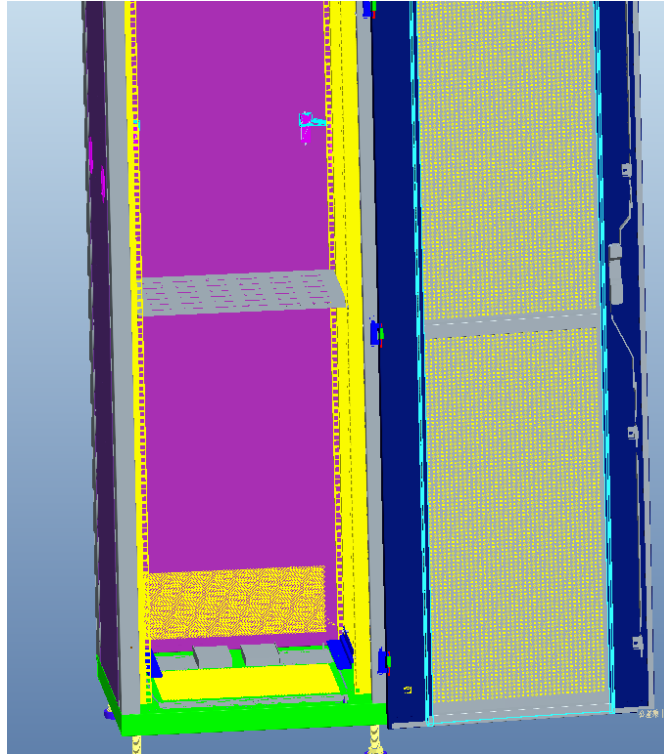


Figure 14: Equipment Cabinet with Pallet

Step 2: Install the mBDA on to the pallet.

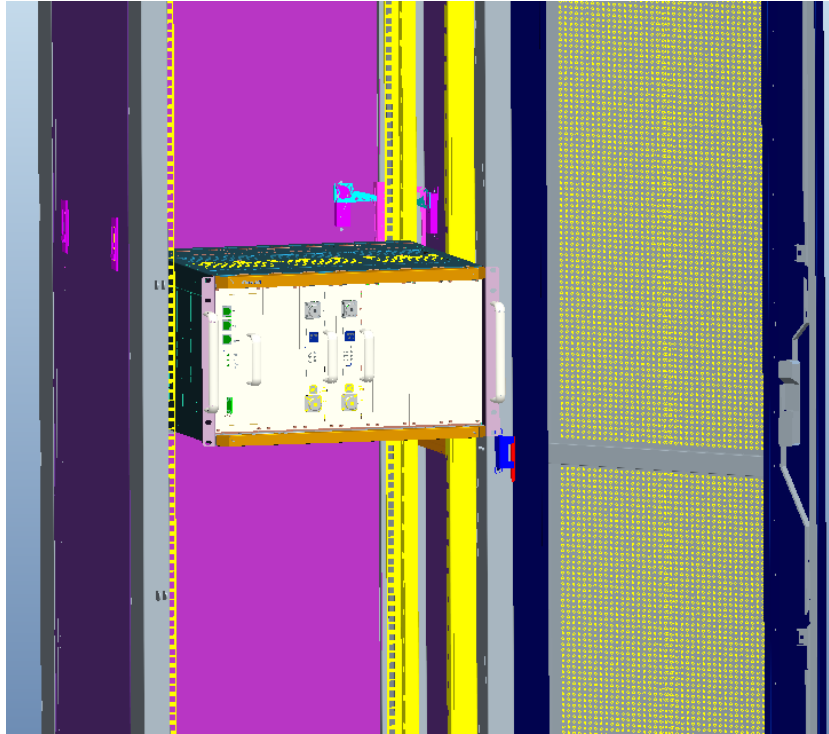


Figure 15: mBDA Installation

Step 3: Attach the mBDA onto the cabinet with the recommended rack screws.

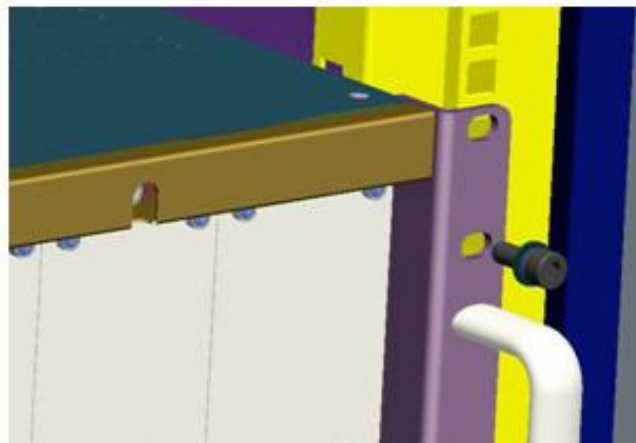


Figure 16: Secure the Screws

Step 4: Finish installation.

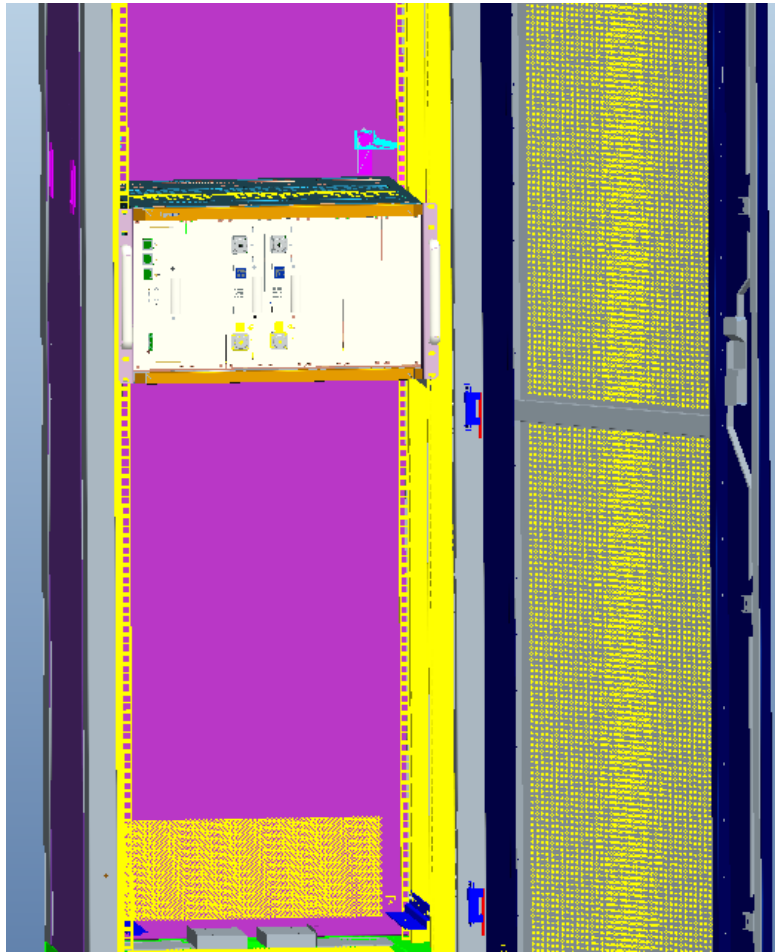


Figure 17: Finish Installaiton

3.3.5 mBDA IN 19" RACK MOUNTING

mBDA can also be installed in 19" rack mounting, the installation procedures are shown as below:

Step 1: Install right angle bracket and left angle bracket on back of the mounting rack (Rack nuts and screws are not provided). Use rack nuts and screws as recommended by the rack manufacturer.

Step 2: Slide the mBDA-EAWS on to the angle brackets and confirm it is level.

Step 3: Attach the mBDA-EAWS onto the rack with the recommended rack screws.

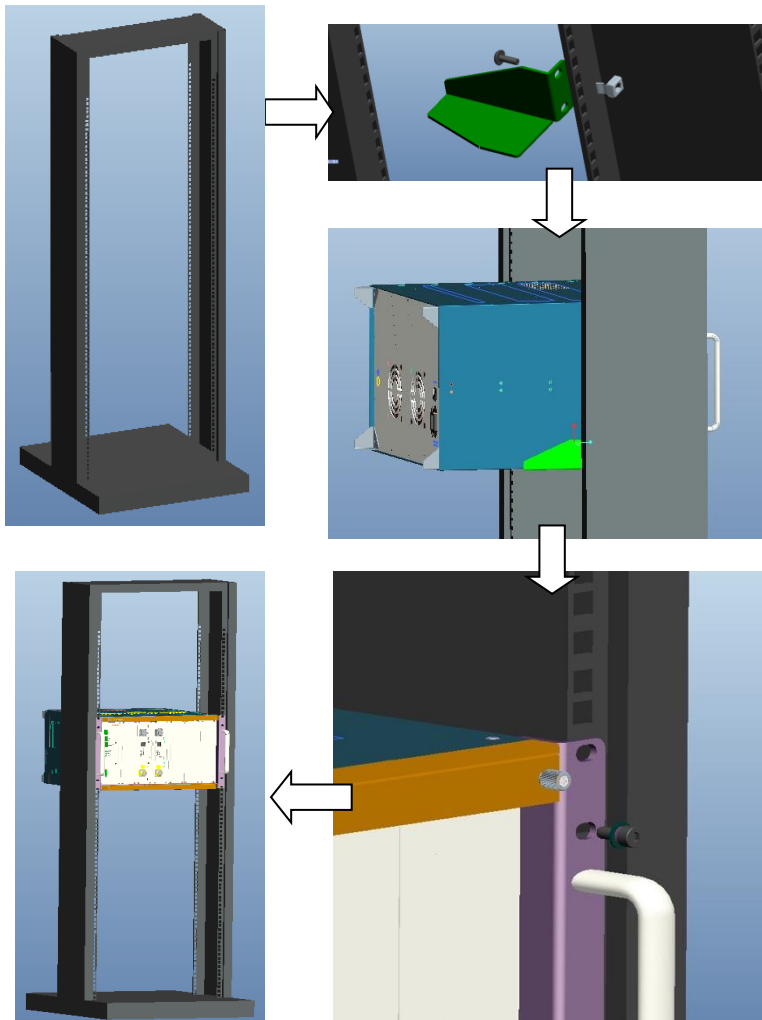


Figure 18: Rack Mounting

3.4 EQUIPMENT CONNECTORS

The figure below presents the connectors of mBDA.



Figure 19: mBDA Front Panel Connectors



Figure 20: mBDA Rear Panel Connectors

Table 3: mBDA Connections

Identifier	Functional Description
1 & 3. LED indicator	LED indicator. Refer to Table 6 for more detailed information.
2. OMT/LAN/RS485	OMT port is for local commissioning; LAN port is for remote connection; RS485 is for extension connection when adding extended equipment.
4.EXT_ALM	External alarm connector with 4 pins. Refer to Table 4 for more detailed information.
5. DT Combiner	Donor signal input port and split relative signal to RF modules. Mini DIN female.
6. DT	RF input port, connects to DT combiner, Mini DIN female.
7. MT Combiner	Combined signals output port, connects to cover system, signals are from relative RF modules. Mini DIN female.
8.CPL	Output coupler port, -40dB, QMA female, DL only.
9.MT	RF output port, Mini DIN female, connect to Service Antenna.
10. ⊕	Grounding connector.
11. FAN	Fan inside
12. POWER	Power switch.
13. AC100~240V	AC power supply connector.

Step 1: a) For systems without CB modules installed

- Connect RFU module's DT port to an external combiner or donor antenna.
- Connect RFU module's MT port to an external combiner or service antenna.

b) For systems with CB modules installed

- Connect donor antenna to DT port of the DT Combiner.
- Connect each RFU module's DT port to their respective port on the DT Combiner.
- Connect each RFU module's MT port to their respective port on the MT Combiner.
- Connect the service antenna to MT port of the MT Combiner.

