BTS3900 (Ver.B)

Hardware Description

Issue 02

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Huawei Technologies Co., Ltd.

About This Document

Overview

This document provides reference for planning and deploying the BTS3900 (Ver.B) (hereinafter referred to as BTS3900). It describes the configurations, functions, and specifications of the subracks, boards, and modules, and the details such as cable types, cable connections, and connector specifications.

Product Version

The following table lists the product version related to this document.

Product Name	Product Version
BTS3900 (Ver.B)	V100R004C01
BTS3900 (Ver.B) GSM	V100R013C01
BTS3900 (Ver.B) WCDMA	V200R013C01
BTS3900 (Ver.B) LTE	V100R004C00

Intended Audience

- System engineers
- Base station installation engineers
- Site maintenance engineers

Organization

1 Changes in the BTS3900 (Ver.B) Hardware Description

This section describes the changes in the *BTS3900 (Ver.B) Hardware Description*.

2 Exterior of the BTS3900 Cabinet

The BTS3900 cabinet is a vertical cabinet, which is designed in compliance with the IEC297 standard.

3 BTS3900 Hardware Configurations

This chapter describes the configurations of a BTS3900 cabinet, power configurations, and monitoring configurations. It provides reference for planning and deploying a BTS3900.

4 BTS3900 Components

This describes the components of the BTS3900, which are the BBU3900, RFUs, DCDU-01, FAN unit, DC/DC power system, AC/DC power system and optional modules. The AC/DC power system is configured in the BTS3900 cabinet (AC); the DC/DC power system is configured in the BTS3900 cabinet (+24 V DC).

5 BTS3900 Cables

This chapter describes the BTS3900 cables. The BTS3900 cables consist of the PGND cable, power cable, transmission cable, CPRI cable, signal cable, and RF cable.

6 BTS3900 Auxiliary Equipment

This chapter describes the auxiliary equipment of the BTS3900.

Conventions

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium or low level of risk, which if not avoided, could result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
TIP	Indicates a tip that may help you solve a problem or save time.
NOTE	Provides additional information to emphasize or supplement important points of the main text.

General Conventions

The general conventions that may be found in this document are defined as follows.

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Boldface	Names of files, directories, folders, and users are in **boldface**. For example, log in as user **root**.
Italic	Book titles are in *italics*.
`Courier New`	Examples of information displayed on the screen are in Courier New.

Command Conventions

The command conventions that may be found in this document are defined as follows.

Convention	Description
Boldface	The keywords of a command line are in **boldface**.
Italic	Command arguments are in *italics*.
[ ]	Items (keywords or arguments) in brackets [ ] are optional.
{ x	y	... }	Optional items are grouped in braces and separated by vertical bars. One item is selected.
[x	y	...]	Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.
{ x	y	... }*	Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.
[x	y	...]*	Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.

GUI Conventions

The GUI conventions that may be found in this document are defined as follows.

Convention	Description
Boldface	Buttons, menus, parameters, tabs, window, and dialog titles are in **boldface**. For example, click **OK**.
>	Multi-level menus are in **boldface** and separated by the ">" signs. For example, choose **File** > **Create** > **Folder**.

Keyboard Operations

The keyboard operations that may be found in this document are defined as follows.

Format	Description
Key	Press the key. For example, press **Enter** and press **Tab**.
Key 1+**Key 2**	Press the keys concurrently. For example, pressing **Ctrl**+**Alt**+**A** means the three keys should be pressed concurrently.
Key 1, **Key 2**	Press the keys in turn. For example, pressing **Alt**, **A** means the two keys should be pressed in turn.

Mouse Operations

The mouse operations that may be found in this document are defined as follows.

Action	Description
Click	Select and release the primary mouse button without moving the pointer.
Double-click	Press the primary mouse button twice continuously and quickly without moving the pointer.
Drag	Press and hold the primary mouse button and move the pointer to a certain position.

Contents

1 Changes in the BTS3900 (Ver.B) Hardware Description

This section describes the changes in the *BTS3900 (Ver.B) Hardware Description*.

02 (2011-11-15)

This is the second commercial release.

Compared with 01 (2011-10-25), this issue adds the following content:

- **UCIU**

Compared with 01 (2011-10-25), no content is modified.

Compared with 01 (2011-10-25), this issue deletes the following contents:

- CPRI Cable Connections for a GU+LO Base Station
- CPRI Cable Connections for a GL+UO Base Station
- CPRI Cable Connections for a UO+GL Base Station

01 (2011-10-25)

This is the first commercial release.

2 Exterior of the BTS3900 Cabinet

The BTS3900 cabinet is a vertical cabinet, which is designed in compliance with the IEC297 standard.

Figure 2-1 shows the exterior of a BTS3900 cabinet.

Figure 2-1 Exterior of a BTS3900 cabinet

PAH01C0000
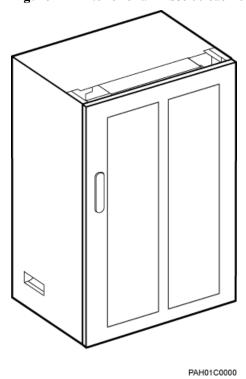
Figure 2-2 shows the dimensions of a BTS3900 cabinet.
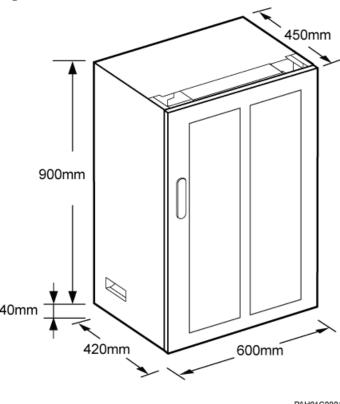
Figure 2-2 Dimensions of a BTS3900 cabinet

3 BTS3900 Hardware Configurations

About This Chapter

This chapter describes the configurations of a BTS3900 cabinet, power configurations, and monitoring configurations. It provides reference for planning and deploying a BTS3900.

3.1 Module Configurations in the Cabinet
The BTS3900 cabinet uses a modular design. The main components of the cabinet are the BBU3900, RFU, DCDU-01, and fan box. The power equipment (DC/DC) and power equipment (AC/DC) are optional components of the cabinet.

3.2 Application Scenario of a Cabinet
The BTS3900 cabinet can be stacked or installed side by side. The side-by-side installation mode is recommended. If the space in the equipment room is insufficient, the stack mode can be used.

3.3 Power System of the BTS3900
The BTS3900 supports 110 V AC, 220 V AC, and -48 V DC power supplies. When AC power is supplied, the power is converted to -48 V DC power for the base station.

3.4 BTS3900 Monitoring System
The BTS3900 monitoring system monitors all boards and components in the cabinet. If any board or component is faulty, an alarm is reported automatically. The alarm signals are collected both inside and outside the cabinet by the UPEU, UEIU, or EMU, so that the entire site can be monitored.

3.1 Module Configurations in the Cabinet

The BTS3900 cabinet uses a modular design. The main components of the cabinet are the BBU3900, RFU, DCDU-01, and fan box. The power equipment (DC/DC) and power equipment (AC/DC) are optional components of the cabinet.

The BTS3900 cabinets can be classified into three types: the BTS3900 cabinet (-48 V DC), BTS3900 cabinet (+24 V DC), and BTS3900 cabinet (AC).

Figure 3-1 Module configurations in the BTS3900 cabinet (-48 V DC)

(1) RFU	(2) Fan box	(3) Air inlet
(4) BBU3900	(5) DCDU-01	-
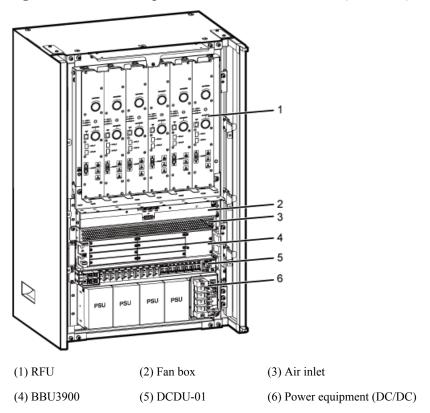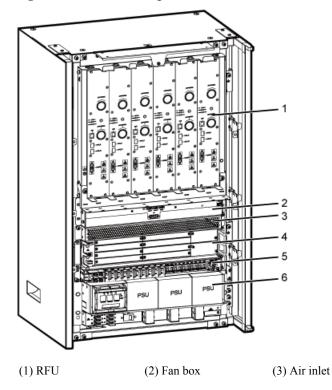
Figure 3-2 Module configurations in the BTS3900 cabinet (+24 V DC)

(1) RFU	(2) Fan box	(3) Air inlet
(4) BBU3900	(5) DCDU-01	(6) Power equipment (DC/DC)

Figure 3-3 Module configurations in the BTS3900 cabinet (AC)

(1) RFU	(2) Fan box	(3) Air inlet

(4) BBU3900   (5) DCDU-01   (6) Power equipment (AC/DC)

Table 3-1 describes the components in the cabinet.

Table 3-1 Components in the cabinet

Module	Optional or Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Remarks
RFU	Mandatory	6	The RFU performs modulation and demodulation between baseband signals and RF signals, processes data, and combines and divides signals.
RFU filler panel	Optional	6	To ensure proper ventilation of the cabinet, the slot in the RFU subrack that is not installed with an RFU must be installed with a filler panel.
4.9 Fan Box	Mandatory	1	The fan dissipates the heat in the cabinet.
BBU3900	Mandatory	1	The BBU3900 processes the baseband signals and enables interaction between the base station and the base station controller.
4.8 DCDU-01	Mandatory	1	The DCDU-01 provides DC power to all components in the cabinet.
4.12 Power Equipment (DC/DC)	Optional	1	The power equipment (DC/DC) converts external +24 V DC power into -48 V DC power and provides power to all components in the cabinet.
4.13 Power Equipment (AC/DC)	Optional	1	The power equipment (AC/DC) converts external 220 V AC single-phase, 220 V AC three-phase, and 110 V AC dual-live-wire power into -48 V DC power and provides power to all components in the cabinet.

Module	Optional or Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Remarks

Idle space	-	-	● There is a 3 U idle space in the BTS3900 cabinet (-48 V DC) for customized equipment.
			   – The customized equipment must be able to work properly at a temperature equal to or higher than 55°C.
			   – The BTS3900 cabinet (-48 V DC) cannot supply power to customized transmission equipment.
			● There is no idle space in the BTS3900 cabinet (+24 V DC).
			● There is no idle space in the BTS3900 cabinet (AC).

3.2 Application Scenario of a Cabinet

The BTS3900 cabinet can be stacked or installed side by side. The side-by-side installation mode is recommended. If the space in the equipment room is insufficient, the stack mode can be used.

Side-by-Side Installation Mode

The principles for installing two cabinets side by side are as follows:
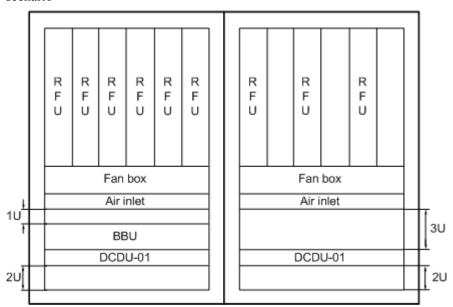
● The BTS3900 cabinet (-48 V DC), BTS3900 cabinet (+24 V DC), and BTS3900 cabinet (AC) all support side-by-side installation mode.

● In a single-mode or dual-mode scenario, only one BBU is configured. In a triple-mode scenario, two BBUs are configured.

📖 **NOTE**

In this document, the two BBUs in a triple-mode scenario are described as BBU0 and BBU1 for better understanding.

● In an expanded base station, BBU0 is the BBU installed during the initial site construction, and BBU1 is the BBU installed during the capacity expansion.
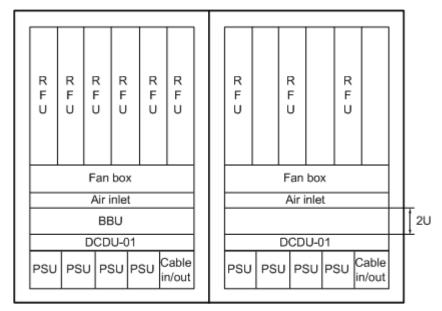
● In a new base station, BBU0 is the BBU working in GSM+UMTS or GSM+LTE mode, and BBU1 is the BBU working in LTE only or UMTS only mode.

Figure 3-4, **Figure 3-5**, and **Figure 3-6** show two side-by-side installation cabinets in a single-mode or dual-mode scenario.

Figure 3-4 Two side-by-side BTS3900 (-48 V DC) cabinets in a single-mode or dual-mode scenario

Figure 3-5 Two side-by-side BTS3900 (+24 V DC) cabinets in a single-mode or dual-mode scenario
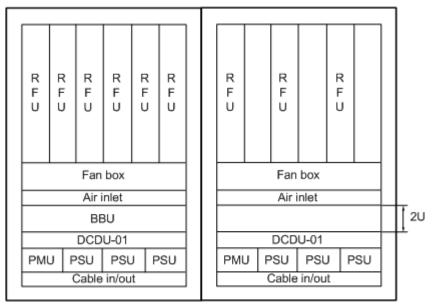
Figure 3-6 Two side-by-side BTS3900 (AC) cabinets in a single-mode or dual-mode scenario

Figure 3-7, **Figure 3-8**, and **Figure 3-9** show two side-by-side installation cabinets in a triple-mode scenario.
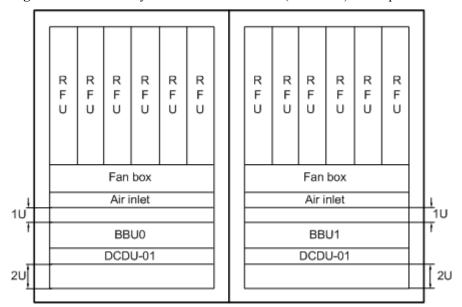
Figure 3-7 Two side-by-side BTS3900 cabinets (-48 V DC) in a triple-mode scenario
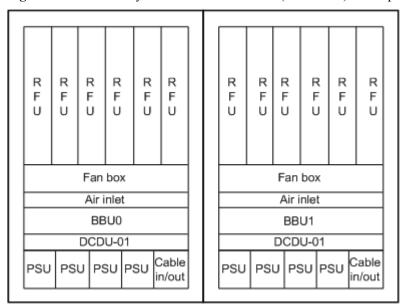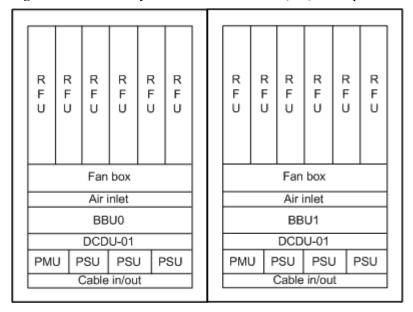
Figure 3-8 Two side-by-side BTS3900 cabinets (+24 V DC) in a triple-mode scenario

Figure 3-9 Two side-by-side BTS3900 cabinets (AC) in a triple-mode scenario

Stack Mode

The principles for stacking two cabinets are as follows:

- The BTS3900 cabinets (-48 V DC) can be stacked.

- The BTS3900 cabinets (+24 V DC) cannot be stacked.

- The stacking of the BTS3900 cabinets (AC) is not recommended. If cabinets are stacked, the highest operating temperature of the cabinets is 50°C.

- In a single-mode or dual-mode scenario, only one BBU is configured. In a triple-mode scenario, two BBUs are configured.

  📖 NOTE

  In this document, the two BBUs in a triple-mode scenario are described as BBU0 and BBU1 for better understanding.

  - In an expanded base station, BBU0 is the BBU installed during the initial site construction, and BBU1 is the BBU installed during the capacity expansion.

  - In a new base station, BBU0 is the BBU working in GSM+UMTS or GSM+LTE mode, and BBU1 is the BBU working in LTE only or UMTS only mode.

Figure 3-10, **Figure 3-11**, and **Figure 3-6** show the stack installation mode with two cabinets in a single-mode or dual-mode scenario.

Figure 3-10 Two stacked BTS3900 cabinets (-48 V DC) in a single-mode or dual-mode scenario
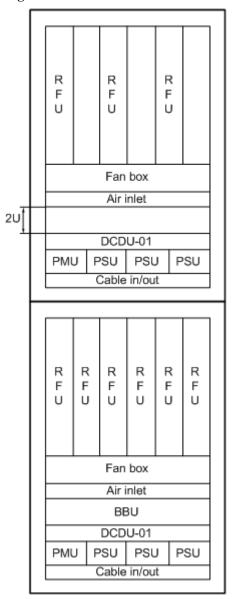
Figure 3-11 Two stacked BTS3900 cabinets (AC) in a single-mode or dual-mode scenario

Figure 3-12 and **Figure 3-13** show two stacked cabinets in a triple-mode scenario.
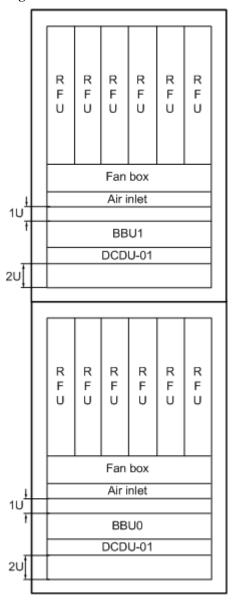
Figure 3-12 Two stacked BTS3900 cabinets (-48 V DC) in a triple-mode scenario
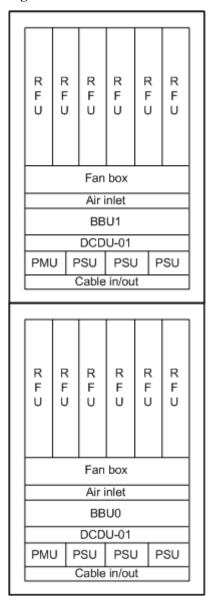
Figure 3-13 Two stacked BTS3900 cabinets (AC) in a triple-mode scenario

3.3 Power System of the BTS3900

The BTS3900 supports 110 V AC, 220 V AC, and -48 V DC power supplies. When AC power is supplied, the power is converted to -48 V DC power for the base station.

Table 3-2 and **Table 3-3** list the input voltage ranges supported by the BTS3900.

Table 3-2 Applicable AC input voltage ranges

Power Input Type	Rated Voltage	Working Voltage
220 V AC single-phase	220 V AC to 240 V AC	176 V AC to 290 V AC

Power Input Type	Rated Voltage	Working Voltage
220 V AC three-phase	220 V AC to 240 V AC	176 V AC to 290 V AC
110 V AC dual-live-wire	100 V AC to 120 V AC	90 V AC to 135 V AC

Table 3-3 Applicable DC input voltage ranges

Power Input Type	Rated Voltage
-48 V DC	-38.4 V DC to -57 V DC
+24 V DC	21.6 V DC to 29 V DC

3.3.1 Configurations of the Upper-Level Circuit Breaker and Power Cables

This section describes the recommended configurations of the upper-level circuit breaker and power cables for the BTS3900. The recommended configurations are based on a fully-configured single cabinet, which has the peak output power. The power requirements for the customer equipment in the cabinet are also included.

Table 3-4 lists the recommended configurations of the upper-level circuit breaker and power cables for the BTS3900.

Table 3-4 Recommended configurations of the upper-level circuit breaker and power cables

Power Supply	Requirement for the Circuit Breakers on Customer Equipment	Cross-Sectional Area of the Power Cable	Length of the Power Cable
-48 V DC	1 x 80 A	16 mm^2	$\leqslant$ 15 m
+24 V DC	1 x 160 A or 2 x 100 A	25 mm^2	$\leqslant$ 15 m
200 V AC single-phase	1 x 63 A or 1 x 50 A (both using the two-level magnetic blast breaker)	6 mm^2	$\leqslant$ 40 m
110 V AC dual-live-wire			
220 V AC three-phase	1 x 25 A or 1 x 32 A (both using the three-level magnetic blast breaker)	2.5 mm^2	$\leqslant$ 40 m

⌞ **NOTE**

All power cables must comply with local standards.

3.3.2 Power Distribution Schemes of the Cabinet

This section describes the power distribution schemes of the BTS3900 cabinet (-48 V DC), BTS3900 cabinet (+24 V DC), and BTS3900 cabinet (AC).

Power Distribution Scheme of the BTS3900 Cabinet (-48 V DC)

When the BTS3900 cabinet uses -48 V DC power supply, the DCDU-01 provides 10 DC power inputs to the modules in the cabinet. **Figure 3-14** shows the power distribution scheme of the BTS3900 cabinet (-48 V DC). Like the power distribution scheme of a single cabinet, two cabinets are supplied by the external power device.
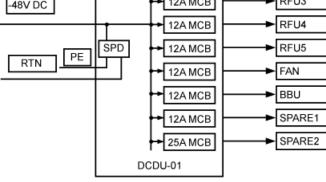
Figure 3-14 Power distribution scheme of the BTS3900 cabinet (-48 V DC)

⌞ **NOTE**

MCB: miniature circuit breaker

Power Distribution Scheme of the BTS3900 Cabinet (+24 V DC)

When the BTS3900 cabinet uses +24 V DC power, the DC/DC power device converts +24 V DC power into -48 V DC power and feeds -48 V DC power to the DCDU-01. Then, the DCDU-01 feeds power to each module in the cabinet. **Figure 3-15** shows the power distribution scheme of the BTS3900 cabinet (+24 V DC). Like the power distribution scheme of a single cabinet, two cabinets are supplied by the external power device.
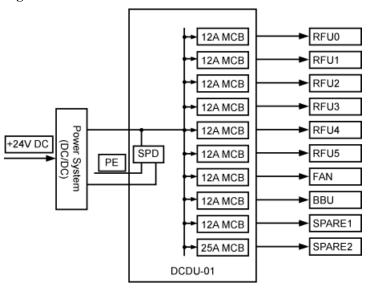
Figure 3-15 Power distribution scheme of the BTS3900 cabinet (+24 V DC)

Power Distribution Scheme of the BTS3900 Cabinet (AC)

When the BTS3900 cabinet uses 220 V AC three-phase power, 220 V AC single-phase power, or 110 V AC dual-live-wire power, the AC/DC power device converts the AC power into -48 V DC power and feeds -48 V DC power to the DCDU-01. Then, the DCDU-01 feeds power to each module in the cabinet. **Figure 3-16** shows the power distribution scheme of the BTS3900 cabinet (AC). Like the power distribution scheme of a single cabinet, two cabinets are supplied by the external power device.
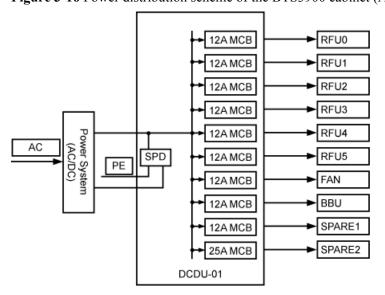
Figure 3-16 Power distribution scheme of the BTS3900 cabinet (AC)

3.4 BTS3900 Monitoring System

The BTS3900 monitoring system monitors all boards and components in the cabinet. If any board or component is faulty, an alarm is reported automatically. The alarm signals are collected both inside and outside the cabinet by the UPEU, UEIU, or EMU, so that the entire site can be monitored.

3.4.1 BBU Monitoring Port

The BBU houses the UPEU and UEIU for monitoring. Each board has two Boolean input ports and two RS485 input ports, and each Boolean input port receives four Boolean inputs.

Figure 3-17 shows the slot assignment for the UPEU and UEIU.

Figure 3-17 Slot assignment for the UPEU and UEIU
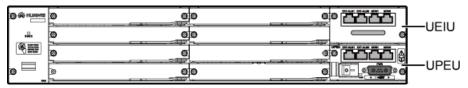
Table 3-5 lists the ports on the UPEU and UEIU.

Table 3-5 Ports on the UPEU and UEIU

Slot	Board	Port	Connector	Quantity	Description
Slot19	UPEU	EXT-ALM0	RJ45 connector	1	Port for Boolean inputs 0 to 3
		EXT-ALM1	RJ45 connector	1	Port for Boolean inputs 4 to 7
		MON0	RJ45 connector	1	Port for RS485 input 0
		MON1	RJ45 connector	1	Port for RS485 input 1
Slot18	UEIU (optional)	EXT-ALM0	RJ45 connector	1	Port for Boolean inputs 0 to 3
		EXT-ALM1	RJ45 connector	1	Port for Boolean inputs 4 to 7

Slot	Board	Port	Connector	Quantity	Description
		MON0	RJ45 connector	1	Port for RS485 input 0
		MON1	RJ45 connector	1	Port for RS485 input 1

3.4.2 Monitoring Principles of the Cabinet

The BTS3900 cabinet is managed by monitoring boards, such as the FMU and PMU. Each monitoring board is connected to the MON port on the BBU. They collect alarms of all components and report the alarms to the BBU by using the RS485 serial bus.

For details about functions of the monitoring ports on the FMU, see **4.9 Fan Box**. The FMU is configured in the BTS3900 (-48 V DC), BTS3900 (+24 V DC), and BTS3900 (AC). For details about the position of the FMU in the cabinet, see **3.1 Module Configurations in the Cabinet** and **4.9 Fan Box**.
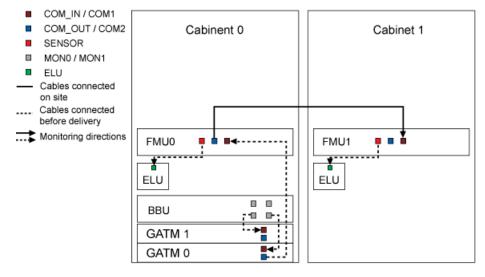
Figure 3-18 and **Figure 3-19** shows the monitoring system of the BTS3900 cabinet (-48 V DC). **Figure 3-20** and **Figure 3-21** show the monitoring systems for the BTS3900 cabinet (+24 V DC) and BTS3900 cabinet (AC) respectively. In triple-mode scenarios where two BBUs are configured, BBU 0 and BBU 1 are installed in **Cabinet 0** and **Cabinet 1** respectively, and all the monitoring equipment is connected to only BBU 0. The monitoring principles for the triple-mode scenarios are the same as those for the single-mode or dual-mode scenarios.

☐ **NOTE**

In this document, the two BBUs in a triple-mode scenario are described as BBU 0 and BBU 1 for clarity.

- In an expanded base station, BBU 0 is installed during the initial site deployment, and BBU 1 is installed during capacity expansion by default.

- In a new base station, BBU 0 works in GSM+UMTS (GU) or GSM+LTE (GL) mode, and BBU 1 works in LTE Only (LO) or UMTS Only (UO) mode by default.

Figure 3-18 Monitoring system for the BTS3900 cabinet (-48 V DC)
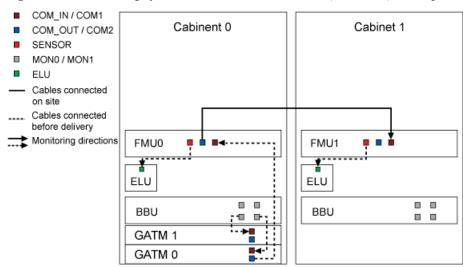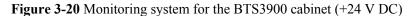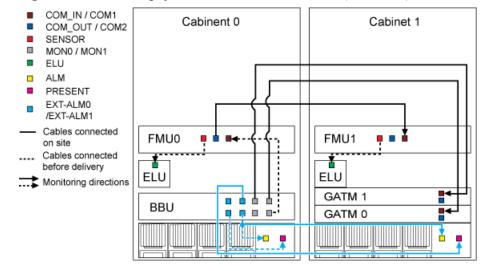
Figure 3-19 Monitoring system for the BTS3900 cabinet (-48 V DC) in a triple-mode scenario

Figure 3-20 Monitoring system for the BTS3900 cabinet (+24 V DC)
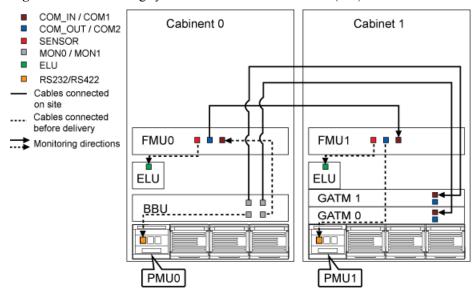
Figure 3-21 Monitoring system for the BTS3900 cabinet (AC)

☐ **NOTE**

For details about how to monitor the EMU, see the section *Customized Alarm Inputs*.

3.4.3 Customized Alarm Inputs

When an alarm is generated by the customized equipment, the alarm must be reported to the BBU.

Customized alarms are reported to the BBU by any of the following methods:

- The alarms are collected by the UPEU or UEIU in the BBU.
- The alarms are collected by the EMU.

For details about the configuration of the customized alarms, see the related initial configuration guide.

Monitoring Board Configuration

The configuration of the monitoring boards in the BTS3900 depends on the number of customized alarms, as listed in **Table 3-6**.

Table 3-6 Configuration of monitoring boards in the BTS3900

Cabinet Type	Number of Dry Contact Alarm Inputs	Monitoring Board
-48 V DC cabinet or AC cabinet	None	UPEU
	1 to 16	UPEU+UEIU
	17 to 32	UPEU+UEIU+EMU
+24 V DC cabinet	None	UPEU

Cabinet Type	Number of Dry Contact Alarm Inputs	Monitoring Board
	1 to 16	UPEU+UEIU+EMU
	17 to 32	
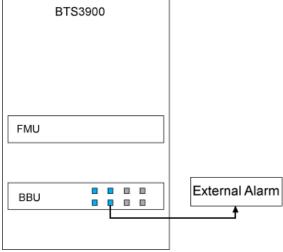
📖 **NOTE**

- If backup power is required for the BBU, two UPEUs rather than UPEU+UEIU are configured.
- If three BTS3900 cabinets are configured, only one UEIU is required to monitor both RS485 and dry contact alarms.
- Analog values can be monitored only by the EMU.
- The EMU with sensors can be configured according to site requirements.

Customized Alarms Collected by the UPEU or UEIU

Each UPEU or UEIU in the BBU supports eight Boolean alarm inputs. A maximum of two UPEUs or UPEU+UEIU can be configured for the BBU to receive 16 Boolean alarm inputs. This method can be used for the configuration of fewer than 16 customized alarm inputs. The method to collect customized alarms by using the UPEU or UEIU is shown in **Figure 3-22**.

Figure 3-22 Customized alarms collected by the UPEU or UEIU
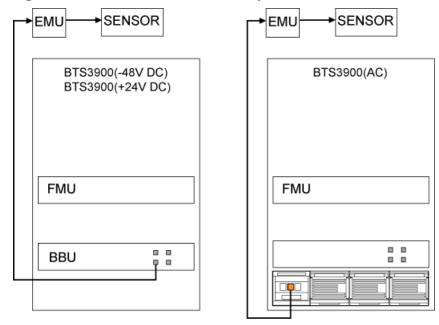
Customized Alarms Collected by the EMU

If there are more than 16 Boolean alarm inputs, the EMU can be configured for the BTS3900. Each EMU supports 32 Boolean alarm inputs and two RS485 signal inputs, the cable connections are shown in **Figure 3-23**.

