

# **BTS3900A**

# **Hardware Description**

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# **About This Document**

# **Purpose**

This document provides reference for planning and deploying the BTS3900A. It describes the configuration, functions, and specifications of the components in the BTS3900A cabinet, 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
BTS3900A WCDMA	V200R013
BTS3900A GSM	V100R013
BTS3900A	V100R004

## **Intended Audience**

This document is intended for:

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

# Organization

#### 1 Changes in the BTS3900A Hardware Description

This describes the changes in the BTS3900A Hardware Description.

#### 2 BTS3900A Cabinets

This chapter describes the exteriors, boards and modules, and configurations of the BTS3900A cabinets, providing reference for planning and deploying the BTS3900A.

#### 3 BTS3900A Power System

The BTS3900A 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.

#### 4 BTS3900A Monitoring System

The BTS3900A monitoring system enables monitoring of all boards and components in the cabinet. If any board or component is faulty, an alarm is automatically reported. The UPEU and UEIU in the BBU collect monitoring signals from boards and components to achieve environment monitoring of the BTS3900A.

#### **5 BTS3900A Components**

The BTS3900A components consist of the BBU3900, RFUs, and modules such as the power equipment and fan box in the RFC and APM30H. In addition, you can optionally configure modules such as the EMUA and cabinets such as the TMC11H and IBBS200D or IBBS200T.

#### 6 BTS3900A Cables

The BTS3900A cables are the PGND cable, equipotential cable, power cable, transmission cable, CPRI cable, signal cable, and RF cable.

#### Conventions

#### **Symbol Conventions**

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

Symbol	Description
<b>⚠</b> DANGER	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.
<b>MARNING</b>	Indicates a hazard with a medium or low level of risk, which if not avoided, could result in minor or moderate injury.
A CAUTION	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
© <del>-</del> 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.

Convention	Description
Boldface	Names of files, directories, folders, and users are in <b>boldface</b> . For example, log in as user <b>root</b> .
Italic	Book titles are in <i>italics</i> .
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 <b>boldface</b> .
Italic	Command arguments are in <i>italics</i> .
[]	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 <b>boldface</b> . For example, click <b>OK</b> .
>	Multi-level menus are in <b>boldface</b> and separated by the ">" signs. For example, choose <b>File</b> > <b>Create</b> > <b>Folder</b> .

#### **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 <b>Enter</b> and press <b>Tab</b> .
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 <b>Alt</b> , <b>A</b> 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.

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# Changes in the BTS3900A Hardware Description

This describes the changes in the BTS3900A Hardware Description.

#### 03 (2011-06-10)

This is the third official release.

Compared with the 02 (2011-04-10), this issue does not added any information.

Compared with the 02 (2011-04-10), this issue incorporates the following change:

Contents	Change Description
5.3.5 GRFU	The description of <b>RX_INB</b> and
5.3.6 WRFU	RX_OUTA is modified.

Compared with the 02 (2011-04-10), this issue does not remove any information.

#### 02 (2011-04-10)

This is the second official release.

Compared with the 01 (2011-03-30), this issue does not added any information.

Compared with the 01 (2011-03-30), this issue incorporates the following change:

Contents	Change Description	
5.3.5 GRFU	The differences of GRFU V1, GRFU V2 and GRFU V2a are added.	
5.3.3 MRFU	The differences of MRFU V1, MRFU V2 and MRFU V2a are added.	
Slot Assignment of the BBU3900	The maximum quantity of the WBBP is modified.	

Compared with the 01 (2011-03-30), this issue does not remove any information.

#### 01 (2011-03-30)

This is the first official release.

Compared with the Draft A (2011-01-30), this issue does not added any information.

Compared with the Draft A (2011-01-30), this issue incorporates the following change:

Topic	Change Description	
4.2 Monitoring Principles for the Cabinets	The cabinet monitoring principles for a triple-mode scenario are added.	
6.3.1 Power Cable Connections	The power cable connections for a triple-mode scenario are added.	
6.3.4 Monitoring Signal Cable Connections	The monitoring signal cable connections for a triple-mode scenario are added.	

Compared with the Draft A (2011-01-30), this issue does not remove any information.

#### Draft A (2011-01-30)

This is the Draft release.

Compared with issue MBTS V100R003C00, WCDMA-NodeB V200R012C00 and GSM-BTS V100R012C00, this issue adds the following topics:

- Transmission Cable Connections for a Triple-Mode Base Station
- 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

Compared with issue MBTS V100R003C00, WCDMA-NodeB V200R012C00 and GSM-BTS V100R012C00, this issue incorporates the following changes:

Topic	Change Description
2.3 Application Scenario of the BTS3900A Cabinet	The cabinet configuration of the triple-mode base station scenarios is added.
Slot Assignment of the BBU3900	The board configurations of the BBU3900 in the triple-mode base station scenarios are added.
FAN	The description of the FANc is added.
UPEU	The description of the UPEUc is added.

Compared with issue MBTS V100R003C00, WCDMA-NodeB V200R012C00 and GSM-BTS V100R012C00, this issue does not remove any information.

# **2** BTS3900A Cabinets

# **About This Chapter**

This chapter describes the exteriors, boards and modules, and configurations of the BTS3900A cabinets, providing reference for planning and deploying the BTS3900A.

#### 2.1 Appearance of the BTS3900A Cabinet

The BTS3900A cabinets are designed in compliance with the IEC297 standard. They are grayish white vertical cabinets.

#### 2.2 Structure of the BTS3900A Cabinet

To meet requirements in different outdoor environments, multiple cabinets with different functions are provided by Huawei for distributed macro base stations. The Advanced Power module with heat exchanger (APM30H) and Radio Frequency Cabinet (RFC) provides space and surge protection and enables power distribution and heat dissipation for the BBU3900 and RFU. The Integrated Battery Backup System with direct ventilation (IBBS200D) and Integrated Battery Backup System with TEC cooler (IBBS200T) provides long-duration backup power for a base station. The Transmission Cabinet of 11 U high with heat exchanger (TMC11H) provides space for customer equipment.

#### 2.3 Application Scenario of the BTS3900A Cabinet

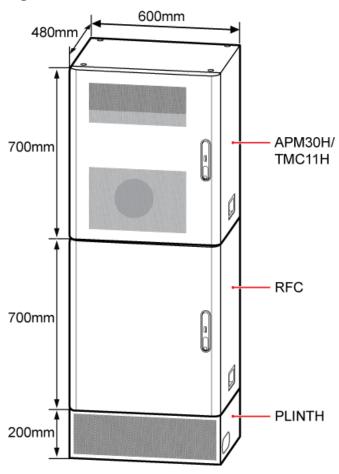
Multiple cabinets can be configured and installed for the BTS3900A to meet the requirements of different RFU configurations, backup power capacity, and space required for customer equipment. In addition, different configurations of cabinets can be used for the BTS3900A in the 110~V AC/220 V AC power supply scenario and -48 V DC power supply scenario.

# 2.1 Appearance of the BTS3900A Cabinet

The BTS3900A cabinets are designed in compliance with the IEC297 standard. They are grayish white vertical cabinets.

Figure 2-1 shows the BTS3900A cabinets.

Figure 2-1 BTS3900A cabinets



#### 2.2 Structure of the BTS3900A Cabinet

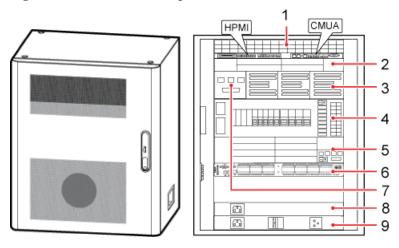
To meet requirements in different outdoor environments, multiple cabinets with different functions are provided by Huawei for distributed macro base stations. The Advanced Power module with heat exchanger (APM30H) and Radio Frequency Cabinet (RFC) provides space and surge protection and enables power distribution and heat dissipation for the BBU3900 and RFU. The Integrated Battery Backup System with direct ventilation (IBBS200D) and Integrated Battery Backup System with TEC cooler (IBBS200T) provides long-duration backup power for a base station. The Transmission Cabinet of 11 U high with heat exchanger (TMC11H) provides space for customer equipment.

#### Configurations of the APM30H

Besides the installation space of the BBU3900, the APM30H also provides installation space of 5 U for customer equipment, for example, the EMUA, heater, and Service Outlet Unit (SOU), which are optional.

Figure 2-2 shows the exterior and configurations of the APM30H.

Figure 2-2 Exterior and configurations of the APM30H



**Table 2-1** describes the configurations.

**Table 2-1** Configurations of the APM30H

No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
1	Fan box	Mandatory	1	The fan box is configured with the fan, Hert Power Monitoring Interface unit (HPMI), and Central Monitoring Unit type A (CMUA). It is used to dissipate heat in the cabinet.