Step 2: Connect the power cable to the power supply port (100-240VAC, 3.5Amp maximum).

3.5 EQUIPMENT CONNECTION

3.5.1 GROUNDING CONNECTION

⚠ WARNING!

This unit must always be grounded. Consult an appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Do not connect power before grounding.

3.5.2 mBDA GROUNDING CONNECTION

Step 1: Connect the GND cable to the GND connector and the building EARTH. Recommended GND cable size is # 12 AWG.

Step 2: Ensure the GND cable is connected to building GND.

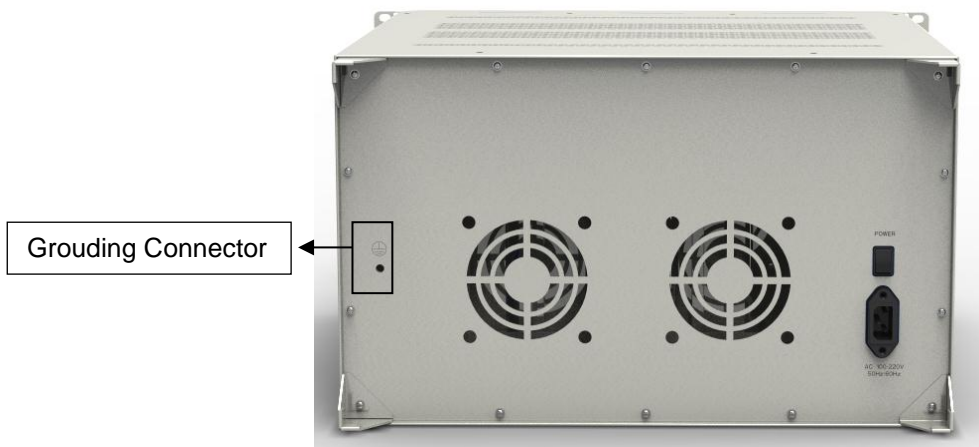


Figure 21: mBDA Grounding (mBDA Rear Panel)

3.5.3 mBDA CONNECTIONS

Step1: Connect the mBDA DT port to the RF Source downlink, and then connect mBDA MT port with RF Source uplink.

Step 2: Connect the power cable to the power supply port (100-240VAC, 1Amp maximum).

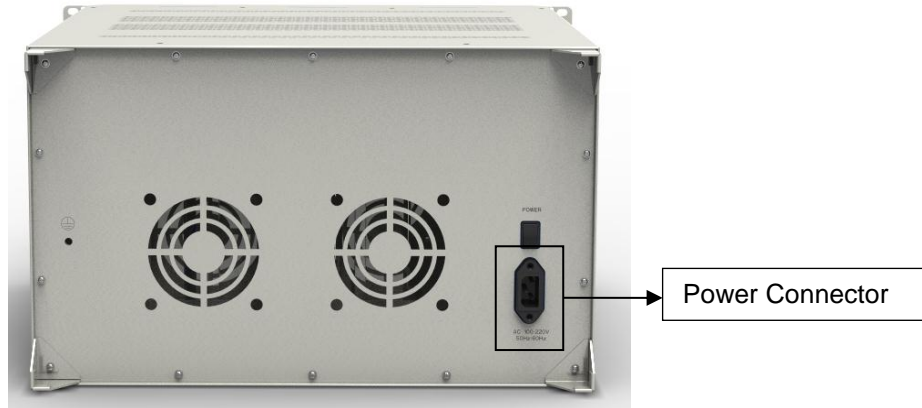


Figure 22: mBDA Power Connection (Rear Panel)

3.5.4 EXTERNAL ALARM CONNECTION

For EXT-ALM, this is a 4-pin connector. The following figure and table show the pin allocation and definition. Pin numbering are shown looking-into the connector on the enclosure.

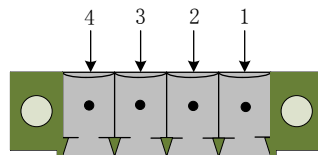


Figure 23: Pins Allocation for “EXT_ALM” Port for mBDA

Table 4: Pin Definition of “EXT_ALM” Port for mBDA

Pin number	1	2	3	4
Alarm definition	EXT. Alarm 1	GND	EXT. Alarm 2	GND

Note: Users need to configure Ext Alm 1~2 on WEB GUI to realize External Alarm (Refer to Chapter 5).

3.5.5 CONNECT TO PC

The local commissioning and management for mBDA is achieved through connecting to the WEB based GUI.

Connect mBDA to PC

Connect mBDA “OMT” port (RJ45) to the RJ45 port of PC with supplied Ethernet cable to achieve local monitoring and management.

End of Section

4 COMMISSIONING

4.1 PRE-COMMISSIONING TASKS

After equipment installation, perform the following steps before equipment powering and commissioning, check that the expected voltage, current, and power levels do not violate any ratings. Double check all connections including ground before applying power. Do not manipulate circuits or make changes when power is applied:

- Visually inspect the power connection within the equipment. Ensure that all cables are correctly and securely connected, including power cables, grounding wires and RF cables.
- Check grounding connection and verify that the ground resistance is less than 5Ω.
- Connect the equipment to the PC.
- Power on equipment.
- Monitor the initialization of the equipment through the LEDs on the panel. Refer to detailed LEDs information in the next section.

4.2 LED INDICATORS

Diagnostic LEDs are located on the equipment front panel; each indicates the status of a particular function:

Table 5: LED Indications

LED Indicator	Normal Status	Indication
PWR	Steady green	Power indicator. If LED is off, it indicates the system has no power.
RUN	Flashing green (1 time/sec)	mBDA operation indicator. After initialization (1~2 minutes), the LED should flash at once per sec. (When upgrade firmware, LED will flash rapidly)
ALM	OFF	Alarm indicator. If LED is RED, there is an alarm.

4.3 COMMISSIONING PROCEDURE

System commissioning can commence after the monitoring system has completed self initialization. The commissioning procedure is shown below:

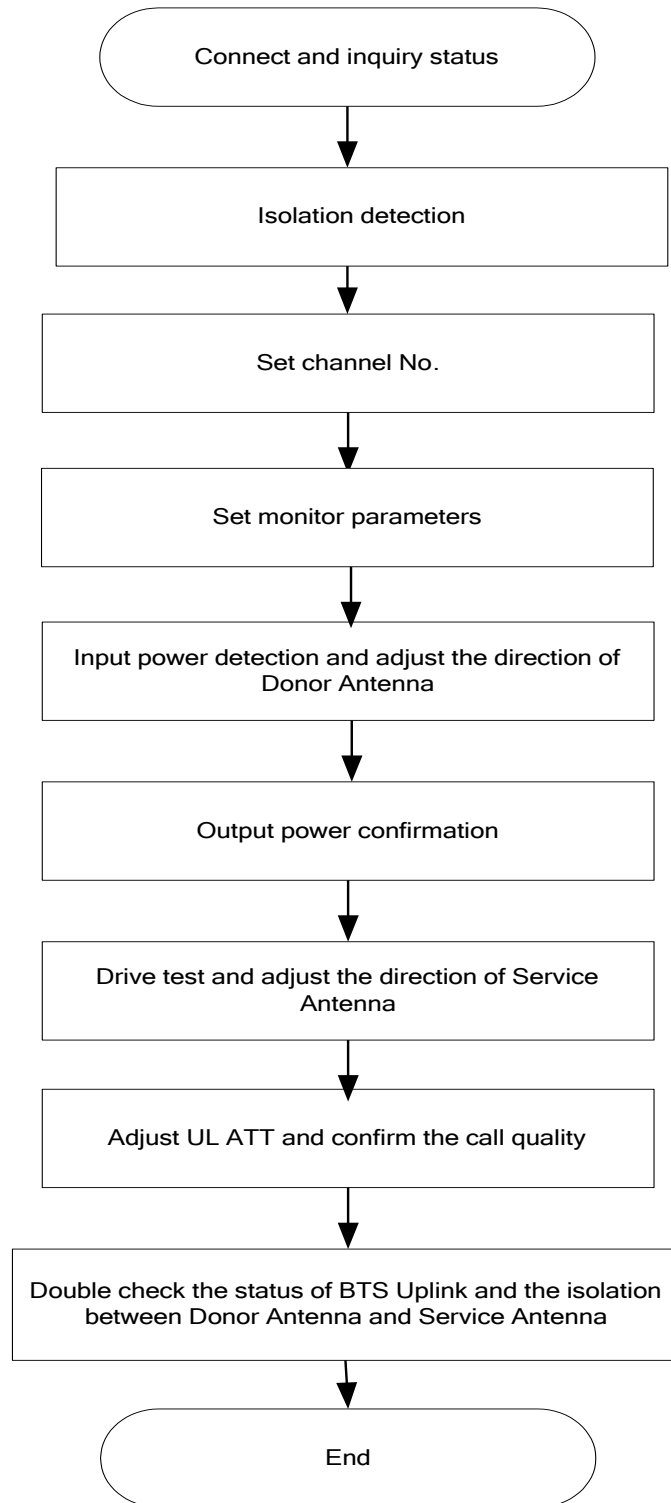


Figure 24: Commissioning Flow Chart

Table 6: Commissioning Procedure

Commissioning Tasks	Observation
1. On-line and Inquiry status	<ul style="list-style-type: none"> ● Activate the OMT Main window. The system Initialization will completed in about 2 minutes. ● Click “Connect” button to enquire the repeater’s status. Proceed if there is no alarm; else check the failure and attend to the alarm.
2. Isolation detection	<ul style="list-style-type: none"> ● Detect isolation of service antenna and donor antenna.
3. Set Channel No.	<ul style="list-style-type: none"> ● Keep RF switch ON and set the channel number of the repeater’s operating frequency.
4. Adjust Downlink Output Power and align donor antenna	<ul style="list-style-type: none"> ● Observe DL input power from measured value. Align the direction of donor antenna until the DL input power reading is maximized. ● Note: To ensure that the measured DL input power is accurate, one should set the DL ATT to “0” before performing the check.
5. Configure [Equipment ID]	<ul style="list-style-type: none"> ● Go to [Properties Info] and set [Equipment ID].
6. Comm. Config	<ul style="list-style-type: none"> ● Enable the power supply by selecting “On” in [RF] -> [Switch]; go to [Properties Info.] -> [Comm. Config.] and set OMC Phones No. , the service No. of SMSC, Report Mode.
7. Select Monitoring Parameters	<ul style="list-style-type: none"> ● Select the equipment controlled and monitored parameters. ● If the external devices are connected to the equipment for management, please enable in the [External Alarm Info.] Interface.
8. Test coverage area field intensity and adjust service antenna.	<ul style="list-style-type: none"> ● Use test-handset to verify field intensity within the coverage area. If needed, realign the service antenna to achieve the desired coverage. ● Note: If during operation, the equipment gain could not be set to maximum or the output power is not high enough due to insufficient donor and service antennas isolation, then the antennas’ position should be changed to increase isolation. If the output power is too high and ALC is activated, then adjust the DL ATT to achieve optimal DL Gain.
9. Verify UL gain and ensure test call produces good voice quality and there is no interfering BTS	<ul style="list-style-type: none"> ● Adjust UL gain and perform test calls. Typically, the UL gain is set around 5dB less than DL gain. Perform test calls in the coverage area while adjusting UL gain if required. ● Note: If the repeater is near the BTS and the test call performance is poor, this may be due to UL noise interference to the BTS. Users can calculate and determine if the repeater UL noise will interfere with the BTS. ● Verify again that there is no unacceptable interference to BTS.

End of Section

5 WEB GUI

mBDA can be monitored and controlled by WEB GUI, follow below contents to achieve system parameter setting and commissioning.