- The cable connection of the EMU in the BTS3900 cabinet (-48 V DC) and BTS3900 cabinet (+24 V DC): The EMU is connected to the MON1 port on the UPEU in the BBU.

● The cable connection of the EMU in the BTS3900 cabinet (AC): The EMU is connected to the right RS232/RS422 port on the PMU in the AC/DC power equipment.

Figure 3-23 Customized alarms collected by the EMU

4 BTS3900 Components

About This Chapter

This describes the components of the BTS3900, which are the BBU3900, RFUs, DCDU-01, FAN unit, DC/DC power system, AC/DC power system and optional modules. The AC/DC power system is configured in the BTS3900 cabinet (AC); the DC/DC power system is configured in the BTS3900 cabinet (+24 V DC).

A fan box consists of a fan tray, four fans, and an FMU.

4.10 GATM

The GSM Antenna and TMA control Module (GATM) controls the antenna and TMA.

4.11 ELU

The Electronic Label Unit (ELU) reports the cabinet type information to the fan box.

4.12 Power Equipment (DC/DC)

The power equipment (DC/DC) converts +24 V DC power into -48 V DC power.

4.13 Power Equipment (AC/DC)

The power equipment (AC/DC) converts 220 V AC power into -48 V DC power.

4.1 BBU3900 Equipment

This describes the BBU3900 equipment in terms of the appearance, boards and their panels, module, LEDs, ports, and engineering specifications.

The BBU3900 has the following functions:
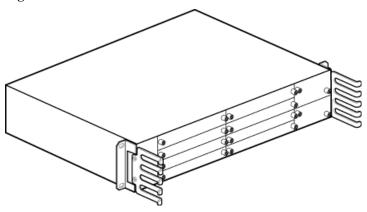
- Provides ports for communication between the base station and the BSC/RNC
- Provides CPRI ports for the communication with the RF modules
- Provides USB ports, which facilitates automatic base station upgrade by allowing a USB disk to be used for software installation and data configuration
- Provides an OM channel between the base station and the LMT or the M2000
- Processes uplink and downlink data
- Manages the entire dual-mode system in terms of OM and signaling processing
- Provides the system clock

4.1.1 Exterior of the BBU3900

The BBU3900, which has a case structure, is 19 inches wide and 2 U high.

The dimensions (W x D x H) of the BBU3900 are 442 mm x 310 mm x 86 mm. **Figure 4-1** shows the BBU3900.
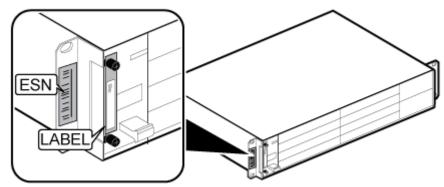
Figure 4-1 BBU3900

The Electronic Serial Number (ESN) is unique to a network element (NE) for identification, and is used during the commissioning of the base station.
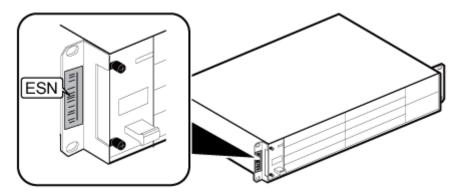
- If there is a label on the FAN unit of the BBU, the ESN is printed on a label and the mounting ears of the BBU. **Figure 4-2** shows the position of the ESN.

Figure 4-2 The position of the ESN (1)

- If there is no label on the FAN unit of the BBU, the ESN is printed on the mounting ears of the BBU. **Figure 4-3** shows the position of the ESN.

Figure 4-3 The position of the ESN (2)

4.1.2 Boards and Module of the BBU3900

This describes the boards and module of the BBU3900 in terms of their configuration principles, functions, ports, LEDs, and DIP switches.

Slot Assignment of the BBU3900

This section describes slot assignment of the BBU3900 in the GSM Only (hereinafter referred to as GO), UMTS Only (hereinafter referred to as UO), LTE Only (hereinafter referred to as LO), GSM+UMTS (hereinafter referred to as GU), GSM+LTE (hereinafter referred to as GL), UMTS+LTE (hereinafter referred to as UL), (GSM+UMTS)+(LTE Only) (hereinafter referred to as GU+LO), (GSM+LTE)+(UMTS Only) (hereinafter referred to as GL+UO) scenarios.

Slots of the BBU3900

The slot assignment of the BBU3900 in GO mode, BBU3900 in GU mode, BBU3900 in UO mode, BBU3900 in LO mode, BBU3900 in GL mode, BBU3900 in UL mode, BBU3900 in GU +LO mode, and BBU3900 in GL+UO mode are the same, as shown in **Figure 4-4**.

Figure 4-4 Slots of the BBU3900

Slot 16	Slot 0	Slot 4	Slot 18
	Slot 1	Slot 5	
	Slot 2	Slot 6	Slot 19
	Slot 3	Slot 7	

BBU3900 Working in GO Mode
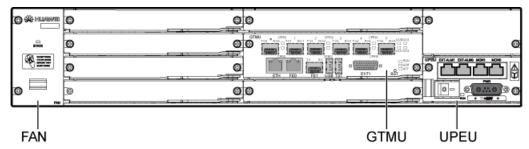
Table 4-1 describes the principles for configuring the boards in the BBU3900 working in GO mode.

Table 4-1 Principles for configuring the boards in the BBU3900 working in GO mode

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
GTMU	Mandatory	1	Slots 5 and 6	It is configured only in slot 6 (with slots 5 and 6 occupied).
FAN	Mandatory	1	Slot 16	It is configured only in slot 16.
UPEU	Mandatory	2	Slot 18 or 19	A single UPEU is preferentially configured in slot 19.
USCU	Optional	1	Slot 0 or 1	It is preferentially configured in slot 1. The 1 U GPS/ GLONASS receiver is configured in slot 1 (with slots 0 and 1 occupied).
UTRP	Optional	1	Slot 0 or 4	It is preferentially configured in slot 4.
UEIU	Optional	1	Slot 18	-
UBRI	Optional	1	Slot 2	-

Figure 4-5 shows the typical configurations of the BBU3900 working in GO mode.

Figure 4-5 Typical configurations of the BBU3900 working in GO mode

FAN   GTMU   UPEU

BBU3900 Working in UO Mode

Table 4-2 describes the principles for configuring the boards in the BBU3900 working in UO mode.

Table 4-2 Principles for configuring the boards in the BBU3900 working in UO mode
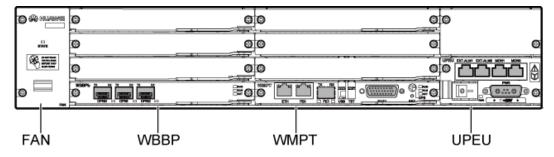
Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
WMPT	Mandatory	2	Slot 6 or 7	A single WMPT is preferentially configured in slot 7.

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
WBBP	Mandatory	6	Slots 0 to 5	It is configured in slot 3 by default. ● If more CPRI ports are required, the WBBP is preferentially configured in slot 3 or 2 in descending order of priority. ● If no more CPRI ports are required, the WBBP is preferentially configured in slot 3, 0, 1, 2, 4, or 5 in descending order of priority. If a WBBPd is required, it is preferentially configured in slot 3 or 2 in descending order of priority. If five or more WBBPs are required, ensure that two WBBPs are installed in slots 2 and 3. At least, one of the two WBBPs is WBBPd.
FAN	Mandatory	1	Slot 16	It is configured only in slot 16.
UPEU	Mandatory	2	Slot 18 or 19	A single UPEU is preferentially configured in slot 19.

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
UEIU	Optional	1	Slot 18	-
UTRP	Optional	4	Slots 0, 1, 4, and 5	It is preferentially configured in slot 4, 5, 0, or 1 in descending order of priority.
USCU	Optional	1	Slot 1 or 0	It is preferentially configured in slot 1. The 1 U GPS/ GLONASS receiver is configured in slot 1 (with slots 0 and 1 occupied).

Figure 4-6 shows the typical configurations of the BBU3900 working in UMTS Only mode.

Figure 4-6 Typical configurations of the BBU3900 working in UO mode

FAN   WBBP   WMPT   UPEU

BBU3900 Working in LO Mode
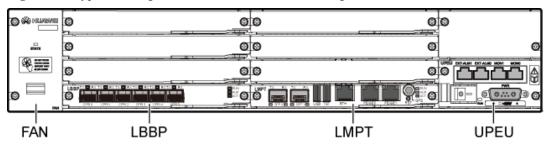
Table 4-3 describes the principles for configuring the boards in the BBU3900 working in LO mode.

Table 4-3 Principles for configuring the boards in the BBU3900 working in LO mode

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
LMPT	Mandatory	2	Slot 6 or 7	A single LMPT is configured in slot 7.
LBBP	Mandatory	6	Slots 0 to 5	A single LBBP is preferentially configured in slot 3. The priorities of slot assignment are as follows: slot 3, slot 2, slot 1, slot 0, slot 4, slot 5.
FAN	Mandatory	1	Slot 16	It is configured only in slot 16.
UPEU	Mandatory	2	Slot 18 or 19	A single UPEU is configured only in slot 19.
UEIU	Optional	1	Slot 18	-
UTRP	Optional	1	Slot 4 or 5	It is preferentially configured in slot 4.
USCU	Optional	1	Slot 0, 1, 4, or 5	A single USCU is preferentially configured in slot 5. A USCU that occupies 1 U space is configured in slots 5 and 4. If slots 4 and 5 are occupied, a single USCU is configured in slot 1. In this situation, a USCU that occupies 1 U space is configured in slots 1 and 0.

Figure 4-7 shows the typical configurations of the BBU3900 working in LO mode.

Figure 4-7 Typical configurations of the BBU3900 working in LO mode

FAN   LBBP   LMPT   UPEU

BBU3900 Working in GU Mode

Table 4-4 describes the principles for configuring the boards in the BBU3900 working in GU mode.

Table 4-4 Principles for configuring the boards in the BBU3900 working in GU mode
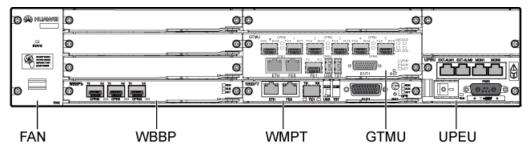
Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
WMPT	Mandatory	1	Slot 7	It is configured only in slot 7.
GTMU	Mandatory	1	Slots 5 and 6	It is configured only in slot 6 (with slots 5 and 6 occupied).

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
WBBP	Mandatory	5	Slots 0 to 4	It is configured in slot 3 by default. ● If more CPRI ports are required, the WBBP is preferentially configured in slot 3 or 2 in descending order of priority. ● If no more CPRI ports are required, the WBBP is preferentially configured in slot 3, 2, 0, 1, or 4 in descending order of priority. If a WBBPd is required, it is preferentially configured in slot 3 or 2 in descending order of priority. If five or more WBBPs are required, ensure that two WBBPs are installed in slots 2 and 3. At least, one of the two WBBPs is WBBPd.
FAN	Mandatory	1	Slot 16	It is configured only in slot 16.
UPEU	Mandatory	2	Slot 18 or 19	A single UPEU is configured only in slot 19.

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
UEIU	Optional	1	Slot 18	-
UTRP	Optional	2	Slot 0 or 4	It is preferentially configured in slot 4. The slot priority of the GO UTRP is higher than that of the UO UTRP.
USCU	Optional	1	Slot 0 or 4	It is preferentially configured in slot 4.
UBRI	Optional	1	Slot 2	-

Figure 4-8 shows the typical configurations of the BBU3900 working in GU mode.

Figure 4-8 Typical configurations of the BBU3900 working in GU mode


BBU3900 Working in GL Mode

Table 4-5 describes the principles for configuring the boards in the BBU3900 working in GL mode.
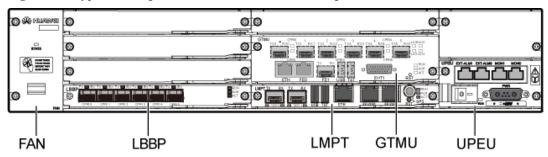
Table 4-5 Principles for configuring the boards in the BBU3900 working in GL mode

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
LMPT	Mandatory	1	Slot 7	It is configured only in slot 7.

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
GTMU	Mandatory	1	Slots 5 and 6	It is configured only in slot 6 (with slots 5 and 6 occupied).
LBBP	Mandatory	5	Slots 0 to 4	It is preferentially configured in slot 3. The priorities of slot assignment are as follows: slot 3, slot 2, slot 1, slot 0, slot 4
FAN	Mandatory	1	Slot 16	It is configured only in slot 16.
UPEU	Mandatory	2	Slot 18 or 19	A single UPEU is configured only in slot 19.
UEIU	Optional	1	Slot 18	-
UTRP	Optional	2	Slot 0 or 4	It is preferentially configured in slot 4, 0, or 1 in descending order of priority. The slot priority of the GO UTRP is higher than that of the LO UTRP.
USCU	Optional	1	Slot 0 or 4	It is preferentially configured in slot 1. The 1 U GPS/ GLONASS receiver is configured in slot 1 (with slots 0 and 1 occupied).
UBRI	Optional	1	Slot 2	-

Figure 4-9 shows the typical configurations of the BBU3900 working in GL mode.

Figure 4-9 Typical configuration of the BBU3900 working in GL mode

FAN LBBP LMPT GTMU UPEU

BBU3900 Working in UL Mode

Table 4-6 describes the principles for configuring the boards in the BBU3900 working in UL mode.

**Table 4-6** Principles for configuring the boards in the BBU3900 working in UL mode

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
LMPT	Mandatory	1	Slot 6	It is configured only in slot 6.
WMPT	Mandatory	1	Slot 7	It is configured only in slot 7.
LBBP	Mandatory	5	Slot 0, 1, 2, 4, or 5	A single LBBP is configured only in slot 2. If more LBBPs are required, the LBBP is preferentially configured in slot 2, 0, 1, 4, or 5 in descending order of priority.

Board	Optional/ Mandatory	Maximum Quantity	Installation Slot	Remarks
WBBP	Mandatory	4	Slot 0, 1, 3, 4, or 5	A single WBBP is configured only in slot 3. If more LBBPs are required, the WBBP is preferentially configured in slot 3, 0, 1, 4, or 5 in descending order of priority. If a WBBPd is required, it is configured only in slot 3.
FAN	Mandatory	1	Slot 16	It is configured only in slot 16.
UPEU	Mandatory	2	Slot 18 or 19	A single UPEU is configured only in slot 19.
UEIU	Optional	1	Slot 18	-
UTRP	Optional	2	Slot 4 or 5	It is preferentially configured in slot 4. The slot priority of the UO UTRP is higher than that of the LO UTRP.
USCU	Optional	1	Slot 4 or 5	It is preferentially configured in slot 4.

Figure 4-10 shows the typical configurations of the BBU3900 working in UL mode.

Figure 4-10 Typical configuration of the BBU3900 working in UL mode


BBU3900 Working in GU+LO Mode

BBU3900 Working in GU Mode shows the configuration principles of the boards in the BBU3900 working in GU mode.

BBU3900 Working in LO Mode shows the configuration principles of the boards in the BBU3900 working in LO mode.

BBU3900 Working in GL+UO Mode

BBU3900 Working in GL Mode shows the configuration principles of the boards in the BBU3900 working in GL mode.

BBU3900 Working in UO Mode shows the configuration principles of the boards in the BBU3900 working in UO mode.

GTMU

The GSM Transmission & Timing & Management Unit for BBU (GTMU) is the basic transmission and control function entity of the BBU. It provides the reference clock, maintenance port, and external alarm collection port, monitors the power supply, and controls and manages the entire base station.

Panel

The GTMU is classified into two types: GTMU and GTMUb. **Figure 4-11** and **Figure 4-12** show the panels of the GTMU and GTMUb.

Figure 4-11 GTMU panel
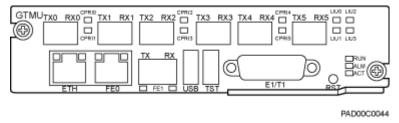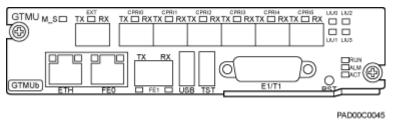
Figure 4-12 GTMUb panel

PAD00C0045

Functions

The GTMU and GTMUb have the following functions:

- Controls and manages the base station
- Supports fault management system, configuration management system, performance management system, and security management system
- Monitors the fans and power modules
- Provides and manages the clock source of the base station in centralized mode
- Provides the clock output for test
- Provides the FE port for maintenance on the OM system
- Supports transmission through four E1s and two FEs
- Provides CPRI ports for communication between the BBU and the RFUs
- The GTMUb supports interconnected BBUs.

LEDs

Table 4-7 describes the LEDs on the GTMU.

Table 4-7 LEDs on the GTMU

LED	Color	Status	Description
RUN	Green	ON	The board is faulty.
		OFF	There is no power supply, or the board is faulty.
		ON for 1s and OFF for 1s	The board is running properly.
		ON for 2s and OFF for 2s	The board is being tested.
		ON for 0.125s and OFF for 0.125s	Software is being loaded to the board.
ALM	Red	ON	An alarm is generated, indicating a running fault.
		OFF	The board is running properly.

LED	Color	Status	Description
ACT	Green	ON	The board is in the active state.
		OFF	The board is in the standby state.

Besides the preceding three LEDs, there are LEDs indicating the connection status of the FE optical port, FE electrical port, CPRI port and commissioning port. Each of the LEDs is positioned near the relevant port without any label on the panel of the board. **Table 4-8** describes the LEDs and their status.

Table 4-8 LEDs and their status

LED	Color	Status	Description
LIU0 to LIU3	Green	ON	The link is in the idle state.
		ON for 0.125s and OFF for 0.125s	An E1/T1 remote alarm is generated.
		OFF	The link is functional.
CPRI0 to CPRI5	Green	ON	The CPRI link is functional.
	Red	ON	The optical module fails to receive signals.
ETH	Green (LINK LED on the left)	ON	The connection is set up successfully.
		OFF	No connection is set up.
	Orange (ACT LED on the right)	Blinking	Data is being transmitted.
		OFF	No data is being transmitted.
FE0	Green (LINK LED on the left)	ON	The connection is set up successfully.
		OFF	No connection is set up.
	Orange (ACT LED on the right)	Blinking	Data is being transmitted.
		OFF	No data is being transmitted.

LED	Color	Status	Description
FE1(GTMUb)	Green (LINK LED on the left)	ON	The connection is set up successfully.
		OFF	No connection is set up.
	Green (ACT LED on the right)	Blinking	Data is being transmitted.
		OFF	No data is being transmitted.
M_S (GTMUb)	-	-	This is the LED of the reserved port.
EXT (GTMUb)	-	-	This is the LED of the reserved port.

Ports

Table 4-9 describes the ports on the GTMU.

Table 4-9 Ports on the GTMU

Label	Connector	Description
CPRI0 to CPRI5	SFP female	Data transmission port interconnected to the RFU. It supports the input and output of optical and electrical transmission signals
EXT (GTMUb)	SFP female	Obligate
ETH	RJ45 connector	Local maintenance and debugging port
FE0	RJ45 connector	Connected to the routers in the equipment room through FE cables to transmit network information
FE1	DLC connector	Connected to the routers in the equipment room through optical cables to transmit network information
USB	USB connector	Used for automatic software upgrade through the USB disk
TST	USB connector	Provides a reference clock for the tester
E1/T1	DB26 female connector	Used for four E1/T1 inputs and outputs between the GTMU and the UELP or between BSCs

The **RST** button on the panel of the GTMU is used for resetting the board.

DIP Switches

On the GTMU, there are five DIP switches, each of which has four bits. DIP switches **S1** and **S2** must be set together. The functions of the five DIP switches are as follows:

- **S1** is used to select the E1 resistance. **Table 4-10** provides details on the DIP switch.
- **S2** is used to select the grounding mode of E1/T1 cables. **Table 4-11** provides details on the DIP switch.
- **S3** is reserved.
- **S4** is used to select the E1 bypass. **Table 4-12** provides details on the DIP switch.
- **S5** is used for timeslot settings when the E1 bypass is selected. **Table 4-13** provides details on the DIP switch.

Table 4-10 Details of the DIP Switch **S1**

DIP Switch	Bit Status				Description
	1	**2**	**3**	**4**	
S1	ON	ON	OFF	OFF	The E1 resistance is set to 75 ohm.
	OFF	ON	OFF	OFF	The E1 resistance is set to 120 ohm.
	ON	OFF	OFF	OFF	The T1 resistance is set to 100 ohm.
	Others				Unavailable

NOTE

Bits 3 and 4 of **S1** should be kept as out-of-factory state, without any manual setting on site. The out-of-factory state should be OFF. If the bits are ON, set them to OFF.

Table 4-11 Details of the DIP Switch **S2**

DIP Switch	Bit Status				Description
	1	**2**	**3**	**4**	
S2	OFF	OFF	OFF	OFF	By default, all the DIP bits of S2 are set to OFF in all the modes.
	ON	ON	ON	ON	When the four E1 RX links in 75 ohm have errors, all the bits of S2 must be set to ON to rectify the faults on the E1 links.
	Others				Unavailable

Table 4-12 Details of the DIP Switch **S4**

DIP Switch	Bit Status				Description
	1	**2**	**3**	**4**	
S4	ON	ON	ON	ON	Supporting E1 bypass
	OFF	OFF	OFF	OFF	Not supporting E1 bypass
	Others				Unavailable

Table 4-13 Details of the DIP Switch **S5**

DIP Switch	Bit Status				Description
	1	**2**	**3**	**4**	
S5	ON	ON	ON	ON	Not supporting E1 bypass
	OFF	ON	ON	OFF	Supporting E1 bypass of level-1 cascaded base stations
	ON	OFF	ON	OFF	Supporting E1 bypass of level-2 cascaded base stations
	OFF	OFF	ON	OFF	Supporting E1 bypass of level-3 cascaded base stations
	ON	ON	OFF	OFF	Supporting E1 bypass of level-4 cascaded base stations
	OFF	ON	OFF	OFF	Supporting E1 bypass of level-5 cascaded base stations
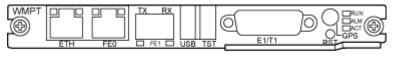
WMPT

The WCDMA Main Processes and Transmission unit (WMPT) of the BBU3900 processes the signals and manages the resources for other boards.

Panel

Figure 4-13 shows the panel of the WMPT.

Figure 4-13 Panel of the WMPT

PAD00C0040

Functions

The WMPT has the following functions:

- Provides Operation and Maintenance (OM) functions such as configuration management, equipment management, performance monitoring, signaling processing, and active/ standby switchover and provides OM channels connected to the OMC (LMT or M2000)

- Provides the reference clock

- Processes signaling and manages resources for other boards in the BBU3900

- Provides USB ports, one of which facilitates automatic base station upgraded when a USB disk is inserted during software installation and data configuration

- Provides four E1s/T1s which support ATM and IP protocols

- Provides one FE electrical port and one FE optical port which support the IP protocol

LEDs

Table 4-14 describes the LEDs on the WMPT panel.
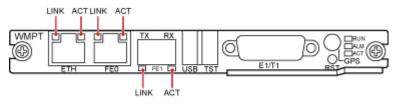
Table 4-14 LEDs on the WMPT panel

Label	Color	Status	Meaning
RUN	Green	ON	The power input is available, but the board is faulty.
		OFF	The power supply is unavailable.
		1s ON and 1s OFF	The board in normal configuration is running properly.
		0.125s ON and 0.125s OFF	The software is being loaded to the board, or the board is not in use.
ALM	Red	OFF	No alarm is generated.
		ON	The board has alarms on hardware.

Label	Color	Status	Meaning
ACT	Green	ON	The board is in active mode.
		OFF	The board is in standby mode.

In addition to the previous three LEDs, the WMPT has another six LEDs indicating the connection status of the FE optical port, FE electrical port, and the commissioning Ethernet port. The six LEDs have no silk screen and are on both sides of each of the three ports. **Figure 4-14** shows the LEDs beside the three ports.

Figure 4-14 LEDs beside the three ports on the WMPT

PAD00C0041

Table 4-15 describes the LEDs and their status.

Table 4-15 LEDs and their status

LED	Color	Status	Meaning
LEDs beside the FE1 optical port	Green (LINK)	ON	The connections are functional.
		OFF	The connections are faulty.
	Green (ACT)	Blinking	Data transmission is ongoing.
		OFF	No data transmission is ongoing.
LEDs beside the FE0 electrical port	Green (LINK)	ON	The connections are functional.
		OFF	The connections are faulty.
	Yellow (ACT)	Blinking	Data transmission is ongoing.
		OFF	No data transmission is ongoing.

LED	Color	Status	Meaning
ETH	Green (LINK)	ON	The connections are functional.
		OFF	The connections are faulty.
	Yellow (ACT)	Blinking	Data transmission is ongoing.
		OFF	No data transmission is ongoing.

Ports

Table 4-16 describes the ports on the WMPT panel.

Table 4-16 Ports on the WMPT panel

Label	Connector Type	Description
E1/T1	DB26 connector	E1/T1 port
FE0	RJ45 connector	FE electrical port
FE1	SFP connector	FE optical port
GPS	SMA connector	Obligate
ETH	RJ45 connector	Commissioning Ethernet port
USB	USB connector	USB loading port
TST	USB connector	USB testing port
RST	-	Resetting the BBU

DIP Switches

The WMPT has two DIP switches: SW1 for setting the E1/T1 working mode and SW2 for setting the protection grounding for the E1/T1 cables receiving 4-way signals. **Figure 4-15** shows the DIP switches on the WMPT.
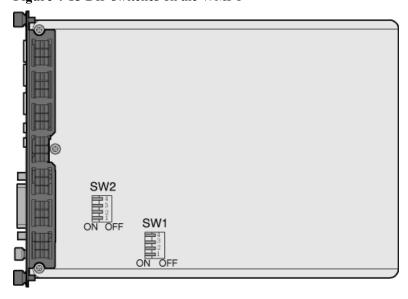
Figure 4-15 DIP switches on the WMPT

Table 4-17 and Table 4-18 describe the settings of SW1 and SW2.

Table 4-17 Settings of SW1

DIP Switch	DIP Status				Description
	1	2	3	4	
SW1	ON	ON	OFF	OFF	T1 Mode
	OFF	OFF	ON	ON	The E1 impedance is set to 120 ohms.
	ON	ON	ON	ON	The E1 impedance is set to 75 ohms.
	Other settings of the DIP bits				Disabled

Table 4-18 Settings of SW2

DIP Switch	DIP Status				Description
	1	2	3	4	
SW2	OFF	OFF	OFF	OFF	Balanced Mode

DIP Switch	DIP Status				Description
	1	**2**	**3**	**4**	
	ON	ON	ON	ON	Unbalanced Mode
	Other settings of the DIP bits				Disabled
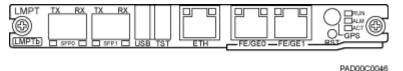
LMPT

The LTE Main Processing & Transmission unit (LMPT) manages the entire eNodeB system in terms of OM and signaling processing and provides the clock for the BBU3900.

Panel

Figure 4-16 shows the LMPT.

Figure 4-16 LMPT

PAD00C0046

Functions

The LMPT has the following functions:

- Enabling configuration management, device management, performance monitoring, signaling processing, and radio source management
- Enabling control for the boards in the system
- Providing the system clock
- Enabling signal exchange between the eNodeB and MME/S-GW

LEDs

There are three LEDs on the panel of the LMPT. **Table 4-19** describes the LEDs on the LMPT.

Table 4-19 LEDs on the panel of the LMPT

Label	Color	Status	Description
RUN	Green	On	The board is powered on but it is faulty.
		Off	There is no power supply, or the board is faulty.

Label	Color	Status	Description
		Blinking (on for 1s and off for 1s)	Data is being loaded to the board, the board is not started, or the board is running in a secure version.
		Blinking (on for 0.125s and off for 0.125s)	The board is being loaded, the board is not started, or the board is running properly.
ALM	Red	On	An alarm is reported, indicating a fault in the board.
		Off	The board is working properly.
		Blinking (on for 1s and off for 1s)	An alarm is generated, and the alarm may be caused by an associated board or port fault. Therefore, you must locate the fault before replacing the board.
ACT	Green	On	The board works in active mode.
		Off	The board works in standby mode.
		Blinking (on for 0.125s and off for 0.125s)	The OML link is disrupted.
		Blinking (on for 1s and off for 1s)	The board is being tested, such as an RRU Voltage Standing Wave Ratio (VSWR) test through a USB disk. When an upgrade through a USB disk is implemented, the ACT LED does not blink.

Besides the preceding three LEDs, some other LEDs used for indicating the connection status of the FE optical port, FE electrical port, commissioning Ethernet port have no silkscreen on the board. They are near the ports. **Table 4-20** describes the LEDs.

Table 4-20 Ports and LEDs

Label	Color	Status	Description
SFP0 and SFP1	Green (LINK)	On	The connection is set up successfully.
		Off	No connection is set up.
	Orange (ACT)	Blinking	Data is being transmitted.
		Off	No data is being transmitted.
ETH	Orange (ACT)	Blinking	Data is being transmitted.
		Off	No data is being transmitted.
	Green (LINK)	On	The connection is set up successfully.
		Off	No connection is set up.
FE/GE0 to FE/GE1	Green (LINK)	On	The connection is set up successfully.
		Off	No connection is set up.
	Orange (ACT)	Blinking	Data is being transmitted.
		Off	No data is being transmitted.

Port

Table 4-21 describes the ports on the panel of the LMPT.

Table 4-21 Ports on the panel of the LMPT

Label	Connector Type	Quantity	Application
SFP0 and SFP1	LC	2	FE/GE optical port, used for connecting transmission equipment or gateway equipment
USB	USB	1	Software loading

Label	Connector Type	Quantity	Application
TST	USB	1	Testing
ETH	RJ45 connector	1	Commissioning
FE/GE0 to FE/GE1	RJ45 connector	2	FE/GE electrical port, used for connecting transmission equipment or gateway equipment
GPS	SMA	1	Receiving GPS signals
RST	-	1	Resetting the BBU3900

📖 **NOTE**

> SFP0 and FE/GE0 ports on the LMPT are used for one GE input or output. Therefore, they are not used simultaneously.
>
> SFP1 and FE/GE1 ports on the LMPT are used for another GE input. Therefore, they are not used simultaneously.

WBBP

The WCDMA Baseband Process Unit (WBBP) in the BBU3900 processes baseband signals.

Panel

The WBBP has three types of panels, as shown in **Figure 4-17**, **Figure 4-18**, and **Figure 4-19**.

Figure 4-17 Panel of the WBBPa

Figure 4-18 Panel of the WBBPb

Figure 4-19 Panel of the WBBPd

Function

The WBBP has the following functions:

- Provides the CPRI ports for communication between the BBU and the RF module, and supports the CPRI interface in 1+1 backup mode.

- Processes uplink and downlink baseband signals.