No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
2	SLPU	Mandatory	2	The Signal Lightning Protection Unit (SLPU) is installed in the top 1 U space of the cabinet, providing protection for trunk signals as a mandatory component. The SLPU is configured with the Universal E1/T1 Lightning Protection unit (UELP) or Universal FE Lightning Protection unit (UFLP). The SLPU is an optional component, which is used to protect monitoring signals, is installed in the 1 U space below the BBU. It contains two Universal Signal Lightning Protection unit 2 boards (USLP2 boards).
3	PSU (AC/ DC)	Mandatory	3	The power supply unit (PSU) converts 110 V/220 V AC power into -48 V DC power.
4	EPS subrack	Mandatory	1	The EPS provides functions of AC and DC power distribution for the cabinet. There are two types of EPSs, which are used in 110 V AC and 220 V AC power supply scenarios.
5	BBU3900	Mandatory	1	The BBU3900 processes the baseband signals and enables interaction between the base station and the BSC or RNC.
6	EMUA	Optional	1	The Environment Monitoring Unit (EMUA) monitors the internal environment of the cabinet and reports related alarms. The EMUA must be configured when 16 Boolean alarm inputs are required. It is installed in the 1 U space below the BBU.

No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
7	PMU	Mandatory	1	The Power Monitoring Unit (PMU) provides the functions of power system and storage battery management, power monitoring, and alarm reporting.
8	Heater	Optional	1	A heater is an optional component. It ensures that the customer equipment in the cabinet works in a proper temperature scope when the surrounding temperature is low. It is installed in the 1 U space at the bottom of the cabinet. If both the heater and SOU are configured, the heater is installed in the 1 U space above the SOU.
9	SOU	Optional	1	The SOU is an optional component. It transfers AC power supply to the customer equipment and is installed in the 1 U space at the bottom of the cabinet.

# Configurations of the RFC

Figure 2-3 shows the exterior and configurations of the RFC.

Figure 2-3 Exterior and configurations of the RFC

**Table 2-2** describes the configurations.

Table 2-2 Configurations of the RFC

No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
1	DCDU-01	Mandatory	1	The Direct Current Distribution Unit-01 (DCDU-01) is a DC power distribution unit supplying power to each component in the RFC.
2	Fan box	Mandatory	1	The fan box is configured with the fan and CMUA. The fan dissipates heat in the cabinet, and the CMUA provides the functions of the temperature control, Boolean alarm detection, and ELU identification of the cabinet.
3	RFU	Mandatory	6	The RFU, a Radio Frequency Unit, performs the functions such as modulation and demodulation between baseband signals and RF signals, data processing, and signal combination and division.

# Configurations of the TMC11H

There are two types of TMC11Hs:

- TMC11H providing space for the transmission equipment, as shown in A of Figure 2-4
- TMC11H configured with the BBU3900 in the -48 V DC power supply scenario, as shown in **B** of **Figure 2-4**

A B

Figure 2-4 Exterior and configurations of the TMC11H

**Table 2-3** describes the configurations.

**Table 2-3** Configurations of the TMC11H

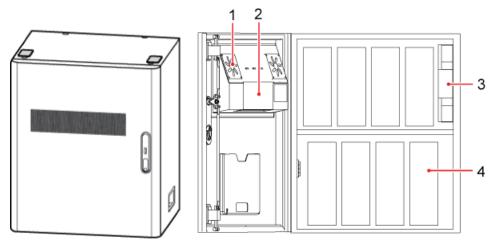
No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
1	Fan box	Mandatory	1	The fan box is configured with the fan, HPMI, and CMUA, dissipating heat in the cabinet.
2	SLPU	Mandatory	2	The SLPU is installed in the top 1 U space of the cabinet, providing protection for trunk signals as a mandatory component. The SLPU is configured with the UELP or UFLP.
				To protect monitoring signals, an SLPU configured with two USLP2s may be configured, which is installed in the 1 U space under the BBU,
3	DCDU-03	Mandatory	1	The Direct Current Distribution Unit-03 (DCDU-03) supplies power to each component in the TMC11H. The DCDU-03 is of 1 U high.

No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
4	BBU3900	Mandatory	1	The BBU3900 processes the baseband signals and enables interaction between the base station and the BSC or RNC.
5	Heater	Optional	1	A heater is an optional component. It ensures that the customer equipment in the cabinet works in a proper temperature scope when the surrounding temperature is low. It is installed in the 1 U space at the bottom of the cabinet.

# Configurations of the IBBS200D

Figure 2-5 shows the exterior and configurations of the IBBS200D.

Figure 2-5 Exterior and configurations of the IBBS200D



**Table 2-4** describes the configurations.

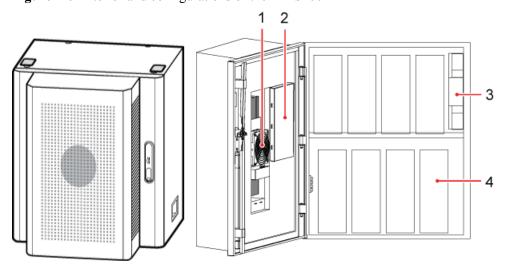
Table 2-4 Configurations of the IBBS200D

No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
1	Fan	Mandatory	2	The FAN is installed on the front door of the cabinet, dissipating heat in the cabinet.
2	CMUA	Mandatory	1	The CMUA provides functions of temperature control, Boolean alarm detection, and ELU identification of the cabinet.
3	Power distribution box	Mandatory	1	The power distribution box is installed on the upper right of the cabinet, transferring and distributing power to the TEC or fan and to the storage batteries.
4	Storage battery	Mandatory	8	The storage battery provides long- duration backup power for a base station.

# Configurations of the IBBS200T

Figure 2-6 shows the exterior and configurations of the IBBS200T.

Figure 2-6 Exterior and configurations of the IBBS200T



**Table 2-5** describes the configurations.

No.	Module/ Board	Optional/ Mandatory	Maximum Number of Boards or Modules Configured in a Single Cabinet	Description
1	TEC	Mandatory	1	The TEC is installed in the protecting hood for the TEC on the front door of the cabinet. The TEC consists of the TEC module, inner air circulation fan, outer air circulation fan, heat-dissipation piece, and monitoring board.
2	CMUA	Mandatory	1	The CMUA provides functions of temperature control, Boolean alarm detection, and ELU identification of the cabinet.
3	Power distribution box	Mandatory	1	The power distribution box is installed on the upper right of the cabinet, transferring and distributing power to the TEC or fan and to the storage batteries.
4	Storage battery	Mandatory	8	The storage battery provides long- duration backup power for a base station.

**Table 2-5** Configurations of the IBBS200T

# 2.3 Application Scenario of the BTS3900A Cabinet

Multiple cabinets can be configured and installed for the BTS3900A to meet the requirements of different RFU configurations, backup power capacity, and space required for customer equipment. In addition, different configurations of cabinets can be used for the BTS3900A in the 110 V AC/220 V AC power supply scenario and -48 V DC power supply scenario.

# **Cabinet Configuration Principles**

- A single BTS3900A can be configured with a maximum of 12 RFUs. That is, more than 12 RFUs must be configured in different BTS3900As.
- A single BTS3900A can be configured with a maximum of two cabinet assemblies, and a
  cabinet assembly must be installed side by side with a default distance of 40 mm. A cabinet
  assembly consists of one APM30H and one RFC.
- A single APM30H can be used with a maximum of one RFC and with a maximum of two IBBS200Ds/IBBS200Ts.
- The RFC can be stacked only under the APM30H/TMC11H.

- The IBBS200D/IBBS200T can be stacked only with the IBBS200D/IBBS200T or TMC11H. When the IBBS200D/IBBS200T is stacked with the TMC11H, the TMC11H is stacked on the IBBS200D/IBBS200T.
- If auxiliary cabinets such as the IBBS200D/IBBS200T or TMC11H are required during an initial site construction, the auxiliary cabinets are positioned on the left, and the primary cabinet is positioned on the right. If both the battery cabinet and the TMC are required, the battery cabinet is positioned on the left of the main cabinet, and the TMC is stacked on the battery cabinet or positioned on the left of the battery cabinet.
- Space must be reserved during an initial site construction for future capacity expansion. In
  the capacity expansion scenario, the original cabinets are not relocated while new cabinets
  are added only from left to right. In a special scenario, new cabinets can be added from
  right to left.
- A single APM30H+RFC cabinet group supports only one BBU. A triple-mode base station is configured with two BBUs. The second BBU must be configured in the second APM30H +RFC cabinet group. These principles are applied to a new or expansion scenario.

# Cabinet Configuration of a Single-Mode or Dual-Mode Base Station

A single-mode or dual-mode base station can be configured with only one BBU, which is installed in the APM30H. When 6 to 12 RFU modules are configured, two APM30Hs are required. The BBU is installed in the main APM30H, that is the left APM30H.

**Table 2-6** shows the cabinet configuration of a single-mode or dual-mode base station in the case of different backup power requirements, space required for customer equipment, and carrier configurations.