5.1 WEB GUI CONNECTION

Step 1: Connect PMU OMT port to PC RJ45 port with the supplied Ethernet cable to set up a physical connection.

Step 2: Open browser (browser IE7.0, IE8.0, Chrome or Firefox, suggest display resolution is 1024x768), input Web GUI **IP address: 192.168.8.101**, click [Enter].

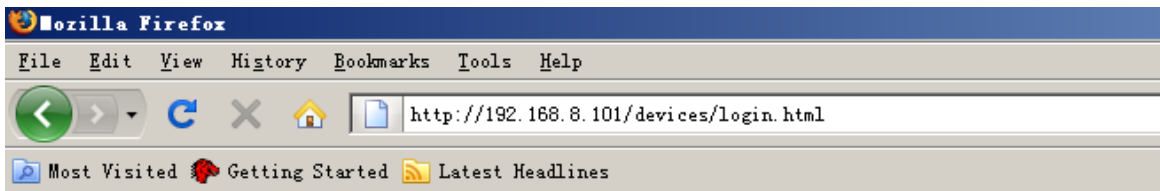


Figure 25: Input IP Address

NOTE: DHCP and DNS are also available to login Web GUI. The domain name is: www.combaomt.com. Input **User Name: admin**; **Password** (default password: **admin**). Click [Log in].

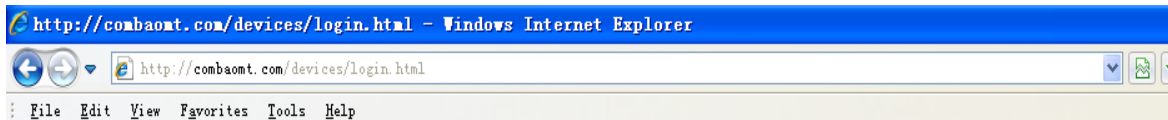


Figure 26: Input Domain Name

A screenshot of the Comba System Management Platform login page. The page has a light blue background. At the top left, the "Comba" logo is displayed in blue. Below the logo, the text "System Management Platform" is centered. In the center of the page, there are two input fields: "username: admin" and "password: [masked]". Below the password field is a "Log In" button.

Figure 27: Input User Name and Password

5.2 WEB GUI INTRODUCTION

After log in, the Web GUI main screen will appear. We take dual bands products for example.

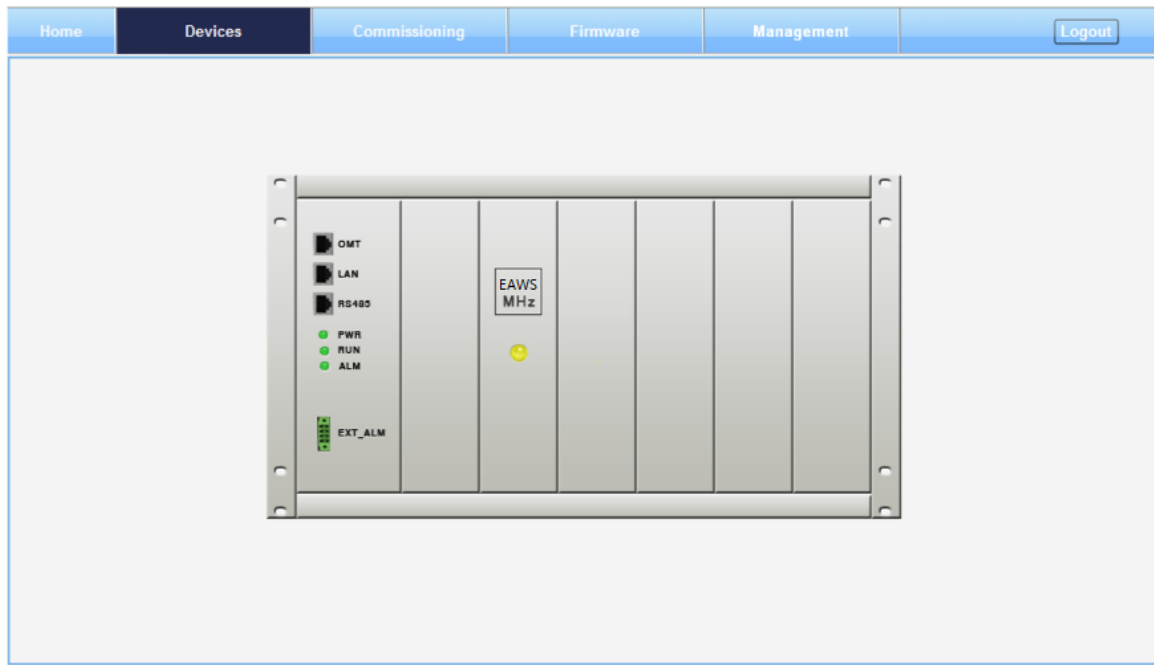


Figure 28: Web GUI Main Screen

On Comba Web GUI Home Screen, there are four Menu bars: **[Devices]**, **[Commissioning]**, **[Firmware]** and **[Management]**.

5.2.1 [DEVICES]

The [Devices] Screen shows the actual active modules of mBDA.