- The WBBPd supports interference cancellation (IC) within the board.

- The WBBPd supports the IC function of uplink data when installed in slot 2 or slot 3.

Table 4-22 describes the specifications of the WBBP.

📖 **NOTE**

The baseband board in slot 2 or slot 3 could transfer the received CPRI data to other boards.

Table 4-22 Specifications of the WBBP

Board	Number of Cells	Number of UL CEs	Number of DL CEs	Baseband Transfer Capacity
WBBPa	3	128	256	Twelve 1T2R cells
WBBPb1	3	64	64	Twelve 1T2R cells
WBBPb2	3	128	128	Twelve 1T2R cells
WBBPb3	6	256	256	Twelve 1T2R cells
WBBPb4	6	384	384	Twelve 1T2R cells
WBBPd1	6	192	192	Twenty-four 1T2R cells
WBBPd2	6	384	384	Twenty-four 1T2R cells
WBBPd3	6	256	256	Twenty-four 1T2R cells

LED

There are three LEDs on the panel of the WBBP. Table 4-23 describes the LEDs on the WBBP and their status.

Table 4-23 LEDs on the panel of the WBBP and their status

Label	Color	Status	Description
RUN	Green	On	There is power supply, but the board is faulty.
		Off	There is no power supply, or the board is faulty.
		Blinking (on for 1s and off for 1s)	The board is running properly.
		On for 0.125s and off for 0.125s	Software is being loaded to the board.
ACT	Green	On	The board is running.
		Off	The board is not in use.
ALM	Red	Off	The board is running properly.
		On	The board has a hardware alarm.

The WBBPa and the WBBPb both provide three LEDs indicating the status of the Small Form-factor Pluggable (SFP) links, which are below the SFP ports. The WBBPd provides six LEDs indicating the status of the SFP links, which are above the SFP ports.

Table 4-24 describes the LEDs.

Table 4-24 LEDs indicating the status of the SFP links

Label	Color	Status	Description
TX RX	Red/green	Off	No cable is connected to the optical module, or the optical module is powered off.
		Steady green	The CPRI link is functional, and the RF module has no hardware faulty.
		Steady red	The optical module is not in position, or the CPRI link is faulty.
		Blinking red (on for 0.125s and off for 0.125s)	The RF module on the CPRI link has a hardware fault, and the RF module needs to be replaced.

Label	Color	Status	Description
		Blinking red (on for 1s and off for 1s)	A VSWR alarm, antenna alarm, or external alarm is generated on the RF unit on the CPRI link.

Ports

Table 4-25 describes the three CPRI ports on the panel of the WBBPa and WBBPb.

Table 4-25 Ports on the panel of the WBBPa and WBBPb

Label	Connector Type	Description
CPRIx	SFP female	Data transmission port interconnected to the RF module. It supports the input and output of optical and electrical transmission signals.

Table 4-26 describes the six CPRI ports on the panel of the WBBPd.

Table 4-26 Ports on the panel of the WBBPd

Label	Connector Type	Description
CPRI0, CPRI1, CPRI2, CPRI3/ EIH0, CPRI4/EIH1, CPRI5/EIH2	SFP female	Data transmission port interconnected to the RF module. It supports the input and output of optical and electrical transmission signals.

LBBP

The LTE BaseBand Processing unit (LBBP) in the BBU3900 processes the baseband signals.

Panel

The LBBP has two types of panels, as shown in Figure 4-20 and Figure 4-21.

Figure 4-20 Panel of the LBBPb

Figure 4-21 Panel of the LBBPc

📖 **NOTE**

The LBBPc can be used in both LTE FDD and LTE TDD modes, and the LBBPb can be used in only LTE FDD mode.

Function

The LBBP has the following functions:

- Processes uplink and downlink baseband signals
- Provides CPRI ports connected to RF modules

Table 4-27 describes the specifications of the LBBP working in LTE FDD mode.

Table 4-27 Specifications of the LBBP

Board	Number of Cells	Bandwidth of the Cell	Antenna Configuration
LBBPb	3	10M	2T2R
	1	20M	2T2R
	1	10M	4T4R
LBBPc	3	20M	2T2R
	3	10M	4T4R
	1	20M	4T4R

Table 4-28 describes the specifications of the LBBP working in LTE TDD mode.

Table 4-28 Specifications of the LBBP

Board	Number of Cells	Bandwidth of the Cell	Antenna Configuration
LBBPc	3	20M	2T2R
	3	10M	4T4R
	1	20M	4T4R
	1	10M/20M	8T8R

LED

There are three LEDs on the panel of the LBBP. **Table 4-29** describes the LEDs on the LBBP.

Table 4-29 LEDs on the LBBP

Label	Color	Status	Description
RUN	Green	On	The board is powered on but is faulty.
		Off	The board is not powered on, or it is faulty.
		On for 1s and off for 1s	The board is running properly.
		On for 0.125s and off for 0.125s	Data is being loaded to the board, or the board is not started.
ALM	Red	On	An alarm is generated, and the board must be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated, and the alarm may be caused by an associated board or port fault. Therefore, you must identify the fault before replacing the board.
		Off	The board is running properly.
ACT	Green	On	The board works in active mode.
		Off	The board works in standby mode.

The LBBP provides six LEDs indicating the status of the SFP links. The LEDs are positioned above the SFP ports. **Table 4-30** describes the LEDs.

Table 4-30 LEDs indicating the status of the SFP links

Label	Color	Status	Description
TX RX	Red/Green	Steady green	The CPRI link is available.
		Steady red	The optical module may fail to send or receive signals. (The failure may be caused by a faulty optical module or disconnected optical fiber.)
		Blinking red (on for 0.125s and off for 0.125s)	The RF unit in the CPRI link has a hardware fault.
		Blinking red (on for 1s and off for 1s)	The CPRI link is out of lock (The fault may be caused by mutual lock of dual-mode clock sources or mismatched data rate over CPRI interfaces, and you are advised to check the system configuration) or the VSWR alarm is reported on the RRUs in the CPRI link (because the USB storage disk is under test).
		Off	The SFP module is not in position or the optical module is powered off.

Port

Table 4-31 describes the ports on the panel of the LBBP.

Table 4-31 Ports on the LBBP

Label	Connector	Quantity	Description
CPRI0 to CPRI5	SFP female	6	The CPRI ports connect to the LRRUs or LRFUs for transmitting service data, clock signals, and synchronization information
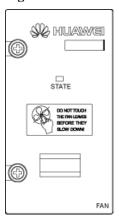
FAN

The FAN unit of the BBU3900 controls the fan speed, monitors the temperature of the FAN unit, and dissipates the heat from the BBU.

Panel

Figure 4-22 shows the panel of the FAN unit.

Figure 4-22 Panel of the FAN unit

Functions

The FAN unit performs the following functions:

- Controls the fan speed.
- Reports the fan status to the main control board.
- Monitors the temperature of the air inlets.
- Dissipates the heat.

LEDs

The FAN unit has one LED, indicating the running status of the module. **Table 4-32** describes the LED on the FAN unit and its status.

Table 4-32 LED on the FAN unit and its status

Label	Color	Status	Description
STATE	Green	On for 0.125s and off for 0.125s	The module is not registered, and no alarm is reported.
		On for 1s and off for 1s	The module is running properly.
	Red	Off	No alarm is reported.
		On for 1s and off for 1s	The module is reporting alarms.
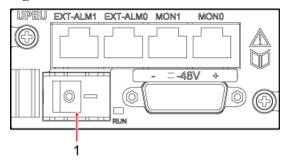
UPEU

The Universal Power and Environment Interface Unit (UPEU) is a mandatory board of the BBU3900. It converts -48 V or +24 V DC power to +12 V DC power.

Panels
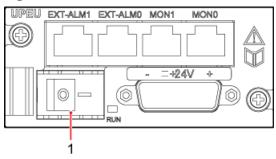
The UPEU is classified into the Universal Power and Environment Interface Unit Type A (UPEUA) and the Universal Power and Environment Interface Unit Type B (UPEUB). The UPEUA converts -48 V DC power to +12 V DC power and the UPEUB converts +24 V DC power to +12 V DC power. **Figure 4-23** shows the UPEUA panel and **Figure 4-24** shows the UPEUB panel.

Figure 4-23 Panel of the UPEUA

(1) Power switch of the BBU

Figure 4-24 Panel of the UPEUB

(1) Power switch of the BBU

Functions

The UPEU performs the following functions:

- Converts -48 V DC or +24 V DC power to +12 V DC power that is applicable to the boards
- Provides two ports for two RS485 inputs and two ports for eight Boolean signals
- Provides reverse connection protection for power cable connectors
- If two UPEUs are configured, two power inputs are required. The UPEU in slot 19 works in active mode, and the UPEU in slot 18 works in standby mode

LEDs

The UPEU has one LED that indicates the operating status of the board. **Table 4-33** describes the LED and its status.

Table 4-33 LED on the UPEU and its status

Label	Color	Status	Description
RUN	Green	On	The UPEU is operational.
		Off	Input power is unavailable or the board is faulty.

Ports

The UPEU provides two RS485 ports and two ports for eight Boolean signals. When configured in different slots, the ports on the UPEU have different functions. **Figure 4-25** shows the slots in the BBU.

Figure 4-25 Slots in the BBU
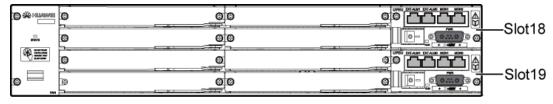
Table 4-34 describes the ports on the panel of the UPEU.

Table 4-34 Ports on the panel of the UPEU

Slot	Label	Connector	Quantity	Description
Slot 19	**+24V** or **-48V**	3V3	1	Port for +24 V DC or -48 V DC input power
	EXT-ALM0	RJ-45	1	Port for Boolean signal inputs 0 to 3
	EXT-ALM1	RJ-45	1	Port for Boolean signal inputs 4 to 7
	MON0	RJ-45	1	Port for RS485 signal input 0
	MON1	RJ-45	1	Port for RS485 signal input 1
Slot 18	**+24V** or **-48V**	3V3	1	Port for +24 V DC or -48 V DC input power
	EXT-ALM0	RJ-45	1	Port for Boolean signal inputs 0 to 3
	EXT-ALM1	RJ-45	1	Port for Boolean signal inputs 4 to 7
	MON0	RJ-45	1	Port for RS485 signal input 0
	MON1	RJ-45	1	Port for RS485 signal input 1
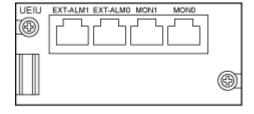
UEIU

The Universal Environment Interface Unit (UEIU) transmits monitoring and alarm signals from the external devices to the main control and transmission unit.

Panel

Figure 4-26 shows the panel of the UEIU.

Figure 4-26 Panel of the UEIU

PAD00C0061

Functions

The UEIU performs the following functions:

- Provides two ports, each transmitting one RS485 signal.
- Provides two ports, each transmitting four Boolean signals. The Boolean signal inputs can be dry contact type or open collector (OC) type.
- Transmits monitoring signals and alarm signals from external devices to the main control and transmission unit.

Ports

The UEIU is configured in slot 18. It provides four ports with two ports transmitting two RS485 input signals and the other two ports transmitting eight Boolean signals.

Table 4-35 describes the ports on the panel of the UEIU.

Table 4-35 Ports on the panel of the UEIU

Slot	Label	Connector	Quantity	Description
slot 18	EXT-ALM0	RJ-45	1	No.0 to 3 Boolean signal input ports
	EXT-ALM1	RJ-45	1	No.4 to 7 Boolean signal input ports
	MON0	RJ-45	1	No.0 RS485 signal input port
	MON1	RJ-45	1	No.1 RS485 signal input port
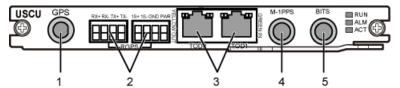
USCU

This section describes the Universal Satellite card and Clock Unit (USCU).

Panel

There are two types of USCU: USCUb0, USCUb1 and USCUb2, as shown in **Figure 4-27** and **Figure 4-28**.

Figure 4-27 Panel of the USCUb0/USCUb1 (0.5 U)

Figure 4-28 Panel of the USCUb2 (1 U)

(1) GPS port	(2) RGPS port	(3) TOD port	(4) M-1PPS port	(5) BITS port

Functions

The USCU has the following functions:

● The USCU provides interface for an external RGPS device (such as a reused device of the operator), Metro1000 device, BITS device, and TOD input.

● The USCUb0 does not incorporate the satellite card.

● The USCUb1 has the GPS receiver. It is used for clock synchronization or obtaining accurate clock signals from transmission devices.

● A dual-satellite receiver is configured in a USCUb2, which supports GPS, GLONASS, or COMPASS clock signals.

LED

Table 4-36 and **Table 4-37** describe the LEDs on the USCU.

Table 4-36 LEDs on the USCU

LED	Color	Status	Description
RUN	Green	On	There is power supply, and the board is faulty.
		Off	There is no power supply, or the board is faulty.
		Blinking (on for 1s and off for 1s)	The board is running properly.
		Blinking (on for 0.125s and off for 0.125s)	Software is being loaded to the board, or the board is not configured.
ALM	Red	Off	The board is running properly, and no alarm is generated.
		On	An alarm is generated, and the board needs to be replaced.

LED	Color	Status	Description
		Blinking (on for 1s and off for 1s)	An alarm is generated. The alarm may be caused due to faults in the related boards or ports. Therefore, whether the board needs to be replaced cannot be determined.
ACT	Green	On	The serial port for communication between the USCU and the main control board is enabled.
		Off	The serial port for communication between the USCU and the main control board is disabled.

Table 4-37 LEDs on the TOD port

Color	Meaning	Default Configuration
Green	On: The TOD port is configured as the input port.	The green LED of the TOD0 port is off, and the yellow LED of the TOD0 port is on.
Yellow	On: The TOD port is configured as the output port.	The yellow LED of the TOD1 port is off, and the green LED of the TOD1 port is on.

Ports

Table 4-38 describes the ports on the USCU.

Table 4-38 Ports on the USCU

Port	Connector	Description
GPS port	SMA coaxial connector	Receives GPS signals
RGPS port	PCB welded wiring terminal	Receives RGPS signals
TOD0 port	RJ45 connector	Receives or transmits 1PPS+TOD signals
TOD1 port	RJ45 connector	Receives or transmits 1PPS+TOD signals, and receives TOD signals from the M1000

Port	Connector	Description
BITS port	SMA coaxial connector	Receives BITS clock signals, and supports adaptive input of 2.048 MHz and 10 MHz clock reference source
M-1PPS port	SMA coaxial connector	Receives 1PPS signals from the M1000

UTRP

This describes the Universal Transmission Processing unit (UTRP) board. As the transmission extension board of the BBU3900, the UTRP provides eight E1s/T1s, one unchannelized STM-1/OC-3 port, four electrical ports, or two optical ports.

Specification

Table 4-39 describes the specifications of the UTRP.

Table 4-39 Specifications of the UTRP

Board	Sub-board/Board Type	Port	Mode
UTRP2	UEOC	Two universal FE/GE optical port	UMTS
UTRP3	UAEC	Ports for eight channels of ATM over E1/T1	UMTS
UTRP4	UIEC	Ports for eight channels of IP over E1/T1	UMTS
UTRPb4	No sub-board	Ports for eight channels of TDM over E1/T1	GSM
UTRPb4	No sub-board	Ports for eight channels of IP over E1/T1	LTE
UTRP6	UUAS	Port for one unchannelized STM-1/OC-3	UMTS
UTRP9	UQEC	Four universal FE/GE electrical ports	UMTS

Panels

Figure 4-29 shows the panel of the UTRP2 supporting two optical ports.

Figure 4-29 Panel of the UTRP2 supporting two optical ports

Figure 4-30 shows the panel of the UTRP3, UTRP4, and UTRPb4 supporting eight E1s/T1s.

Figure 4-30 Panel of the UTRP3, UTRP4, and UTRPb4 supporting eight E1s/T1s
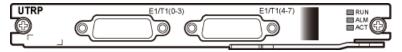
Figure 4-31 shows the panel of the UTRP6 supporting one STM-1.

Figure 4-31 Panel of the UTRP6 supporting one STM-1
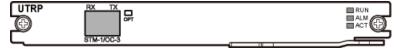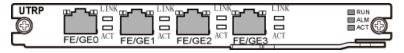
Figure 4-32 shows the panel of the UTRP9 supporting four electrical ports.

Figure 4-32 Panel of the UTRP supporting four electrical ports

Functions

The UTRP has the following functions:

- The UTRP2 provides two 100M/1000M Ethernet optical ports, performs functions of the MAC layer, receives and transmits data on Ethernet links, and analyzes the MAC address.

- The UTRP3 provides eight E1s/T1s and performs inverse multiplexing and demultiplexing on a single ATM cell flow on the eight E1/T1 links.

- The UTRP4 provides eight E1s/T1s, frames and deframes HDLC frames, and allocates and controls the 256 HDLC timeslot channels.

- The UTRPb4 provides an E1/T1 port for four TDM transmission links in GSM mode and provides a port for four transmission links in another mode for co-transmission in a dual-mode base station.

- The UTRP6 supports one unchannelized STM-1/OC-3 port.

- The UTRP9 provides four 10M/100M/1000M Ethernet electrical ports and performs the functions of the MAC layer and physical layer.

- The cold backup is supported.

LEDs

Table 4-40 describes the LEDs on the panel of the UTRP.

Table 4-40 LEDs on the panel of the UTRP

Label	Color	Status	Description
RUN	Green	ON	The board has power input, but the board is faulty.
		OFF	The board has no power input, or the board is faulty.
		ON for 1s and OFF for 1s	The board is running properly.
		ON for 0.125s and OFF for 0.125s	The board is not configured or is loading software.
		ON for 2s and OFF for 2s	The board is in the offline state or under test.
ALM	Red	ON or blinking rapidly	The board is reporting alarms.
		OFF	The board is running properly.
		ON for 2s and OFF for 2s	The board is reporting a minor alarm.
		ON for 1s and OFF for 1s	The board is reporting a major alarm.
		ON for 0.125s and OFF for 0.125s	The board is reporting a critical alarm.
ACT	Green	ON	The board is in active mode.

Label	Color	Status	Description
		OFF	The board is in standby mode.

The ACT indicator on the UTRPb4 board in GSM mode has different status as the ACT indicator on other boards, as shown in **Table 4-41**.

Table 4-41 Status of the ACT indicator on the UTRPb4 board in GSM mode

Status of the ACT Indicator	Before Configurations Take Effect	After Configurations Take Effect
Steady on	The board works in active mode, and none of the E1 ports in GSM mode is functional	The board works in active mode
Steady off	The board works in standby mode	The board works in standby mode
On for 0.125s and off for 0.125s	The board serves as an active board, and some or all E1 ports in GSM mode are functional	-

UTRP2 and UTRP9 provide two LEDs for indicating the status of the current link. **Table 4-42** describes the LEDs on the Ethernet ports of the UTRP2 and UTRP9.

Table 4-42 LEDs on the Ethernet ports of the UTRP2 and UTRP9

Label	Color	Status	Description
LINK	Green	ON	The link is properly connected.
		OFF	The link is disconnected.
ACT	Orange	Blinking	The link is receiving or transmitting data.
		OFF	The link is not receiving or transmitting data.

Ports

Table 4-43 describes the ports of the UTRP2 supporting two optical ports.

Table 4-43 Ports of the UTRP2 supporting two optical ports

Label	Port Type	Quantity	Connector Type
FE/GE0 to FE/GE1	FE/GE optical port	2	SFP connector

Table 4-44 describes the ports on the UTRP3 and UTRP4 supporting eight E1s/T1s.

Table 4-44 Ports on the panel of the UTRP3, UTRP4 an UTRPb4 supporting eight E1s/T1s

Label	Port Type	Quantity	Connector Type
E1/T1	E1/T1 port	2	DB26 connector

Table 4-45 describes the port of the UTRP6 supporting one STM-1.

Table 4-45 Port of the UTRP6 supporting one STM-1

Label	Port Type	Quantity	Connector Type
STM-1/OC-3	STM-1/OC-3 port	1	SFP connector

Table 4-46 describes the ports of the UTRP9 supporting four electrical ports.

Table 4-46 Ports of the UTRP9 supporting four electrical ports

Label	Port Type	Quantity	Connector Type
FE/GE0 to FE/GE3	FE/GE electrical port	4	RJ45 connector

DIP Switches

There is no DIP switch on the UTRP2, UTRP6, and UTRP9.

The UTRP3, UTRP4, or UTRPb4 has three DIP switches numbered from SW1 to SW3. SW1 and SW2 are used to set the grounding status of the eight E1s. SW3 is used to set matched impedance for the eight E1s. **Figure 4-33** shows the DIP switch on the UTRP3 or UTRP4, **Figure 4-34** shows the DIP switch on the UTRPb4.

Figure 4-33 DIP switch on the UTRP3 or UTRP4

Figure 4-34 DIP switch on the UTRPb4

Table 4-47, Table 4-48, and Table 4-49 describe how to set the DIP switches on the UTRP.

Table 4-47 DIP switch SW1 on the UTRP

DIP Switch	DIP Status				Description
	1	2	3	4	
SW1	OFF	OFF	OFF	OFF	Balanced Mode
	ON	ON	ON	ON	Unbalanced Mode
	Other settings of the DIP bits				Disabled

Table 4-48 DIP switch SW2 on the UTRP

DIP Switch	DIP Status				Description
	1	2	3	4	
SW2	OFF	OFF	OFF	OFF	Balanced Mode
	ON	ON	ON	ON	Unbalanced Mode
	Other settings of the DIP bits				Disabled

⚠️ **CAUTION**

SW1 and SW2 are set to OFF by default. SW1 corresponds to E1s No.4 to No.7 and SW2 corresponds to E1s No.0 to No.3.

Table 4-49 DIP switch SW3 on the UTRP

DIP Switch	DIP Status				Description
	1	2	3	4	
SW3	OFF	OFF	ON	ON	T1 Mode
	ON	ON	OFF	OFF	The E1 impedance is set to 120 ohms.
	ON	ON	ON	ON	The E1 impedance is set to 75 ohms.
	Other settings of the DIP bits				Disabled
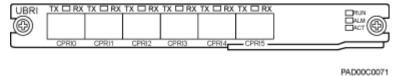
UBRI

The Universal Baseband Radio Interface Board (UBRI) provides extended CPRI optical or electrical ports to implement convergence, distribution, and multi-mode transmission on the CPRI.

Panel

Figure 4-35 shows the panel of the UBRI.

Figure 4-35 Panel of the UBRI

Functions

The UBRI performs the following functions:

● Provides extended CPRI optical or electrical ports

● Performs convergence, distribution, and multi-mode transmission on the CPRI

LEDs

Table 4-50 describes the LEDs on the panel of the UBRI.

Table 4-50 LEDs on the panel of the UBRI

LED	Color	State	Description
RUN	Green	ON steady	There is power supply, but the board is faulty.
		OFF steady	There is no power supply, or the board is in the alarm status.
		1s ON, 1s OFF	The board works properly.
		0.125s ON, 0.125s OFF	The board is loading software.
ALM	Red	ON or blinking at a high frequency	The board is in the alarm status.
		OFF steady	No alarm is generated.
ACT	Green	ON steady	The board works properly.
		OFF steady	The board is not working.

The UBRI provides six LEDs indicating the status of the CRRI links, which are above the SFP ports. Table 4-51 describes the CPRI link status LED.

Table 4-51 CPRI link status LED

Label	Color	State	Description
CPRIx	Red/Green	ON (green)	The CPRI link is available.
		ON (red)	The optical module fails to receive signals.
		0.125s ON, 0.125s OFF (Red)	The RRU on the CPRI link is faulty.
		1s ON, 1s OFF (red)	The CPRI link is out of lock.

Ports

Table 4-52 describes the ports on the panel of the UBRI.

Table 4-52 Ports on the panel of the UBRI

Label	Connector	Port Quantity	Description
CPRI0 to CPRI5	SFP	6	Connecting the BBU and the RF module
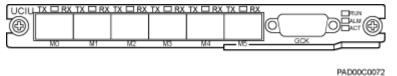
UCIU

A universal inter-connection infrastructure unit (UCIU) is used between cascaded BBUs, which transmits the control and synchronization information between the BBUs.

Panel

Figure 4-36 shows the panel of the UCIU.

Figure 4-36 Panel of the UCIU

PAD00C0072

Function

The UCIU performs the following functions:

- Supports configuration and management for all standards.
- Supports cascaded BBUs, transmitting the control and synchronization information between the BBUs.
- Supports the combination of a 3900 series base station and a 3012 series base station.
- Supports optical connections between UCIUs.

Indicators

A UCIU provides one DB15 port, three running indicators, and six SFP+ ports for interconnection, with one double-colored indicator on each SFP+ port. Table 4-53 describes the indicators on the UCIU.

Table 4-53 Indicators on the UCIU

Indicator	Color	Status	Description
RUN	Green	On	There is power supply, but the board is faulty.
		Off	There is no power supply, or the board is faulty.
		Blinking (on for 1s and off for 1s)	The board is working properly.
		Blinking (on for 0.125s and off for 0.125s)	The board is loading software, configuring data, not started, or running properly.
ALM	Red	On	An alarm is generated, and the board must be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated, and the alarm may be caused by an associated board or port fault. Therefore, you must identify the fault before replacing the board.
		Off	The board is running properly.
ACT	Green	On	The board is in active mode and running properly.
		Off	The board is in standby mode or not activated for reasons such as the board is not configured or is blocked manually.
Mx or Sx	Red and green	Green	The interconnection link is normal.
		Red	The optical module or the fiber optic cable is faulty.
		Blinking red (on for 0.125s and off for 0.125s)	Cables are not properly connected in any of the following ways: 1. The primary ports are interconnected or the secondary ports are interconnected. The corresponding indicators blink. 2. The ports are connected in cascading order to make a ring. All the indicators blink.

Indicator	Color	Status	Description
		Off	The SFP module is not properly installed, or the optical module is powered off.

Ports

Table 4-54 describes the ports on the UCIU.

Table 4-54 Ports on the USCU

Label	Connector	Description
M0 to M4	SFP connector	Primary port, which is connected to the secondary port
S0	SFP connector	Secondary port, which is connected to the primary port
GCK	DB15 connector	Provides clocks when the base station is combined with a 3012 series base station

4.2 GRFU

The the GSM radio frequency unit (GRFU) is designed on the basis of multi-transceiver technology. One GRFU supports six carriers.

Panel

GRFUs fall into three types: GRFU V1, GRFU V2, and GRFU V2a. The three types of GRFUs can be identified by their labels. As shown in **Figure 4-37**, there is "V0" or "V1" on the label of a GRFU V1, there is "V2" on the label of a GRFU V2, and there is "V2a" on the label of a GRFU V2a.

Figure 4-37 GRFU panel

Function

A GRFU performs modulation and demodulation between baseband signals and radio frequency (RF) signals, processes data, and combines and divides signals.

In addition,the GRFU has the following functions:

- Converts the direct frequency conversion technology, modulates the baseband signals for the GSM TX band. After filtering and amplification, the baseband signals are transmitted to the antenna system through the duplexer.

- Receives uplink RF signals from the antenna system and then down-converts the received signals to intermediate frequency (IF) signals. After an amplification, analog-to-digital conversion, digital down-conversion, matched filtering, automatic gain control (AGC), the IF signals are sent to the baseband unit (BBU) for further processing.

- Provides power control and VSWR detection.

- Performs reverse power detection.

- Synthesizes frequencies and tests loops.

- Generates the common public radio interface (CPRI) clock, recovers the CPRI clock from loss of synchronization, and detects alarms.

Principles

A GRFU consists of a high-speed interface unit, signal processing unit, power amplifier, and dual-duplexer. **Figure 4-38** shows the logical structure of the GRFU.

Figure 4-38 Logical structure of the GRFU

The high-speed interface unit performs the following functions:

- Converts the signals from the BBU for the signal processing unit.
- Converts the signals from the signal processing unit for the BBU.

A signal processing unit consists of two uplink RX channels and one downlink TX channel.

- The uplink RX channels perform the following functions:
  - Down-converts the received RF signals to IF signals.
  - Amplifies the IF signals and performs In-phase/Quadrature (IQ) modulation.
  - Performs an analog-to-digital (A/D) conversion through an analog-to-digital converter (ADC).
  - Performs digital sampling.
  - Performs matched filtering.
  - Performs a Digital Automatic Gain Control (DAGC).
  - Encapsulates the data.
- The downlink TX channel performs the following functions:
  - Processes the signals (timing signals, control signals, and data signals) from the BBU and sends them to the associated units.
  - Shapes and filters downlink signals.
  - Performs a digital-to-analog (D/A) conversion through a digital-to-analog converter (DAC) and performs an IQ modulation.
  - Up-converts RF signals to the TX band.

A power amplifier (PA) amplifies the low-power RF signals that are received from the signal processing unit.

The functions of the duplexer are as followings:

- Multiplexes the RX and TX signals of the RF channels.
- Enables the TX and RX signals to share the same antenna channel.
- Filters the RX and TX signals.

Indicators

The six indicators on the GRFU panel indicate the operating status of the GRFU. **Table 4-55** describes the indicators on the GRFU panel.

Table 4-55 Indicators on the GRFU Panel

Indicator	Color	Status	Description
RUN	Green	Steady on	There is power supply, but the GRFU is faulty.
		Blinking (on for 1s and off for 1s)	The GRFU works properly.
		Blinking (on for 0.125s and off for 0.125s)	The GRFU is loading software or is not started.
		Off	There is no power supply, or the GRFU is faulty.
ALM	Red	Steady on	Alarms are generated, and the GRFU must be replaced.
		Blinking (on for 1s and off for 1s)	Alarms are generated. The alarms may be caused by the faults on the related boards or ports. Therefore, you must locate the fault before replacing the board GRFU.
		Off	No alarm is generated.
ACT	Green	Steady on	The GRFU works properly with the TX channel enabled.
		Blinking (on for 1s and off for 1s)	The GRFU works properly with the TX channel disabled.
VSWR	Red	Steady on	The VSWR alarm is generated on the ANT_TX/RXA port.
		Blinking (on for 1s and off for 1s)	A VSWR alarm is generated on the ANT_RXB port.
		Blinking (on for 0.25s and off for 0.25s)	The VSWR alarm is generated on the ANT_TX/RXA and ANT_RXB port.
		Off	No VSWR alarm is generated.
CPRI0	Red and green	Steady green	The CPRI link is available.
		Steady red	The reception of the optical module is abnormal, and an alarm is generated.
		Blinking red (on for 0.1s and off for0.1s)	The CPRI link has a loss-of-lock error.

Indicator	Color	Status	Description
		Off	The small form-factor pluggable (SFP) module is not properly installed, or the optical module is powered off.
CPRI1	Red and green	Steady green	The CPRI link is available.
		Steady red	The reception of the optical module is abnormal, and an alarm is generated.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link has a loss-of-lock error.
		Off	The SFP module is not properly installed, or the optical module is powered off.