Table 2-6 Cabinet	configuration of	f a single-mode or	dual-mode base station

Power Supply	Backup Power Requireme nt	Space Required for Customer Equipmen t	Carrier Configurat ion	Cabinet Configuration
110 V AC or	No backup	≤ 5 U	≤ 6 RFUs	1 APM30H + 1 RFC
220 V AC	power	≤ 12 U	≤ 12 RFUs	2 APM30Hs + 2 RFCs
	0.5 h/2 h backup power	≤ 16 U	≤ 6 RFUs	1 APM30H + 1 RFC + 1 TMC11H
		≤ 23 U	≤ 12 RFUs	2 APM30Hs + 2 RFCs + 1 TMC11H
		≤ 5 U	≤ 6 RFUs	1 APM30H + 1 RFC + 1 IBBS200D/IBBS200T
		≤ 12 U	≤ 12 RFUs	2 APM30Hs + 2 RFCs + 2 IBBS200Ds/IBBS200Ts
		≤ 16 U	≤ 6 RFUs	1 APM30H + 1 RFC + 1 IBBS200D/IBBS200T + 1 TMC11H

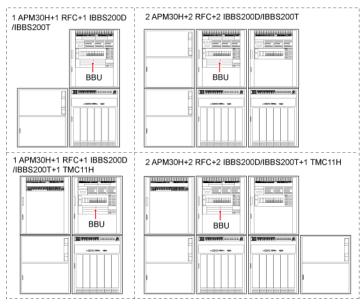
Power Supply	Backup Power Requireme nt	Space Required for Customer Equipmen t	Carrier Configurat ion	Cabinet Configuration
		≤ 23 U	≤ 12 RFUs	2 APM30Hs + 2 RFCs + 2 IBBS200Ds/IBBS200Ts + 1 TMC11H
	4 h/6 h/8 h backup	≤ 5 U	≤ 6 RFUs	1 APM30H + 1 RFC + 2 IBBS200Ds/IBBS200Ts
	power	≤ 12 U	≤ 12 RFUs	2 APM30Hs + 2 RFCs + 4 IBBS200Ds/IBBS200Ts
		≤ 16 U	≤ 6 RFUs	1 APM30H + 1 RFC + 2 IBBS200Ds/IBBS200Ts + 1 TMC11H
		≤ 23 U	≤ 12 RFUs	2 APM30Hs + 2 RFCs + 4 IBBS200Ds/IBBS200Ts + 1 TMC11H
-48 V DC	-	≤ 9 U	≤ 6 RFUs	1 TMC11H + 1 RFC
			≤ 12 RFUs	1 TMC11Hs + 2 RFCs
		≤ 20 U	≤ 6 RFUs	2 TMC11Hs + 1 RFC
			≤ 12 RFUs	2 TMC11Hs + 2 RFCs

In the 110 V or 220 V AC power supply scenario, if there is no backup power requirement, the cabinet configuration of a single-mode or dual-mode base station in the case of different space required for customer equipment and carrier configurations is shown in **Figure 2-7**.

**Figure 2-7** Cabinet configuration of a single-mode or dual-mode base station if there is no backup power requirement

When a site requires 0.5 h or 2 h backup power, the cabinet configuration of a single-mode or dual-mode base station in the case of different space required for customer equipment and carrier configurations is shown in **Figure 2-8**.

**Figure 2-8** Cabinet configuration of a single-mode or dual-mode base station if 0.5 h or 2 h backup power is provided



When a site requires 4 h, 6 h, or 8 h backup power, the cabinet configuration of a single-mode or dual-mode base station in the case of different space required for customer equipment and carrier configurations is shown in **Figure 2-9**.

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 RFC+2 IBBS200D/IBBS200T

1 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

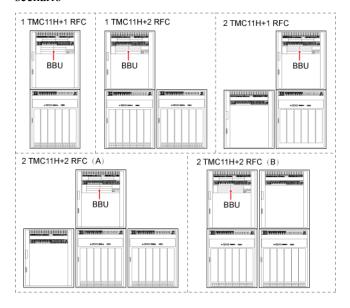
1 APM30H+1 RFC+2 IBBS200D/IBBS200T+1 TMC11H

1 APM30H+1 R

**Figure 2-9** Cabinet configuration of a single-mode or dual-mode base station if 4 h, 6 h, or 8 h backup power is provided

When a -48 V DC power is provided, the cabinet configuration of a single-mode or dual-mode base station in the case of different space required for customer equipment and carrier configurations is shown in Figure 2-10.

**Figure 2-10** Cabinet configuration of a single-mode or dual-mode base station in the -48 V DC scenario



NOTE

As shown in Figure 2-10, 2 TMC11Hs + 2 RFCs can be categorized into two modes: (A) and (B). In mode (A), one RFC is installed during the initial site construction, and the other RFC is installed during capacity expansion. In mode (B), two RFCs are installed during the initial site construction.

# Cabinet Configuration of a Triple-Mode Base Station

Two BBUs are configured for a triple-mode base station. The main BBU is BBU0, which is installed in the main APM30H or TMC11H on the left. The extension BBU is BBU1, which is installed in the extension APM30H or TMC11H on the right.

**Table 2-7** shows the cabinet configuration of a triple-mode base station in the case of different backup power requirements, space required for customer equipment, and carrier configurations.

 Table 2-7 Cabinet configuration of a triple-mode base station

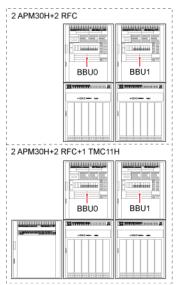
Power Supply	Backup Power Requireme nt	Space Required for Customer Equipmen t	Carrier Configurat ion	Cabinet Configuration
110 V AC or	1	≤ 10 U	≤12 RFUs	2 APM30Hs + 2 RFCs
220 V AC	power	≤ 21 U	(1)	2 APM30Hs + 2 RFCs + 1 TMC11H
	0.5 h/2 h backup power 4 h/6 h/8 h backup	≤ 10 U		2 APM30Hs + 2 RFCs + 2 IBBS200Ds/IBBS200Ts
		≤ 21 U		2 APM30Hs + 2 RFCs + 2 IBBS200Ds/IBBS200Ts + 1 TMC11H
		≤ 10 U		2 APM30Hs + 2 RFCs + 4 IBBS200Ds/IBBS200Ts
	power	≤ 21 U		2 APM30Hs + 2 RFCs + 4 IBBS200Ds/IBBS200Ts + 1 TMC11H
-48 V DC	-	≤ 18 U		2 TMC11Hs + 2 RFCs

## NOTE

In the 110 V or 220 V AC power supply scenario, if there is no backup power requirement, the cabinet configuration of a triple-mode base station in the case of different space required for customer equipment is shown in **Figure 2-11**.

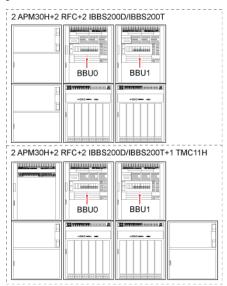
<sup>(1)</sup> A maximum of 12 RFUs are supported by a triple-mode base station. If there are more than 12 RFUs, an extra base station is required.

**Figure 2-11** Cabinet configuration of a triple-mode base station if there is no backup power requirement



When a site requires 0.5 h or 2 h backup power, the cabinet configuration of a triple-mode base station in the case of different space required for customer equipment is shown in **Figure 2-12**.

**Figure 2-12** Cabinet configuration of a triple-mode base station if 0.5 h or 2 h backup power is provided



When a site requires 4 h, 6 h, or 8 h backup power, the cabinet configuration of a triple-mode base station in the case of different space required for customer equipment is shown in **Figure 2-13**.

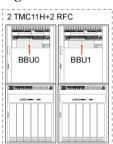
2 APM30H+2 RFC+4 IBBS200D/IBBS200T+1 TMC11H

BBU0
BBU1

**Figure 2-13** Cabinet configuration of a triple-mode base station if 4 h, 6 h, or 8 h backup power is provided

**Figure 2-14** shows the cabinet configuration of a triple-mode base station when a -48 V DC power is provided.

Figure 2-14 Cabinet configuration of a triple-mode base station in the -48 V DC scenario



# 3 BTS3900A Power System

# **About This Chapter**

The BTS3900A 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 3-1 and Table 3-2 list the input voltage ranges supported by the BTS3900A.

Table 3-1 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
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 3-2 Applicable DC input voltage ranges

Power Input Type	Rated Voltage	
-48 V DC	-38.4 V DC to -57 V DC	

# 3.1 Configuration of Circuit Breakers and Connections of Power Cables for the BTS3900A

This section lists the recommended configuration of circuit breakers and connections of power cables for the BTS3900A. The recommended configurations are all based on a fully configured base station, which has the peak output power. The power requirements for the customer equipment in the cabinet are also included.

**Table 3-3** lists the recommended configuration of circuit breakers and connections of power cables for the BTS3900A.

Table 3-3 Recommended configuration of circuit breakers and connections of power cables

Power Input Type	Requirements for Circuit Breakers on Customer Equipment	Cross-Sectional Area of Power Cables	Length of Power Cables
220 V AC single- phase	1 x 50 A (using a two- level magnetic	6 mm <sup>2</sup>	≤40 m
110 V AC dual-livewire	circuit breaker)		
220 V AC three- phase	1 x 25 A (using a three-level magnetic circuit breaker)	2.5 mm <sup>2</sup>	≤40 m
-48 V DC	1 x 80 A	16 mm <sup>2</sup>	≤15 m

## **□** NOTE

- When an RFC is added to a BTS3900A, the input power cable for the RFC that is routed outdoors cannot exceed 15 m.
- All power cables must comply with local standards.

If a heater is installed when -48 V DC power is used, one more AC power input must be added. In this scenario, the recommended configurations of the circuit breaker and power cables for the heater are listed in **Table 3-4**.