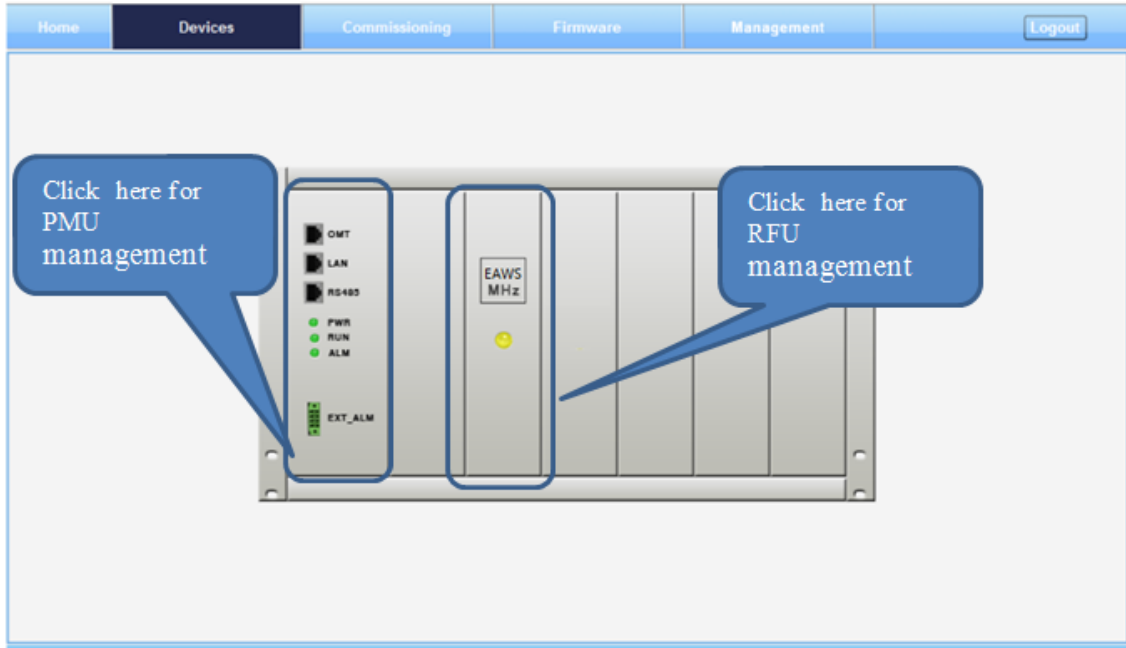


Figure 29: [Devices] Screen

PMU Main Management Screen

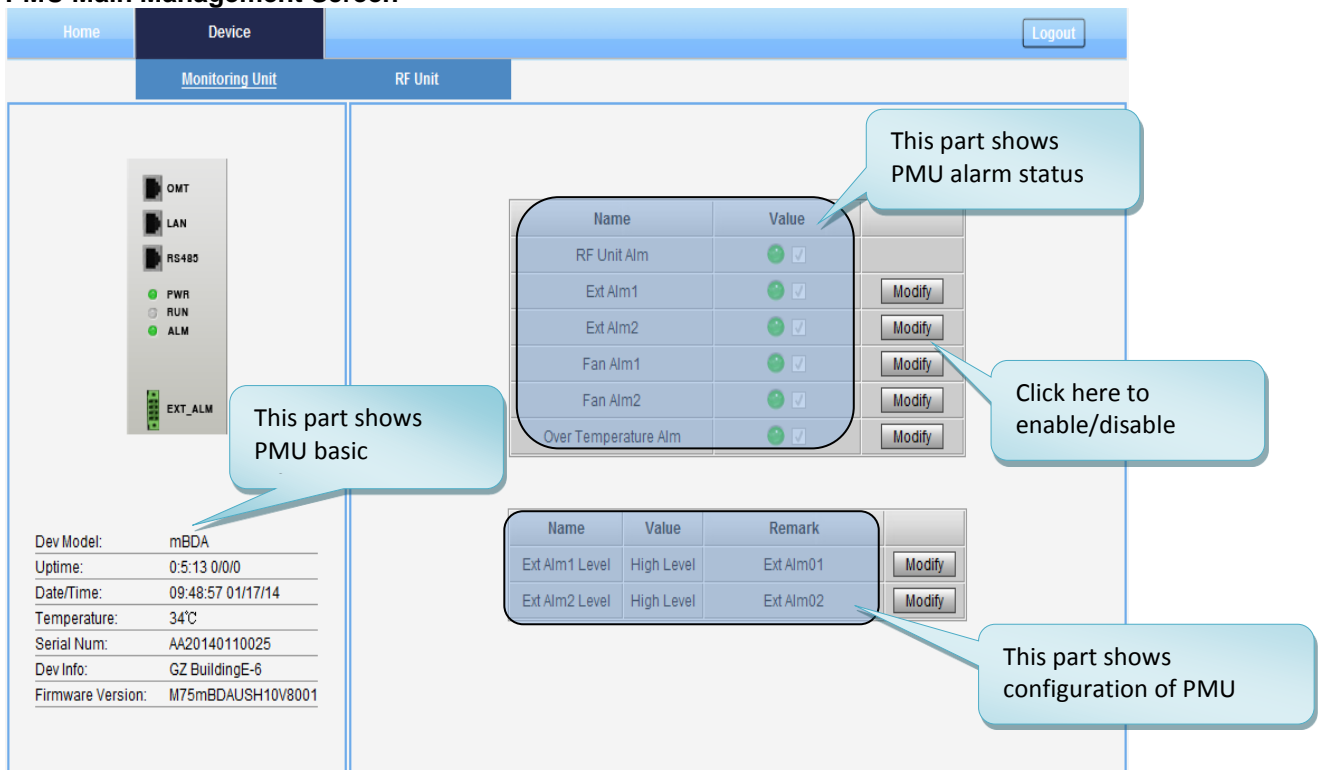


Figure 30: Power & Monitoring Unit

RF Unit Management Screen

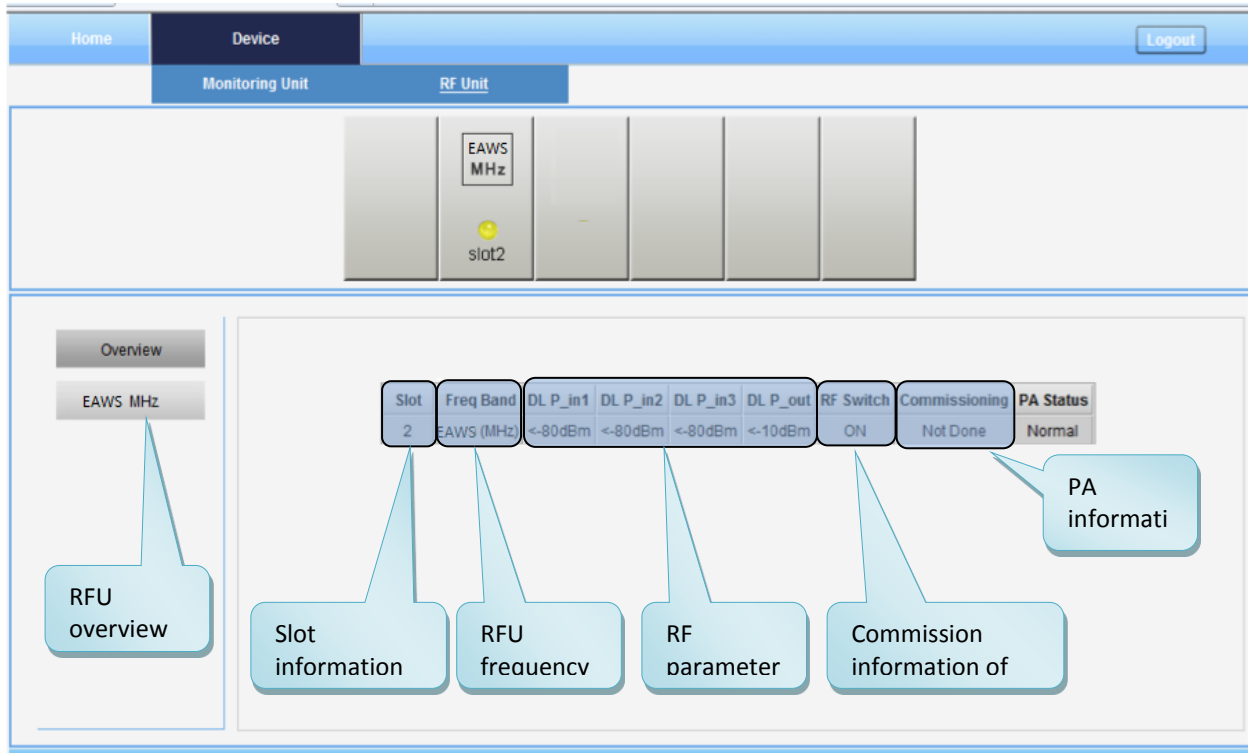


Figure 31: RF Unit

NOTE: There are three statuses for PA Service: **Normal**, **Recovery** and **Shutdown**. If PA output power or reflected power exceeds the threshold, software will trigger Recovery:

- It will reset PA and then re-detect the PA output power and reflected power, if they are normal, the PA Service Status will turn to **Normal**, if PA output power or reflected power is still over the threshold, PA Service Status will turn to **Recovery** again.
- If PA output power or reflected power is still over the threshold after six times of PA Recovery, PA Service status will be **Shutdown** which will need to be reset manually. Reset at Management > PA Reset.

Sub Band	Network	Freq Low	Freq High	DL P_in	Switch	UL ATT	DL ATT	Over DL P_in Alm	
1	LTE	1710MHz	1755MHz	<-80dBm	ON	0dB	0dB	● <input checked="" type="checkbox"/>	Modify
2	LTE	1710MHz	1755MHz	<-80dBm	ON	3dB	3dB	● <input checked="" type="checkbox"/>	Modify
3	LTE	1710MHz	1755MHz	<-80dBm	ON	3dB	3dB	● <input checked="" type="checkbox"/>	Modify

Name	Value	
RF Switch	ON	Modify
PLL Alm	● <input checked="" type="checkbox"/>	Modify
LNA Alm	● <input checked="" type="checkbox"/>	Modify
DL PA Alm	● <input checked="" type="checkbox"/>	Modify
VSWR Alm	● <input checked="" type="checkbox"/>	Modify
Protection Shut Alm	● <input checked="" type="checkbox"/>	Modify

Figure 32: RF Unit Detail Information

5.2.2 [COMMISSIONING]

A work flow of the commissioning process is shown on [Commissioning] Screen. Click the [Start] button, the software will guide you through the commissioning step by step. For details, please refer to chapter 5.3.

Figure 33: [Commissioning] Screen

5.2.3 [FIRMWARE]

There are two functions on the [Firmware] bar: [upgrade] and [swap]. [Upgrade] is used to upgrade software, and [Swap] is to replace current firmware version to the previous one.

Follow steps shown in below figure to upgrade firmware.

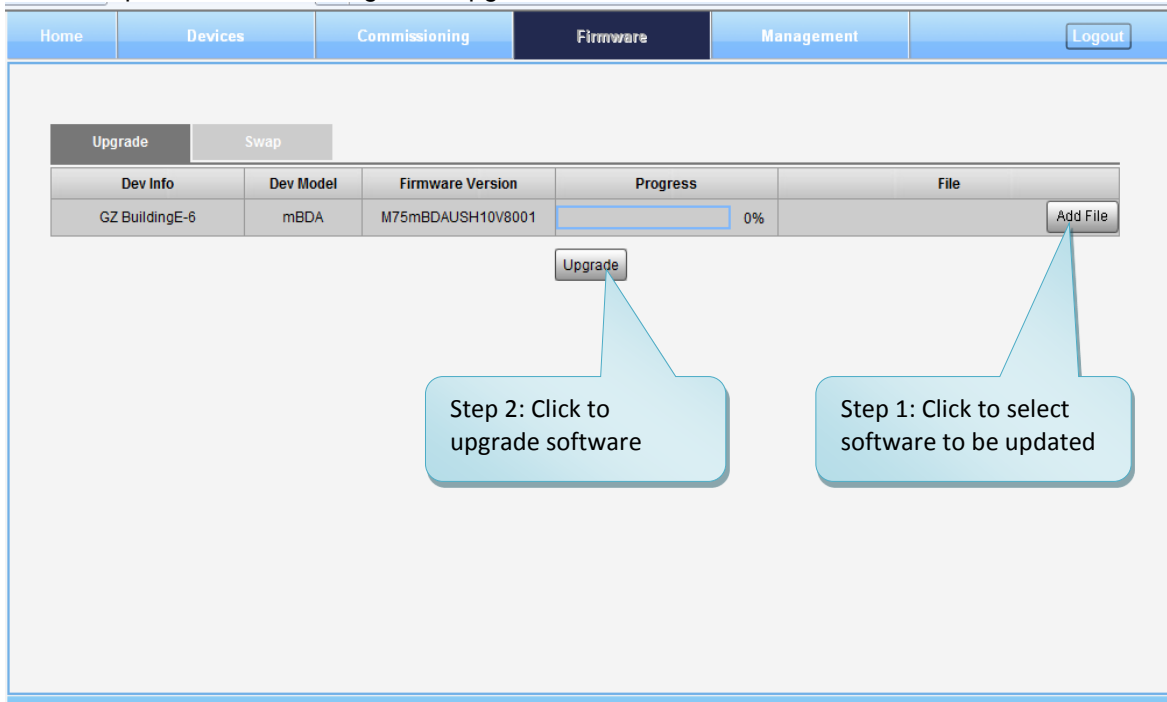


Figure 34: [Firmware] Screen – Upgrade

Step 4: After clicking , a window will pop up and click .

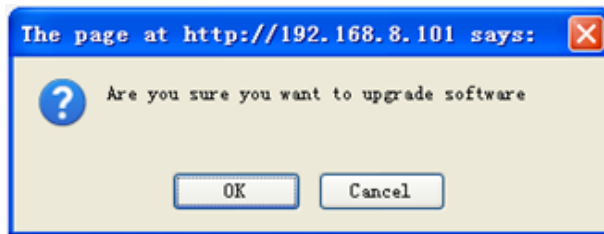


Figure 35: [Firmware] Screen – Pop-up Window 1

Step 5: Wait for 2~4 minutes while mBDA is being reset. Click to continue.

Step 6: Clear browsing history and cookies from browser.

NOTE: For PMU software upgrade, users need to re-login Web GUI after reset is done.

Follow steps shown in below figure to Swap firmware.

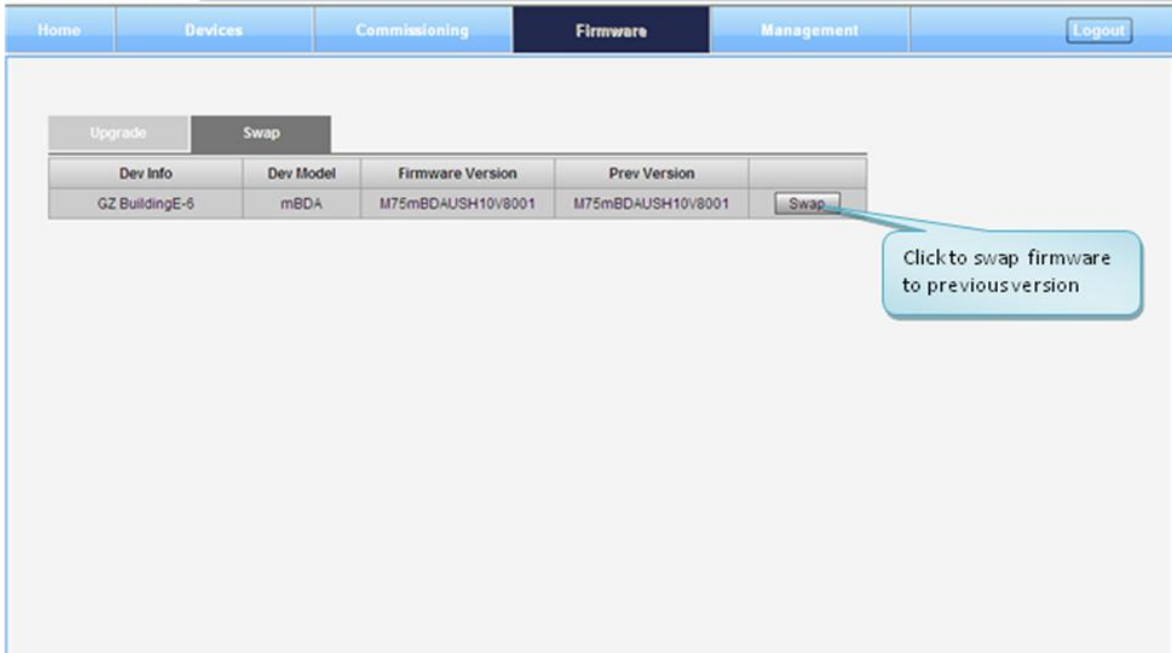


Figure 36: [Firmware] Screen - Swap

5.2.4 [MANAGEMENT]

Other parameters can be configured on [Management] Screen.

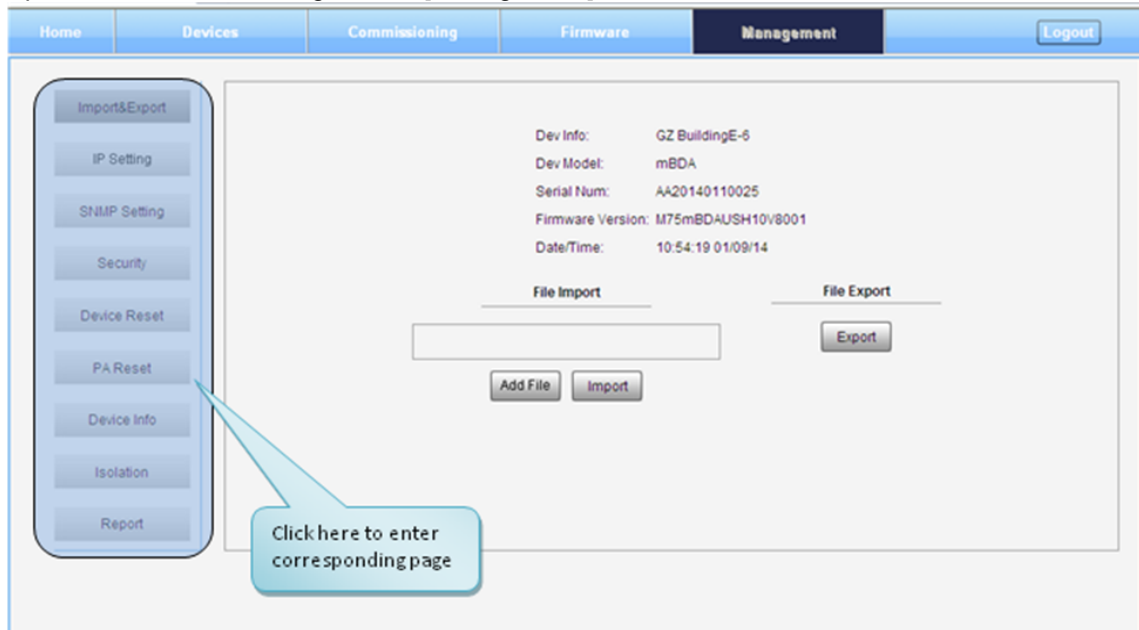


Figure 37: [Management] Screen

There are nine function bars list in the left side of the [Mangement] Screen. Below figures are the introduction of each function bar.