Ports

Table 4-56 describes the ports on the GRFU panel.

Table 4-56 Ports on the GRFU Panel

| Port Type	Silkscreen	Connector Type	Description
RF port	ANT_RXB	DIN connector	Connects to the antenna system.
	ANT_TX/ RXA	DIN connector	Connects to the antenna system.
CPRI port	CPRI0	SFP female connector	Connects to the BBU, or an upper-level RFU in the cascading mode.
	CPRI1	SFP female connector	Connects to a lower-level RFU during the cascading.
Interconnection port for receiving RF signals	RX_INB	QMA female connector	Receives the diversity signals.
	RX_OUTA	QMA female connector	Transmits the main signals.
Power supply port	PWR	3V3 power connector	Feeds in power.
Monitoring port	MON	RJ45 connector	Port for monitoring and maintenance.
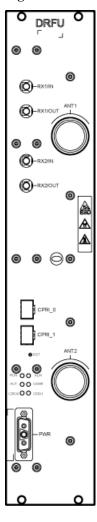
4.3 DRFU

A double radio frequency unit (DRFU) processes two carriers.

Panel

shows the DRFU panel.
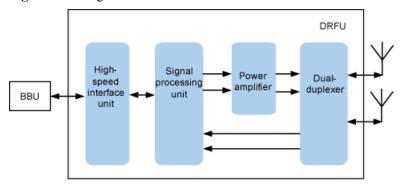
Figure 4-39 DRFU panel

Function

The DRFU performs modulation, demodulation, data processing, and combining and dividing for baseband signals and radio frequency (RF) signals.

In addition, the DRFU provides the following functions:

- Converts the direct frequency conversion technology, modulates the baseband signals for the GSM TX band. After filtering and amplification, the baseband signals are transmitted to the antenna system through the duplexer.

- Receives uplink RF signals from the antenna system and then down-converts the received signals to intermediate frequency (IF) signals. After amplification, analog-to-digital conversion, digital down-conversion, matched filtering, automatic gain control (AGC), the IF signals are sent to a baseband unit (BBU) for further processing.

- Performs power control.

- Performs reverse power detection.

- Synthesizes frequencies and tests loops.

- Generates the common public radio interface (CPRI) clock, recovers the CPRI clock from loss of synchronization, and detects alarms.

- Supports the frequency domain reflectormeter (FDR) for accurate voltage standing wave ratio (VSWR) detection.

A DRFU consists of a high-speed interface unit, signal processing unit, power amplifier, and dual-duplexer. **Figure 4-40** shows the logical structure of the DRFU.

Figure 4-40 Logical structure of the DRFU

The high-speed interface unit performs the following functions:

- Converts the signals from the BBU for the signal processing unit.

- Converts the signals from the signal processing unit for the BBU.

The signal processing unit consists of two uplink RX channels and two downlink TX channels.

- The uplink RX channels perform the following functions:

  - Down-converts the received RF signals to Intermediate Frequency (IF) signals.

  - Amplifies the IF signals and performs In-phase/Quadrature (IQ) modulation.

  - Performs an analog-to-digital (A/D) conversion through an analog-to-digital converter (ADC).

  - Performs digital sampling.

  - Performs matched filtering.

  - Performs a Digital Automatic Gain Control (DAGC).

  - Encapsulates the data.

- The downlink TX channels perform the following functions:

- − Processes the signals (timing signals, control signals, and data signals) from the BBU and sends them to the associated units.

- − Shapes and filters downlink signals.

- − Performs a digital-to-analog (D/A) conversion through a digital-to-analog converter (DAC) and performs an IQ modulation.

- − Up-converts RF signals to the TX band.

A power amplifier (PA) amplifies the low-power RF signals that are received from the signal processing unit.

The functions of the duplexer are as followings:

- Multiplexes the RX and TX signals of the RF channels.

- Enables the TX and RX signals to share the same antenna channel.

- Filters the RX and TX signals.

Indicators

There are six indicators on the DRFU panel, indicating its operating status. **Table 4-57** describes the status of the indicators on the DRFU.

Table 4-57 Status of the Indicators on the DRFU

Indicator	Color	Status	Description
RUN	Green	Steady on	There is power supply, but the DRFU is faulty.
		Blinking (on for 1s and off for 1s)	The DRFU works properly.
		Blinking (on for 0.125s and off for 0.125s)	The DRFU is loading software or is not started.
		Off	There is no power supply, or the DRFU is faulty.
ALM	Red	Steady on	Alarms are generated, and the DRFU must be replaced.
		Blinking (on for 1s and off for 1s)	Alarms are generated. The alarms may be caused by the faults on the related boards or ports. Therefore, you must locate the fault before replacing the DRFU.
		Off	No alarm is generated.
ACT	Green	Steady on	The DRFU works properly with the TX channel enabled.
		Blinking (on for 1s and off for 1s)	The DRFU works properly with the TX channel disabled.

Indicator	Color	Status	Description
VSWR	Red	Steady on	The VSWR alarm is generated on the ANT1 port.
		Blinking (on for 1s and off for 1s)	The VSWR alarm is generated on the ANT2 port.
		Blinking (on for 0.125s and off for 0.125s)	The VSWR alarm is generated on the ANT1 and ANT2 ports.
		Off	No VSWR alarm is generated.
CPRI0	Red and green	Steady green	The CPRI link is available.
		Steady red	The reception of the optical module is abnormal, and an alarm is generated.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link has a loss-of-lock error.
		Off	The small form-factor pluggable (SFP) module is not properly installed, or the optical module is powered off.
CPRI1	Red and green	Steady green	The CPRI link is available.
		Steady red	The reception of the optical module is abnormal, and an alarm is generated.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link has a loss-of-lock error.
		Off	The SFP module is not properly installed, or the optical module is powered off.

Ports

Table 4-58 describes the ports on the DRFU.

Table 4-58 Ports on the DRFU

Port Type	Connector Type	Silkscreen on the Port	Description
Port for transceiving RF signals	DIN female connector	ANT1	Connects to the antenna system.
		ANT2	
CPRI port	SFP female connector	CPRI0	Connects to a lower-level radio frequency unit (RFU) during the cascading.

Port Type	Connector Type	Silkscreen on the Port	Description
		CPRI1	Connects to the BBU, or an upper-level RFU in the cascading mode.
Interconnection port for receiving RF signals	QMA female connector	RX1/IN	Receives the diversity signals in the antenna channel 1.
		RX1/OUT	Transmits the diversity signals in the antenna channel 1.
		RX2/IN	Receives the diversity signals in the antenna channel 2.
		RX2/OUT	Transmits the diversity signals in the antenna channel 2.
Power supply port	3V3 power connector	PWR	Feeds in power.

4.4 WRFU

One WCDMA Radio Filter Unit (WRFU) supports 2 carriers or 4 carriers.

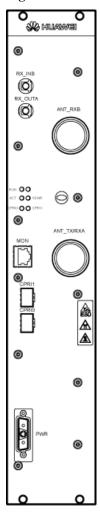## Panel

Figure 4-41 shows the panel of the WRFU.

Figure 4-41 Panel of the WRFU

Functions

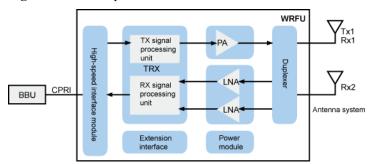The functions of the WRFU are as follows:

- Implements the direct frequency conversion technique in the transmit channel. The baseband signals are modulated to WCDMA RF signals. After being filtered and amplified or being combined, the RF signals are transmitted through the duplex filter to the antenna for radio transmission.

- Receives UL RF signals from the antenna system and then down-converts the received signals to IF signals. After amplification, analog-to-digital conversion, digital down-conversion, matched filtering, automatic gain control (AGC), the IF signals are sent to the BBU for further processing.

- Implements power control and Voltage Standing Wave Ratio (VSWR) detection

- Provides reverse power detection

- Provides frequency synthesis and loopback test

- Generates the CPRI clock, recovers the CPRI clock from loss of synchronization, and detects alarms

● Supports 40 W (2 carriers) and 80 W (4 carriers) power outputs

Principle

The WRFU consists of the high-speed interface unit, signal processing unit, power amplifier, and duplex unit. **Figure 4-42** shows the principle of the WRFU.

Figure 4-42 Principle of the WRFU

The high-speed interface unit has the following functions:

● Transmits the signals received from the BBU to the signal processing unit

● Transmits the signals received from the signal processing unit to the BBU

The signal processing unit consists of two UL RX channels and one DL TX channel.

● The UL RX channel has the following functions:

 – Performs down-conversion of the RF signals to IF signals

 – Amplifies the IF signals and performs IQ demodulation

 – Converts analog signals to digital signals

 – Samples digital signals

 – Performs matched filtering

 – Performs AGC

 – Encapsulates data

● The DL TX channel has the following functions:

 – Decapsulates the clock signals, control signals, and data signals from the BBU and sends them to associated units

 – Shapes and filters DL signals

 – Performs digital-to-analog conversion and IQ modulation

 – Performs orthogonal up-conversion of IF signals to the TX band

The power amplifier amplifies the low-power RF signals from the signal processing unit.

The duplexer has the following functions:

● Multiplexes the RX signals and TX signals

● Enables RX signals and TX signals to share one antenna channel

● Filters RX signals and TX signals

LEDs

Table 4-59 describes the LEDs on the WRFU panel.

Table 4-59 LEDs on the MRFU panel

Label	Color	State	Description
RUN	Green	ON	The power input is normal, but the module is faulty.
		OFF	There is no power input, or the module is faulty.
		ON for 1s and OFF for 1s	The module runs properly.
		ON for 0.125s and OFF for 0.125s	The module is loading software or is not started.
ALM	Red	ON	An alarm is generated, and the module needs to be replaced.
		Blinking (ON for 1s and OFF for 1s)	An alarm is generated. The alarm may be caused by the fault of the related module or port. Therefore, whether the module needs to be replaced cannot be determined.
		OFF	No alarm is generated.
ACT	Green	ON	The module works properly (the TX channel is set to ON).
		ON for 1s and OFF for 1s	The module is running (the TX channel is set to OFF).
VSWR	Red	ON (red)	A VSWR-related alarm is generated at the ANT_TX/RXA port.
		Blinking (ON for 1s and OFF for 1s)	A VSWR-related alarm is generated at the ANT_RXB port.
		Blinking (ON for 0.125s and OFF for 0.125s)	A VSWR-related alarm is generated at the ANT_TX/RXA and ANT_RXB ports.
		OFF (red)	No VSWR alarm is generated.
CPRI0	Red/Green	On (green)	The CPRI links are normal.
		On (red)	The reception of the optical module is abnormal, and an alarm is generated.
		ON for 1s and OFF for 1s (red)	The CPRI link has a loss-of-lock error.

Label	Color	State	Description
		OFF	The SFP is out of position, or the optical module is powered off.
CPRI1	Red/Green	On (green)	The CPRI links are normal.
		On (red)	The reception of the optical module is abnormal, and an alarm is generated.
		ON for 1s and OFF for 1s (red)	The CPRI link has a loss-of-lock error.
		OFF	The SFP is out of position, or the optical module is powered off.

Ports

Table 4-60 describes the ports on the WRFU panel.

Table 4-60 Ports on the WRFU panel

| Port	Label	Connector	Description
RF port	ANT_RXB	DIN	RF RX port, connected to the antenna system
	ANT_TX/ RXA	DIN	RF TX/RX port, connected to the antenna system
CPRI	CPRI0	SFP female	Connected to the BBU, or the upper-level WRFU during the cascading
	CPRI1	SFP female	Connected to the lower-level WRFU during the cascading
Interconnection port for RF RX signals	RX_INB	QMA female	Receives the diversity signals.
	RX_OUTA	QMA female	Transmits the main signals.
Power supply socket	PWR	2V2 power	Feeding power
Commissioning port	MON	RJ-45	Used for commissioning
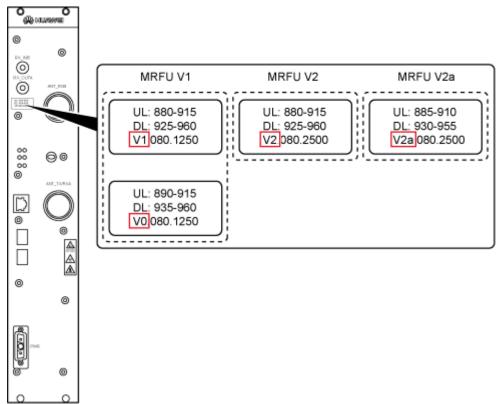
4.5 MRFU

A multi-mode radio frequency unit (MRFU) supports a maximum of six carriers. The MRFU (Multi-Mode Radio Frequency Unit) is a type of the multi-mode radio frequency unit and supports up to 6 carriers for GSM, 4 carriers for UMTS, and 1 carrier for LTE.

Panel

MRFUs fall into three types: MRFU V1, MRFU V2, and MRFU V2a. The three types of MRFUs can be identified by their labels. As shown in **Figure 4-43**, there is "V0" or "V1" on the label of a MRFU V1, there is "V2" on the label of a MRFU V2, and there is "V2a" on the label of a MRFU V2a.

Figure 4-43 MRFU Panel
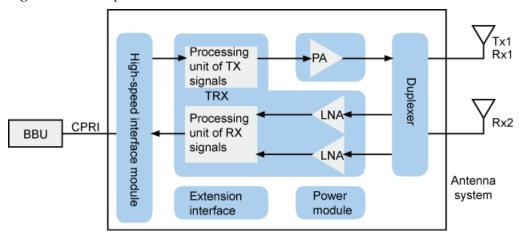

Function

The functions of MRFU are as follows:

- Modulates and converts the signals to the TX band by up-converting the intermediate frequency (IF) signals, filters and amplifies the signals and then transmits the signals to the antenna through the duplexer.

- Receives radio frequency (RF) signals from the antenna system, down-converts the signals to IF signals, and then transmits them to the baseband unit (BBU) after an amplification, analog-to-digital conversion, digital down-conversion, matched filtering, and Digital Automatic Gain Control (DAGC).

- Performs power control.

- Provides Voltage Standing Wave Ration (VSWR) detection.

- Supplies power to the tower mounted amplifier (TMA) and controls the remote electrical tilt (RET) antenna.

- Controls Digital Predistortion (DPD) based on feedback signals.

● Generates the common public radio interface (CPRI) clock, recovers the CPRI clock from loss of synchronization, and detects alarms.

Principles

A MRFU consists of the high-speed interface unit, signal processing unit, power amplifier, and duplexer. **Figure 4-44** shows the principle of the MRFU.

Figure 4-44 Principle of the MRFU

The high-speed interface unit performs the following functions:

● Converts the signals from the BBU for the signal processing unit.

● Converts the signals from the signal processing unit for the BBU.

A signal processing unit consists of two uplink RX channels and one downlink TX channel.

● The uplink RX channels perform the following functions:

  – Down-converts the received RF signals to IF signals.

  – Amplifies the IF signals through an Automatic Gain Control (AGC) simulation.

  – Performs an analog-to-digital conversion and IQ demodulation.

  – Performs digital sampling.

  – Performs matched filtering.

  – Performs a DAGC.

  – Encapsulates the data.

● The downlink TX channel performs the following functions:

  – Processes the clock signals, control signals, and data signals from the BBU and sends them to associated units.

  – Shapes and filters downlink signals.

  – Performs a digital-to-analog conversion and IF output of IQ analog signals.

  – Performs an orthogonal up-conversion of IF signals to the TX band.

A power amplifier (PA) amplifies the low-power RF signals that are received from the signal processing unit.

The functions of the duplexer are as followings:
- Multiplexes the RX and TX signals of the RF channels.
- Enables the TX and RX signals to share the same antenna channel.
- Filters the RX and TX signals.

Indicators

Table 4-61 describes the indicators on the MRFU.

Table 4-61 Indicators on the MRFU

Indicator	Color	Status	Description
RUN	Green	Steady on	There is power supply, but the MRFU is faulty.
		Blinking (on for 1s and off for 1s)	The MRFU works properly.
		Blinking (on for 0.125s and off for 0.125s)	The MRFU is loading software or is not started.
		Off	There is no power supply, or the MRFU is faulty.
ALM	Red	Steady on	Alarms are generated, and the MRFU must be replaced.
		Blinking (on for 1s and off for 1s)	Alarms are generated. The alarms may be caused by the faults on the related boards or ports. Therefore, you must locate the fault before replacing the MRFU.
		Off	No alarm is generated.
ACT	Green	Steady on	The MRFU works properly with the TX channel enabled.
		Blinking (on for 1s and off for 1s)	The MRFU works properly with the TX channel disabled.
VSWR	Red	Steady on	The VSWR alarm is generated on the ANT_TX/RXA port.
		Blinking (on for 1s and off for 1s)	A VSWR alarm is generated on the ANT_RXB port.
		Blinking (on for 0.25s and off for 0.25s)	The VSWR alarm is generated on the ANT_TX/RXA and ANT_RXB port.
		Off	No VSWR alarm is generated.
CPRI0	Red and green	Steady green	The CPRI link is available.

Indicator	Color	Status	Description
		Steady red	The optical module fails to receive signals.
		Blinking red (on for 0.1s and off for 0.1s)	The reception of the optical module is abnormal, and an alarm is generated.
		Off	The small form-factor pluggable (SFP) module is not properly installed, or the optical module is powered off.
CPRI1	Red and green	Steady green	The CPRI link is available.
		Steady red	The reception of the optical module is abnormal, and an alarm is generated.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link has a loss-of-lock error.
		Off	The SFP module is not properly installed, or the optical module is powered off.

Ports

Table 4-62 describes the ports on the MRFU.

Table 4-62 Port on the MRFU

Port Type	Silkscreen	Connector Type	Description
RF port	ANT_RXB	DIN connector	Connects to the antenna system.
	ANT_TX/ RXA	DIN connector	Connects to the antenna system.
CPRI port	CPRI0	SFP female connector	Connects to the BBU.
	CPRI1	SFP female connector	Connects to the BBU.
Interconnection port for receiving RF signals	RX_INB	QMA female connector	Receives the diversity signals.
	RX_OUTA	QMA female connector	Transmits the main signals.
Power supply port	PWR	3V3 power connector	Feeding -48 V DC power.

Port Type	Silkscreen	Connector Type	Description
Monitoring port	MON	RJ45 connector	Port for monitoring and maintenance.

4.6 MRFU V3

The MRFU V3 is a type of the multi-mode radio frequency unit. An MRFU V3 in single mode supports a maximum of 6 GSM carriers, 4 UMTS carriers, or 2 LTE carriers. An MRFU V3 in GU or GL mode supports a maximum of 6 carriers.

Panel

Figure 4-45 shows a MRFU V3 panel.

Figure 4-45 MRFU V3 Panel

PAA01C0020

Function
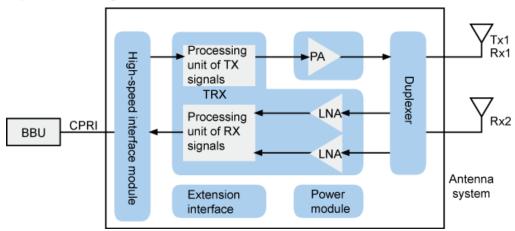
The functions of MRFU V3 are as follows:

- Modulates and converts the signals to the TX band by up-converting the intermediate frequency (IF) signals, filters and amplifies the signals and then transmits the signals to the antenna through the duplexer.

- Receives radio frequency (RF) signals from the antenna system, down-converts the signals to IF signals, and then transmits them to the baseband unit (BBU) after an amplification, analog-to-digital conversion, digital down-conversion, matched filtering, and Automatic Gain Control (AGC).

- Performs power control.

- Provides Voltage Standing Wave Ration (VSWR) detection.

- Performs reverse power detection.

- Synthesizes frequencies.

- Controls Digital Predistortion (DPD) based on feedback signals.

- Generates the common public radio interface (CPRI) clock, recovers the CPRI clock from loss of synchronization, and detects alarms.

Principles

A MRFU V3 consists of the high-speed interface unit, signal processing unit, power amplifier, and duplexer. **Figure 4-46** shows the principle of the MRFU V3.

Figure 4-46 Principle of the MRFU V3

The high-speed interface unit performs the following functions:

- Converts the signals from the BBU for the signal processing unit.

- Converts the signals from the signal processing unit for the BBU.

A signal processing unit consists of two uplink RX channels and one downlink TX channel.

- The uplink RX channels perform the following functions:
    - Down-converts the received RF signals to IF signals.
    - Amplifies the IF signals through an Automatic Gain Control (AGC) simulation.
    - Performs an analog-to-digital conversion and IQ demodulation.
    - Performs digital sampling.

- – Performs matched filtering.

- – Performs a AGC.

- – Encapsulates the data.

- The downlink TX channel performs the following functions:

  - – Processes the clock signals, control signals, and data signals from the BBU and sends them to associated units.

  - – Shapes and filters downlink signals.

  - – Performs a digital-to-analog conversion and IF output of IQ analog signals.

  - – Performs an orthogonal up-conversion of IF signals to the TX band.

A power amplifier (PA) amplifies the low-power RF signals that are received from the signal processing unit.

The functions of the duplexer are as followings:

- Multiplexes the RX and TX signals of the RF channels.

- Enables the TX and RX signals to share the same antenna channel.

- Filters the RX and TX signals.

Indicators

Table 4-63 describes the indicators on the MRFU V3.

Table 4-63 Indicators on the MRFU V3

Indicator	Color	Status	Description
RUN	Green	Steady on	There is power supply, but the MRFU V3 is faulty.
		Blinking (on for 1s and off for 1s)	The MRFU V3 works properly.
		Blinking (on for 0.125s and off for 0.125s)	The MRFU V3 is loading software or is not started.
		Off	There is no power supply, or the MRFU V3 is faulty.
ALM	Red	Steady on	Alarms are generated, and the MRFU V3 must be replaced.
		Blinking (on for 1s and off for 1s)	Alarms are generated. The alarms may be caused by the faults on the related boards or ports. Therefore, you must locate the fault before replacing the MRFU V3.
		Off	No alarm is generated.
ACT	Green	Steady on	The MRFU V3 works properly with the TX channel enabled.

Indicator	Color	Status	Description
		Blinking (on for 1s and off for 1s)	The MRFU V3 works properly with the TX channel disabled.
VSWR	Red	Steady on	The VSWR alarm is generated on the ANT_TX/RXA port.
		Blinking (on for 1s and off for 1s)	A VSWR alarm is generated on the ANT/RXB port.
		Blinking (on for 0.25s and off for 0.25s)	The VSWR alarm is generated on the ANT_TX/RXA and ANT/RXB port.
		Off	No VSWR alarm is generated.
CPRI0	Red and green	Steady green	The CPRI link is available.
		Steady red	The reception of the optical module is abnormal, and an alarm is generated.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link has a loss-of-lock error.
		Off	The small form-factor pluggable (SFP) module is not properly installed, or the optical module is powered off.
CPRI1	Red and green	Steady green	The CPRI link is available.
		Steady red	The reception of the optical module is abnormal, and an alarm is generated.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link has a loss-of-lock error.
		Off	The SFP module is not properly installed, or the optical module is powered off.

Ports

Table 4-64 describes the ports on the MRFU V3.

Table 4-64 Port on the MRFU V3

Port Type	Silkscreen	Connector Type	Description
Port for transceiving RF signals	ANT_RXB	DIN connector	Connects to the antenna system.
	ANT_TX/ RXA	DIN connector	

Port Type	Silkscreen	Connector Type	Description
CPRI port	CPRI0	SFP female connector	Connects to the BBU.
	CPRI1	SFP female connector	Connects to the BBU.
Interconnection port for receiving RF signals	RX_INB	QMA female connector	Receives the diversity signals.
	RX_OUTA	QMA female connector	Transmits the main signals.
Power supply port	PWR	3V3 power connector	Feeds in power.
Monitoring port	MON	RJ45 connector	Monitors the fans. (reserved port)

4.7 LRFU

LTE Radio Frequency Units (LRFUs) work in Frequency Division Duplex (FDD) mode.

Panel

Figure 4-47 shows the panel of the LRFU.
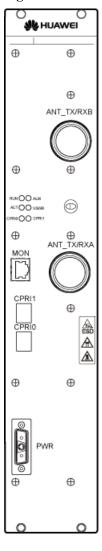
Figure 4-47 Panel of the LRFU

Functions

The LRFU processes uplink and downlink services and controls and monitors internal boards or modules. **Figure 4-48** shows the logical structure of the LRFU.
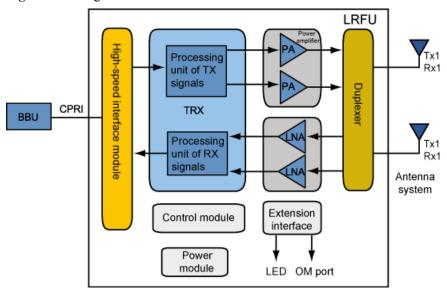
Figure 4-48 Logical structure of the LRFU

The uplink RX channels implement the following functions:

● Filters and amplifies two uplink signals and performs digital down-conversion, analog-to-digital (A/D) conversion, digital Inphase Quadrature (IQ) signal demodulation, and matched filtering.

● Performs uplink Automatic Gain Control (AGC) and stabilizes the level in the IQ digital domain of the BBU-RFU interface.

● Frames the IQ signals of the BBU-RFU interface.

● Reports the Received Signal Strength Indicator (RSSI).

The downlink TX channels implement the following functions:

● Deframes the IQ signals of the BBU-RFU interface.

● Shapes and filters downlink IQ signals, performs digital up-conversion, digital-to-analog (D/A) conversion, and amplifies the power.

● Reports the transmit power.

● Provides overload protection of the power amplifier.

● Enables or disables TX channels.

● Provides closed-loop power control.

● Simulates the downlink load.

The control module implements the following functions:

● Provides the interface for reporting backup power alarms.

● Provides the functions of the Remote Electrical antenna Tilt (RET) antenna.

● Supports the Tower Mounted Amplifier (TMA).

● Provides the BBU-RFU port for signal transmission by using the CPRI electrical cable or optical cable.

LEDs

Table 4-65 describes the LEDs on the panel of the LRFU.

Table 4-65 LEDs on the LRFU

Label	Color	Status	Description
RUN	Green	On	The power input is normal, but the module is faulty.
		Off	There is no power input, or the module is faulty.
		On for 1s and off for 1s	The module runs properly.
		On for 0.125s and off for 0.125s	The module is loading software or is not started.
ALM	Red	On	An alarm is generated, and the module needs to be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated. The alarm may be caused by the fault of the related module or port. Therefore, the replacement of the module cannot be determined.
		Off	No alarm is generated.
ACT	Green	On	The module works properly (TX channel enabled).
		On for 1s and Off for 1s	The module is running (TX channel disabled).
VSWR	Red	On (red)	A VSWR-related alarm is generated at the ANT_TX/RXA port.
		Blinking (on for 1s and off for 1s)	A VSWR-related alarm is generated at the ANT_TX/RXB port.
		Blinking (on for 0.125s and off for 0.125s)	A VSWR-related alarm is generated at the ANT_TX/RXA and ANT_TX/RXB ports.
		Off (red)	No VSWR alarm is generated.
CPRI0	Red/Green	On (green)	The CPRI links are normal.
		On (red)	The reception of the optical module is abnormal, and an alarm is generated.
		On for 1s and off for 1s (red)	The CPRI link has a loss-of-lock error.
		Off	The SFP module is out of position, or the optical module is powered off.
CPRI1	Red/Green	On (green)	The CPRI links are normal.
		On (red)	The reception of the optical module is abnormal, and an alarm is generated.

Label	Color	Status	Description
		On for 1s and off for 1s (red)	The CPRI link has a loss-of-lock error.
		Off	The SFP module is out of position, or the optical module is powered off.

Port

Table 4-66 describes the ports on the panel of the LRFU.

Table 4-66 Ports on the panel of the LRFU

Label	Connector	Description
ANT_TX/RXB	DIN	TX/RX port for RF signals
ANT_TX/RXA	DIN	Used for the connection to the antenna system
CPRI0	SFP female connector	CPRI port Used for the connection to the BBU. CPRI0 port and CPRI1 port work in mutual backup mode.
CPRI1	SFP female connector	CPRI port Used for the connection to the BBU. CPRI1 port and CPRI0 port work in mutual backup mode.
PWR	3V3 power connector	Power port Used for feeding -48 V DC input power
MON	RJ45 connector	Monitoring port Port for monitoring and maintenance
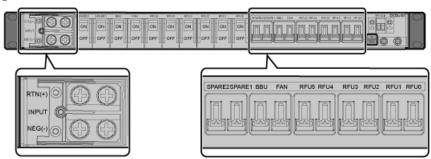
4.8 DCDU-01

The Direct Current Distribution Unit-01 (DCDU-01) supplies DC power to each component in the cabinet.

Panel

Figure 4-49 shows the panel of the DCDU-01.

Figure 4-49 Panel of the DCDU-01

Functions

The DCDU-01 has the following functions:

- Supports one -48 V DC inputs
- Supports ten -48 V DC outputs
  - One 25 A output to the SPARE2 port
  - Nine 12 A outputs to other ports
- Supplies power to only the BBU3900, RFUs, and fan box in the cabinet, but not external devices

Ports

[Table 4-67](#) describes the ports, terminals, and power switches on the panel of the DCDU-01.

Table 4-67 Ports, terminals, and power switches on the panel of the DCDU-01
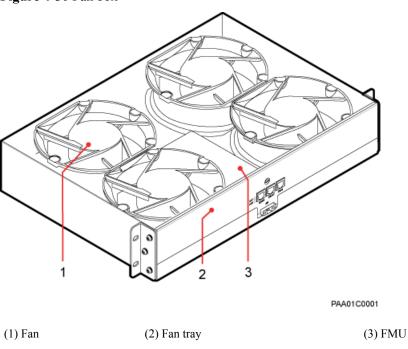
Port	Label	Connector	Description
Power input wiring terminals	NEG(-)	OT terminal	Negative input wiring terminal
	RTN(+)		Positive input wiring terminal
Power output port	SPARE2, SPARE1, BBU, FAN, and RFU5 to RFU0	Parallel terminal	Providing 10 power outputs to the modules such as the BBU3900, RFUs, and fan box
Power switch	SPARE2, SPARE1, BBU, FAN, and RFU5 to RFU0	-	Powering on or powering off the modules such as the BBU3900, RFUs, and fan box

4.9 Fan Box

A fan box consists of a fan tray, four fans, and an FMU.

Figure 4-50 shows a fan box.

Figure 4-50 Fan box

PAA01C0001

(1) Fan   (2) Fan tray   (3) FMU

The fan box performs the following functions:

- Provides forced ventilation and heat dissipation for the cabinet.
- Monitors the temperature.
- Supports fan speed adjustment based on temperature or controlled by the BBU.
- Stops the fans when the ambient temperature is low.
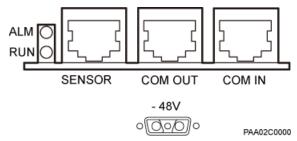
Figure 4-51 shows the ports on the FMU board.