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

Power Input Type	Requirements for Circuit Breakers on Customer Equipment	Cross-Sectional Area of Power Input Cables	Length of Power Cable
220 V AC single- phase	2 x 5 A	2.5 mm <sup>2</sup>	≤15 m

Power Input Type	Requirements for Circuit Breakers on Customer Equipment	Cross-Sectional Area of Power Input Cables	Length of Power Cable
110 V AC dual-livewire			

# 3.2 BTS3900A Power Distribution

This section describes the power distribution schemes used for the BTS3900A cabinets in the 110 V AC, 220 V AC, and -48 V DC power supply scenarios.

# Power Distribution Scheme in the 110 V AC or 220 V AC Power Supply Scenario

When the BTS3900A is supplied with 220 V AC or 110 V AC power, the AC power is converted to DC power and distributed by the Embedded Power Supply System (EPS) in the APM30H.

After going through the EPS, an AC power input is divided into two AC power outputs:

- One provides AC power for the Service Outlet Unit (SOU).
- One is connected to the junction box on the left of the cabinet, and divided into four AC power outputs, which are then provided for the heater or heating film.

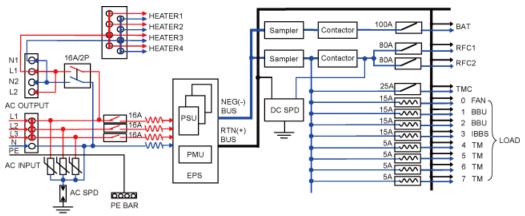
The AC power input is converted by PSUs into DC power, which is supplied to the storage battery cabinet, RFC, TMC11H, and other base station equipment.

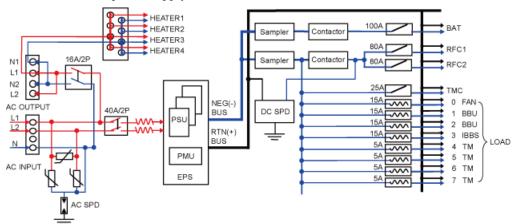
**Figure 3-1** and **Figure 3-2** show the power distribution schemes in the 220 V AC and 110 V AC power supply scenarios. **Table 3-5** lists the specifications for the circuit breakers and fuses in the base station in the 220 V AC and 110 V AC power supply scenarios.

### M NOTE

When the 220 V AC three-phase power supply is used, the three AC power inputs do not need to be connected in series using a short-circuiting bar. The power distribution principles for this scenario are the same as those for the 220 V AC single-phase power supply scenario.

**Figure 3-1** Power distribution scheme for the APM30H when the BTS3900A uses the 220 V AC single-phase power supply





**Figure 3-2** Power distribution scheme for the APM30H when the BTS3900A uses the 110 V AC dual-live-wire power supply

**Table 3-5** Specifications for the circuit breakers and fuses in the APM30H when the BTS3900A uses the AC power supply

Power Input Type	Specifications for Upper-Level Circuit Breakers of the EPS	Specifications for AC Output Circuit Breakers	Specifications for DC Output Circuit Breakers and Fuses
200 V AC single-phase/ three-phase	3 x 16 A (MCB <sup>(1)</sup> )	<ul> <li>Heater: 1 x 16 A (MCB)</li> <li>SOU: 1 x 16 A (MCB)</li> </ul>	<ul> <li>BAT<sup>(2)</sup>: 1 x 100 A (MCB)</li> <li>RFC1: 1 x 80 A (MCB)</li> </ul>
110 V AC dual- live-wire	1 x 40 A (MCB)	<ul> <li>Heater: 1 x 16 A (MCB)</li> <li>SOU: 1 x 16 A (MCB)</li> </ul>	<ul> <li>RFC2: 1 x 80 A (MCB)</li> <li>TMC: 1 x 25 A (MCB)</li> <li>FAN: 1 x 15 A (FUSE<sup>(3)</sup>)</li> <li>BBU: 2 x 15 A (FUSE)</li> <li>TEC<sup>(4)</sup>: 1 x 15 A (FUSE)</li> <li>TM<sup>(5)</sup>: 4 x 5 A (FUSE)</li> </ul>

### **NOTE**

• (1) MCB: miniature circuit breaker

• (2) BAT: storage battery

• (3) FUSE: fuse

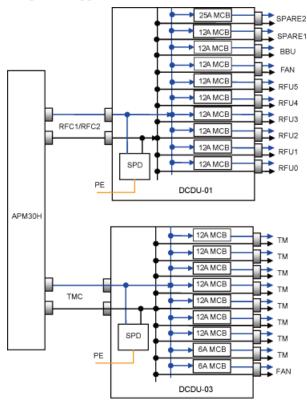
• (4) TEC: air conditioner

• (5) TM: transmission equipment

As shown in **Figure 3-1** and **Figure 3-2**, three DC power outputs from the APM30H are provided to RFC1, RFC2, and TMC11H separately when the BTS3900A uses AC power supply. The RFC provides power supply for the RFUs, fan box, and other components in the cabinet through the DCDU-01. The TMC11H provides power supply for the transmission equipment, fan box, and other components in the cabinet through the DCDU-03.

**Figure 3-3** shows the power distribution scheme for the RFC and TMC11H. **Table 3-6** lists the specifications for the circuit breakers in the RFC and TMC11H.

**Figure 3-3** Power distribution scheme for the RFC and TMC11H when the BTS3900A uses the AC power supply



**Table 3-6** Specifications for the circuit breakers in the RFC and TMC11H when the BTS3900A uses the AC power supply

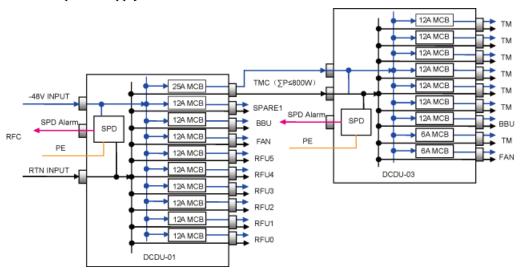
Cabinet Type	Specifications for DC Output Circuit Breakers
RFC	<ul> <li>RFU0 to RFU5: 6 x 12 A (MCB)</li> <li>FAN: 1 x 12 A (MCB)</li> <li>BBU (reserved): 1 x 12 A (MCB)</li> <li>Reserved: 1 x 12 A (MCB) + 1 x 25 A (MCB)</li> </ul>
TMC11H	<ul> <li>FAN: 1 x 6 A (MCB)</li> <li>Transmission device: 7 x 12 A (MCB) + 1 x 6 A (MCB)</li> </ul>

# Power Distribution Scheme in the -48 V DC Power Supply Scenario

When the BTS3900A uses -48 V DC power supply, the external power supply is connected to the RFC, forwarded to the DCDU-01, and provided to the RFUs and fan box in the cabinet. In addition, the DCDU-01 can provide a DC power of 25 A with a maximum power of 800 W to the TMC11H. The DCDU-03 in the TMC11H then provides DC power to the BBU and fan.

**Figure 3-4** shows the power distribution schemes for the RFC and TMC11H. **Table 3-7** lists the specifications for the circuit breakers in the RFC and TMC11H.

**Figure 3-4** Power distribution scheme for the RFC and TMC11H when the BTS3900A uses the -48 V DC power supply



**Table 3-7** Specifications for the circuit breakers in the RFC and TMC11H when the BTS3900A uses the -48 V DC power supply

Cabinet Type	Specifications for DC Output Circuit Breakers			
RFC	• RFU0 to RFU5: 6 x 12 A (MCB)			
	• FAN: 1 x 12 A (MCB)			
	BBU (reserved): 1 x 12 A (MCB)			
	• Reserved: 1 x 12 A (MCB)			
	• TMC: 1 x 25 A (MCB)			
TMC11H	• FAN: 1 x 6 A (MCB)			
	● BBU: 1 x 12 A (MCB)			
	• Transmission device: 6 x 12 A (MCB) + 1 x 6 A (MCB)			

# 4 BTS3900A Monitoring System

# **About This Chapter**

The BTS3900A monitoring system enables monitoring of all boards and components in the cabinet. If any board or component is faulty, an alarm is automatically reported. The UPEU and UEIU in the BBU collect monitoring signals from boards and components to achieve environment monitoring of the BTS3900A.

## 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.

# 4.2 Monitoring Principles for the Cabinets

The BTS3900A cabinets are monitored by monitoring boards, such as the central monitoring unit type A (CMUA), HERT power monitoring interface unit (HPMI), and power monitoring unit (PMU). These boards collect alarms from sensors and fans, and then transmit the alarm signals to the MON port on the BBU through the RS485 serial bus. This implements the monitoring of the cabinets.

### 4.3 Customized Alarm Inputs

If the BBU monitors customer devices, customized alarms for the devices must be reported to the BBU.

# 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 4-1 shows the slot assignment for the UPEU and UEIU.

Figure 4-1 Slot assignment for the UPEU and UEIU

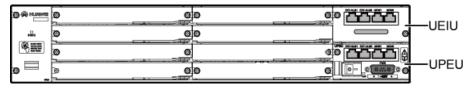


Table 4-1 lists the ports on the UPEU and UEIU.