➤ **Inport&Export**

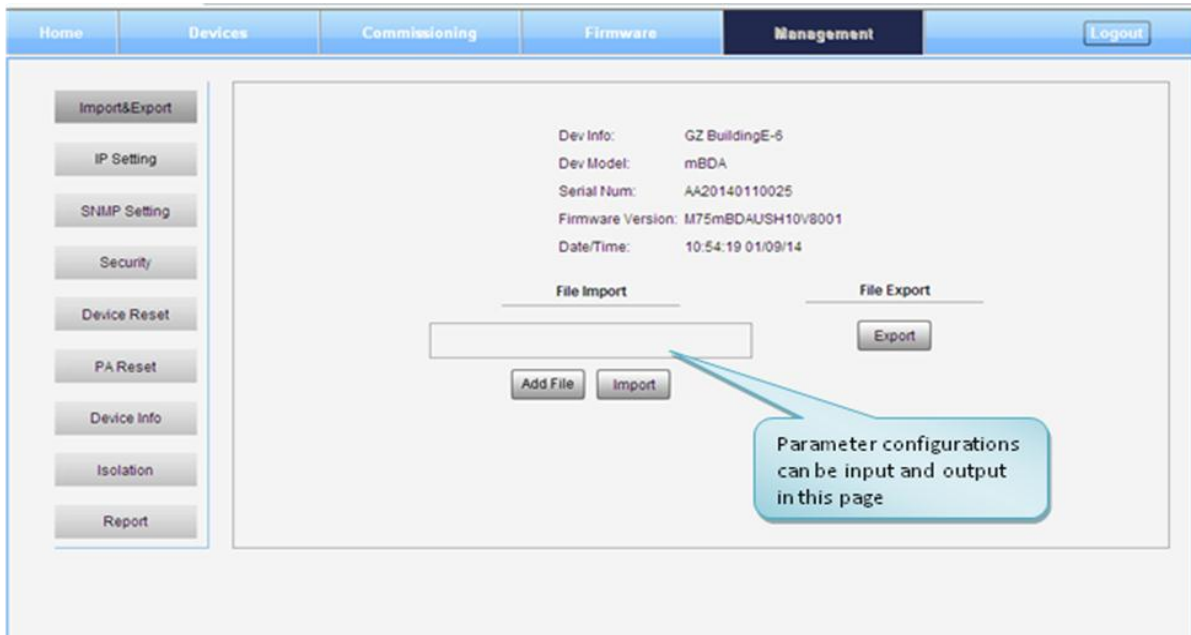


Figure 38: Management – Import&Export

The parameters that can be import/export as below: sub band, alarm enable, ATT value, RF switch, DL output power and so on.

Import and Export can help users quickly configure mBDA parameters. For example, if one mBDA finished configuration, users can export its parameters and save as a file in PC, and then import this file to other mBDA to fast finish the device parameter setting.

➤ **IP Setting**

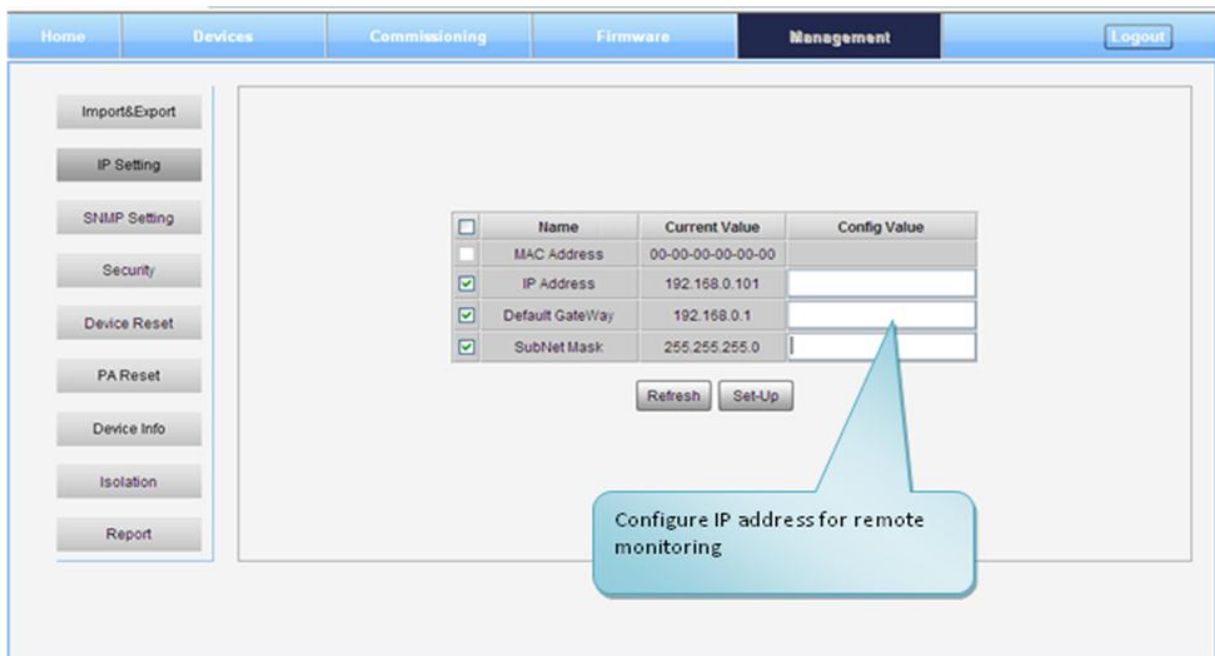


Figure 39: Management – IP Setting

Note: For remote monitoring, the IP Address must be set correctly according to the location IP of remote connection. If more than one equipment is connected to the public network through the same router, the router's local IP **CANNOT** be set as 192.168.8.*.

➤ **SNMP Setting**

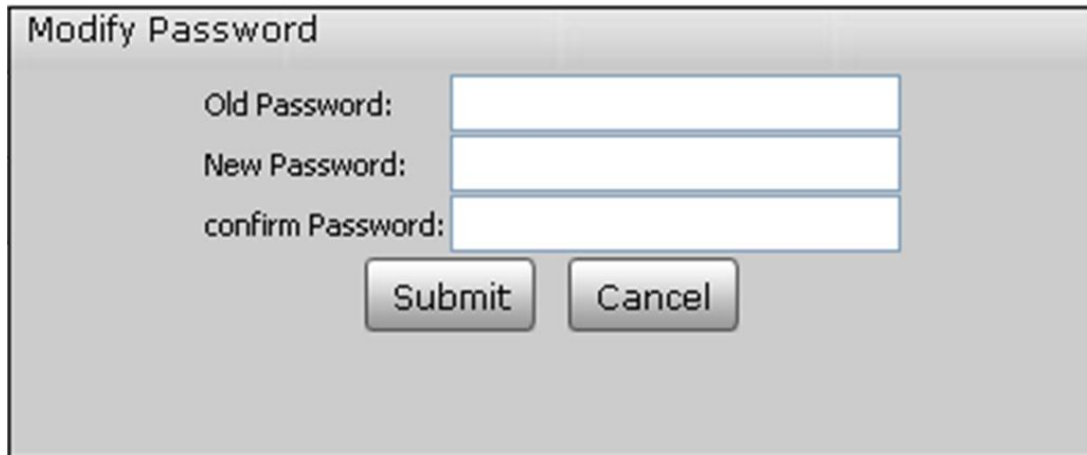
<input type="checkbox"/>	Name	Current Value	Config Value
<input type="checkbox"/>	Trap Des: IP1	192.168.8.100	<input type="text"/>
<input type="checkbox"/>	Trap Des: IP2	4.252.80.175	<input type="text"/>
<input type="checkbox"/>	Trap Des: IP3	1.2.3.4	<input type="text"/>
<input type="checkbox"/>	Port Num	161	<input type="text"/>
<input type="checkbox"/>	Read Community	public	<input type="text"/>
<input type="checkbox"/>	Write Community	private	<input type="text"/>
<input type="checkbox"/>	User Name	admin	<input type="text"/>
<input type="checkbox"/>	User Pwd	0123456789	<input type="text"/>
<input type="checkbox"/>	Encry Algorithm	NONE	NONE <input type="text"/>
<input type="checkbox"/>	Version	v2c	v2c <input type="text"/>
<input type="checkbox"/>	Authentication Algorithm	NONE	NONE <input type="text"/>
<input type="checkbox"/>	Authentication Pwd	12345678	<input type="text"/>

Figure 40: Management – SNMP Setting

➤ **Security**

Figure 41: Management – Security

Click , [Modify Password] window will pop-up.



Modify Password

Old Password:

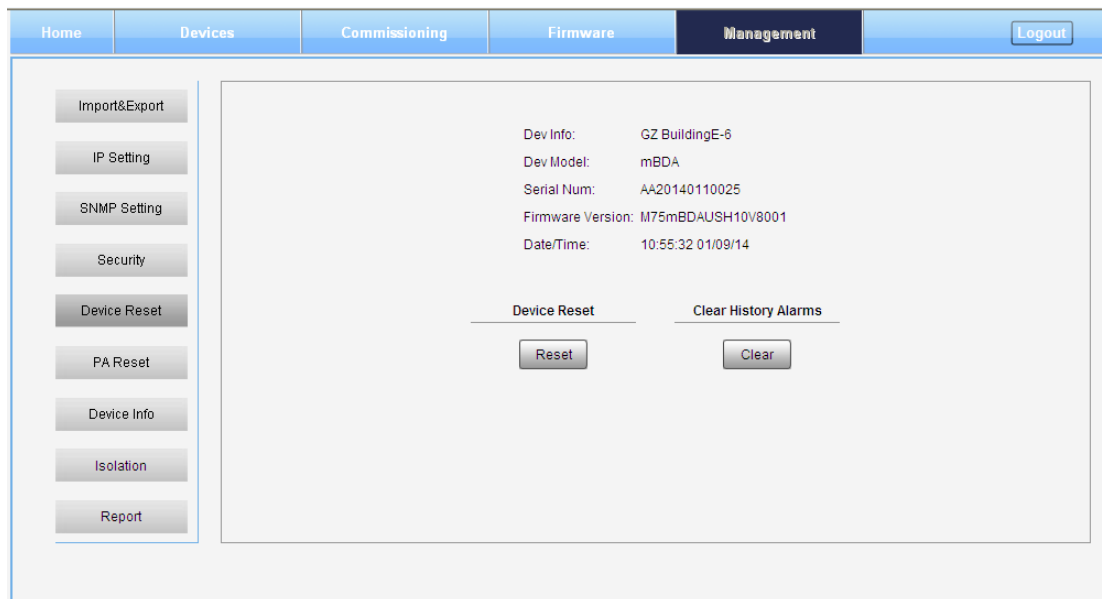
New Password:

confirm Password:

Figure 42: Modify Password

Note: Username cannot be modified.