Figure 4-51 Ports on the FMU board

Table 4-68 describes the LEDs on the FMU board.

Table 4-68 LEDs on the FMU board

LED	Color	Status	Meaning
RUN	Green	Blinking (on for 0.125s and off for 0.125s)	The unit is functional but fails to communicate with the BBU or upper-level FMU.
		Blinking (on for 1s and off for 1s)	The unit is functional and is communicating with the BBU or upper-level FMU.
		Off	There is no power supply, or the module is faulty.
ALM	Red	Blinking (on for 1s and off for 1s)	The module is reporting alarms.
		Off	No alarm is generated.

Table 4-69 describes the ports on the FMU board.

Table 4-69 Ports on the FMU board

Port Type	Label	Connector Type	Description
Power port	-48 V	3V3 power connector	The port is used to introduce the -48 V DC power supply.
Sensor port	SENSOR	RJ45 connector	The port is connected to the ELU.
Communication port	COM OUT	RJ45 connector	The port is connected to the lower-level FMU.
	COM IN	RJ45 connector	The port is connected to the BBU or upper-level FMU.

4.10 GATM

The GSM Antenna and TMA control Module (GATM) controls the antenna and TMA.

Panel

Figure 4-52 shows the GATM panel.

Figure 4-52 GATM panel

Function

The GATM has the following functions:

- Controls the RET antenna.
- Supplies power to the TMA.
- Reports the RET control signal alarms.
- Monitors the current from the feeder.

📖 **NOTE**

The GATM cannot support the TMA and RET antenna simultaneously.

LED

On the GATM there are three LEDs, which indicate the operating status of the GATM. **Table 4-70** describes the LEDs on the GATM.

Table 4-70 LEDs on the GATM

LED	Color	Status	Description
RUN	Green	ON for 2s and OFF for 2s	The power supply is normal, but the communication with the BBU incurs faults.
		ON for 1s and OFF for 1s	The module is functional and communicates with the BBU properly.
		OFF	There is no power supply, or the module is faulty.
ACT	Green	ON	The AISG link is available.
		OFF	The AISG link is unavailable.
		Blinking irregularly	The AISG link is in transmission state.
ALM	Red	ON	An alarm is generated, such as an overcurrent alarm.
		OFF	The module is functional.

Port ID

There are eight ports on the GATM, of which six are used to supply power to the TMA or transmit the RET control signals, one is used to connect the GATM to the BBU, and one is used as an extended RS485 port. In addition, there is also a -48 V DC power supply socket. **Table 4-71** describes the ports and socket on the GATM.

Table 4-71 Ports and socket on the GATM
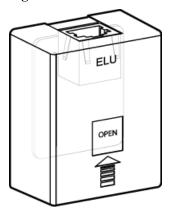
Port ID	Connector	Function
ANT0 to ANT5	SMA female connector	Providing power and transmitting control signals for the RET antenna
COM1	RJ45 connector	Connecting to the BBU
COM2	RJ45 connector	Serving as an extended RS485 port for connecting to other devices
-48 V	3V3 power connector	Feeding -48 V DC power

4.11 ELU

The Electronic Label Unit (ELU) reports the cabinet type information to the fan box.

Figure 4-53 shows an ELU.

Figure 4-53 ELU

4.12 Power Equipment (DC/DC)

The power equipment (DC/DC) converts +24 V DC power into -48 V DC power.

4.12.1 Components of the Power Equipment (DC/DC)

The power equipment (DC/DC) consists of the PSUs (DC/DC) and power subrack (DC/DC).

Figure 4-54 shows the power equipment (DC/DC).

Figure 4-54 Power equipment (DC/DC)

(1) PSUs (DC/DC)　　　　　　　　　　(2) Power subrack (DC/DC)
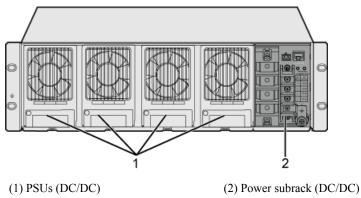
Table 4-72 describes the components of the power equipment (DC/DC).

Table 4-72 Components of the power equipment (DC/DC)

Component	Description
PSU (DC/DC)	For details, see **4.12.2 PSU (DC/DC)**.
Power subrack (DC/DC)	For details, see **4.12.3 Power Subrack (DC/DC)**.

4.12.2 PSU (DC/DC)

The PSU is the power supply unit. The PSU (DC/DC) converts +24 V DC power into -48 V DC power.

Panel

Figure 4-55 shows the panel of the PSU (DC/DC).
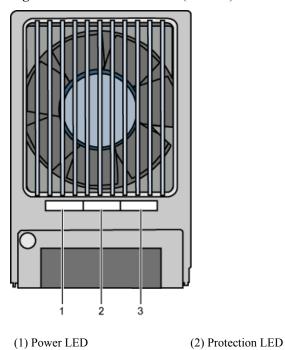
Figure 4-55 Panel of the PSU (DC/DC)

(1) Power LED   (2) Protection LED   (3) Fault LED

Functions

- Converts +24 V DC power into -48 V DC power and leads the -48 V DC power into the DCDU-01.

- Monitors the unit and reports alarms related to PSU faults (such as output overvoltage, no output, and fan faults), alarms related to PSU protection (such as overtemperature protection, and input overvoltage/undervoltage protection), and PSU out-of-position alarms, if any.

LEDs

Table 4-73 describes the LEDs on the panel of the PSU (DC/DC).

Table 4-73 LEDs on the panel of the PSU (DC/DC)

LED	Color	Status	Description
Power LED	Green	On	The power supply is normal.
		Off	There is no power input, or the fuse is damaged.
Protection LED	Yellow	Off	The running status is normal.

LED	Color	Status	Description
		On	There is abnormal input or output voltage, the unit is overheated, or the unit is not properly inserted.
Fault LED	Red	Off	The running status is normal.
		Blinking	The fan is faulty.
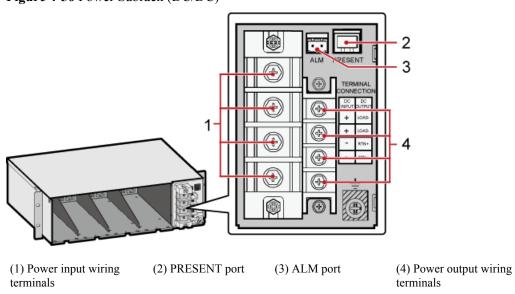
4.12.3 Power Subrack (DC/DC)

The power subrack (DC/DC) provides the power input wiring terminals, power output wiring terminals, ALM port, and PRESENT port. The terminals and ports are used for the connections of the +24 V input power cables, -48 V output power cables, monitoring signal cable for the PSU, and in-position signal cable for the PSU respectively.

Exterior

Figure 4-56 shows the power subrack (DC/DC).

Figure 4-56 Power Subrack (DC/DC)

(1) Power input wiring terminals	(2) PRESENT port	(3) ALM port	(4) Power output wiring terminals

Ports

Table 4-74 describes the ports and terminals on the power subrack (DC/DC).

Table 4-74 Ports and terminals on the power subrack (DC/DC)

Terminal/ Port	Label	Connector	Description
Power input wiring terminal	DC INPUT	OT terminal	The + wiring terminals are used for the connections of +24 V power cables, and the - wiring terminals are used for the connections of +24 V RTN cables.
Power output wiring terminal	DC OUTPUT	OT terminal	The LOAD- wiring terminals are used for the connections of the -48 V power cables, and the RTN+ wiring terminals are used for the connections of the -48 V RTN cables.
Alarm signal port	ALM	Cord end terminal	The ALM port is used for the connection of the monitoring signal cable for the PSU.
PRESENT port	PRESENT	RJ45 connector	The PRESENT port is used for the connection of the in-position signal cable for the PSU.

4.13 Power Equipment (AC/DC)

The power equipment (AC/DC) converts 220 V AC power into -48 V DC power.

4.13.1 Components of the Power Equipment (AC/DC)

The power equipment (AC/DC) consists of the PMU, PSUs (AC/DC) and power subrack (AC/DC).

Figure 4-57 shows the power equipment (AC/DC).

Figure 4-57 Power equipment (AC/DC)

(1) PMU	(2) PSUs (AC/DC)	(3) Power subrack (AC/DC)

Table 4-75 describes the components of the power equipment (AC/DC).

Table 4-75 Components of the power equipment (AC/DC)

Component	Description
PMU	For details, see **4.13.2 PMU**.
PSU (AC/DC)	For details, see **4.13.3 PSU (AC/DC)**.
Power subrack (AC/DC)	For details, see **4.13.4 Power Subrack (AC/DC)**.
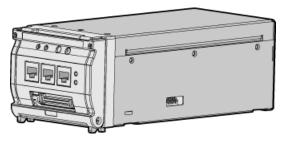
4.13.2 PMU

The Power and Environment Monitoring Unit (PMU) performs the power system management, power distribution detection, and alarm reporting functions.

Exterior

Figure 4-58 shows the PMU.

Figure 4-58 PMU

Functions

The PMU performs the following functions:

- Communicates with the BBU or upper-level PMU through an RS232/RS422 serial port.
- Manages the power system and battery charge/discharge.
- Detects and reports water damage alarms, smoke alarms, door status alarms, and customized Boolean values.
- Reports the ambient temperature, ambient humidity, battery temperature, and customized analog values.
- Monitors power distribution, reports related alarms, and reports dry contact alarms.

Ports and LEDs

Figure 4-59 shows the front panel of the PMU.
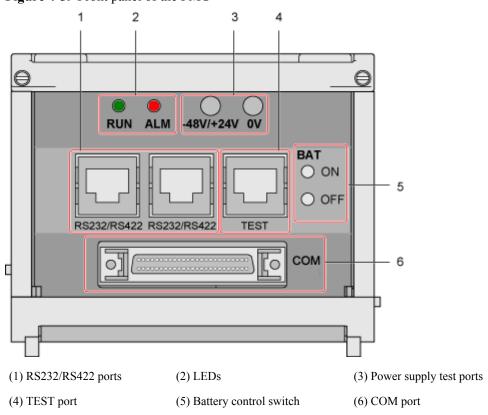
Figure 4-59 Front panel of the PMU

| (1) RS232/RS422 ports | (2) LEDs | (3) Power supply test ports |
| (4) TEST port | (5) Battery control switch | (6) COM port |

Table 4-76 describes the ports and switch on the PMU.

Table 4-76 Ports and switch on the PMU

Port/Switch	Function
RS232/RS422 port	Communicating with the BBU or upper-level PMU
Power supply test port	Measuring the power voltage by using a multimeter through the -48V/+24V and 0V ports
TEST port	Testing
Battery control switch	Controlling the connection of the batteries through the ON and OFF ports ● Press and hold the ON port for 5s to 10s to connect to the batteries. ● Press and hold the OFF port for 5s to 10s to disconnect the batteries. **CAUTION** ● You must insert a small round bar into the hole when you operate the battery control switch. When you hear a crack, the batteries are connected or disconnected.
COM port	Reserved for connecting to the external signal monitoring board

Table 4-77 describes the LEDs on the panel of the PMU.

Table 4-77 LEDs on the panel of the PMU

Label	Color	Status	Description
RUN	Green	Blinking (on for 1s and off for 1s)	The unit is functional, and the communication with the BBU or upper-level PMU is normal.
		Blinking (on for 0.125s and off for 0.125s)	The unit is functional, but the communication with the BBU or upper-level PMU fails. If the unit does not communicate with the BBU or upper-level PMU for one minute, the communication is regarded as failed.
		On or off	The unit is faulty or the unit is in power-on self-check state.
ALM	Red	On	The base station reports at least one of the following alarms: ● Mains overvoltage or undervoltage alarm ● Busbar overvoltage or undervoltage alarm ● Alarm related to PSUs ● Load disconnection alarm
		Off	No alarm is reported.

 NOTE

In 3s to 5s after the PMU is powered on, the ALM and RUN LEDs are simultaneously on for about 3s.

DIP Switch

The DIP switch, which is used to choose monitoring address, is positioned on the right panel of the PMU. The DIP switch has eight bits, which are set before the PMU is delivered, as shown in **Figure 4-60**.

Figure 4-60 Right panel of the PMU

4.13.3 PSU (AC/DC)

The PSU is a power supply unit. The PSU (AC/DC) converts 220 V AC power into -48 V DC power.

Panel

Figure 4-61 shows the panel of the PSU (AC/DC).
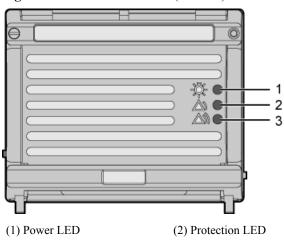
Figure 4-61 Panel of the PSU (AC/DC)

| (1) Power LED | (2) Protection LED | (3) Fault LED |

Functions

The PSU (AC/DC) performs the following functions:

- Converts 220 V AC power into -48 V DC power and supplies -48 V DC power to the DCDU-01.

- Monitors the unit and reports alarms related to PSU faults (such as output overvoltage, no output, and fan faults), alarms related to PSU protection (such as overtemperature protection, and input overvoltage/undervoltage protection), and PSU out-of-position alarm, if any.

LEDs

Table 4-78 describes the LEDs on the panel of the PSU (AC/DC).

Table 4-78 LEDs on the panel of the PSU (AC/DC)

LED	Color	Status	Description
Power LED	Green	On	The power supply is normal.
		Off	There are faults (such as no AC input, or overvoltage and undervoltage of AC input) on the mains, or the PSU has no output.
Protection LED	Yellow	Off	The running status is normal.
		On	There is a pre-alarm relating to temperature or the fan.
Fault LED	Red	Off	The PSU is normal, or the PSU has no output because of faults (such as no AC input, or overvoltage and undervoltage of AC input) on the mains.
		On	There is no output because of output overvoltage shutdown, the fan fault, overtemperature shutdown, remote shutdown, or an internal PSU fault.
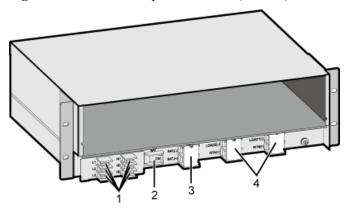
4.13.4 Power Subrack (AC/DC)

The power subrack (AC/DC) provides the power input wiring terminals, wiring terminals for batteries, and battery power output wiring terminal. The terminals are used for the connections of the input power cables, output power cables, and power cable for the batteries respectively.

Panel

Figure 4-62 shows the panel of the power subrack (AC/DC).

Figure 4-62 Panel of the power subrack (AC/DC)

(1) Power input wiring terminals	(2) Power switch of the batteries
(3) Wiring terminals for batteries	(4) Power output wiring terminals

Ports

Table 4-79 describes the terminals and switch on the power subrack (AC/DC).

Table 4-79 Terminals and switch on the power subrack (AC/DC)

Terminal/Switch	Description
Power input wiring terminals	These terminals are used for the connections of the AC input power cables.
Power output wiring terminals	The LOAD1(-) and LOAD2(-) wiring terminals are used for the connections of the -48 V power cables, and the RTN(+) wiring terminals are used for the connections of the -48 V RTN cables.
Wiring terminals for batteries	The BAT(-) wiring terminal is used for the connection of negative pole for the batteries, and the BAT(+) wiring terminal is used for the connection of positive pole for the batteries.

Terminal/Switch	Description
Power switch of the batteries	The power switch controls the connection of the batteries.

5 BTS3900 Cables

About This Chapter

This chapter describes the BTS3900 cables. The BTS3900 cables consist of the PGND cable, power cable, transmission cable, CPRI cable, signal cable, and RF cable.

📖 **NOTE**

> The colors of cables vary according to the countries and areas where Huawei products are delivered. If cables are purchased at local market, the colors of the cables must comply with the rules and regulations.

5.1 List of BTS3900 Cables
This describes the BTS3900 cables, which are the power cables, PGND cables, transmission cables, CPRI electrical cables, signal cables, and RF cables.

5.2 BTS3900 Cable Connections
The cable connections in the BTS3900 vary according to the power supply scenarios and configurations related to the cabinet, transmission system, CPRI port, and RF.

5.3 PGND Cables
The PGND cables are used to ensure proper grounding of the cabinet and the modules in the cabinet.

5.4 Equipotential Cable
When the battery cabinet is working with the power cabinet, one cabinet should be grounded through connecting the equipotential cable to the other cabinet.

5.5 BTS3900 Power Cable
The BTS3900 power cables consist of the cables leading power to the BTS3900 cabinet, BBU3900, DCDU-01, fan box, RFU, and transmission equipment.

5.6 BTS3900 Transmission Cable
The BTS3900 transmission cables are the E1 cable, E1 surge protection transfer cable, FE cable, FE surge protection transfer cable, and CPRI electrical cable.

5.7 CPRI Electrical Cable
The CPRI electrical cable enables high speed communication between the BBU3900 and the RFU.

5.8 BTS3900 Signal Cable

The BTS3900 signal cables are the monitoring signal cable for the DCDU, monitoring signal cable for the PMU, monitoring signal cable for the PSU, in-position signal cable for the PSU, monitoring signal cable for the FAN unit, BBU alarm cable, and GPS clock signal cable.

5.9 BTS3900 RF Cable
The BTS3900 RF cables are the RF jumper and inter-RFU RF signal cable.

5.1 List of BTS3900 Cables

This describes the BTS3900 cables, which are the power cables, PGND cables, transmission cables, CPRI electrical cables, signal cables, and RF cables.

Power Cables and PGND Cables

Table 5-1 lists the power cables and PGND cables.

Table 5-1 Power Cables and PGND Cables

Item	Cable	One End		The Other End	
		Connector	**Installation Position**	**Connector**	**Installation Position**
Cables to be installed on site	**5.3 PGND Cables** (PGND cable for the cabinet)	OT terminal	The main PGND terminal inside the cabinet	OT terminal	External grounding bar
	5.4 Equipotential Cable	OT terminal	Wiring terminal for the equipotential cable	OT terminal	Wiring terminal for the equipotential cable
	5.5.1 Input Power Cable for the Cabinet (-48 V power cable)	OT terminal	**NEG(-)** and **RTN(+)** on the DCDU-01	OT terminal	External power supply device
	5.5.1 Input Power Cable for the Cabinet (+24 V power cable)	OT terminal	Power input wiring terminals of the power subrack (DC/DC)	OT terminal	External power supply device
	5.5.1 Input Power Cable for the Cabinet (AC power cable)	OT terminal	Power input wiring terminals of the power subrack (AC/DC)	OT terminal	External power supply device

Item	Cable	One End		The Other End	
		Connector	**Installation Position**	**Connector**	**Installation Position**
Cables installed before delivery	**5.3 PGND Cables** (PGND cable for the modules)	OT terminal	PGND terminals of the modules	OT terminal	PGND terminals inside the cabinet.
	5.5.5 Power Cable for the RFU	3V3 power connector	**PWR** port on the RFU	Parallel terminal	Ports **RFU0** to **RFU5** on the DCDU-01
	5.5.4 Power Cable for the Fan Box	3V3 power connector	**-48 V** port of the fan box	Parallel terminal	**FAN** port on the DCDU-01
	5.5.3 Power Cable for the BBU	3V3 power connector	**PWR** port on the UPEU	Parallel terminal	**BBU** port on the DCDU-01
	5.5.2 Power Cable for the DCDU-01 (Black)	OT terminal	**RTN(+)** port on the DCDU-01	OT terminal	**RTN(+)** wiring terminal for power output of the power subrack (DC/DC)
	5.5.2 Power Cable for the DCDU-01 (Blue)	OT terminal	**NEG(-)** port on the DCDU-01	OT terminal	**LOAD(-)** wiring terminal for power output of the power subrack (DC/DC)
	5.5.2 Power Cable for the DCDU-01 (Black)	OT terminal	**RTN(+)** port on the DCDU-01	OT terminal	**RTN(+)** wiring terminal for power output of the power subrack (AC/DC)

Item	Cable	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position
	5.5.2 Power Cable for the DCDU-01 (Blue)	OT terminal	**NEG(-)** port on the DCDU-01	OT terminal	**LOAD1(-)** or **LOAD2 (-)** wiring terminal for power output of the power subrack (AC/DC)

Transmission Cables

Table 5-2 lists the transmission cables.

Table 5-2 Transmission Cables

Item	Cable	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position
Cables to be installed on site	**5.6.1 E1/T1 Cable**	DB26 male connector	**E1/T1** port on the GTMU or WMPT or UTRP	None	External transmission equipment
	5.6.2 FE/GE Cable	RJ45	**FE0** or **FE1** port on the GTMU or WMPT or LMPT or UTRP	RJ45	External transmission equipment
	5.6.3 FE/GE Optical Cable	LC connector	**SFP0** or **SFP1** port on the GTMU or WMPT or UTRP	• FC connector • SC connector • LC connector	External transmission equipment

Item	Cable	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position
Cables installed before delivery	**5.6.4 Cable Between Two FE Electrical Ports**	RJ45	**FE0** port on the GTMU	RJ45	**FE0** port on the WMPT
	5.6.5 Cable Between Two FE Optical Ports	LC connector	**FE1** port on the GTMU	LC connector	**FE1** port on the WMPT

CPRI Cables

Table 5-3 lists the CPRI Cables.

Table 5-3 CPRI Cables

Item	Cable	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position
Cables installed before delivery	**5.7 CPRI Electrical Cable**	SFP200 male connector	CPRI ports on the GTMU or WBBP or LBBP	SFP200 male connector	CPRI ports on the RFU
Cables to be installed on site	The BTS3900 cabinet is delivered with boards installed, and the CPRI cables in the cabinet are already installed. The CPRI cables between multiple cabinets may be need to be installed on site according to the configuration.				

Signal Cables

Table 5-4 lists the signal cables.

Table 5-4 Signal Cables

Item	Cable	One End		The Other End	
		Connector	**Installation Position**	**Connector**	**Installation Position**
Cables to be installed on site	**5.8.6 Monitoring Signal Cable for the EMU**	DB9 male connector	**RS485** port on the EMU	RJ45 connector	**MON1** port on the UPEU or UEIU
	5.8.9 BBU Alarm Cable	RJ45 connector	**EXT-ALM0** port on the UPEU or UEIU	RJ45 connector	External alarm device
	5.8.10 GPS Clock Signal Cable	SMA male connector	**GPS** port on the USCU	N-type female connector	GPS surge protector
Cables installed before delivery	**5.8.1 Monitoring Signal Cable for the PMU**	RJ45 connector	Left **RS232/ RS422** port on PMU	RJ45 connector	**MON1** port on the UPEU
	5.8.2 Monitoring Signal Cable for the PSU (DC/DC)	Cord end terminal	**ALM** port on the power subrack (DC/ DC)	RJ45 connector	**EXT-ALM0** port on the UPEU
	5.8.3 In-Position Signal Cable for the PSU (DC/DC)	RJ45 connector	**PRESENT** port on the power subrack (DC/ DC)	RJ45 connector	**EXT-ALM1** port on the UPEU or UEIU
	5.8.4 Monitoring Signal Cable for the Fan Box	RJ45 connector	**COM IN** port on the fan box	RJ45 connector	**MON0** port on the UPEU

Item	Cable	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position
	5.8.5 Fan Box Cascade Signal Cable	RJ45 connector	**COM OUT** port on the upper-level fan box **NOTE** Upper-level fan box: the fan box directly connected to the BBU.	RJ45 connector	**COM IN** port on the lower-level fan box **NOTE** Lower-level fan box: the fan box connected to the upper-level fan box and then to the BBU.
	5.8.11 Signal Cable for the ELU	RJ45 connector	ELU	RJ45 connector	**SENSOR** on the fan box

RF Cables

Table 5-5 lists the RF cables.

Table 5-5 RF Cables

Item	Cable	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position
Cables to be installed on site	**5.9.1 RF Jumper**	DIN elbow male connector	RF ports on the RFU	DIN straight male connector	Antenna system
Cables installed before delivery	**5.9.2 Inter-RFU RF Signal Cable**	QMA elbow male connector	**RX OUT** port on one RFU panel	QMA elbow male connector	**RX IN** port on another RFU panel

5.2 BTS3900 Cable Connections

The cable connections in the BTS3900 vary according to the power supply scenarios and configurations related to the cabinet, transmission system, CPRI port, and RF.

5.2.1 Power Cable Connections

This section describes the power cable connections of the BTS3900 cabinet (-48 V DC), BTS3900 cabinet (+24 V DC), and BTS3900 cabinet (AC).

Power Cable Connections of the BTS3900 Cabinet (-48 V DC)

Figure 5-1 shows the power cable connections of the BTS3900 cabinet (-48 V DC). The power distribution schemes of a single cabinet and two cabinets are the same.
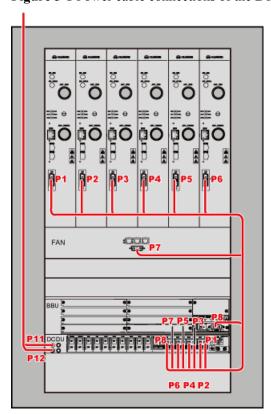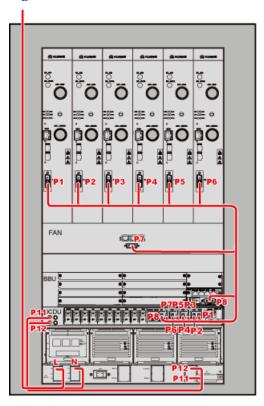
Figure 5-1 Power cable connections of the BTS3900 cabinet (-48 V DC)

Table 5-6 lists the power cables of the BTS3900 cabinet (-48 V DC).

Table 5-6 Power cables of the BTS3900 cabinet (-48 V DC)

SN	Description
P1 to P6	For details, see **5.5.5 Power Cable for the RFU**.
P7	For details, see **5.5.4 Power Cable for the Fan Box**.
P8	For details, see **5.5.3 Power Cable for the BBU**.
P11 and P12	For details, see **5.5.1 Input Power Cable for the Cabinet**.

Power Cable Connections of the BTS3900 Cabinet (+24 V DC)

Figure 5-2 shows the power cable connections of the BTS3900 cabinet (+24 V DC). The power distribution schemes of a single cabinet and two cabinets are the same.
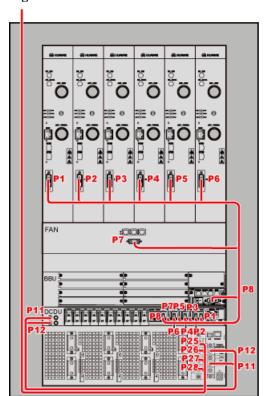
Figure 5-2 Power cable connections of the BTS3900 cabinet (+24 V DC)

Table 5-7 lists the power cables of the BTS3900 cabinet (+24 V DC).
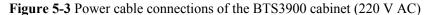
Table 5-7 Power cables of the BTS3900 cabinet (+24 V DC)

SN	Description
P1 to P6	For details, see **5.5.5 Power Cable for the RFU**.
P7	For details, see **5.5.4 Power Cable for the Fan Box**.
P8	For details, see **5.5.3 Power Cable for the BBU**.
P11 and P12	For details, see **5.5.2 Power Cable for the DCDU-01**.
P25 to P28	For details, see **5.5.1 Input Power Cable for the Cabinet**.

Power Cable Connections of the BTS3900 Cabinet (AC)

The BTS3900 cabinet supports 220 V AC three-phase input, 220 V AC single-phase input, and 110 V AC dual-live-wire input. Following is based on 220 V AC single-phase input. The power distribution schemes of a single cabinet and two cabinets are the same.

Figure 5-3 shows the power cable connections of the BTS3900 (220 V AC).

Figure 5-3 Power cable connections of the BTS3900 cabinet (220 V AC)

Table 5-8 lists the power cables of the BTS3900 cabinet (220 V AC).

Table 5-8 Power cables of the BTS3900 cabinet (220 V AC)

SN	Description
P1 to P6	For details, see **5.5.5 Power Cable for the RFU**.
P7	For details, see **5.5.4 Power Cable for the Fan Box**.
P8	For details, see **5.5.3 Power Cable for the BBU**.
P11 and P12	For details, see **5.5.2 Power Cable for the DCDU-01**.
L and N	For details, see **5.5.1 Input Power Cable for the Cabinet**.

5.2.2 Transmission Cable Connections

The base station supports the GSM only, UMTS only, LTE only, GSM+UMTS, GSM+LTE, and UMTS+LTE modes. In different modes, board configurations and transmission cable connections are different.

Transmission Cable Connections in the GSM Only Base Station

In a GSM base station, the E1/T1 cable, FE/GE Ethernet cable, or FE/GE optical cable can be used for data transmission.

Transmission over the E1 Cable

Figure 5-4 shows the transmission cable connections when the E1/T1 cable is used for data transmission in a GSM only base station where only the GTMU is configured as the transmission board in the BBU3900.

Figure 5-4 E1/T1 cable connections

Table 5-9 describes the cable connections.

Table 5-9 E1/T1 cable connections

Cable Number	Cable Description
T1	See **5.6.1 E1/T1 Cable**.

Figure 5-5 shows the transmission cable connections when the E1/T1 cable is used for data transmission in a GSM only base station where the GTMU and UTRP4 are configured as transmission boards in the BBU3900.

Figure 5-5 E1/T1 cable connections

Table 5-10 describes the cable connections.
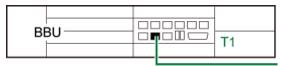
Table 5-10 E1/T1 cable connections

Cable Number	Cable Description
T1 and T2	See **5.6.2 FE/GE Cable**.

Transmission over the FE Cable

Figure 5-6 shows the transmission cable connections when the FE/GE Ethernet cable is used for data transmission.

Figure 5-6 FE/GE Ethernet cable connections
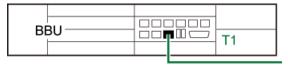
Table 5-11 describes the cable connections.

Table 5-11 FE/GE Ethernet cable connections

Cable Number	Cable Description
T1	See **5.6.2 FE/GE Cable**.

Figure 5-7 shows the transmission cable connections when the FE/GE optical cable is used for data transmission.

Figure 5-7 FE/GE optical cable connections

Table 5-12 describes the cable connections.

Table 5-12 FE/GE optical cable connections

Cable Number	Cable Description
T1	See **5.6.3 FE/GE Optical Cable**.

Transmission Cable Connections in the UMTS Only Base Station

In a UMTS base station, the E1/T1 cable, FE/GE Ethernet cable, or FE/GE optical cable can be used for data transmission.

Transmission over the E1 Cable

Figure 5-8 shows the transmission cable connections when only the E1/T1 cable is used for data transmission in a base station where only the WMPT is configured in the BBU.
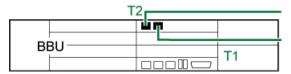
Figure 5-8 E1/T1 cable connections (1)
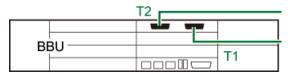
Table 5-13 describes the cable connections.

Table 5-13 E1/T1 cable connections (1)

Cable Number	Cable Description
T1	See **5.6.1 E1/T1 Cable**.