Table 4-1 Ports on the UPEU and UEIU

Slot	Board	Port	Connector	Quantity	Description
Slot19	UPEU	EXT-ALM0	RJ-45 connector	1	Port for Boolean inputs 8 to 11
		EXT-ALM1	RJ-45 connector	1	Port for Boolean inputs 12 to 15
		MON0	RJ-45 connector	1	Port for RS485 input 0
		MON1	RJ-45 connector	1	Port for RS485 input 1
Slot18	Slot18 UEIU (optional)		RJ-45 connector	1	Port for Boolean inputs 0 to 3
		EXT-ALM1	RJ-45 connector	1	Port for Boolean inputs 4 to 7
		MON0	RJ-45 connector	1	Port for RS485 input 0

Slot	Board	Port	Connector	Quantity	Description
		MON1	RJ-45 connector	1	Port for RS485 input

# 4.2 Monitoring Principles for the Cabinets

The BTS3900A cabinets are monitored by monitoring boards, such as the central monitoring unit type A (CMUA), HERT power monitoring interface unit (HPMI), and power monitoring unit (PMU). These boards collect alarms from sensors and fans, and then transmit the alarm signals to the MON port on the BBU through the RS485 serial bus. This implements the monitoring of the cabinets.

# Cabinet Monitoring Principles for a Single-Mode or Dual-Mode Scenario

Only one BBU is configured in a single-mode or dual-mode scenario, which is installed in the APM30H. If two APM30H cabinets are configured, the BBU is installed in the basic APM30H cabinet, which is installed on the left.

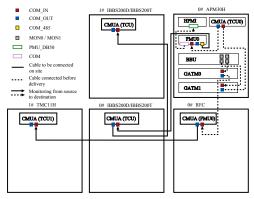
Figure 1 and Figure 2 show the monitoring principles for the BTS3900A in a 110 V AC or 220 V AC power supply scenario. Figure 3 shows the monitoring principles for the BTS3900A in a –48 V DC power supply scenario.

# NOTE

Devices monitored by the CMUA, HPMI, and PMU are not shown in the following figures. For details, see the descriptions about the monitoring boards. For details about the monitoring functions of the environment monitoring unit type A (EMUA), see **4.3 Customized Alarm Inputs**.

- For details about the functions of monitoring ports on the CMUA, see CMUA. The CMUA is installed
  in the APM30H, TMC11H, RFC, IBBS200D, and IBBS200T.
- For details about the functions of monitoring ports on the HPMI, see HPMI. The HPMI is installed
  in the APM30H (AC) and TMC11H. Ports on the HPMI in the TMC11H are reserved for later use.
- For details about the functions of ports on the PMU, see PMU. The PMU is installed only in the APM30H (AC).
- For details about the positions for installing the CMUA, HPMI, PMU, and EMUA in each cabinet, see 2.2 Structure of the BTS3900A Cabinet.

**Figure 4-2** Monitoring principles for the BTS3900A configured with one APM30H, one RFC, two IBBS200Ds/IBBS200Ts, and one TMC11H



COM\_IN

I# IBBS200D/IBBS200T

O# APM30H

I# APM30H

I# APM30H

I# BBS200D/IBBS200T

CMUA (TCU)

CMUA (TCU)

PMU\_DB50

COM

Cable to be connected before delivery

Monitoring from source

to destination

2# TMCIH

O# IBBS200D/IBBS200T

CMUA (PMU)

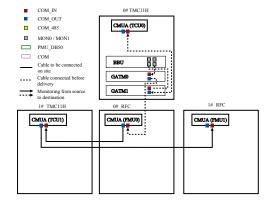
CMUA (PMU)

MAIA (TCU)

CMUA (PMU)

**Figure 4-3** Monitoring principles for the BTS3900A configured with two APM30Hs, two RFCs, four IBBS200Ds/IBBS200Ts, and one TMC11H in a single-mode scenario

**Figure 4-4** Monitoring principles for the BTS3900A configured with two TMC11Hs and two RFCs



# ■ NOTE

- If any of the following devices is not configured at a site, the monitoring signal cable can be directly connected to the lower-level device. For example, if the GSM antenna and TMA control module (GATM 0) and GATM 1 are not configured in Figure 1, the monitoring signal cables can be directly connected to the CMUA through the MON0 and MON1 ports on the BBU.
- If any of the following cabinets is not configured at a site, the monitoring signal cable related to this cabinet can be directly connected to the lower-level cabinet. For example, if No. 2 TMC11H is not configured in Figure 2, the monitoring signal cable can directly connect the COM\_OUT port on the CMUA in No. 0 RFC and the COM\_IN port on the CMUA in No. 1 RFC.
- All monitoring signal cables in the cabinets and between the APM30H and RFC are connected before
  delivery. You only need to connect monitoring signal cables between other cabinets. For details about
  connections of all the monitoring signal cables in different cabinets, see Monitoring Signal Cable
  Connections, , , and .

# Cabinet Monitoring Principles for a Triple-Mode Scenario

Two BBUs are configured in a triple-mode scenario. The basic BBU is BBU 0, which is installed in the APM30H No. 0 on the left. The extension BBU is BBU 1, which is installed in the

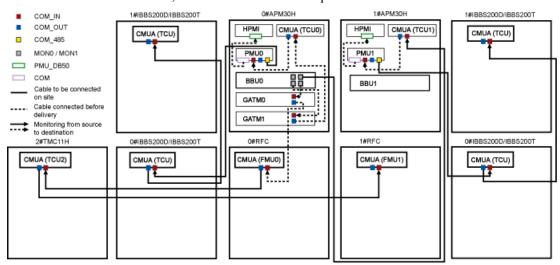
APM30H No. 1 on the right. In this scenario, all the monitoring boards are connected only to BBU 0. The monitoring principles for a triple-mode scenario are the same as those for a single-mode or dual-mode scenario, as shown in **Figure 4-5**.

# **□** 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 4-5** Monitoring principles for the BTS3900A configured with two APM30Hs, two RFCs, four IBBS200Ds/IBBS200Ts, and one TMC11H in a triple-mode scenario



# 4.3 Customized Alarm Inputs

If the BBU monitors customer devices, customized alarms for the devices must be reported to the BBU.

# **Monitoring Board Configuration**

If the BBU monitors customer devices, customized alarms for the devices must be reported to the BBU. The configurations of monitoring boards in the BTS3900A depend on the number of customized alarms, as listed in **Table 4-2**.

Table 4-2 Monitoring board configurations of the BTS3900A

<b>Customized Alarm Inputs</b>	Monitoring Board Configuration		
1 to 16	UPEU+UEIU		
17 to 32	EMUA		

### NOTE

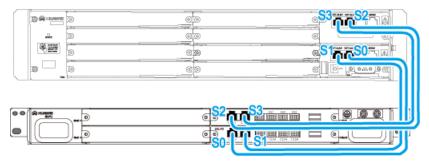
When the number of customized alarms ranges from 1 to 16, the SLPU must be configured because SLPU provides surge protection to the alarm signals before the signals are transmitted to the BBU.

# 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, which means there are 16 Boolean alarm inputs. This method can be used for the configuration of less than 16 customized alarm inputs.

If using this method, connect the device to be monitored to the SLPU for surge protection, and then connect the device to the EXT ALM port on the BBU, as shown in **Figure 4-6**.

Figure 4-6 Customized alarms collected by the UPEU or UEIU



Customized alarm signals are transmitted to the IN0 to IN3 ports on the USLP2 in the SLPU and then transferred to the EXT\_ALM port on the UPEU or EUIU through the alarm cable for the BBU. **Table 4-3** describes the relationship between the IN0 to IN3 ports and the number of customized alarms.

**Table 4-3** Relationship between the IN0 to IN3 ports on the USLP2 and the number of customized alarms

Pins of	USLP2 in the upper slot			USLP2 in the lower slot				
the IN0 to IN3 ports	IN0	IN1	IN2	IN3	IN0	IN1	IN2	IN3
1	4+	5+	0+	1+	12+	13+	8+	9+
2	4- (GND)	5- (GND)	0- (GND)	1- (GND)	12- (GND)	13- (GND)	8- (GND)	9- (GND)
3	6- (GND)	7+	2- (GND)	3+	14- (GND)	15+	10- (GND)	11+
4	6+	7- (GND)	2+	3- (GND)	14+	15- (GND)	10+	11- (GND)

For details about ports on the USLP2, see **5.2.5 USLP2**. For details about the wire sequence of the BBU alarm cable, see **6.9.11 BBU Alarm Cable**.

# NOTE

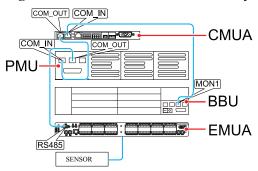
The SLPU is configured with two USLP2s by default before delivery when it is used as an alarm signal protection unit. If a BBU is configured with one UPEU, the UPEU must be installed only in the lower slot. In this case, the USLP2 in the upper slot of the SLPU is not used.

# Customized Alarms Collected by the EMUA

The EMUA can be configured for the DBS3900 that requires more than 16 Boolean alarm signals. Each EMUA supports 32 Boolean alarm inputs and two RS485 signal inputs.

Customized alarms are transmitted to the EMUA that connects to the PMU. Then, the PMU reports the alarms to the CMUA, which transfers the alarms to the BBU through the MON port. For details about cable connections, see **Figure 4-7**.