➤ Device Reset



Home Devices Commissioning Firmware Management Logout

Import&Export

IP Setting

SNMP Setting

Security

Device Reset

PA Reset

Device Info

Isolation

Report

Dev Info: GZ BuildingE-6
Dev Model: mBDA
Serial Num: AA20140110025
Firmware Version: M75mBDAUSH10V8001
Date/Time: 10:55:32 01/09/14

Device Reset Clear History Alarms

Reset Clear

Figure 43: Management – Device Reset

Note: If users click , all the parameter and alarm will set to factory default value. Device Reset process will last about 2~4 minutes. For PMU monitor reset, users need to re-login WEB GUI.

➤ PA Reset

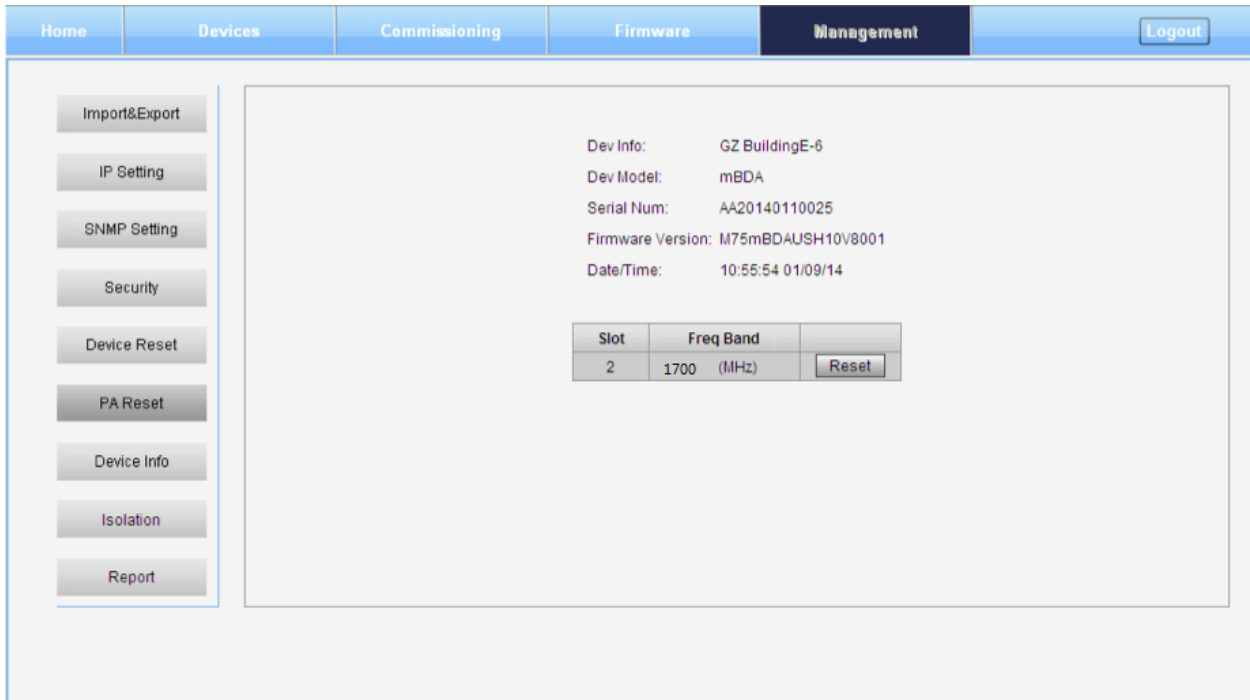


Figure 44: Management – PA Reset

Note: PA will be turned off by software when PA output power or (VSWR) reflected power is exceed the threshold. Users need to reset PA after debugging.

➤ Device Info



Figure 45: Management – Device Info

Note: Users can input maximum 30 bytes characters in Device Info.

➤ **Isolation**

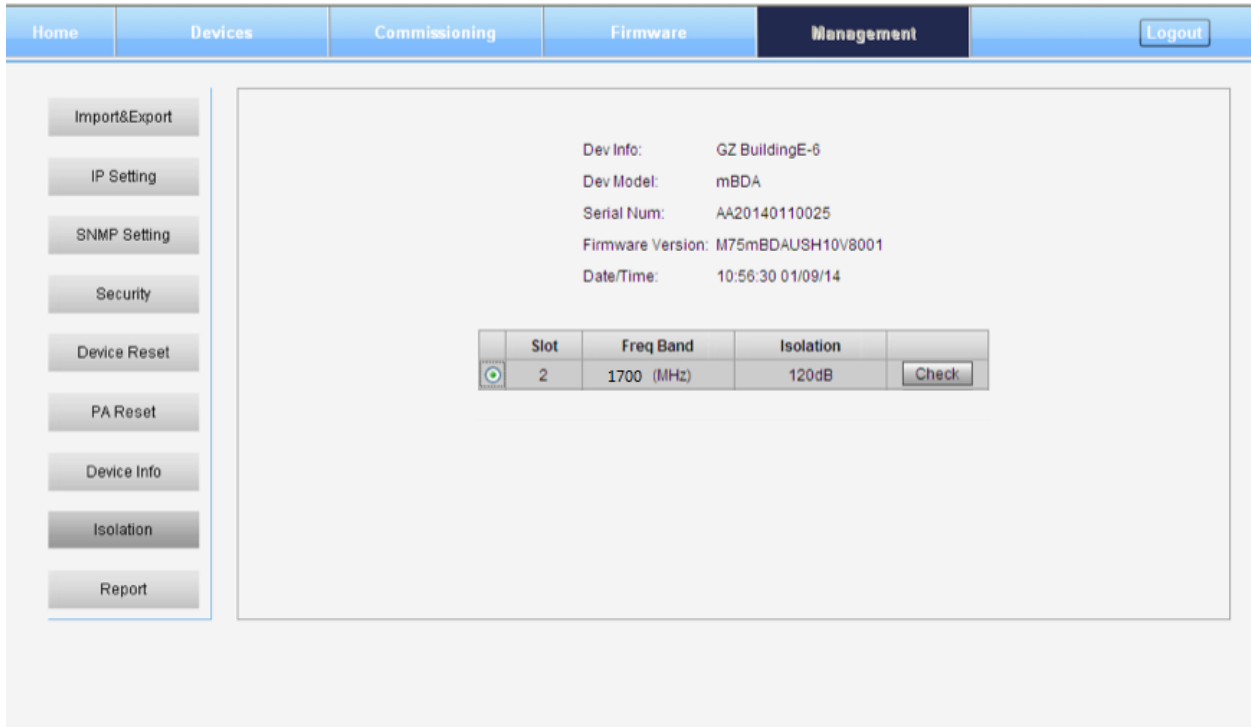


Figure 46: Management – Isolation

Note: This Step is the same as step3 of [Commissioning]. Users can check isolation again by clicking Check button.

➤ **Report**

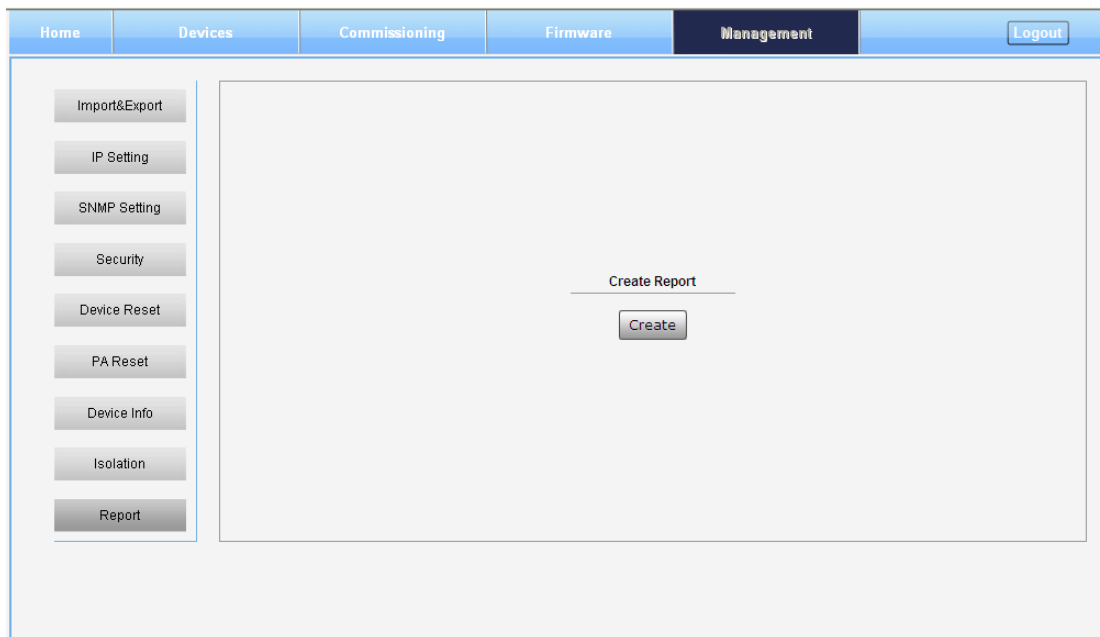


Figure 47: Management – Report

Note: Click Create to create report (The report can't create in IE browser.) and make sure the computer has installed PDF Reader software. If no, users will see nothing.

5.3 COMMISSIONING PROCEDURE

To complete the installation and commissioning, users need to follow the steps below.

Step 1: Click Menu bar [Commissioning] on home screen, a work flow will show up.

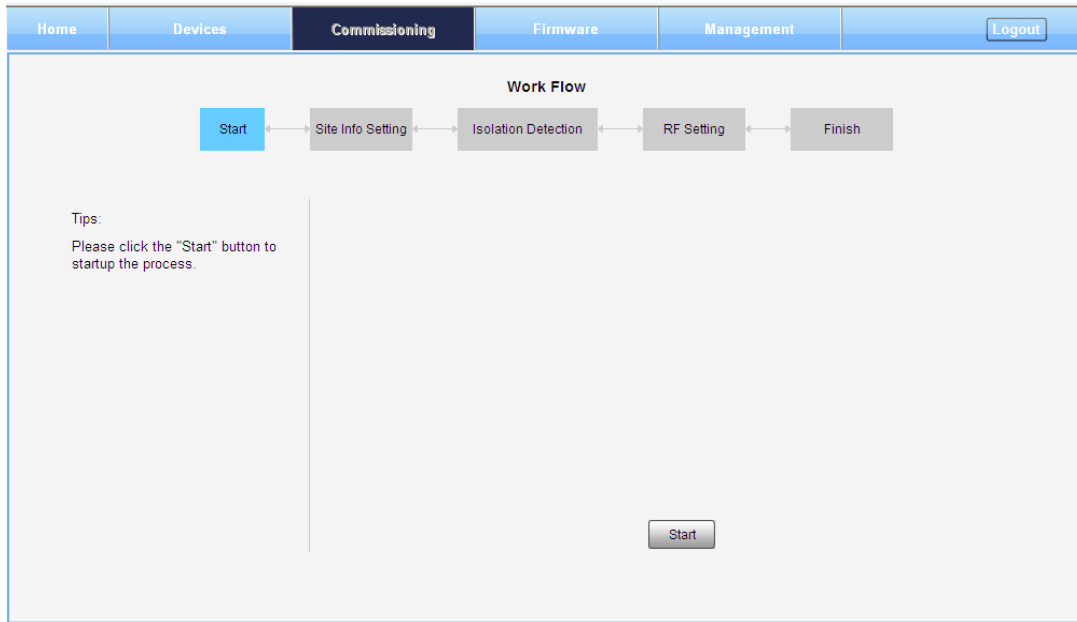


Figure 48: Commissioning Procedure – Start

Step 2: Click  to start the process.