Figure 5-9 shows the transmission cable connections when only the E1/T1 cable is used for data transmission in a base station where only the WMPT and UTRP3/UTRP4 is configured in the BBU.

Figure 5-9 E1/T1 cable connections (2)

Table 5-14 describes the cable connections.

Table 5-14 E1/T1 cable connections (2)

Cable Number	Cable Description
T1 and T2	See **5.6.1 E1/T1 Cable**.

Transmission over the FE Cable

Figure 5-10 shows the transmission cable connections when only the FE/GE Ethernet cable is used for data transmission in a base station where only the WMPT is configured in the BBU.

Figure 5-10 FE/GE Ethernet cable connections (1)
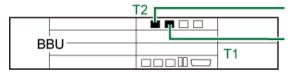
Table 5-15 describes the cable connections.

Table 5-15 FE/GE Ethernet cable connections (1)

Cable Number	Cable Description
T1	See **5.6.2 FE/GE Cable**.

Figure 5-11 shows the transmission cable connections when only the FE/GE Ethernet cable is used for data transmission in a base station where only the WMPT and UTRP9 is configured in the BBU.

Figure 5-11 FE/GE Ethernet cable connections (2)

Table 5-16 describes the cable connections.

Table 5-16 FE/GE Ethernet cable connections (2)

Cable Number	Cable Description
T1 and T2	See **5.6.2 FE/GE Cable**.

Figure 5-12 shows the transmission cable connections when only the FE/GE optical cable is used for data transmission in a base station where only the WMPT is configured in the BBU.

Figure 5-12 FE/GE optical cable connections (1)

Table 5-17 describes the cable connections.

Table 5-17 FE/GE optical cable connections (1)

Cable Number	Cable Description
T1	See **5.6.3 FE/GE Optical Cable**.

Figure 5-13 shows the transmission cable connections when only the FE/GE optical cable is used for data transmission in a base station where only the WMPT and UTRP2 is configured in the BBU.

Figure 5-13 FE/GE optical cable connections (2)

Table 5-18 describes the cable connections.

Table 5-18 FE/GE optical cable connections (2)

Cable Number	Cable Description
T1 and T2	See **5.6.3 FE/GE Optical Cable**.

Transmission Cable Connections in the LTE Only Base Station

In an LTE only base station, the E1/T1 cable or FE/GE optical cable can be used for data transmission.

Transmission over the E1/T1 Cable

When the E1/T1 cable is used for data transmission, the UTRP is required. **Figure 5-14** shows the transmission cable connections.

Figure 5-14 E1/T1 cable connections

Table 5-19 describes the cable connections.

Table 5-19 E1/T1 cable connections

Cable Number	Cable Description
T1 and T2	See **5.6.1 E1/T1 Cable**.

Transmission over the FE/GE Cable

When an LTE only base station uses FE/GE transmission, the FE/GE optical cable is usually used for data transmission. **Figure 5-15** shows the transmission cable connections.

Figure 5-15 FE/GE optical cable connections
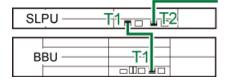
Table 5-20 describes the cable connections.

Table 5-20 FE/GE optical cable connections

Cable Number	Cable Description
T1	See **5.6.3 FE/GE Optical Cable**.

Figure 5-16 shows the transmission cable connections for a GSM only base station when the FE/GE Ethernet cable is used for data transmission.

Figure 5-16 FE/GE Ethernet cable connections

Table 5-21 describes the cable connections.

Table 5-21 FE/GE Ethernet cable connections

Cable Number	Cable Description
T1	See FE Surge Protection Transfer Cable.
T2	See **5.6.2 FE/GE Cable**.

Transmission Cable Connections for a GSM+UMTS Base Station in Common Transmission Mode

When a GSM+UMTS base station works in co-transmission mode, TDM co-transmission or IP co-transmission can be used. Based on the IP co-transmission, the GSM+UMTS base station can implement route backup. That is, four FE ports on the GTMU and LMPT panels are used. Of the four FE ports, two FE ports of one type are used for interconnection, and the FE ports of the other type are connected to the transport network.

TDM Common Transmission

Figure 5-17 shows the transmission cable connection for a GSM+UMTS base station in TDM common transmission mode when the E1/T1 port on the GTMU serves as the shared port to connect to the BSC and RNC. The GTMU communicates with the WMPT using the backplane to implement TDM common transmission.

**Figure 5-17** Transmission cable connection for a GSM+UMTS base station in TDM common transmission mode (1)
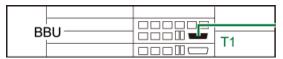
Table 5-22 describes the cable.

Table 5-22 Transmission cable for a GSM+UMTS base station in TDM common transmission mode (1)

SN	Description
T1	For details, see **5.6.1 E1/T1 Cable**.

Figure 5-18 shows the transmission cable connection for a GSM+UMTS base station in TDM common transmission mode when the E1/T1 port on the GSM UTRP serves as the shared port to connect to the BSC and RNC. The GSM UTRP communicates with the WMPT using the backplane to implement TDM common transmission.

📖 **NOTE**

Note that the E1/T1 ports on the GTMU and the WMPT can also be used for data transmission independently, but the corresponding cable connections are not shown here.

Figure 5-18 Transmission cable connection for a GSM+UMTS base station in TDM common transmission mode (2)

Table 5-23 describes the cable.

Table 5-23 Transmission cable for a GSM+UMTS base station in TDM common transmission mode (2)

SN	Description
T1	For details, see **5.6.1 E1/T1 Cable**.

IP Over E1 Common Transmission

Figure 5-19 shows the transmission cable connections for a GSM+UMTS base station in IP common transmission mode when the E1/F1 port on the UMTS UTRP serves as the shared port to connect to the BSC and RNC, and the FE/GE electrical ports on the GTMU and the WMPT are interconnected to implement IP common transmission.

☷ **NOTE**

IP common transmission can also be implemented by interconnecting the FE/GE optical ports on the GTMU and the WMPT. The transmission cable connections are similar to **Figure 5-19**, which are not described here.

Figure 5-19 Transmission cable connections for a GSM+UMTS base station in IP over E1 common transmission mode (1)
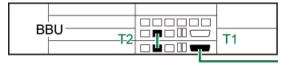
Table 5-24 describes the cables.

Table 5-24 Transmission cables for a GSM+UMTS base station in IP over E1 common transmission mode (1)

SN	Description
T1	For details, see **5.6.1 E1/T1 Cable**.
T2	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.

Figure 5-20 shows the transmission cable connections for a GSM+UMTS base station in IP common transmission mode when the FE/GE electrical port on the WMPT serves as the shared port to connect to the BSC and RNC, and the FE/GE optical ports on the GTMU and the WMPT are interconnected to implement IP common transmission.

Figure 5-20 Transmission cable connections for a GSM+UMTS base station in IP over E1 common transmission mode (2)

Table 5-25 describes the cables.

Table 5-25 Transmission cables for a GSM+UMTS base station in IP over E1 common transmission mode (2)

SN	Description
T1	For details, see **5.6.2 FE/GE Cable**.
T2	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

IP Over FE Common Transmission

Figure 5-21 shows the transmission cable connections for a GSM+UMTS base station in IP co-transmission mode when the FE/GE optical port of the UMTS UTRP2 is used as the shared ports for data transmission, and the FE/GE optical ports of the GTMU and the UMTS UTRP2 are interconnected to implement IP co-transmission.

Figure 5-21 Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (1)
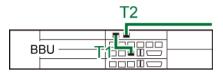
Table 5-26 describes the cables.

Table 5-26 Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (1)

SN	Description
T1	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.
T2	For details, see **5.6.3 FE/GE Optical Cable**.

Figure 5-22 shows the transmission cable connections for a GSM+UMTS base station in IP co-transmission mode when the WMPT FE/GE optical port is used as the shared port for data transmission, and the FE/GE electrical ports of the GTMU and the WMPT are interconnected to implement IP co-transmission.

Figure 5-22 Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (2)
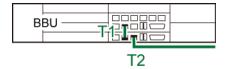
Table 5-27 describes the cables.

Table 5-27 Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (2)

SN	Description
T1	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.
T2	For details, see **5.6.3 FE/GE Optical Cable**.

Route Backup Mode with IP Common Transmission

In a GSM+UMTS base station, the route backup mode with IP common transmission has the following characteristics:

● IP transmission is applied. The GTMU and WMPT are connected to the BSC and RNC respectively using the active channel.

● The GTMU and the WMPT are interconnected using FE ports on their panels.

● If the active channel is faulty, the standby channel takes over. After the active channel is restored, the route is switched back to the active one.

● The bandwidth required by UMTS services is larger than the processing capability of the GSM standard transport network. Therefore, when the standby channel is used, the Quality of Service (QoS) of only high-priority data flows can be guaranteed.

In a GSM+UMTS base station, the route backup mode with IP common transmission has the following limitations:

● The route backup function is not applicable when the base station uses the IP over E1 common transmission.

● The route backup mode is not applicable to the ports on the UTRPs for GSM or UMTS transmission. It is applicable only to the ports on the GTMU and WMPT panels.

● In route backup mode, the FE ports of one type on the GTMU and WMPT panels are interconnected. The FE ports of the other type on the two boards are connected to the BSC and the RNC.

Figure 5-23 shows the transmission cable connections for a GSM+UMTS base station in route backup mode with IP common transmission when the FE optical ports on the GTMU and WMPT are interconnected and the FE electrical ports on the two boards are connected to the BSC and RNC.

Figure 5-23 Transmission cable connections with FE optical ports for interconnection and FE electrical ports connected to the BSC and RNC
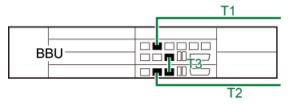
Table 5-28 describes the cables.

Table 5-28 Transmission cables with FE optical ports for interconnection and FE electrical ports connected to the BSC and RNC

SN	Description
T1 and T2	For details, see **5.6.2 FE/GE Cable**.
T3	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

Figure 5-24 shows the transmission cable connections for a GSM+UMTS base station in route backup mode with IP common transmission when the FE electrical ports on the GTMU and WMPT are interconnected and the FE optical ports on the two boards are connected to the BSC and RNC.

Figure 5-24 Transmission cable connections with FE electrical ports for interconnection and FE optical ports connected to the BSC and RNC
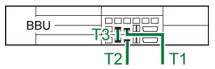
Table 5-29 describes the cables.

Table 5-29 Transmission cables with FE electrical ports for interconnection and FE optical ports connected to the BSC and RNC

SN	Description
T1 and T2	For details, see **5.6.3 FE/GE Optical Cable**.
T3	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.

Transmission Cable Connections in a GSM+UMTS Base Station in Separate Transmission Mode
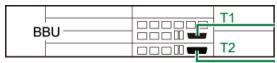
When a GSM+UMTS base station works in separate transmission mode, separate transmission links can be configured for the GSM side and UMTS side. This section describes only two typical manners of the transmission cable connections in separate transmission mode.

GSM E1/T1+UMTS E1/T1

Figure 5-25 shows the transmission cable connections when the E1/T1 cables are used for data transmission on both the GSM and UMTS sides when a GSM+UMTS base station works in separate transmission mode.

Figure 5-25 E1/T1 cable connections in separate transmission mode

Table 5-30 describes the cable connections.

Table 5-30 E1/T1 cable connections in separate transmission mode

Cable Number	Cable Description
T1 and T2	See **5.6.1 E1/T1 Cable**.

GSM FE/GE+UMTS FE/GE

Figure 5-26 shows the transmission cable connections when the FE/GE Ethernet cables are used for data transmission on both the GSM and UMTS sides when a GSM+UMTS base station works in separate transmission mode.

Figure 5-26 FE/GE cable connections in separate transmission mode (1)

Table 5-31 describes the cable connections.

Table 5-31 FE/GE cable connections in separate transmission mode (1)

Cable Number	Cable Description
T1 and T2	See **5.6.2 FE/GE Cable**.

Figure 5-27 shows the transmission cable connections when the FE/GE optical cables are used for data transmission on both the GSM and UMTS sides when a GSM+UMTS base station works in separate transmission mode.

Figure 5-27 FE/GE cable connections in separate transmission mode (2)

Table 5-32 describes the cable connections.

Table 5-32 FE/GE cable connections in separate transmission mode (2)

Cable Number	Cable Description
T1 and T2	See **5.6.3 FE/GE Optical Cable**.

Transmission Cable Connections in the GSM+LTE Base Station in Co-Transmission Mode

A GSM+LTE base station implements IP over E1 and IP over FE/GE co-transmission based on the interconnection between the FE ports (optical or electrical type) on the GTMU and LMPT panels. Based on the co-transmission, route backup can be implemented. That is, four FE ports on the GTMU and LMPT panels are used. Of the four FE ports, two FE ports of one type are used for interconnection, and the FE ports of the other type are connected to the transport network.

IP Over E1 Common Transmission

Figure 5-28 shows the transmission cable connections for a GSM+LTE base station when the E1/T1 port on the LTE UTRP is connected to the transmission equipment and the FE/GE optical port on the LMPT is interconnected to the FE/GE optical port on the GTMU.

Figure 5-28 Transmission cable connections for a GSM+LTE base station in IP over E1 common transmission mode (1)
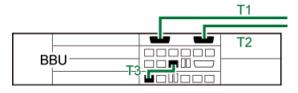
Table 5-33 describes the cables.

Table 5-33 Transmission cables for a GSM+LTE base station in IP over E1 common transmission mode (1)

SN	Description
T1 and T2	For details, see **5.6.1 E1/T1 Cable**.
T3	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

Figure 5-29 shows the transmission cable connections for a GSM+LTE base station when the E1/T1 port on the LTE UTRP is connected to the transmission equipment and the FE/GE electrical port on the LMPT is interconnected to the FE/GE electrical port on the GTMU.
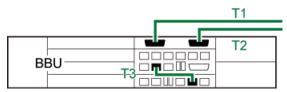
Table 5-34 describes the cables.

Table 5-34 Transmission cables for a GSM+LTE base station in IP over E1 common transmission mode (2)

SN	Description
T1 and T2	For details, see **5.6.1 E1/T1 Cable**.
T3	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.

IP Over FE/GE Common Transmission

Figure 5-30 shows the transmission cable connections for a GSM+LTE base station when the FE/GE optical port on the LMPT is connected to the transmission equipment and the FE/GE electrical port on the LMPT is interconnected to the FE/GE electrical port on the GTMU.

Figure 5-30 Transmission cable connections for a GSM+LTE base station in IP over FE/GE common transmission mode (1)

Table 5-35 describes the cables.

Table 5-35 Transmission cables for a GSM+LTE base station in IP over FE/GE common transmission mode (1)

SN	Description
T1	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.
T2	For details, see **5.6.3 FE/GE Optical Cable**.

Figure 5-31 shows the transmission cable connections for a GSM+LTE base station when the FE/GE electrical port on the LMPT is connected to the transmission equipment and the FE/GE optical port on the LMPT is interconnected to the FE/GE optical port on the GTMU.

Figure 5-31 Transmission cable connections for a GSM+LTE base station in IP over FE/GE common transmission mode

Table 5-36 describes the cables.

Table 5-36 Transmission cables for a GSM+LTE base station in IP over FE/GE common transmission mode

SN	Description
T1	For details, see **5.6.2 FE/GE Cable**.
T2	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

Route Backup Mode with IP Common Transmission

In a GSM+LTE base station, the route backup transmission mode has the following characteristics:

- IP transmission is applied. The GTMU and LMPT are connected to the transport network through the primary channel.

- The GTMU and the LMPT are interconnected through FE ports on their panels.

- If the primary channel is faulty, the secondary channel takes over. After the primary channel is restored, the route is switched back to the primary one.

- The bandwidth required by LTE services is larger than the processing capability of the GSM standard transport network. Therefore, when the secondary channel is used, the Quality of Service (QoS) of only high-priority data flows can be guaranteed.

In a GSM+LTE base station, the following limitations on the route backup transmission mode apply:

- The route backup function is not applicable when the base station uses the IP over E1 transmission.

- The route backup transmission mode is not applicable on the ports on the UTRPs for GSM and LTE transmission. It is applicable only on the ports on the GTMU and LMPT panels.

- In route backup transmission mode, the FE ports of one type on the GTMU and LMPT panels are interconnected. The FE ports of the other type on the two boards are connected to the transport network.

Figure 5-32 shows the transmission cable connections for a GSM+LTE base station in route backup mode with IP common transmission when the FE electrical ports on the GTMU and LMPT are interconnected and the FE optical ports on the two boards are connected to the base station controller.

Figure 5-32 Transmission cable connections with FE electrical ports for interconnection and FE optical ports connected to the base station controller
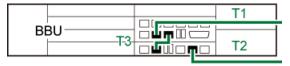

Table 5-37 describes the cables.

Table 5-37 Transmission cables with FE electrical ports for interconnection and FE optical ports connected to the base station controller

SN	Description
T1 and T2	For details, see **5.6.3 FE/GE Optical Cable**.
T3	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.

FE Optical Ports for Interconnection and FE Electrical Ports Connected to the BSC and RNC

Figure 5-33 shows the transmission cable connections for a GSM+LTE base station in route backup mode with IP common transmission when the FE optical ports on the GTMU and LMPT are interconnected and the FE electrical ports on the two boards are connected to the base station controller.

Figure 5-33 Transmission cable connections with FE optical ports for interconnection and FE electrical ports connected to the base station controller

Table 5-38 describes the cables.

Table 5-38 Transmission cables with FE optical ports for interconnection and FE electrical ports connected to the base station controller

SN	Description
T1 and T2	For details, see **5.6.2 FE/GE Cable**.
T3	For details, see **5.6.5 Cable Between Two FE Optical Ports**.
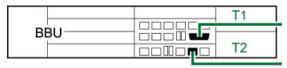
Transmission Cable Connections in the GSM+LTE Base Station in Separate Transmission Mode

When a GSM+LTE base station works in separate transmission mode, separate transport links can be configured for the GSM side and LTE side. This section describes two typical manners of the transmission cable connections in separate transmission mode.

GSM E1/T1+LTE FE/GE

Figure 5-34 shows the transmission cable connections for a GSM+LTE base station when the E1/T1 port (providing four E1s/T1s) on the GTMU is used for data transmission on the GSM side and the FE/GE electrical port is used for data transmission on the LTE side.

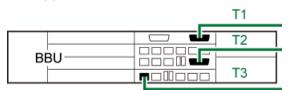**Figure 5-34** Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (1)

Table 5-39 describes the cable connections.

Table 5-39 Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1	See **5.6.1 E1/T1 Cable**.
T2	See **5.6.2 FE/GE Cable**.

Figure 5-35 shows the transmission cable connections for a GSM+LTE base station when the E1/T1 port (providing four E1s/T1s) on the GTMU is used for data transmission on the GSM side and the FE/GE optical port is used for data transmission on the LTE side.

Figure 5-35 Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (2)
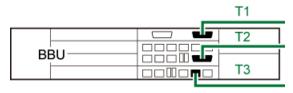
Table 5-40 describes the cable connections.

Table 5-40 Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See **5.6.1 E1/T1 Cable**.
T2	See **5.6.3 FE/GE Optical Cable**.

Figure 5-36 shows the transmission cable connections for a GSM+LTE base station when the E1/T1 port (providing four E1s/T1s) on the GTMU and the E1/T1 port (providing four E1s/T1s) on the UTRP are used for data transmission on the GSM side and the FE/GE electrical port is used for data transmission on the LTE side.

Figure 5-36 Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (1)

Table 5-41 describes the cable connections.

Table 5-41 Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T2	See **5.6.1 E1/T1 Cable**.
T3	See **5.6.2 FE/GE Cable**.

Figure 5-37 shows the transmission cable connections for a GSM+LTE base station when the E1/T1 port (providing four E1s/T1s) on the GTMU and the E1/T1 port (providing four E1s/T1s) on the UTRP are used for data transmission on the GSM side and the FE/GE optical port is used for data transmission on the LTE side.

Figure 5-37 Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (2)

Table 5-42 describes the cable connections.

Table 5-42 Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1 and T2	See **5.6.1 E1/T1 Cable**.
T3	See **5.6.3 FE/GE Optical Cable**.

GSM FE/GE+LTE FE/GE

Figure 5-38 shows the transmission cable connections for a GSM+LTE base station in separate transmission mode when the FE/GE electrical ports are used for data transmission on both the GSM and LTE sides.

Figure 5-38 Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (1)
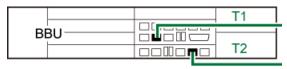
Table 5-43 describes the cable connections.

Table 5-43 Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T2	See **5.6.2 FE/GE Cable**.

Figure 5-39 shows the transmission cable connections for a GSM+LTE base station when the FE/GE electrical port is used for data transmission on the GSM side and the FE/GE optical port is used for data transmission on the LTE side.

Figure 5-39 Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (2)

Table 5-44 describes the cable connections.

Table 5-44 Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See **5.6.2 FE/GE Cable**.
T2	See **5.6.3 FE/GE Optical Cable**.

Transmission Cable Connection in the UMTS+LTE Base Station in Co-Transmission Mode

A UMTS+LTE base station implements IP co-transmission based on the interconnection between the FE ports on the WMPT and LMPT panels. Based on the co-transmission, route backup and hybrid transmission can be implemented.

IP Over E1 Common Transmission

Figure 5-40 shows the transmission cable connections for a UMTS+LTE base station when the E1/T1 port on the LTE UTRP is connected to the transmission equipment and the FE/GE optical port on the LMPT is interconnected to the FE/GE optical port on the WMPT.

Figure 5-40 Transmission cable connections for a UMTS+LTE base station in IP over E1 common transmission mode (1)
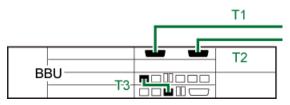
Table 5-45 describes the cables.

Table 5-45 Transmission cables for a UMTS+LTE base station in IP over E1 common transmission mode (1)

SN	Description
T1 and T2	For details, see **5.6.1 E1/T1 Cable**.
T3	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

Figure 5-41 shows the transmission cable connections for a UMTS+LTE base station when the E1/T1 port on the LTE UTRP is connected to the transmission equipment and the FE/GE electrical port on the LMPT is interconnected to the FE/GE electrical port on the WMPT.

Figure 5-41 Transmission cable connections for a UMTS+LTE base station in IP over E1 common transmission mode (2)
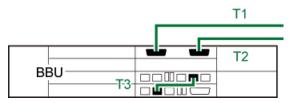
Table 5-46 describes the cables.

Table 5-46 Transmission cables for a UMTS+LTE base station in IP over E1 common transmission mode (2)

SN	Description
T1 and T2	For details, see **5.6.1 E1/T1 Cable**.
T3	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.

IP Over FE/GE Common Transmission

Figure 5-42 shows the transmission cable connections for a UMTS+LTE base station when the FE/GE optical port on the LMPT is connected to the transmission equipment and the FE/GE electrical port on the LMPT is interconnected to the FE/GE electrical port on the WMPT.

Figure 5-42 Transmission cable connections for a UMTS+LTE base station in IP over FE/GE common transmission mode (1)
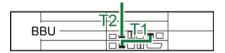
Table 5-47 describes the cables.

Table 5-47 Transmission cables for a UMTS+LTE base station in IP over FE/GE common transmission mode (1)

SN	Description
T1	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.
T2	For details, see **5.6.3 FE/GE Optical Cable**.

Figure 5-43 shows the transmission cable connections for a UMTS+LTE base station when the FE/GE electrical port on the LMPT is connected to the transmission equipment and the FE/GE optical port on the LMPT is interconnected to the FE/GE optical port on the WMPT.

Figure 5-43 Transmission cable connections for a UMTS+LTE base station in IP over FE/GE common transmission mode

Table 5-48 describes the cables.

Table 5-48 Transmission cables for a UMTS+LTE base station in IP over FE/GE common transmission mode

SN	Description
T1	For details, see **5.6.2 FE/GE Cable**.
T2	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

Route Backup Mode with IP Common Transmission

In route backup mode, the FE ports of one type (either optical or electrical ports) on the WMPT and LMPT are interconnected, and the FE ports of the other type (either optical or electrical ports) on the two boards are connected to the transmission equipment.

In a UMTS+LTE base station, the route backup transmission mode has the following characteristics:

- IP transmission is applied. The WMPT and LMPT are connected to the transport network through the primary channel.

- The WMPT and the LMPT are interconnected through FE ports on their panels.

- If the primary channel is faulty, the secondary channel takes over. After the primary channel is restored, the route is switched back to the primary one.

- The bandwidth required by LTE services is larger than the processing capability of the UMTS standard transport network. Therefore, when the secondary channel is used, the Quality of Service (QoS) of only high-priority data flows can be guaranteed.

In a UMTS+LTE base station, the following limitations on the route backup transmission mode apply:

- The route backup function is not applicable when the base station uses the IP over E1 transmission.

- The route backup transmission mode is not applicable on the ports on the UTRPs for UMTS and LTE transmission. It is applicable only on the ports on the WMPT and LMPT panels.

- In route backup transmission mode, the FE ports of one type on the WMPT and LMPT panels are interconnected. The FE ports of the other type on the two boards are connected to the transport network.

Figure 5-44 shows the transmission cable connections for a UMTS+LTE base station in route backup mode with IP common transmission when the FE electrical ports on the WMPT and LMPT are interconnected and the FE optical ports on the two boards are connected to the transmission equipment.

Figure 5-44 Transmission cable connections for a UMTS+LTE base station in route backup mode with IP common transmission (1)
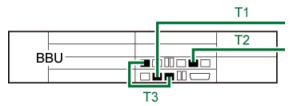

Table 5-49 describes the cables.

Table 5-49 Transmission cables for a UMTS+LTE base station in route backup mode with IP common transmission (1)

SN	Description
T1 and T2	For details, see **5.6.3 FE/GE Optical Cable**.
T3	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.

Figure 5-45 shows the transmission cable connections for a UMTS+LTE base station in route backup mode with IP common transmission when the FE optical ports on the WMPT and LMPT are interconnected and the FE electrical ports on the two boards are connected to the transmission equipment.

Figure 5-45 Transmission cable connections for a UMTS+LTE base station in route backup mode with IP common transmission (2)

Table 5-50 describes the cables.

Table 5-50 Transmission cables for a UMTS+LTE base station in route backup mode with IP common transmission (2)

SN	Description
T1 and T2	For details, see **5.6.2 FE/GE Cable**.

SN	Description
T3	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

Hybrid Transmission

In hybrid transmission mode, the UMTS E1/T1 port and LTE FE/GE port serve as shared ports to connect to the transmission equipment. The E1/T1 port is used to transmit the services with high QoS requirements, such as CS services; and the FE/GE port is used to transmit the services with low QoS requirements, such as PS services.

The UMTS E1/T1 port and the LTE FE/GE port are used for data transmission in a UMTS+LTE base station in hybrid transmission mode. When the UMTS FE/GE port and the LTE FE/GE port are used for data transmission, hybrid transmission is not applicable.

Figure 5-46 shows the transmission cable connections in hybrid transmission mode (UMTS E1/T1 port + LTE FE/GE optical port).

Figure 5-46 Transmission cable connections in hybrid transmission mode (1)

Table 5-51 describes the cables.

Table 5-51 Transmission cables in hybrid transmission mode (1)

SN	Description
T1	For details, see **5.6.3 FE/GE Optical Cable**.
T2	For details, see **5.6.1 E1/T1 Cable**.
T3	For details, see **5.6.4 Cable Between Two FE Electrical Ports**.

Figure 5-47 shows the transmission cable connections in hybrid transmission mode (UMTS E1/T1 port + LTE FE/GE electrical port).

Figure 5-47 Transmission cable connections in hybrid transmission mode (2)
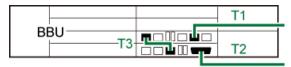
Table 5-52 describes the cables.

Table 5-52 Transmission cables in hybrid transmission mode (2)

SN	Description
T1	For details, see **5.6.2 FE/GE Cable**.
T2	For details, see **5.6.1 E1/T1 Cable**.
T3	For details, see **5.6.5 Cable Between Two FE Optical Ports**.

Transmission Cable Connection in the UMTS+LTE Base Station in Separate Transmission Mode

When a UMTS+LTE base station works in separate transmission mode, separate transport links can be configured for the UMTS side and the LTE side. This section describes two typical manners of the transmission cable connections in separate transmission mode.

UMTS E1/T1+LTE FE/GE

Figure 5-48 shows the transmission cable connections for a UMTS+LTE base station when the E1/T1 port (providing four E1s/T1s) on the WMPT is used for data transmission on the UMTS side and the FE/GE electrical port is used for data transmission on the LTE side.

Figure 5-48 Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (1)
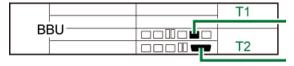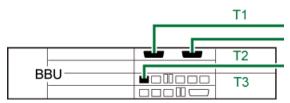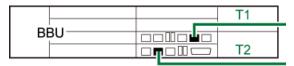

Table 5-53 describes the cable connections.

Table 5-53 Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1	See **5.6.2 FE/GE Cable**.
T2	See **5.6.1 E1/T1 Cable**.

Figure 5-49 shows the transmission cable connections for a UMTS+LTE base station when the E1/T1 port (providing four E1s/T1s) on the WMPT is used for data transmission on the UMTS side and the FE/GE optical port is used for data transmission on the LTE side.

Figure 5-49 Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (2)
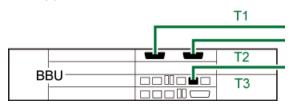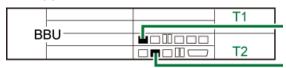

Table 5-54 describes the cable connections.

Table 5-54 Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See **5.6.3 FE/GE Optical Cable**.
T2	See **5.6.1 E1/T1 Cable**.

Figure 5-50 shows the transmission cable connections for a UMTS+LTE base station when the E1/T1 port (providing eight E1s/T1s) on the UTRP3 or UTRP4 is used for data transmission on the UMTS side and the FE/GE electrical port is used for data transmission on the LTE side.

Figure 5-50 Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (1)

Table 5-55 describes the cable connections.

Table 5-55 Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T2	See **5.6.1 E1/T1 Cable**.
T3	See **5.6.2 FE/GE Cable**.

Figure 5-51 shows the transmission cable connections for a UMTS+LTE base station when the E1/T1 port (providing eight E1s/T1s) on the UTRP3 or UTRP4 is used for data transmission on the UMTS side and the FE/GE optical port is used for data transmission on the LTE side.

Figure 5-51 Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (2)

Table 5-56 describes the cable connections.

Table 5-56 Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1 and T2	See **5.6.1 E1/T1 Cable**.
T3	See **5.6.3 FE/GE Optical Cable**.

UMTS FE/GE+LTE FE/GE

Figure 5-52 shows the transmission cable connections for a UMTS+LTE base station in separate transmission mode when the FE/GE ports are used for data transmission on both the UMTS and LTE sides.

Figure 5-52 Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (1)

Table 5-57 describes the cable connections.

Table 5-57 Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T2	See **5.6.2 FE/GE Cable**.