Figure 4-7 Customized alarms collected by the EMUA (1)



For details about the position of the input port on the EMUA and cable connection between the EMUA and the sensor, see EMUA User Guide.

# 5 BTS3900A Components

# **About This Chapter**

The BTS3900A components consist of the BBU3900, RFUs, and modules such as the power equipment and fan box in the RFC and APM30H. In addition, you can optionally configure modules such as the EMUA and cabinets such as the TMC11H and IBBS200D or IBBS200T.

# 5.1 BBU3900 Equipment

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

# 5.2 SLPU

The signal lightning protection unit (SLPU), which can be optionally configured with the UFLP, UELP, or USLP2, provides the signal surge protection.

# 5.3 RFC

The RFC components are the DCDU-01, fan box, RFU, ELU, and door status sensor.

### 5.4 APM30H Components

The components of the APM30H consist of the fan box, power equipment (AC/DC), core of the heat exchanger, junction box, Electronic Label Unit (ELU), heater, and Service Outlet Unit (SOU). The heater and the SOU are optional.

# 5.5 IBBS200T Components

The components of the IBBS200T consist of the TEC cooler, power distribution box, CMUA, and storage batteries.

### 5.6 IBBS200D Components

The components of the IBBS200D consist of the fans, fan box, CMUA, power distribution box, storage batteries, and heating film. The heating film is optional.

### 5.7 TMC11H Components

The components of the TMC11H consist of the fan box, DCDU-03, and heater. The heater is optional.

### 5.8 Overview of the DDF

This section describes the structure, functions, features, and technical specifications of the DDF.

### **5.9 EMUA**

The Environment Monitoring Unit (EMUA) monitors the internal environment of the cabinet and reports related alarms.

# 5.1 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

### 5.1.1 Exterior of the BBU3900

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

### 5.1.2 Boards and Module of the BBU3900

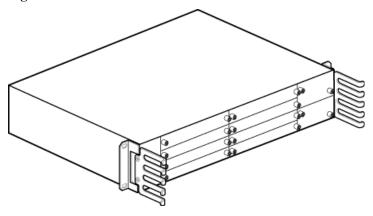
This describes the boards and module of the BBU3900 in terms of their configuration principles, functions, ports, LEDs, and DIP switches.

# 5.1.1 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 5-1 shows the BBU3900.

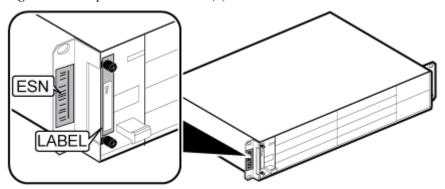
**Figure 5-1** BBU3900



The Electronic Serial Number (ESN) is unique to a network element (NE) for identification, and is used during the commissioning of the base station.

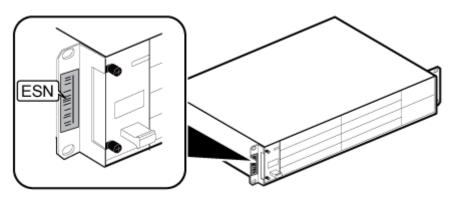
• If there is a label on the FAN unit of the BBU, the ESN is printed on a label and the mounting ears of the BBU. Figure 5-2 shows the position of the ESN.

Figure 5-2 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 5-3** shows the position of the ESN.

Figure 5-3 The position of the ESN (2)



# 5.1.2 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 the board configurations 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 board configurations of the BBU3900 in GO mode, BBU3900 in GU mode, BBU3900 in UO mode, BBU3900 in LO mode, BBU3900 in GL mode, BBU3900 in GU+LO mode, and BBU3900 in GL+UO mode are the same, as shown in **Figure 5-4**.

Figure 5-4 Slots of the BBU3900

Slot 16	Slot 0	Slot 4	Slot 18
	Slot 1	Slot 5	3101 10
	Slot 2	Slot 6	Slot 10
	Slot 3	Slot 7	Slot 19

# BBU3900 in GO Mode

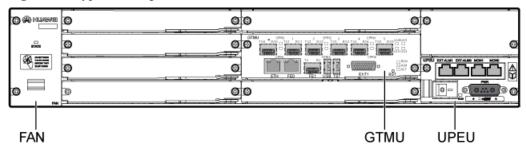
**Table 5-1** describes the principles for configuring the boards in the BBU3900 in GO mode.

Table 5-1 Principles for configuring the boards in the BBU3900 in GO mode

Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
GTMU	Mandatory	1	Slots 5 and 6	Configured only in slot 6 (both slots 5 and 6 are occupied)
FAN	Mandatory	1	Slot 16	Configured only in slot 16
UPEU	Mandatory	2	Slot 18 or slot 19	Preferentially configured in slot 19 in the case of a single UPEU
USCU	Optional	1	Slot 0 or slot 1	Preferentially configured in slot 1
				Configured in slot 1 in the case of 1 U dual-satellite-card (in this case, slot 0 is also occupied)
UEIU	Optional	1	Slot 18	-

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

Figure 5-5 Typical configuration of the BBU3900 in GO mode



# BBU3900 in UO Mode

Table 5-2 describes the principles for configuring the boards in the BBU3900 in UO mode.

Table 5-2 Principles for configuring the boards in the BBU3900 in UO mode

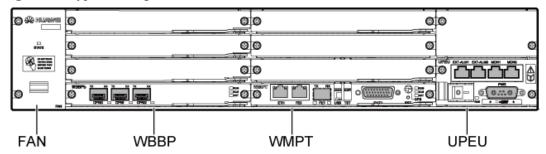
Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
WMPT	Mandatory	2	Slot 6 or slot 7	Preferentially configured in slot 7 in the case of a single WMPT

Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
WBBP	Mandatory	6	Slots 0 to 5	Configured in slot 3 by default:  If an expansion of the CPRI port is required, the priorities of the slots in configuratio n are as follows in descending order: slot 3, and slot 2  If an expansion of the CPRI port is not required, the priorities of the slots in configuratio n are as follows in descending order: slot 3, slot 0, slot 1, slot 2, slot 4, slot 5  If the WBBPd is configured in the BBU, the WBBPd is preferentially configured in slot 2 or slot 3  If five WBBPs or more are required, slot 2 and slot 3 must house WBBPs, and one WBBPd
				must be configured in slot 2 or slot 3 at

Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
FAN	Mandatory	1	Slot 16	Configured only in slot 16
UPEU	Mandatory	2	Slot 18 or slot 19	Preferentially configured in slot 19 in the case of a single UPEU
UEIU	Optional	1	Slot 18	-
UTRP	Optional	4	Slot 0, slot 1, slot 4, and slot 5	Configured in a slot, with slot priority of slot 4, slot 5, slot 0, and slot 1
USCU	Optional	1	Slot 1 or slot 0	Preferentially configured in slot 1  Configured in slot 1 in the case of 1 U dual-satellite-card (in this case, slot 0 is also occupied)

Figure 5-6 shows the typical configurations of the BBU3900 in UO mode.

Figure 5-6 Typical configuration of the BBU3900 in UO mode



### BBU3900 in LO Mode

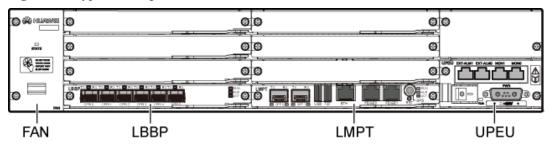
**Table 5-3** describes the principles for configuring the boards in the BBU3900 in LO mode.

Table 5-3 Principles for configuring the boards in the BBU3900 in LO mode

Board	Optional/ Mandatory	Maximum Number of Modules Configured in a Cabinet	Installation Slot	Remarks
LMPT	Mandatory	2	Slot 6 or 7	Configured only in slot 7 in the case of a single LMPT
LBBP	Mandatory	6	Slots 0 to 5	Preferentially configured in slot 3
FAN	Mandatory	1	Slot 16	The FAN unit can be configured only in slot 16.
UPEU	Mandatory	2	Slot 18 or 19	Configured only in slot 19 in the case of a single UPEU
UEIU	Optional	1	Slot 18	-
UTRP	Optional	1	Slot 4 or slot 5	Preferentially configured in slot 4
USCU	Optional		Slot 0, slot 1, slot 4, or slot 5	Preferentially configured in slot 5 in the case of a single USCU; configured in slot 5 in the case of 1 U USCU (in this case, slot 4 is also occupied)  Preferentially configured in slot 1 if slot 4 and slot 5 are occupied; configured in slot 1 in the case of 1 U USCU (in this case, slot 0 is also occupied)

Figure 5-7 shows the typical configurations of the BBU3900 in LO mode.

Figure 5-7 Typical configuration of the BBU3900 in LO mode



## BBU3900 in GU Mode

Table 5-4 describes the principles for configuring the boards in the BBU3900 in GU mode.