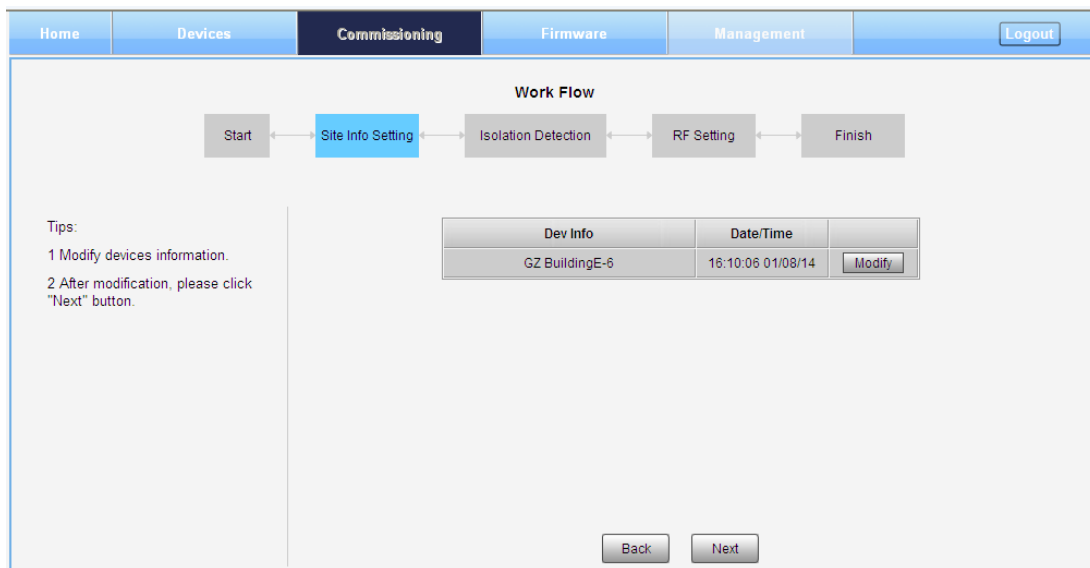

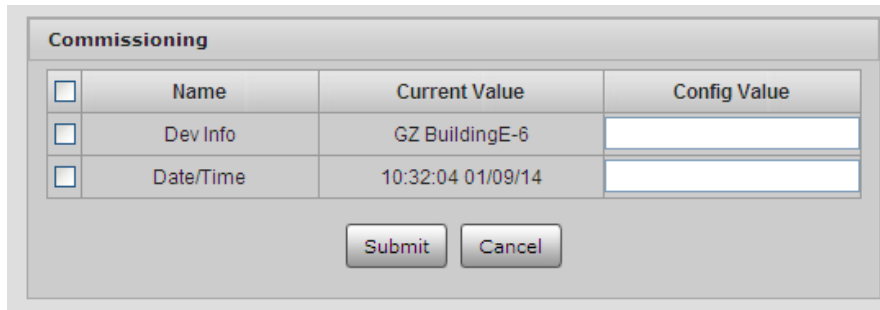


Figure 49: Commissioning Procedure – Site Info. Setting

Step 3: Click , users can set the site information.






<input type="checkbox"/>	Name	Current Value	Config Value
<input type="checkbox"/>	Dev Info	GZ BuildingE-6	
<input type="checkbox"/>	Date/Time	10:32:04 01/09/14	

Figure 50: Dev Info & Date/Time

Dev Info mainly used to record device location and Date/Time provide a time reference. Click the Config Value of Date/Time, will update Date/time automatically.

NOTE: Make sure the device is connected with appropriate donor and service antennas before proceeding to step 4.

Step 4: Click  to enter to Isolation Detection Screen shown as Figure 52.

- ✓ Select a frequency band (RFU) that need to commission.
- ✓ Click  to start Isolation Detecting, then [Confirm] window will pop-up shown as Figure 53.
- ✓ Click  to continue. If isolation detection success, the process will go to RF Setting Screen shown as Figure 55. If failed, a Tips window will pop-up shown as Figure 54, users need to check whether the system isolation is very weak.

NOTE: At the end of first frequency band commissioning, user can start other frequency band commission.

The screenshot shows a web interface with a navigation bar at the top containing 'Home', 'Devices', 'Commissioning' (highlighted), 'Firmware', 'Management', and 'Logout'. Below the navigation bar is a 'Work Flow' diagram with five steps: 'Start', 'Site Info Setting', 'Isolation Detecting' (highlighted in blue), 'RF Setting', and 'Finish'. To the left of the diagram is a 'Tips' section with the text: '1 Make sure to connect appropriate donor and service antennas.' To the right of the tips is a table with the following data:

Slot	Freq Band(MHz)	RF Switch	Commissioning	
<input type="radio"/>	2	1700 (MHz)	ON	Not Done

At the bottom of the interface are 'Back' and 'Next' buttons.

Figure 51: Commissioning Procedure – Isolation Detecting

The dialog box has a title bar 'Confirm'. The main text reads: 'Are you sure to connect appropriate donor and service antennas?'. At the bottom right, there are two buttons: 'Ok' and 'Cancel'.

Figure 52: Commissioning Procedure – Isolation Detecting Confirm

The dialog box has a title bar 'Tips:'. The main text reads: 'Isolation detection failed'. At the bottom right, there is an 'Ok' button.

Figure 53: Commissioning Procedure –Isolation Detection Failed

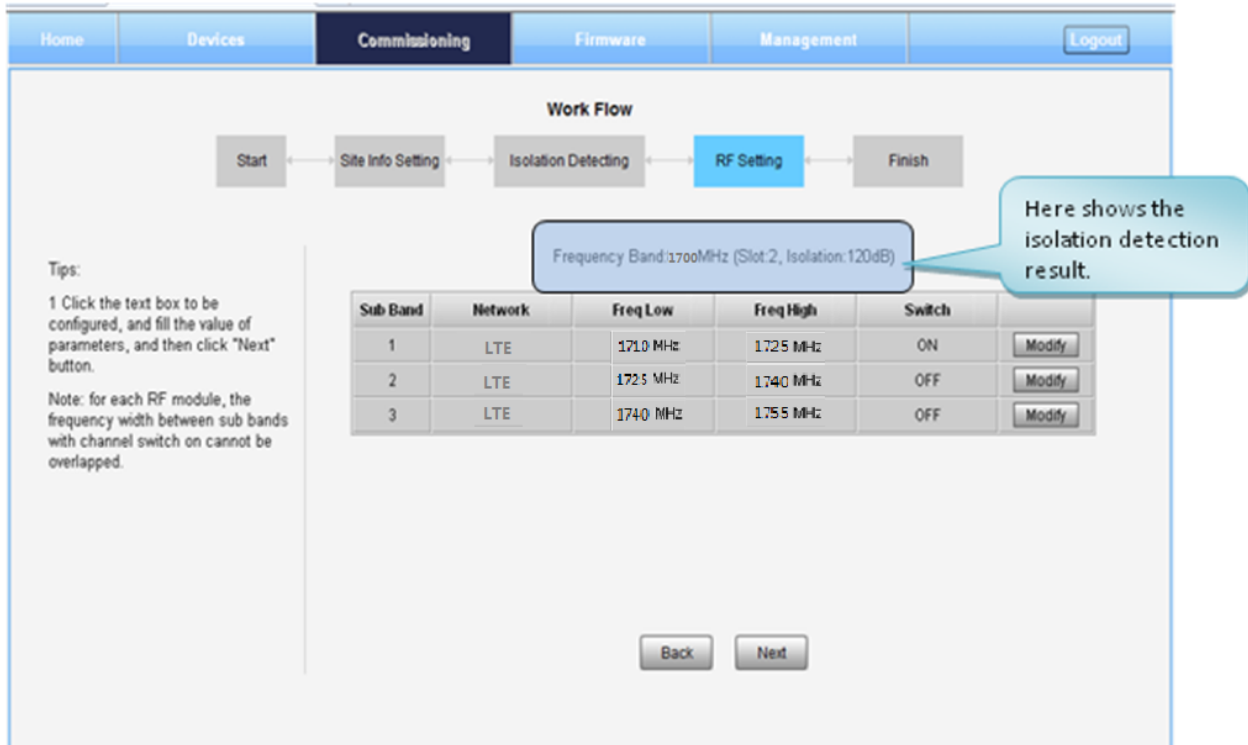


Figure 54: Commissioning Procedure –Isolation Detection Finish

Step 5: RF Setting Screen for setting subband bandwidths and switches.

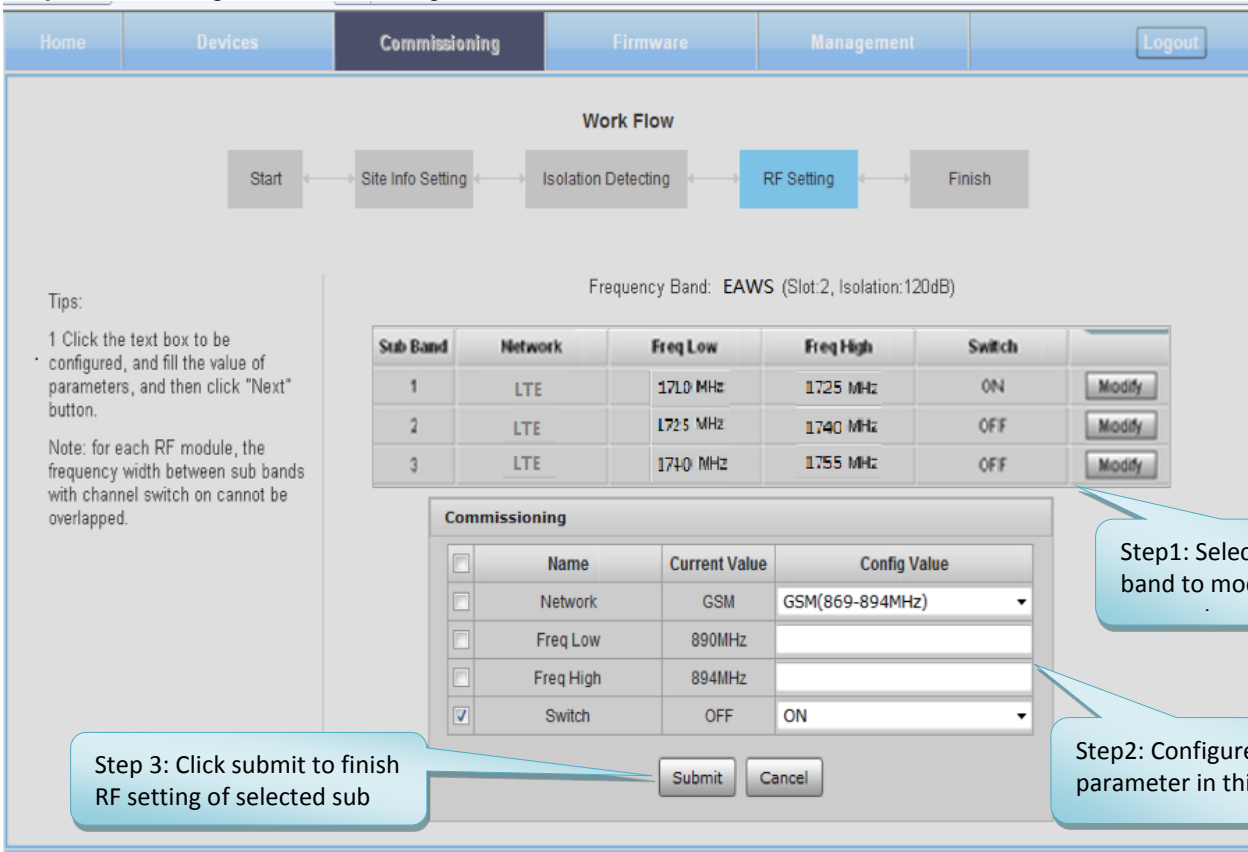


Figure 55: Commissioning Procedure – Subband bandwidth and Switch Setting

NOTE: For each RF module, the 3 subband bandwidth setting should not be overlap each other, if yes, only 1 subband can be turn on, other overlap subband is forbidden to switch on by equipment.