Figure 5-53 shows the transmission cable connections for a UMTS+LTE base station when the FE/GE electrical port is used for data transmission on the UMTS side and the FE/GE optical port is used for data transmission on the LTE side.

Figure 5-53 Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (2)

Table 5-58 describes the cable connections.

Table 5-58 Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See **5.6.3 FE/GE Optical Cable**.
T2	See **5.6.2 FE/GE Cable**.

Transmission Cable Connections for a Triple-Mode Base Station

The triple-mode base station solution is provided by Huawei in SingleRAN6.0, which is applicable to three scenarios: GU+LO, GL+UO, and UO+GL. This section describes the transmission cable connections for the triple-mode base stations in three scenarios.

In SingleRAN6.0, a single BBU can support a maximum of two modes, and two BBUs are required for a triple-mode base station.

In this document, the two BBUs are described as BBU0 and BBU1 for better understanding.

- In an expanded base station, BBU0 is the BBU installed during the initial site construction, and BBU1 is the BBU installed during the capacity expansion.

- In a new base station, BBU0 is the BBU working in GSM+UMTS or GSM+LTE mode, and BBU1 is the BBU working in LTE only or UMTS only mode.

- The difference between the GL+UO scenario and UO+GL scenario is as follows: the GL+UO scenario is applicable to both an expanded base station and a new base station, while the UO+GL scenario is applicable only to an expanded base station.

GU (BBU0)+LO (BBU1)

In the GU+LO scenario, BBU0 works in GSM+UMTS mode. The common transmission mode and separate transmission mode are supported. For details about the transmission cable connections, see **Transmission Cable Connections for a GSM+UMTS Base Station in Common Transmission Mode** and **Transmission Cable Connections in a GSM+UMTS Base Station in Separate Transmission Mode**.

In the GU+LO scenario, BBU1 works in LTE only mode. For details about the transmission cable connections, see **Transmission Cable Connections in the LTE Only Base Station**.

GL (BBU0)+UO (BBU1)

In the GL+UO scenario, BBU0 works in GSM+LTE mode. The common transmission mode and separate transmission mode are supported. For details about the transmission cable

connections, see **Transmission Cable Connections in the GSM+LTE Base Station in Co-Transmission Mode** and **Transmission Cable Connections in the GSM+LTE Base Station in Separate Transmission Mode**.

In the GL+UO scenario, BBU1 works in UMTS only mode. For details about the transmission cable connections, see **Transmission Cable Connections in the UMTS Only Base Station**.

UO (BBU0)+GL (BBU1)

In the UO+GL scenario, BBU0 works in UMTS only mode. For details about the transmission cable connections, see **Transmission Cable Connections in the UMTS Only Base Station**.

In the UO+GL scenario, BBU1 works in GSM+LTE mode. The common transmission mode and separate transmission mode are supported. For details about the transmission cable connections, see **Transmission Cable Connections in the GSM+LTE Base Station in Co-Transmission Mode** and **Transmission Cable Connections in the GSM+LTE Base Station in Separate Transmission Mode**.

5.2.3 CPRI Cable Connections

The CPRI cables are connected in star topology or chain topology. In star topology, each RFU is connected to the BBU separately. In chain topology, the RFUs are cascaded before connected to the BBU.

CPRI Cable Connections for a GSM Only Base Station

Figure 5-54 and **Figure 5-55** show the CPRI cable connections of the DRFU/GRFU.
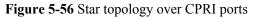
Figure 5-54 Star topology
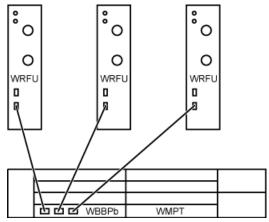
Figure 5-55 Chain topology

CPRI Cable Connections in the UMTS Only Base Station

Figure 5-56 shows the star topology of the WRFUs over CPRI ports when the WRFUs work in single-band mode and support not more than three sectors in a base station with MIMO not supported.

Figure 5-56 Star topology over CPRI ports
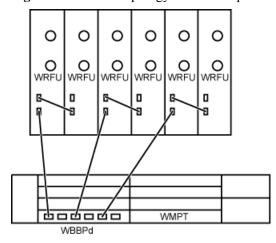
When the WRFUs work in single-band mode and support not more than three sectors (two WRFUs for each sector) in a base station with MIMO supported, or when the bandwidth and carriers are expanded, the CPRI ports are connected in chain topology, as shown in **Figure 5-57** and **Figure 5-58**.

Figure 5-57 Chain topology over CPRI ports

Figure 5-58 Chain topology over CPRI ports on the WBBPd

CPRI Cable Connections in the LTE Only Base Station

Figure 5-59 shows the CPRI cable connections in the 3 x 10 MHz 2T2R configuration.

Figure 5-59 CPRI cable connections in the 3 x 10 MHz 2T2R configuration

Figure 5-60 shows the CPRI cable connections in the 3 x 20 MHz 2T2R configuration.

Figure 5-60 CPRI cable connections in the 3 x 20 MHz 2T2R configuration
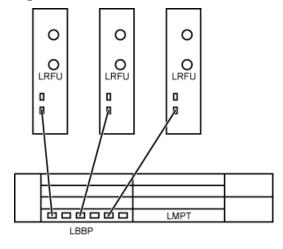
Figure 5-61 shows the CPRI cable connections in the 3 x 10 MHz 4T4R configuration.
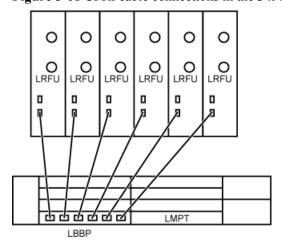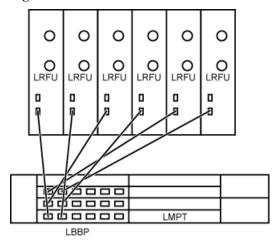
Figure 5-61 CPRI cable connections in the 3 x 10 MHz 4T4R configuration

Figure 5-62 shows the CPRI cable connections in the 3 x 20 MHz 4T4R configuration.

Figure 5-62 CPRI cable connections in the 3 x 20 MHz 4T4R configuration

CPRI Cable Connections in the GSM+UMTS Base Station

CPRI Cable Connections in the Co-Module GSM+UMTS Base Station
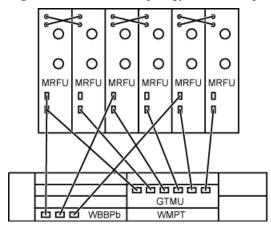
When the MRFUs support not more than three sectors, one WBBPb is configured. When the MRFUs support more than three sectors, two WBBPbs or one WBBPd are configured.

When the MRFUs work in single-band mode and support three sectors, the CPRI ports are connected in dual-star topology, as shown in **Figure 5-63** and **Figure 5-64**.
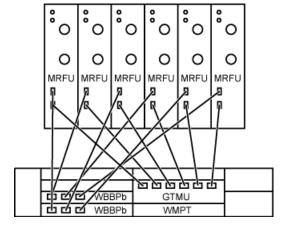
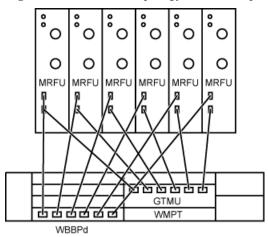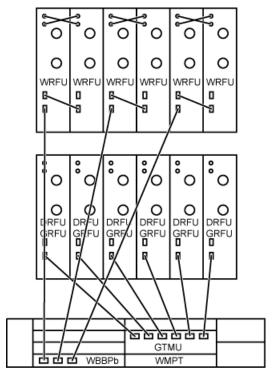**Figure 5-63** Dual-star topology over CPRI ports (1)

Figure 5-64 Dual-star topology over CPRI ports (2)

When the MRFUs work in single-band mode and support more than three sectors, the CPRI ports are connected in dual-star topology, as shown in **Figure 5-65** and **Figure 5-66**.

Figure 5-65 Dual-star topology over CPRI ports (3)

Figure 5-66 Dual-star topology over CPRI ports (4)

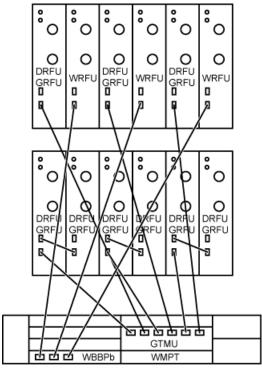## CPRI Cable Connections in the Co-Cabinet GSM+UMTS Base Station

When a GSM+UMTS base station works in co-cabinet mode, the base station supports a maximum of 12 RFUs.

Figure 5-67 and **Figure 5-68** show the CPRI cable connections in a base station in co-cabinet mode.

Figure 5-67 CPRI cable connections in a co-cabinet base station with WRFUs and DRFUs/GRFUs (1)

Figure 5-68 CPRI cable connections in a co-cabinet base station with WRFUs and DRFUs/ GRFUs (2)

When the MRFUs work in dual-mode and support three sectors and when the WRFU support three sectors in a base station with MIMO not supported, the CPRI cables are connected in the manner shown in **Figure 5-69**.
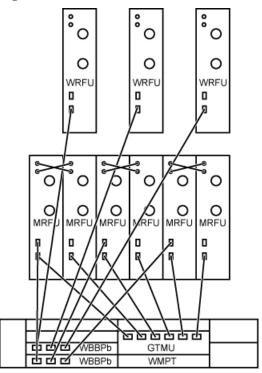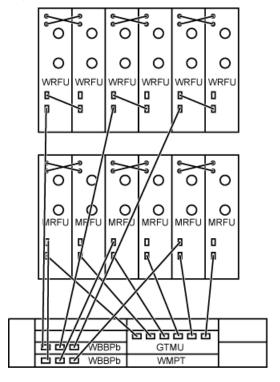
Figure 5-69 CPRI cable connections in a co-cabinet base station with MRFUs and WRFUs (1)
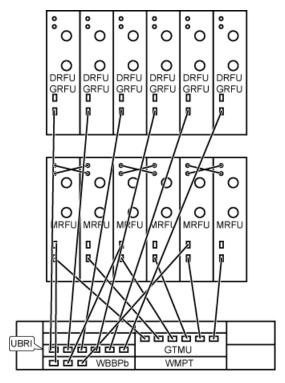

When the MRFUs work in dual-mode and support three sectors and when the WRFU support three sectors in a base station with MIMO supported, the CPRI cables are connected in the manner shown in **Figure 5-70**.

Figure 5-70 CPRI cable connections in a co-cabinet base station with MRFUs and WRFUs (2)

When the MRFUs work in dual-mode and support three sectors, and the number of DRFUs/ GRFUs is more than three, the UBRI is required. In this case, the CPRI cables are connected in the manner shown in **Figure 5-71**.

Figure 5-71 CPRI cable connections in a co-cabinet base station with MRFUs and DRFUs/ GRFUs

CPRI Cable Connections in the GSM+LTE Base Station

CPRI Cable Connections in the Co-Module GSM+LTE Base Station

The MRFUs working in GSM+LTE mode are connected in the dual-star topology, as shown in **Figure 5-72**.
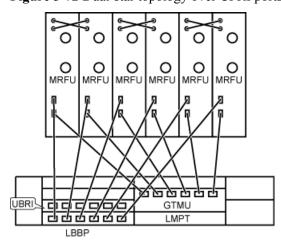
Figure 5-72 Dual-star topology over CPRI ports

CPRI Cable Connections in the Co-Cabinet GSM+UMTS Base Station

Figure 5-73 shows the CPRI cable connections in a base station in co-cabinet mode.
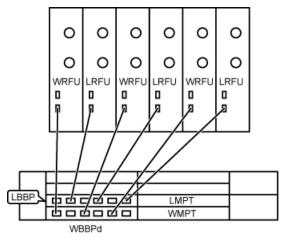
Figure 5-73 CPRI cable connections in co-cabinet mode

CPRI Cable Connections in the UMTS+LTE Base Station

The WRFUs and LRFUs in a UMTS+LTE base station use the same CPRI cable connection as the RFUs in a UMTS only base station and LTE only base station respectively, as shown in **Figure 5-74**.

Figure 5-74 CPRI port connection principles

CPRI Cable Connection in the Tri-Mode Base Station

The tri-mode base station solution, provided by Huawei in SingleRAN6.0, is also applicable to two other scenarios: GU+L(G) and GL+U(G).

A single baseband unit (BBU) can support a maximum of two modes, and two BBUs are required for a tri-mode base station.

In this document, the two BBUs are described as BBU0 and BBU1.

- In capacity expansion, BBU0 is the BBU installed during the initial site construction, and BBU1 is the BBU installed during the capacity expansion.

- In a site construction, BBU 0 works in GSM+UMTS (GU) or GSM+LTE (GL) mode, and BBU 1 works in LTE Only (LO) or UMTS Only (UO) mode by default.

- The difference between the GL+UO scenario and UO+GL scenario is as follows: the GL +UO scenario is applicable to both an expanded base station and a new base station, while the UO+GL scenario is applicable only to an expanded base station.

- The difference between the GU+LO scenario and GU+L(G) scenario is as follows: in the GU+LO scenario, a BBU working in GU mode and a BBU working in LO mode are installed at one site, while in GU+L(G) scenario, a BBU working in GU mode and a BBU working in LO are connected by using UCIU for achieving triple mode. UCIU is short for universal cascading interface unit.

GU (BBU0)+LO (BBU1)

In the GU+LO scenario, BBU0 works in GU mode. **CPRI Cable Connections in the GSM +UMTS Base Station** shows the connections of the CPRI cables.

In the GU+LO scenario, BBU1 works in LO mode. **CPRI Cable Connections in the LTE Only Base Station** shows the connections of the CPRI cables.

GL (BBU0)+UO (BBU1)

In the GL+UO scenario, BBU0 works in GL mode. **CPRI Cable Connections in the GSM +LTE Base Station** shows the connections of the CPRI cables.

In the GL+UO scenario, BBU1 works in UO mode. **CPRI Cable Connections in the UMTS Only Base Station** shows the connections of the CPRI cables.

GU (BBU0)+L(G) (BBU1)

In the GU+L(G) scenario, BBU0 works in GU mode and BBU1 works in L(G) mode. BBU0 is connected to BBU1 by using UCIU for achieving triple mode. **Figure 5-75** shows the connections of the CPRI cables. UCIU is short for universal cascading interface unit.
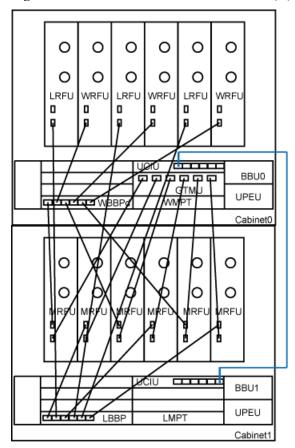
Figure 5-75 CPRI cable connections in GU+L(G) scenario

The configuration order is as follows:

● Configure radio frequency units (RFUs) that are connected to BBU0, including MRFUs in the inter-BBU SDR scenario.

● Configure RFUs that are connected to BBU1.

● Configure the CPRI cables connected to BBU0, including the ones connected to the MRFUS in the inter-BBU SDR scenario.

● Configure the CPRI cables connected to BBU1, including the ones connected to the MRFUS in the inter-BBU SDR scenario.

⚌ **NOTE**

- In tri-mode base station, BBU0 is preferentially connected to CPRI cables in lower subrack and then connected to CPRI cables in upper subrack.
- BBU1 is preferentially connected to CPRI cables in lower subrack and then connected to CPRI cables in upper subrack.

GL (BBU0)+U(G) (BBU1)

In the GL+U(G) scenario, BBU0 works in GL mode and BBU1 works in U(G) mode. BBU0 is connected to BBU1 by using UCIU for achieving triple mode. **Figure 5-76** shows the connections of the CPRI cables.

Figure 5-76 CPRI cable connections in GU+L(G) scenario

⚌ **NOTE**

The MRFUs work in GO scenario first and then in GU/GL scenario after capacity expansion. The cable configuration principle is the same as in a new site construction.

5.2.4 RF Cable Connections

The RFUs configured in a base station can be DRFUs, GRFUs, WRFUs, and MRFUs. The RF cable connections vary according to RFU types.

RF Cable Connections for DRFUs

The DRFU supports two carriers.

The following description is based on the RF cable connections for DRFUs with a single sector.

Cable Connections in 1T2R Mode

With one RX channel and two TX channels, the following items are configured for one carrier:

- A pair of dual-polarized antennas
- One DRFU

Figure 5-77 describes the RF cable connections.

Figure 5-77 Cable connections in 1T2R mode (1)

With one RX channel and two TX channels, the following items are configured for two carriers:

- A pair of dual-polarized antennas
- One DRFU

Figure 5-77 shows the RF cable connections.

With one RX channel and two TX channels, the following items are configured for four carriers:

- A pair of dual-polarized antennas
- Two DRFUs

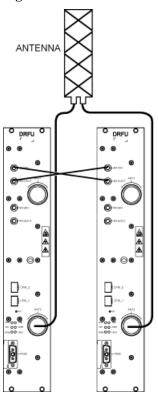Figure 5-78 describes the RF cable connections.

Figure 5-78 Cable connections in 1T2R mode (2)

Cable Connections in 2T2R Mode

With two RX channels and two TX channels, the following items are configured for one carrier:

- A pair of dual-polarized antennas
- One DRFU

Figure 5-77 shows the RF cable connections.

With two RX channels and two TX channels, the following items are configured for two carriers:

- A pair of dual-polarized antennas
- Two DRFUs

Figure 5-78 shows the RF cable connections.

RF Cable Connections for GRFUs

The GRFU supports six carriers.

The following description is based on the RF cable connections for GRFUs with a single sector.

The GRFU supports only the 1T2R configuration.

Cable Connections with Three Carriers

The following items are configured for three carriers:

- A pair of dual-polarized antennas

- One GRFU

Figure 5-79 describes the RF cable connections.

Figure 5-79 Cable connections with three carriers

Cable Connections with Nine Carriers

The following items are configured for nine carriers:

- A pair of dual-polarized antennas
- Two GRFUs

Figure 5-80 describes the RF cable connections.

Figure 5-80 Cable Connections with Nine Carriers
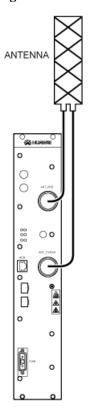

Cable Connections with 14 Carriers

The following items are configured for 14 carriers:

● Two pairs of dual-polarized antennas

● Three GRFUs
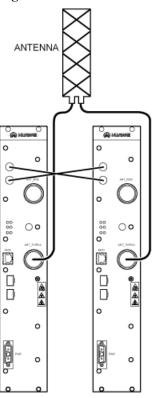
Figure 5-81 describes the RF cable connections.
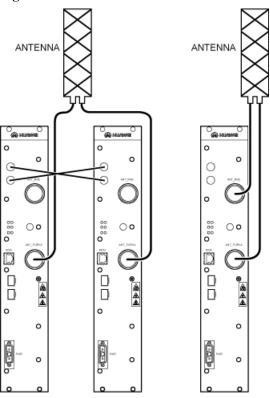
Figure 5-81 Cable connections with 14 carriers

Cable Connections with 24 Carriers

The following items are configured for 24 carriers:

- Two pairs of dual-polarized antennas
- Four GRFUs

Figure 5-82 describes the RF cable connections.
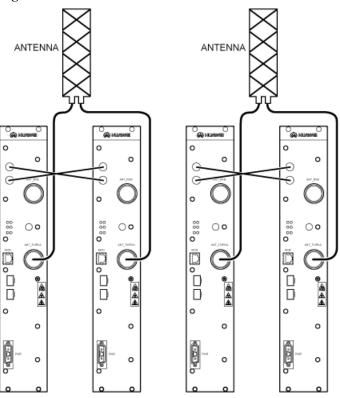
Figure 5-82 Cable connections with 24 carriers

RF Cable Connections for WRFUs

The WRFU supports four carriers.

The following description is based on the RF cable connections for WRFUs with a single sector.

Cable Connections in 1T2R Mode

With one RX channel and two TX channels, the following items are configured for one to four carriers:

● A pair of dual-polarized antennas

● One WRFU

Figure 5-83 describes the RF cable connections.

Figure 5-83 Cable connections in 1T2R mode (1)

With one RX channel and two TX channels, the following items are configured for five to eight carriers:

- A pair of dual-polarized antennas
- Two WRFUs

Figure 5-84 describes the RF cable connections.

Figure 5-84 Cable connections in 1T2R mode (2)

Cable Connections in 2T2R Mode

With two RX channels and two TX channels, the following items are configured for one to four carriers:

- A pair of dual-polarized antennas
- Two WRFUs

Figure 5-84 shows the RF cable connections.

Cable Connections in 2T4R Mode

With two RX channels and four TX channels, the following items are configured for one to four carriers:

- Two pairs of dual-polarized antennas
- Two WRFUs

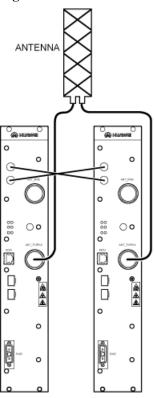**Figure 5-85** describes the RF cable connections.
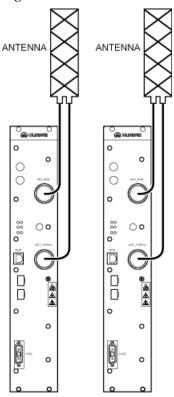
Figure 5-85 Cable connections in 2T4R mode

Cable Connections in 2x2 MIMO Mode

The base station in UMTS only mode supports 2x2 MIMO. **Figure 5-84** shows the cable connections.

RF Cable Connections for LRFUs

The LRFU supports a single carrier.

The following description is based on the RF cable connections for LRFUs supporting a single sector.

The LRFU supports only the 2T2R configuration.

RF Cable Connections in 2T2R Mode

In 2T2R mode, the following items are configured:

- A dual-polarized antenna
- An LRFU

Figure 5-86 shows RF cable connections.

Figure 5-86 RF cable connections in 2T2R mode

RF Cable Connections in 4T4R mode

In 4T4R mode, the following items are configured:

- Two dual-polarized antennas
- Two LRFUs

Figure 5-87 shows RF cable connections.
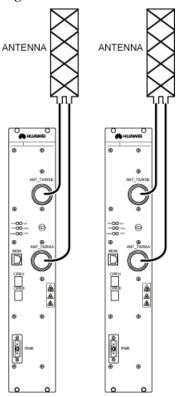
Figure 5-87 RF cable connections in 4T4R mode

RF Cable Connections for MRFUs

The MRFU supports six carriers.

The following description is based on the RF cable connections for MRFUs with a single sector.

The MRFU supports only the 1T2R configuration.

RF Cable Connections in G4U2 Mode

When the GSM system is configured with four carriers and the UMTS system is configured with two carriers, the following items are required:

● A pair of dual-polarized antennas

● One MRFU

Figure 5-88 shows the RF cable connections in G4U2 mode.

Figure 5-88 RF cable connections in G4U2 mode

RF Cable Connections in G6U2 Mode

When the GSM system is configured with six carriers and the UMTS system is configured with two carriers, the following items are required:

- A pair of dual-polarized antennas
- Two MRFUs

Figure 5-89 shows the RF cable connections in G6U2 mode.
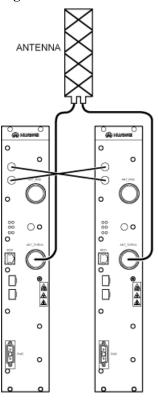
Figure 5-89 RF cable connections in G6U2 mode

RF Cable Connections in G2L1 Mode

When the GSM system is configured with two carriers and the LTE system is configured with one carrier, the following items are required:

● A pair of dual-polarized antennas

● One MRFU

Figure 5-88 shows the RF cable connections in G2L1 mode.

RF Cable Connections in Single-mode Scenarios

In GSM only mode, a single MRFU supports a maximum of six carriers. **Figure 5-88** shows the corresponding RF cable connections.

In UMTS only mode, a single MRFU supports a maximum of four carriers. **Figure 5-88** shows the corresponding RF cable connections.

In LTE only mode, a single MRFU supports the 1T2R configuration and two MRFUs support the 2T2R configuration. **Figure 5-88** shows the corresponding RF cable connections for the 1T2R configuration, and **Figure 5-90** shows the corresponding RF cable connections for the 2T2R configuration.
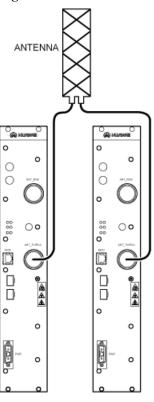
Figure 5-90 RF cable connections in 2T2R mode

RF Cable Connections for MRFU V3

An MRFU V3 in single mode supports a maximum of 6 GSM carriers, 4 UMTS carriers, or 2 LTE carriers. An MRFU V3 in GU or GL mode supports a maximum of 6 carriers.

The following description is based on the RF cable connections for MRFU V3s with a single sector.
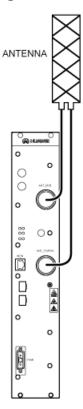
Cable Connections in 1T2R Mode

With two RX channels and one TX channel, the following items are configured:

● A pair of dual-polarized antennas

● One MRFU V3

Figure 5-91 shows the RF cable connections.

Figure 5-91 Cable connections in 1T2R

Cable Connections in 2T4R Mode

With four RX channels and two TX channels, the following items are configured:

- Two pairs of dual-polarized antennas
- Two MRFU V3s

Figure 5-92 shows the RF cable connections.
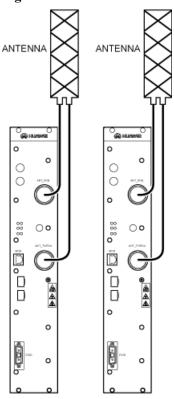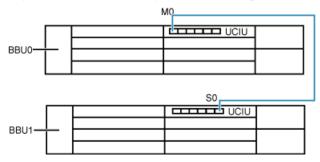
Figure 5-92 Cable connections in 2T4R mode (II)

5.2.5 Inter-BBU Signal Cable in a Triple-Mode Base Station

A triple-mode base station supports the interconnection of UCIUs in two BBUs to achieve triple modes of GSM+UMTS+LTE.

In a triple-mode base station, assume that BBU0 is working in GU mode and BBU1 in L (G) mode or BBU0 is working in GL mode and BBU1 in U (G) mode. The M0 port on the UCIU of BBU0 is connected to the S0 port on the UCIU of BBU1 to achieve the interconnection of BBUs, as shown in **Figure 5-93**.

Figure 5-93 Inter-BBU signal cable in a triple-mode base station

5.2.6 Signal Cable Connections

This section describes the signal cable connections of the BTS3900 cabinet (-48 V DC), BTS3900 cabinet (+24 V DC), and BTS3900 cabinet (AC).

❏ **NOTE**

- If any of the following devices is not configured at the site, ignore the device and its cable connections.
- In triple-mode scenarios where two BBUs are configured, all the monitoring equipment is connected to only BBU 0. The monitoring principles for the triple-mode scenarios are the same as those for the single-mode or dual-mode scenarios.

Signal Cable Connections of the BTS3900 Cabinet (-48 V DC)

The signal cable connections of the BTS3900 cabinet (-48 V DC) are shown in **Figure 5-94** and the signal cables are listed in **Table 5-59**.

Figure 5-94 Signal cable connections of the BTS3900 cabinet (-48 V DC)

Table 5-59 Signal cables of the BTS3900 cabinet (-48 V DC)

SN	Description
S1 and S2	For details, see **5.8.11 Signal Cable for the ELU**.
S3	For details, see **5.8.4 Monitoring Signal Cable for the Fan Box**.
S4	For details, see **5.8.5 Fan Box Cascade Signal Cable**.
S5	For details, see **5.8.6 Monitoring Signal Cable for the EMU**.

SN	Description
S6 and S7	For details, see **5.8.7 Monitoring Signal Cable for the GATM**.

Signal Cable Connections of the BTS3900 Cabinet (+24 V DC)

The signal cable connections of the BTS3900 cabinet (+24 V DC) are shown in **Table 5-60** and the signal cables are listed in **Figure 5-95**.

Figure 5-95 Signal cable connections of the BTS3900 cabinet (+24 V DC)

Table 5-60 Signal cables of the BTS3900 cabinet (+24 V DC)

SN	Description
S1 and S2	For details, see **5.8.11 Signal Cable for the ELU**.
S3	For details, see **5.8.4 Monitoring Signal Cable for the Fan Box**.
S4	For details, see **5.8.5 Fan Box Cascade Signal Cable**.

SN	Description
S5	For details, see **5.8.6 Monitoring Signal Cable for the EMU**.
S6 and S7	For details, see **5.8.7 Monitoring Signal Cable for the GATM**.
S8	For details, see **5.8.2 Monitoring Signal Cable for the PSU (DC/DC)**.
S9 and S10	For details, see **5.8.3 In-Position Signal Cable for the PSU (DC/DC)**.

Signal Cable Connections of the BTS3900 Cabinet (AC)

The signal cable connections of the BTS3900 cabinet (AC) are shown in **Figure 5-96** and the signal cables are listed in **Table 5-61**.

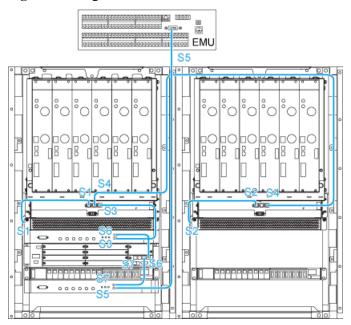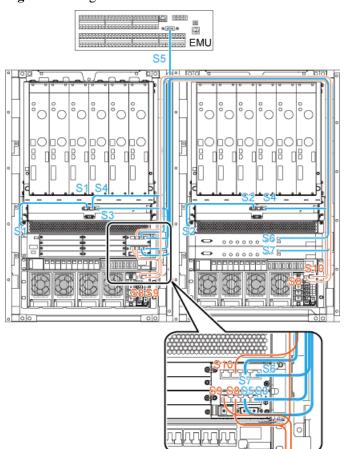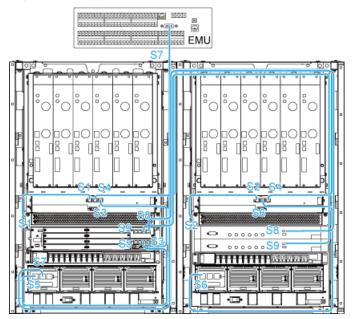**Figure 5-96** Signal cable connections of the BTS3900 cabinet (AC)

Table 5-61 Signal cables of the BTS3900 cabinet (AC)

SN	Description
S1 and S2	For details, see **5.8.11 Signal Cable for the ELU**.
S3	For details, see **5.8.4 Monitoring Signal Cable for the Fan Box**.
S4	For details, see **5.8.5 Fan Box Cascade Signal Cable**.

SN	Description
S5 and S6	For details, see **5.8.1 Monitoring Signal Cable for the PMU**.
S7	For details, see **5.8.6 Monitoring Signal Cable for the EMU**.
S8 and S9	For details, see **5.8.7 Monitoring Signal Cable for the GATM**.
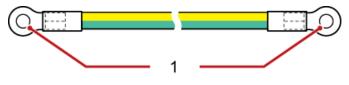
5.3 PGND Cables

The PGND cables are used to ensure proper grounding of the cabinet and the modules in the cabinet.