Table 5-4 Principles for configuring the boards in the BBU3900 in GU mode

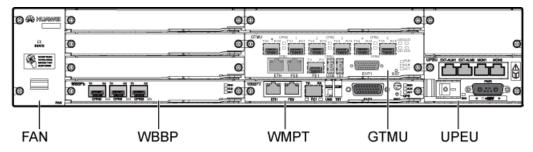
Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
WMPT	Mandatory	1	Slot 7	Configured only in slot 7
GTMU	Mandatory	1	Slots 5 and 6	Configured only in slot 6 (both slots 5 and 6 are occupied)

Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
WBBP	Mandatory	5	Slots 0 to 4	The priorities of the slots in configuration are as follows in descending order: slot 3, slot 2, slot 0, slot 1, and slot 4  If the WBBPd is configured in the BBU, the WBBPd is preferentially configured in slot 2 or slot 3  If five WBBPs or more are required, slot 2 and slot 3 must house WBBPs, and one WBBPd must be configured in slot 2 or slot 3 at
EAN	<b>M</b> 1.	1	GI + 16	least
FAN	Mandatory	1	Slot 16	Configured only in slot 16
UPEU	Mandatory	2	Slot 18 or slot 19	Configured only in slot 19 in the case of a single UPEU
UEIU	Optional	1	Slot 18	-
UTRP	Optional	2	Slot 0, slot 1, or slot 4	Configured in a slot, with slot priority of slot 4, slot 0, and slot 1
USCU	Optional	1	Slot 0, slot 1, or slot 4	Preferentially configured in slot 1  Configured in slot 1 in the case of 1 U dual-satellite-card (in this case, slot 0 is also occupied)

Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
UBRI	Optional	1	Slot 1 or slot 2	Preferentially configured in slot 2

Figure 5-8 shows the typical configurations of the BBU3900 in GU mode.

Figure 5-8 Typical configuration of the BBU3900 in GU mode



### BBU3900 in GL Mode

**Table 5-5** describes the principles for configuring the boards in the BBU3900 in GL mode.

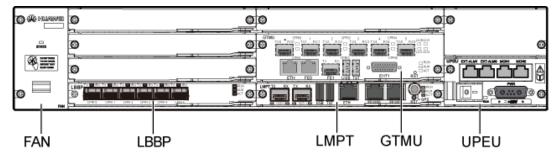
Table 5-5 Principles for configuring the boards in the BBU3900 in GL mode

Board	Optional/ Mandatory	Maximum Quantity	Slot	Remarks
LMPT	Mandatory	1	Slot 7	Configured only in slot 7
GTMU	Mandatory	1	Slots 5 and 6	Configured only in slot 6 (both slots 5 and 6 are occupied)
LBBP	Mandatory	3	Slots 0 to 3	Configured in a slot, with slot priority of slot 3, slot 1, and slot 2
FAN	Mandatory	1	Slot 16	Configured only in slot 16
UPEU	Mandatory	2	Slot 18 or slot 19	Configured only in slot 19 in the case of a single UPEU

Board	Optional/ Mandatory	Maximum Quantity	Slot	Remarks
UEIU	Optional	1	Slot 18	-
UTRP	Optional	2	Slot 0, slot 1, or slot 4	Configured in a slot, with slot priority of slot 4, slot 0, and slot 1 The slot priority of the GO UTRP is higher than that of the LO UTRP
USCU	Optional	1	Slot 0 or slot 1	Preferentially configured in slot 1 Configured in slot 1 in the case of 1 U dual-satellite-card (in this case, slot 0 is also occupied)
UBRI	Optional	1	Slot 1 or slot 2	Preferentially configured in slot 2

Figure 5-9 shows the typical configurations of the BBU3900 in GL mode.

Figure 5-9 Typical configuration of the BBU3900 in GL mode



### BBU3900 in UL Mode

**Table 5-6** describes the principles for configuring the boards in the BBU3900 in UL mode.

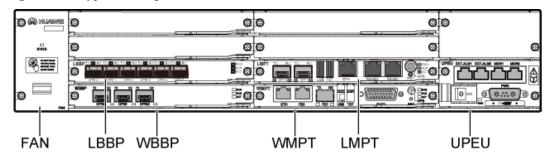
Table 5-6 Principles for configuring the boards in the BBU3900 in UL mode

Board	Optional/ Mandatory	Maximum Quantity	Slot	Remarks
LMPT	Mandatory	1	Slot 6	Configured only in slot 6
WMPT	Mandatory	1	Slot 7	Configured only in slot 7
LBBP	Mandatory	5	Slot 0, slot 1, slot 2, slot 4, or slot 5	The priorities of the slots in configuration are as follows in descending order: slot 2, slot 0, slot 1, slot 4, slot 5
WBBP	Mandatory	4	Slot 0, slot 1, slot 3, slot 4, or slot 5	The priorities of the slots in configuration are as follows in descending order: slot 3, slot 0, slot 1, slot 4, slot 5  If the WBBPd is configured in the BBU, the WBBPd is configured only in slot 3
FAN	Mandatory	1	Slot 16	Configured only in slot 16
UPEU	Mandatory	2	Slot 18 or slot 19	Configured only in slot 19 in the case of a single UPEU
UEIU	Optional	1	Slot 18	-
UTRP	Optional	2	Slot 0, slot 1, slot 4, or slot 5	Configured in a slot, with slot priority of slot 4, slot 5, slot 0, and slot 1  The slot priority of the UO UTRP is higher than that of the LO UTRP

Board	Optional/ Mandatory	Maximum Quantity	Slot	Remarks
USCU	Optional	1	Slot 0 or slot 1	Preferentially configured in slot 1  Configured in slot 1 in the case of 1 U dual-satellite-card (in this case, slot 0 is also occupied)

Figure 5-10 shows the typical configurations of the BBU3900 in UL mode.

Figure 5-10 Typical configuration of the BBU3900 in UL mode



#### BBU3900 in GU+LO Mode

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

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

### BBU3900 in GL+UO Mode

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

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

#### **WMPT**

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

#### **Panel**

Figure 5-11 shows the panel of the WMPT.

Figure 5-11 Panel of the WMPT



#### **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 5-7** describes the LEDs on the WMPT panel.

**Table 5-7** 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.

Label	Color	Status	Meaning
		ON	The board has alarms on hardware.
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 5-12** shows the LEDs beside the three ports.

Figure 5-12 LEDs beside the three ports on the WMPT

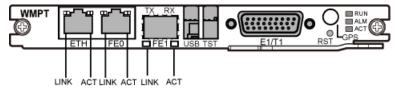


Table 5-8 describes the LEDs and their status.

Table 5-8 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.

LED	Color	Status	Meaning
		OFF	No data transmission is ongoing.
ETH Green (LINK)	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 5-9** describes the ports on the WMPT panel.

Table 5-9 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 5-13** shows the DIP switches on the WMPT.

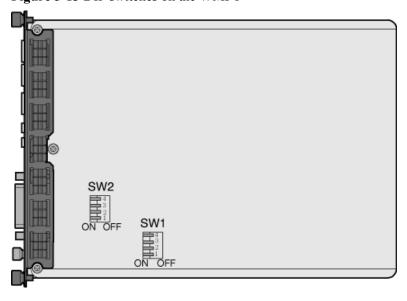


Figure 5-13 DIP switches on the WMPT

Table 5-10 and Table 5-11 describe the settings of SW1 and SW2.

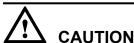
Table 5-10 Settings of SW1

DIP	DIP Status	Description			
Switch	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 5-11 Settings of SW2

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

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



All the DIP bits of SW2 are set to OFF by default. When four E1 links are faulty, you should set all the DIP bits of SW2 to ON so that the faults are rectified.

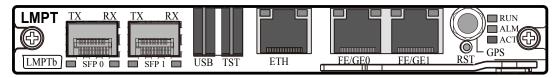
#### **LMPT**

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 5-14 shows the LMPT.

Figure 5-14 LMPT



### **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 5-12** describes the LEDs on the LMPT.

Table 5-12 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.
		Blinking (on for 1s and off for 1s)	The board is running properly.
		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 5-13** describes the LEDs.

Table 5-13 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.
ЕТН	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 5-14** describes the ports on the panel of the LMPT.

Table 5-14 Ports on the panel of the LMPT

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

Label	Connector Type	Quantity	Application
TST	USB	1	Testing
ЕТН	RJ45 connector	1	Commissioning
FE/GE0 to FE/GE1	RJ45 connector	2	Ethernet 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. 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.

### **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 5-15 and Figure 5-16 show the panels of the GTMU and GTMUb.

Figure 5-15 GTMU panel

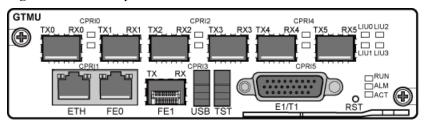
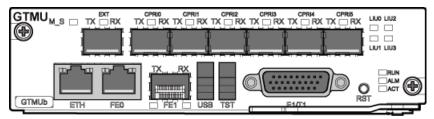


Figure 5-16 GTMUb panel



### **Ⅲ** NOTE

The GTMU hereinafter mentioned in this document is the first type.

#### **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.
- Four IDX2 ports on the backplane of the GTMUb can achieve the function of baseband resource pool backup.

#### **LEDs**

**Table 5-15** describes the LEDs on the GTMU.

Table 5-15 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.

LED	Color	Status	Description
ALM	Red	ON	An alarm is generated, indicating a running fault.
		OFF	The board is running properly.
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 5-16** describes the LEDs and their status.

Table 5-16 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.