Step 6: Click to enter to DL output power setting after finishing subband bandwidths and switches setting.

Work Flow

Start → Site Info Setting → Isolation Detecting → **RF Setting** → Finish

Frequency Band: 850MHz (Slot: 2, Isolation: 120dB)

Sub Band	Network	Freq Low	Freq High	DL P_in	Switch	Target DL P_out(dBm)
1	LTE	1710 MHz	1725 MHz	<-80dBm	ON	30
2	LTE	1725 MHz	1740 MHz	<-80dBm	ON	28
3	LTE	1740 MHz	1755 MHz	<-80dBm	ON	20

Tips:
 1 Click the text box to be configured, and fill the value of parameters(Unit: dBm), and then click "Next" button.
 Note: for each RF module, the total target output power of sub bands with channel switch on must not exceed the nominal downlink output power.

Figure 56: Commissioning Procedure – DL Output Power Setting Screen

Work Flow

Start → Site Info Setting → Isolation Detecting → **RF Setting** → Finish

Frequency Band: EAWS (Slot:2, Isolation:120dB)

Sub Band	Network	Freq Low	Freq High	Switch	
1	LTE	1710 MHz	1725 MHz	ON	Modify
2	LTE	1725 MHz	1740 MHz	OFF	Modify
3	LTE	1740 MHz	1755 MHz	OFF	Modify

Tips:
 1 Click the text box to be configured, and fill the value of parameters, and then click "Next" button.
 Note: for each RF module, the frequency width between sub bands with channel switch on cannot be overlapped.

Commissioning

<input type="checkbox"/>	Name	Current Value	Config Value
<input type="checkbox"/>	Network	GSM	GSM(869-894MHz)
<input type="checkbox"/>	Freq Low	890MHz	
<input type="checkbox"/>	Freq High	894MHz	
<input checked="" type="checkbox"/>	Switch	OFF	ON

Submit Cancel

Step 1: Select a channel with switch on

Step 2: Fill the value of parameter

Step 3: Click submit to finish DL output power

Figure 57: Commissioning Procedure – DL Output Power Setting

NOTE: For each RF module, the total target output power of all subbands which channel switch is on must not exceed the nominal downlink output power (27, 30, 33dBm); if yes, Tips window will pop-up shown as Figure 59. Finish the output power setting, click button, go to Finish Screen shown as Figure 60.

Tips:

The total target output power exceeds the nominal output power.

Ok

Figure 58: DL Output Power Over Exceed

Step 7: Click to commission other RFUs parameters. Click to finish the commissioning.

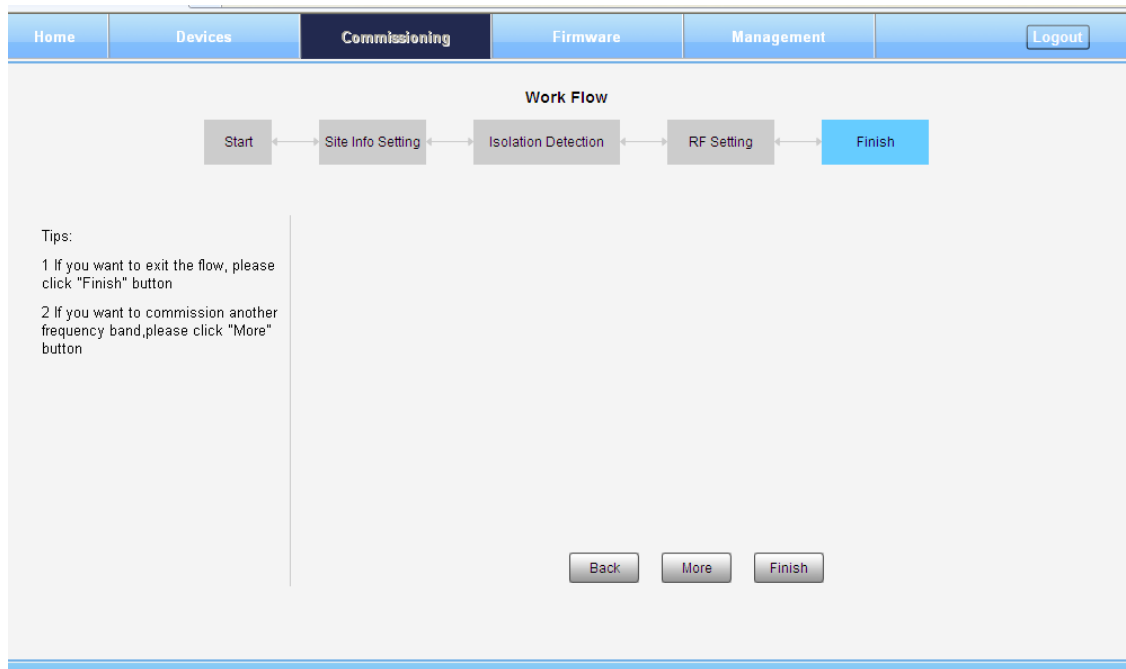


Figure 59: Commissioning Procedure – Finish

End of Section

6 MAINTENANCE

The mBDA is designed for trouble-free operation and generally does not need maintenance. Maintenance activities should only be carried out by trained personnel.

The equipment operation status can be observed remotely through OMC.

Periodic inspection of the repeater equipment(s) is recommended, the recommended tasks includes:

- Inspect and record operation status and output power of the repeater from OMC or OMT.
- Verify the direction and position of antennas. Re-align if necessary.
- Make sure the cable gland and sealing on the RF cable connectors are not damaged.
- Verify lightning and grounding protection is in good condition.

6.1 ALARMS

Table 7: Monitoring Unit Alarm List

Alarm List	Alarm Condition
RF Unit Alarm	<ul style="list-style-type: none"> • Alarm when any RF unit is alarm, otherwise normal; • Alarm judgment period: Immediately;
Ext Alarm	<ul style="list-style-type: none"> • Alarm status when the external terminals have the same H/L level with alarm level, otherwise normal; • Alarm period: 10s by default.
Fan Alarm	<ul style="list-style-type: none"> • Alarm when the Fan has broken, otherwise normal; Fan2 is close to MCU. Another one is Fan1; • Alarm period: 10s by default.
Over-Temperature Alarm	<ul style="list-style-type: none"> • Alarm when equipment temperature is higher than the threshold, otherwise normal; • Alarm judgment period: 3 minutes by default; • Alarm threshold : 80°C by default.

Table 8: RF Unit Alarm List

Alarm List	Alarm Condition
Over DL P_in Alarm	<ul style="list-style-type: none"> • Alarm when DL input power is higher than the threshold, otherwise normal; • Alarm judgment period: 3 minutes by default; • Alarm threshold: -30dBm by default.
PLL Alarm	<ul style="list-style-type: none"> • Alarm when PLL circuit is broken, otherwise normal; • Alarm judgment period: 3 minutes by default;
LNA Alarm	<ul style="list-style-type: none"> • Alarm When LNA is broken, otherwise normal; • Alarm judgment period: 3 minutes by default;
DL PA Alarm	<ul style="list-style-type: none"> • Alarm when PA Over-temperature Alarm, PA DL output power overload Alarm, Reflection Power Alarm happens, otherwise normal; • Alarm judgment period: 3 minutes by default.
VSWR Alarm	<ul style="list-style-type: none"> • Alarm when the DL reflection power is higher than the threshold, otherwise normal; • Alarm judgment period: 3 minutes by default; • Alarm threshold: 2.0 by default.
Protection Shut Alarm	<ul style="list-style-type: none"> • Alarm when the PA status is off itself, otherwise normal; • Alarm judgment period: 10s by default.

6.2 TROUBLESHOOTING

Following installation and commissioning, occasional operation tasks to handle alarms may be required:

Table 9: Monitor Unit Alarms Diagnosis

Alarm condition	Diagnosis
RF Unit Alarm	<ul style="list-style-type: none"> Check RF Unit alarm on WEB GUI.
Ext Alarm	<ul style="list-style-type: none"> Check to make sure if the external device connected is working normally.
Fan Alarm	<ul style="list-style-type: none"> Check to make sure the fan is working normally.
Over-Temperature alarm	<ul style="list-style-type: none"> Check temperature on WEB GUI If device temperature is over threshold, make sure environment temperature is within the environment temperature range that device supported (-20~40°C). Apply climatic protection to the system under severe environment.

Table 10: RF Unit Alarms Diagnosis

Alarm condition	Diagnosis
Over DL P_in Alarm	<ul style="list-style-type: none"> Test DL input power of the alarm RF Unit, if it is higher than threshold, changing the threshold value; when the DL input power is more than -40dBm, it is recommended to add an external attenuator with proper attenuating value.
PLL Alarm	<ul style="list-style-type: none"> Check device on WEB GUI; Restart the device, if the PLL alarm is not fixed, replace the RF Unit.
LNA Alarm	<ul style="list-style-type: none"> Check device on WEB GUI; Restart the device, if the LNA alarm is not fixed, replace the RF Unit.
DL PA alarms	<ul style="list-style-type: none"> Check PA Service Status on WEB GUI RU page, If it is [Recovery], reset PA on WEB GUI Management page, then read RF Unit output power: If output power is exceed threshold, need to reduce gain or input power; if output power is normal, check whether antenna port VSWR is too high. If it is [Shutdown], Refer to Protection Shut Alarm
Protection Shut Alarm	<ul style="list-style-type: none"> Make Sure the environment temperature is -20~40°C Reset PA, if PA service status turns to [Recovery], and then refer to DL PA Alarms. If PA still shutdown, the PA part maybe broken, please replace the RU.

End of Section

7 APPENDICES

7.1 APPENDIX A: TOOLS FOR INSTALLATION AND MAINTENANCE

The following tools (not included in package) are required for installation or routine maintenance:

- Power Drill (for wall mount)
- Adjustable Wrench (0.31 inch~0.79 inch)
- Philips Screwdriver
- Allen wrench (M6)
- Signal generator support output power 10dBm.
- Site Master

7.2 APPENDIX B: RMA (RETURN MATERIAL AUTHORIZATION)



Comba Telecom Ltd.

611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong
Tel: +852 2636 6861 Fax: +852 2637 0966

RMA Request Form

Date: _____

From: _____
Address: _____
Tel: _____ Fax: _____
E-Mail: _____
ATTN: _____

Product Information:

Item	Model	Serial Number	Return Category	Qty	Problem Description
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Notes:

- For 'Return Category' column, please select from **A**: Return of Defective Product, **B**: Return of Trial Sample, or **C**: Return of New and Unused Product.
- If **A** or **C** category of return product is chosen, please give short description of the problem or reason for returning.

Transportation Information:

Location of Product: _____

Transportation Method: _____

Shipping Forwarder: _____

Note: Location of Product' must be stated, while 'Transportation Method' or 'Shipping Forwarder' can be left blank if not determined.

Signature: _____

For Comba Use (Only)

Return Merchandise Authorization Number (RMA#): _____

Recommended Action: _____

Shipment and Handling Cost to be paid by: _____

Approved by: _____

Date: _____

End of Section

End of Document

FOR NAM OFFICE EMAIL, PLEASE INSERT: support.us@comba-telecom.com

Comba

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