PGND Cable for the Cabinet

The PGND cable for the cabinet is green and yellow with a cross-sectional area of 25 mm^2. **Figure 5-97** shows the PGND cable for the cabinet.

Figure 5-97 PGND cable for the cabinet
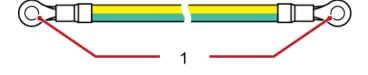
(1) OT terminal (25 mm^2, M8)

PGND Cable for the Modules

The PGND cable for the modules is green and yellow with a cross-sectional area of 6 mm^2. **Figure 5-98** shows the PGND cable for the modules.

Figure 5-98 PGND cable for the modules

(1) OT terminal (6 mm^2, M4)

5.4 Equipotential Cable
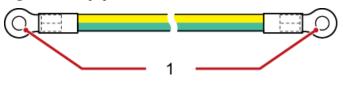
When the battery cabinet is working with the power cabinet, one cabinet should be grounded through connecting the equipotential cable to the other cabinet.

Structure

The equipotential cable is a single cable with OT terminals at both ends. It is a yellow and green cable with cross-sectional area of 16 mm^2. The OT terminals should be made on site.

Figure 5-99 show the equipotential cable.

Figure 5-99 Equipotential cable

(1) OT terminals (16 mm^2, M6)

5.5 BTS3900 Power Cable

The BTS3900 power cables consist of the cables leading power to the BTS3900 cabinet, BBU3900, DCDU-01, fan box, RFU, and transmission equipment.

5.5.1 Input Power Cable for the Cabinet

The input power cable for the cabinet feeds DC or AC power into the cabinet.

-48 V Power Cable

The -48 V power cable feeds -48 V power into the cabinet. **Figure 5-100** shows the -48 V power cable. **Table 5-62** describes the -48 V power cable.

Figure 5-100 -48 V power cable

(1) OT terminal
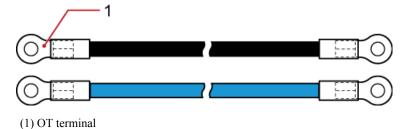
Table 5-62 -48 V power cable

Cable	Color	Cross-Sectional Area	OT Aperture
-48 V power cable	Blue	16 mm^2	M6
	Black		

+24 V Power Cable

The +24 V power cable feeds +24 V power into the cabinet. **Figure 5-101** shows the +24 V power cable. **Table 5-63** describes the +24 V power cable.

Figure 5-101 +24 V power cable

(1) OT terminal

Table 5-63 +24 V power cable

Cable	Color	Cross-Sectional Area	OT Aperture
+24 V power cable	Red	25 mm^2	M6
	Black		
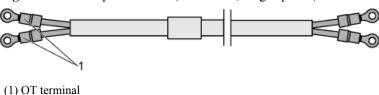
□ **NOTE**

The +24 V power cable consists of two pairs of wires, with each pair containing a red wire and a black wire.

AC Power Cable

The BTS3900 cabinet supports three types of AC power supply. That is, the 220 V AC single-phase, 220 V AC three-phase, and 110 V AC dual-live-wire. The AC power cable feeds AC power into a cabinet. **Figure 5-102** shows the AC power cable. **Table 5-64** describes the AC power cable.

Figure 5-102 AC power cable (220 V AC, single-phase)

 (1) OT terminal

□ NOTE

> Different types of 220 V power cable have different exteriors and consist of different numbers of wires. **Figure 5-102** shows the 220 V AC single-phase power cable.

Table 5-64 220 V power cable

Cable	Wire	Cross-Sectional Area	OT Aperture
220 V AC three-phase power cable	L1 wire	2.5 mm^2	M6
	L2 wire		
	L3 wire		
	N wire		
220 V AC single-phase power cable	L wire	6 mm^2	
	N wire		
110 V dual-live-wire power cable	L1 wire	6 mm^2	
	L2 wire		

□ NOTE

> The colors and exteriors of cables delivered by Huawei vary according to countries and areas. If cables are purchased at local markets, the cables must comply with the local rules and regulations.
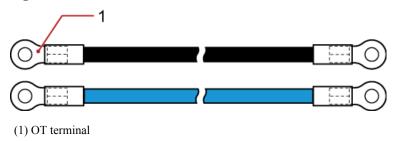
5.5.2 Power Cable for the DCDU-01

The power equipment (DC/DC) and power equipment (AC/DC) provide -48 V DC power to the DCDU-01 through the DCDU-01 power cable.

Exterior

Figure 5-103 shows the power cable for the DCDU-01.

Figure 5-103 Power cable for the DCDU-01

(1) OT terminal

Cable Description

Table 5-65 describes the power cable for the DCDU-01.

Table 5-65 Power cable for the DCDU-01

Power Equipment	Cable Color	Cross-Sectional Area	OT Aperture
Power equipment (DC/DC)	Blue	16 mm^2	M6
	Black		
Power equipment (AC/DC)	Blue	16 mm^2	M6
	Black		
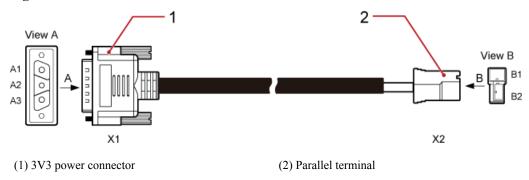
5.5.3 Power Cable for the BBU

The DCDU-01 feeds -48 V DC power into the BBU through the power cable for the BBU.

Exterior

Figure 5-104 shows the power cable for the BBU.

Figure 5-104 Power cable for the BBU

(1) 3V3 power connector   (2) Parallel terminal

Pin Assignment

Table 5-66 describes the pin assignment of the power cable for the BBU.

Table 5-66 Pin assignment of the power cable for the BBU

Cable	X1 End	X2 End	Cable Color
W1	A3	B1	Black
W2	A1	B2	Blue
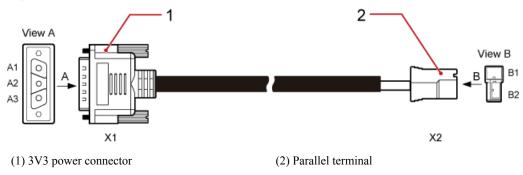
5.5.4 Power Cable for the Fan Box

The DCDU-01 feeds -48 V DC power into the fan box through the power cable for the fan box.

Exterior

Figure 5-105 shows the power cable for the fan box.

Figure 5-105 Power cable for the fan box

(1) 3V3 power connector   (2) Parallel terminal

Pin Assignment

Table 5-67 describes the pin assignment for the wires of the power cable for the fan box.

Table 5-67 Pin assignment for the wires of the power cable for the fan box

Cable	X1 End	X2 End	Cable Color
W1	A3	B1	Black
W2	A1	B2	Blue
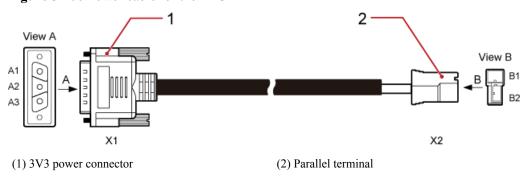
5.5.5 Power Cable for the RFU

The DCDU-01 feeds -48 V DC power into the RFU through the power cable for the RFU.

Exterior

Figure 5-106 shows the power cable for the RFU.

Figure 5-106 Power cable for the RFU

(1) 3V3 power connector   (2) Parallel terminal

Pin Assignment

Table 5-68 describes the pin assignment for the wires of the power cable for the RFU.

Table 5-68 Pin assignment for the wires of the power cable for the RFU

Cable	X1 End	X2 End	Cable Color
W1	A3	B1	Black
W2	A1	B2	Blue

5.5.6 Power Cable for the GATM

The power cable for the GATM feeds -48 V DC power into the GATM.

Structure

One end of the power cable for the GATM is a parallel terminal, and the other end is a 3V3 power connector. Figure 5-107 shows the power cable for the GATM.

Figure 5-107 Power cable for the GATM

| (1) 3V3 power connector | (2) Parallel terminal |

Pin Assignment

Table 5-69 describes the pin assignment for the wires of the power cable for the GATM.

Table 5-69 Pin assignment for the wires of the power cable for the GATM

Wire	X1 End	X2 End	Wire Color
W1	X1.A1	X2.B2	Blue
W2	X1.A3	X2.B1	Black

5.6 BTS3900 Transmission Cable

The BTS3900 transmission cables are the E1 cable, E1 surge protection transfer cable, FE cable, FE surge protection transfer cable, and CPRI electrical cable.

5.6.1 E1/T1 Cable

The E1/T1 cable connects the BBU to the external transmission device and transmits baseband signals.

Exterior

The E1/T1 cables are classified into two types: 75-ohm E1 coaxial cable, 120-ohm E1 twisted pair cable, and 100-ohm T1 twisted pair cable.

One end of the E1/T1 cable is a DB26 male connector. The connector at the other end of the cable should be made on site according to site requirements. **Figure 5-108** shows an E1/T1 cable.

Figure 5-108 E1/T1 cable

(1) DB26 male connector

Table 5-70 describes the connectors of the 75-ohm E1 coaxial cable.

Table 5-70 Connectors of the 75-ohm E1 coaxial cable

Cable	One End	The other End
75-ohm E1 coaxial cable	DB26 male connector	L9 male connector
		L9 female connector
		SMB female connector
		BNC male connector
		SMZ male connector
		SMZ female connector

Pin Assignment

Table 5-71, **Table 5-72** and **Table 5-73** describe the pin assignment for the wires of the E1/T1 cable.

📖 **NOTE**

In **Table 5-71**, "Tip" refers to a wire in the E1 coaxial cable, and "Ring" refers to an external conductor of the cable.

Table 5-71 Pin assignment for the wires of the 75-ohm E1 coaxial cable

Pins of the DB26 Male Connector	Wire Type	Coaxial Series No.	Cable Label
X1.1	Tip	1	RX1+
X1.2	Ring		RX1-
X1.3	Tip	3	RX2+
X1.4	Ring		RX2-

Pins of the DB26 Male Connector	Wire Type	Coaxial Series No.	Cable Label
X1.5	Tip	5	RX3+
X1.6	Ring		RX3-
X1.7	Tip	7	RX4+
X1.8	Ring		RX4-
X1.19	Tip	2	TX1+
X1.20	Ring		TX1-
X1.21	Tip	4	TX2+
X1.22	Ring		TX2-
X1.23	Tip	6	TX3+
X1.24	Ring		TX3-
X1.25	Tip	8	TX4+
X1.26	Ring		TX4-

Table 5-72 Pin assignment for the wires of the 120-ohm E1 twisted pair cable

Pins of the DB26 Male Connector	Wire Color	Wire Type	Cable Labels
X.1	Blue	Twisted pair	RX1+
X.2	White		RX1-
X.3	Orange	Twisted pair	RX2+
X.4	White		RX2-
X.5	Green	Twisted pair	RX3+
X.6	White		RX3-
X.7	Brown	Twisted pair	RX4+
X.8	White		RX4-
X.19	Gray	Twisted pair	TX1+
X.20	White		TX1-
X.21	Blue	Twisted pair	TX2+
X.22	Red		TX2-
X.23	Orange	Twisted pair	TX3+

Pins of the DB26 Male Connector	Wire Color	Wire Type	Cable Labels
X.24	Red		TX3-
X.25	Green	Twisted pair	TX4+
X.26	Red		TX4-

Table 5-73 Pin assignment for the wires of the 100-ohm T1 twisted pair cable

Pins of the DB26 Male Connector	Wire Color	Wire Type	Cable Labels
X.1	Blue/White	Twisted pair	RX1+
X.2	White/Blue		RX1-
X.3	Orange/White	Twisted pair	RX2+
X.4	White/Orange		RX2-
X.5	Green/White	Twisted pair	RX3+
X.6	White/Green		RX3-
X.7	Brown/White	Twisted pair	RX4+
X.8	White/Brown		RX4-
X.19	Gray/White	Twisted pair	TX1+
X.20	White/Gray		TX1-
X.21	Blue/Red	Twisted pair	TX2+
X.22	Red/Blue		TX2-
X.23	Orange/Red	Twisted pair	TX3+
X.24	Red/Orange		TX3-
X.25	Green/Red	Twisted pair	TX4+
X.26	Red/Green		TX4-

5.6.2 FE/GE Cable

The FE/GE cable connects the BBU to the transmission device through routing devices and transmits baseband signals.

📕 **NOTE**

The maximum length of the FE/GE cable for remote connection is 100 m.

Exterior

The FE/GE cable is a shielded straight-through cable. It has an RJ45 connector at each end, as shown in **Figure 5-109**.

Figure 5-109 FE/GE cable

(1) RJ45 connector

Pin Assignment

Table 5-74 describes the pin assignment for the wires of the FE/GE cable.

Table 5-74 Pin assignment for the wires of the FE/GE cable

Pin on the RJ45 Connector	Wire Color	Wire Type	Pin on the RJ45 Connector
X1.2	Orange	Twisted pair	X2.2
X1.1	White and orange		X2.1
X1.6	Green	Twisted pair	X2.6
X1.3	White and green		X2.3
X1.4	Blue	Twisted pair	X2.4
X1.5	White and blue		X2.5
X1.8	Brown	Twisted pair	X2.8
X1.7	White and brown		X2.7

5.6.3 FE/GE Optical Cable

The FE/GE optical cable is used to transmit optical signals between the BBU3900 and the transmission device. This cable is optional.

Exterior

The FE/GE optical cable has an LC connector at one end and an FC connector, SC connector, or LC connector at the other end, as shown in **Figure 5-110**, **Figure 5-111**, and **Figure 5-112** respectively.

Figure 5-110 FE/GE optical cable (FC and LC connectors)

Figure 5-111 FE/GE optical cable (SC and LC connectors)

Figure 5-112 FE/GE optical cable (LC and LC connectors)

⚠ **CAUTION**

When connecting the BBU3900 and the transmission device using the FE/GE optical cable, adhere to the following rules:

- The TX port on the BBU3900 is connected to the RX port on the transmission device.
- The RX port on the BBU3900 is connected to the TX port on the transmission device.

5.6.4 Cable Between Two FE Electrical Ports

The cable between two FE electrical ports connects the GTMU and the WMPT to implement IP transmission.

Structure

The cable between two FE electrical ports has an RJ45 connector at each end, as shown in **Figure 5-113**.

Figure 5-113 Cable between two FE electrical ports

(1) RJ45 connector

5.6.5 Cable Between Two FE Optical Ports

The cable between two FE optical ports connects the GTMU and the WMPT to implement IP transmission.

Structure

The cable between two FE optical ports has an LC connector at each end, as shown in **Figure 5-114**.

Figure 5-114 Cable between two FE optical ports

(1) LC connector

5.7 CPRI Electrical Cable

The CPRI electrical cable enables high speed communication between the BBU3900 and the RFU.

Exterior

The CPRI electrical cable is an SFP high speed transmission cable that has an SFP20 male connector at each end, as shown in **Figure 5-115**.

Figure 5-115 CPRI electrical cable

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5.8 BTS3900 Signal Cable

The BTS3900 signal cables are the monitoring signal cable for the DCDU, monitoring signal cable for the PMU, monitoring signal cable for the PSU, in-position signal cable for the PSU, monitoring signal cable for the FAN unit, BBU alarm cable, and GPS clock signal cable.

5.8.1 Monitoring Signal Cable for the PMU

The monitoring signal cable for the PMU transmits the environment alarm information collected by the PMU to the BBU.

Exterior

Figure 5-116 shows the monitoring signal cable for the PMU.

Figure 5-116 Monitoring signal cable for the PMU

(1) RJ45 connector

Pin Assignment

Table 5-75 describes the pin assignment for the wires of the monitoring signal cable for the PMU.

Table 5-75 Pin assignment for the wires of the monitoring signal cable for the PMU

X1 End	X2 End	Wire Color	Wire Type
X1.1	X2.1	White	Twisted pair
X1.2	X2.2	Orange	
X1.3	X2.3	White	Twisted pair
X1.6	X2.6	Green	
X1.5	X2.5	White	Twisted pair
X1.4	X2.4	Blue	
X1.7	X2.7	White	Twisted pair
X1.8	X2.8	Brown	

5.8.2 Monitoring Signal Cable for the PSU (DC/DC)

The monitoring signal cable for the PSU (DC/DC) is used for the BBU to monitor the power status of the PSUs and receive related alarms.

Exterior

The blue and white wires of the monitoring cable is used for monitoring the power status of the PSUs. The other wires are tied to the column of the cabinet. **Figure 5-117** shows the monitoring signal cable for the PSU (DC/DC).

Figure 5-117 Monitoring signal cable for the PSU (DC/DC)

(1) Monitoring signal cable for the PSU (DC/DC)

5.8.3 In-Position Signal Cable for the PSU (DC/DC)

The in-position signal cable for the PSU (DC/DC) is used for the BBU to monitor the in-position status of the PSU.

Exterior

Figure 5-118 shows the in-position signal cable for the PSU (DC/DC).

Figure 5-118 In-position signal cable for the PSU (DC/DC)

(1) RJ45 connector

Pin Assignment

Table 5-76 describes the pin assignment for the wires of the in-position signal cable for the PSU (DC/DC).

Table 5-76 Pin assignment for the wires of the in-position signal cable for the PSU (DC/DC)

X1 End	X2 End	Wire Color	Wire Type
X1.1	X2.1	White	Twisted pair
X1.2	X2.2	Orange	
X1.3	X2.3	White	Twisted pair
X1.6	X2.6	Green	
X1.5	X2.5	White	Twisted pair
X1.4	X2.4	Blue	
X1.7	X2.7	White	Twisted pair
X1.8	X2.8	Brown	
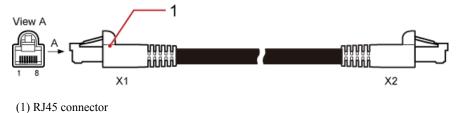
5.8.4 Monitoring Signal Cable for the Fan Box

The monitoring signal cable for the fan box is used for the BBU to monitor the running status of the fan box.

Exterior

Figure 5-119 shows the monitoring signal cable for the fan box.

Figure 5-119 Monitoring signal cable for the fan box

(1) RJ45 connector

Pin Assignment

Table 5-77 describes the pin assignment for the wires of the monitoring signal cable for the fan box.

Table 5-77 Pin assignment for the wires of the monitoring signal cable for the fan box

X1 End	X2 End	Color	Type
X1.1	X2.1	White	Twisted pair cable
X1.2	X2.2	Orange	

X1 End	X2 End	Color	Type
X1.3	X2.3	White	Twisted pair cable
X1.6	X2.6	Green	
X1.5	X2.5	White	Twisted pair cable
X1.4	X2.4	Blue	
X1.7	X2.7	White	Twisted pair cable
X1.8	X2.8	Brown	

5.8.5 Fan Box Cascade Signal Cable

Fan box cascade signal cable is used to connect two fan boxes.

Structure

Figure 5-120 shows the fan box cascade signal cable.

Figure 5-120 Fan box cascade signal cable

(1) RJ45 connector

Pin Assignment

Table 5-78 describes the pin assignment of the fan box cascade signal cable.

Table 5-78 Pin assignment of the fan box cascade signal cable

X1 End	X2 End	Color	Type
X1.1	X2.1	White	Twisted pair cable
X1.2	X2.2	Orange	
X1.3	X2.3	White	Twisted pair cable
X1.6	X2.6	Green	
X1.5	X2.5	White	Twisted pair cable
X1.4	X2.4	Blue	

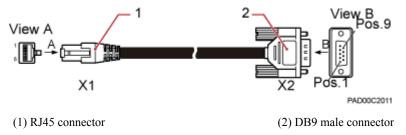| X1 End	X2 End	Color	Type
X1.7	X2.7	White	Twisted pair cable
X1.8	X2.8	Brown	

5.8.6 Monitoring Signal Cable for the EMU

The monitoring signal cable for the EMU transmits monitoring signals from the EMU to the BBU.

Exterior

Figure 5-121 shows the monitoring signal cable for the EMU.

Figure 5-121 Monitoring signal cable for the EMU

| (1) RJ45 connector | (2) DB9 male connector |

Pin Assignment

Table 5-79 describes the pin assignment for the wires of the monitoring signal cable for the EMU.

Table 5-79 Pin assignment for the wires of the monitoring signal cable for the EMU

Pin on the RJ-45 Connector	Pin on the DB9 Male Connector	Wire Color	Wire Type	Label
X1.1	X2.3	White	Twisted pair	TX+
X1.2	X2.7	Orange		TX-
X1.5	X2.6	White	Twisted pair	RX-
X1.4	X2.2	Blue		RX+

5.8.7 Monitoring Signal Cable for the GATM

This cable connects the BBU and GATM, enabling the BBU to transmit control signals to the GATM and enabling the GATM to report alarms to the BBU.

Structure

Figure 5-122 shows the monitoring signal cable for the GATM.

Figure 5-122 Monitoring signal cable for the GATM

(1) RJ45 connector

Pin Assignment

Table 5-80 describes the pin assignment for the wires of the monitoring signal cable for the GATM.

Table 5-80 Pin assignment for the wires of the monitoring signal cable for the GATM

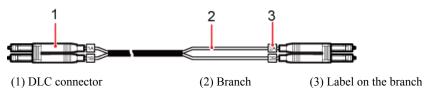| X1 End	X2 End	Wire Color	Wire Type
X1.1	X2.1	White	Twisted pair
X1.2	X2.2	Orange	
X1.3	X2.3	White	Twisted pair
X1.6	X2.6	Green	
X1.5	X2.5	White	Twisted pair
X1.4	X2.4	Blue	
X1.7	X2.7	White	Twisted pair
X1.8	X2.8	Brown	

5.8.8 Inter-BBU Signal Cable

The inter-BBU signal cable connects BBU0 and BBU1.

Exterior

Figure 5-123 shows an inter-BBU signal cable.

Figure 5-123 Inter-BBU signal cable

(1) DLC connector   (2) Branch   (3) Label on the branch

5.8.9 BBU Alarm Cable

The BBU alarm cable transmits alarm signals from an external alarm device to the BBU.

Exterior

The BBU alarm cable has an RJ45 connector at each end, as shown in **Figure 5-124**. However, an RJ45 connector at one end may be removed, and an appropriate terminal may be added according to the field requirements.

Figure 5-124 BBU alarm cable

(1) RJ45 connector

Pin Assignment

Table 5-81 describes the pin assignment for the wires of the BBU alarm cable.

Table 5-81 Pin assignment for the wires of the BBU alarm cable

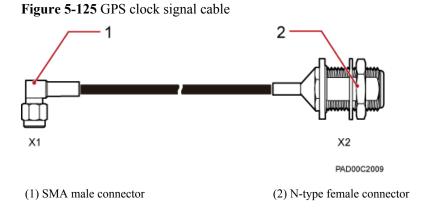| BBU Alarm Port	Pin on the RJ45 Connector at One End	Wire Color	Wire Type	Pin on the RJ45 Connector at the Other End	Description
EXT-ALM1	X1.1	White and orange	Twisted pair	X2.1	Boolean value input 4+
	X1.2	Orange		X2.2	Boolean value input 4- (GND)
	X1.3	White and green	Twisted pair	X2.3	Boolean value input 5+

BBU Alarm Port	Pin on the RJ45 Connector at One End	Wire Color	Wire Type	Pin on the RJ45 Connector at the Other End	Description
	X1.6	Green		X2.6	Boolean value input 5- (GND)
	X1.5	White and blue	Twisted pair	X2.5	Boolean value input 6+
	X1.4	Blue		X2.4	Boolean value input 6- (GND)
	X1.7	White and brown	Twisted pair	X2.7	Boolean value input 7+
	X1.8	Brown		X2.8	Boolean value input 7- (GND)
EXT-ALM0	X1.1	White and orange	Twisted pair	X2.1	Boolean value input 0+
	X1.2	Orange		X2.2	Boolean value input 0- (GND)
	X1.3	White and green	Twisted pair	X2.3	Boolean value input 1+
	X1.6	Green		X2.6	Boolean value input 1- (GND)
	X1.5	White and blue	Twisted pair	X2.5	Boolean value input 2+
	X1.4	Blue		X2.4	Boolean value input 2- (GND)
	X1.7	White and brown	Twisted pair	X2.7	Boolean value input 3+
	X1.8	Brown		X2.8	Boolean value input 3- (GND)

5.8.10 GPS Clock Signal Cable

The GPS clock signal cable is an optional cable that transmits GPS clock signals from the GPS antenna system to the BBU. The GPS clock signals serve as the clock reference of the BBU.

Exterior

The GPS clock signal cable has an SMA male connector at one end and an N-type female connector at the other end, as shown in **Figure 5-125**.

Figure 5-125 GPS clock signal cable

(1) SMA male connector   (2) N-type female connector

5.8.11 Signal Cable for the ELU

The signal cable for the ELU is used to report the cabinet type information detected by the ELU to the fan box.

Exterior

Figure 5-126 shows the signal cable for the ELU.

Figure 5-126 Signal cable for the ELU

(1) RJ45 connector

Pin Assignment

Table 5-82 describes the pin assignment for the wires of the signal cable for the ELU.

Table 5-82 Pin assignment for the wires of the signal cable for the ELU

X1 End	X2 End	Wire Color	Wire Type
X1.1	X2.1	White	Twisted pair
X1.2	X2.2	Orange	
X1.3	X2.3	White	Twisted pair
X1.6	X2.6	Green	
X1.5	X2.5	White	Twisted pair

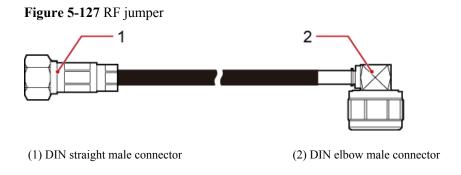| X1 End	X2 End	Wire Color	Wire Type
X1.4	X2.4	Blue	
X1.7	X2.7	White	Twisted pair
X1.8	X2.8	Brown	

5.9 BTS3900 RF Cable

The BTS3900 RF cables are the RF jumper and inter-RFU RF signal cable.

5.9.1 RF Jumper

The RF jumper connects the RFU and the feeder of the antenna system for signal exchange between the base station and the antenna system.

Exterior

Figure 5-127 shows an RF jumper.

Figure 5-127 RF jumper

(1) DIN straight male connector   (2) DIN elbow male connector

📖 **NOTE**

Macro base stations use super-flexible 1/2-inch jumpers.

5.9.2 Inter-RFU RF Signal Cable

The inter-RFU RF signal cable is used for transmitting the received diversity signals between two RFUs. The cable connects the RX IN port on one RFU and the RX OUT port on another RFU.

Structure

Figure 5-128 shows the inter-RFU RF signal cable.

Figure 5-128 Inter-RFU RF signal cable

(1) QMA elbow male connector

6 BTS3900 Auxiliary Equipment

About This Chapter

This chapter describes the auxiliary equipment of the BTS3900.

6.1 PS4890 Cabinet

The PS4890 cabinet is designed based on the BTS3900 cabinet. The PS4890 cabinet houses the power equipment and modules such as the DCDU-04 and DCDU-03. For details, see the *PS4890 User Guide*.

6.2 EMU

The Environment Monitoring Unit (EMU) is an environmental monitoring device that monitors environmental conditions of the equipment room.

6.3 DDF

This section describes the structure, functions, features, and technical specifications of the DDF.

6.1 PS4890 Cabinet

The PS4890 cabinet is designed based on the BTS3900 cabinet. The PS4890 cabinet houses the power equipment and modules such as the DCDU-04 and DCDU-03. For details, see the *PS4890 User Guide*.

Figure 6-1 shows the cable connections between the BTS3900 and the PS4890.

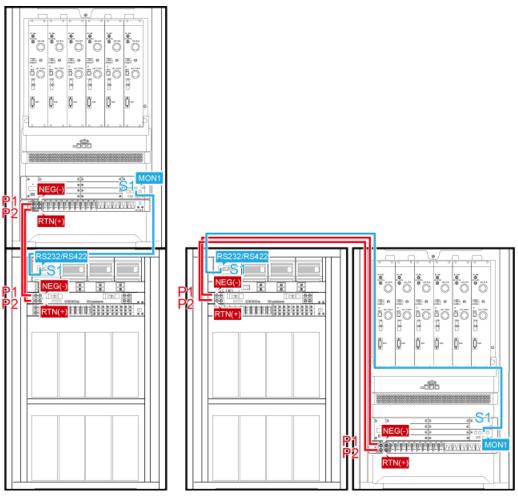Figure 6-1 Cable connections between the BTS3900 and the PS4890

Table 6-1 lists the cables between the BTS3900 and the PS4890.

Table 6-1 Cables between the BTS3900 and the PS4890

SN	Cable
P1, P2	For details, see Output Power Cable for the DCDU-04

SN	Cable
S1	For details, see **5.8.1 Monitoring Signal Cable for the PMU**

6.2 EMU

The Environment Monitoring Unit (EMU) is an environmental monitoring device that monitors environmental conditions of the equipment room.

The EMU connects to main equipment and performs monitoring functions through the alarm cables. The EMU performs the following functions:

- Provides monitoring ports for the temperature, humidity, water, infrared, door control sensors, Boolean signals, analog signals, and output control signals.
- Provides the RS485 and RS232 ports for the communication with the base station.

For details about the structure and functions of the EMU, see *HUAWEI QCKG1EMU User Guide*.
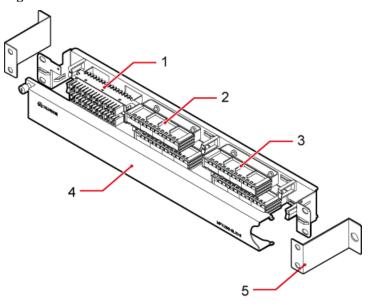
6.3 DDF

This section describes the structure, functions, features, and technical specifications of the DDF.

Structure

Figure 6-2 shows the structure of the DDF.

Figure 6-2 Structure of the DDF

(1) Alarm module (2) Digital distribution module (3) Digital distribution module (4) Baffle plate (5) Wall-mounting pieces

Function

The DDF performs the following functions:

- Transfers signals through the trunk cables between the communication devices and the transmission devices.
- Transfers signals through the alarm cables between the communication devices and the external alarm devices.

Feature

The DDF has the following features:

- Provides wall-mounting pieces and supporting the installations in a 19-inch cabinet and on a wall.
- Transfers 16 alarm signals and eight E1s with each E1 grounded.
- Supports wire punching from the front.

Technical Specification

Table 6-2 describes the technical specifications of the DDF.

Table 6-2 Technical specifications of the DDF

Item	Specification
Dimensions (height x width x depth)	44 mm x 483 mm x 59 mm
Weight	1 kg
Working rate	2 Mbit/s
Characteristic impedance	120 ohms
Inter-wire-bundle cross noise prevention class	$\geqslant$ 60 dB
Insertion loss	$\leqslant$ 0.4 dB
Return loss	$\geqslant$ 18 dB