LED	Color	Status	Description
	Orange (ACT LED on the right)	Blinking	Data is being transmitted.
		OFF	No data is being transmitted.
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 5-17** describes the ports on the GTMU.

**Table 5-17** 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	RJ-45 connector	Local maintenance and debugging port
FE0	RJ-45 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

Label	Connector	Description
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 5-18 provides details on the DIP switch.
- S2 is used to select the grounding mode of E1/T1 cables. Table 5-19 provides details on the DIP switch.
- S3 is reserved.
- S4 is used to select the E1 bypass. Table 5-20 provides details on the DIP switch.
- S5 is used for timeslot settings when the E1 bypass is selected. Table 5-21 provides details on the DIP switch.

Table 5-18 Details of the DIP Switch S1

DIP	Bit Status	6	Description		
Switch	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.
		О	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 5-19 Details of the DIP Switch S2

DIP	Bit Status				Description
Switch	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.
		C	Others		Unavailable

Table 5-20 Details of the DIP Switch S4

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

Table 5-21 Details of the DIP Switch S5

DIP	Bit Status				Description
Switch	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

DIP	Bit Status	Description			
Switch 1		2	3	4	
	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

### **◯** NOTE

The E1 bypass function is not supported in this version. All the bits of S4 should be set to OFF, and all the bits of S5 should be set to ON.

#### **WBBP**

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

#### **Panels**

The WBBP has three types of panels, as shown in Figure 5-17, Figure 5-18 and Figure 5-19.

Figure 5-17 Panel of the WBBPa

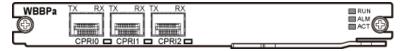


Figure 5-18 Panel of the WBBPb



Figure 5-19 Panel of the WBBPd



### **Functions**

The WBBP has the following functions:

- Provides the CPRI interface for communication between the BBU and the RRU or RFU, 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.
- When installed in slot 2 or slot 3, the WBBPd supports the IC function of uplink data.

Table 5-22 describes the specifications of the WBBP.

Table 5-22 Specifications of the WBBP

Board	Number of Cells	UL CE Number	DL CE Number
WBBPa	3	128	256
WBBPb1	3	64	64
WBBPb2	3	128	128
WBBPb3	6	256	256
WBBPb4	6	384	384
WBBPd1	6	192	192
WBBPd2	6	384	384
WBBPd3	6	256	256

### **LEDs**

Table 5-23 describes the LEDs on the WBBP and their status.

Table 5-23 LEDs on the WBBP and their status

Label	Color	Status	Description
RUN	Green	ON	The board has power input, yet the board is faulty.
		OFF	The power supply or the board is faulty.
		Blinking (on for one second and off for one second)	The board is running properly.
		Blinking (on for 0.125 second and off for 0.125 second)	Software is being loaded to the board.
ACT	Green	ON	The board is running properly.
		OFF	The WBBP is not in use.
ALM	Red	OFF	The board is running properly.
		ON	The board has hardware alarms.

The WBBPa or WBBPb provides three LEDs indicating the status of the SFP links. The LEDs are positioned below the SFP ports. The WBBPd provides six LEDs indicating the status of the SFP links. The LEDs are positioned above the SFP ports.

**Table 5-24** describes the LEDs.

**Table 5-24** LEDs indicating the status of the SFP links

Label	Color	Status	Description
TX RX	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 no hardware fault occurs on the RF unit.
		Steady red	No optical module is installed, or the CPRI link is faulty.
		Blinking red (on for 0.125s and off for 0.125s)	The RF unit on the CPRI link is faulty and needs to be replaced.
	Blinking red (on for 1s and off for 1s)	A VSWR, antenna, or external alarm is generated on the RF unit on the CPRI link.	

### **Ports**

Table 5-25 describes the three CPRI ports on the panels of the WBBPa and WBBPb.

Table 5-25 Ports on the panels of the WBBPa and WBBPb

Label	Connector Type	Description
CPRIx	SFP female	Data transmission port between the BBU and the RF module, supporting input and output of optical and electrical signals

The WBBPd has six ports. **Table 5-26** describes the ports on the WBBPd.

Table 5-26 Ports on the WBBPd

Label	Connector Type	Description
CPRI0, CPRI1, CPRI2 CPRI3/EIH0, CPRI4/EIH1, CPRI5/EIH2	SFP female	Data transmission port between the BBU and the RF module, supporting input and output of optical and electrical signals

## ■ NOTE

The six CPRI ports are available on the WBBPd configured only in slot 2 or 3, and the CPRI ports are not available on the WBBPd configured in other port.

#### **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 5-20 and Figure 5-21.

Figure 5-20 Panel of the LBBPb



Figure 5-21 Panel of the LBBPc



#### M 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 5-27** describes the specifications of the LBBP working in LTE FDD mode.

Table 5-27 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 5-28** describes the specifications of the LBBP working in LTE TDD mode.

Table 5-28 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 5-29 describes the LEDs on the LBBP.

Table 5-29 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.	

Label	Color	Status	Description
ALM	Red	On	An alarm is reported, indicating a fault in the board.
		Off	The board is normal.
ACT	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 5-30** describes the LEDs.

Table 5-30 LEDs indicating the status of the SFP links

Label	Color	Status	Description
TX RX	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 RRU in the CPRI link has a hardware fault.	

Label	Color	Status	Description
		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 5-31 describes the ports on the panel of the LBBP.

Table 5-31 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 for the BBU3900 controls the speed of fans and monitors the temperature of the fan unit. It reports the status of the fans and fan unit, and dissipates heat from the BBU.

### **Panels**

The FAN unit has two types of exterior, which are shown in Figure 5-22 and Figure 5-23.

Figure 5-22 FAN panel

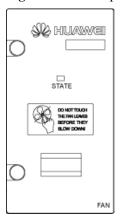


Figure 5-23 FANc panel



#### **□** NOTE

The FANc has **FANc** label, which is different from the FAN.

### **Functions**

The FAN unit performs the following functions:

- Controls the fan speed.
- Reports the status, temperature, and in-position signal of the fans to the main control processing unit.
- Monitors the temperature at the air inlet.
- Dissipates heat.
- The FANc supports the function of reading and writing the information reported by the electronic label unit.

### **LED**

The FAN panel has only one LED, which indicates the operating status of the fans. **Table 5-32** describes the LED.

Label Color State Meaning **STATE** On for 0.125s and off The module is not Green for 0.125s registered, and no alarm is reported. On for 1s and off for The module is functional. Red Off No alarm is generated. On for 1s and off for The unit is reporting alarms.

Table 5-32 LED on the FAN panel

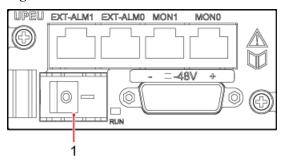
#### **UPEU**

A universal power and environment interface unit (UPEU) for the BBU3900 converts –48 V DC or +24 V DC power into +12 V DC power.

#### **Panel**

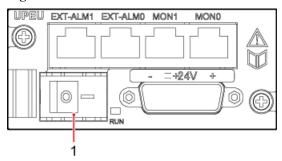
UPEUs fall into three types: universal power and environment interface unit type A (UPEUa), universal power and environment interface unit type B (UPEUb), and universal power and environment interface unit type C (UPEUc). The UPEUa and UPEUc convert –48 V DC power into +12 V DC power, and the UPEUb converts +24 V DC power into +12 V DC power. **Figure 5-24**, **Figure 5-25**, and **Figure 5-26** show the panels of the UPEUa, UPEUb, and UPEUc respectively.

Figure 5-24 Panel of the UPEUa



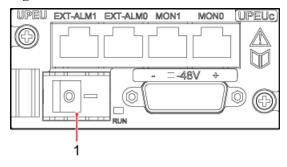
(1) BBU power switch

Figure 5-25 Panel of the UPEUb



(1) BBU power switch

Figure 5-26 Panel of the UPEUc



(1) BBU power switch

#### **□** NOTE

The UPEUa can be distinguished from the UPEUb by observing the silkscreen on the panel. The silkscreen on the UPEUa is -48V and the silkscreen on the UPEUb is +24V. The UPEUa can also be distinguished from the UPEUc because a UPEUc label is on the UPEUc.

### **Function**

The UPEU performs the following functions:

- Converts –48 V DC or +24 V DC power into +12 V DC power, which is the only operating voltage of the BBU.
- Provides ports for two RS485 signal inputs and eight Boolean signal inputs.
- If two UPEUs are configured, two power inputs are required. The UPEU in slot 19 is active and the one in slot 18 is standby.

Table 5-33 lists the specifications of the UPEUs.

**Table 5-33** Specifications of the UPEUs

Board	Output Power	Backup
UPEUa	A UPEUa has an output power of 300 W.	1+1 backup
UPEUc	A UPEUc has an output power of 360 W and two UPEUc boards have a total output power of 650 W.	1+1 backup

### **Ⅲ** NOTE

If a UPEUa is replaced with a UPEUc, the power consumption changes in the monitoring of the power consumption on the M2000. The monitoring result of the power consumption varies depending on the output power and the sampling method. In this situation, the UPEUc and the UPEUa adopt different sampling methods and therefore the monitored power consumption may decrease after a UPEUa is replaced with a UPEUc.

#### **Indicator**

The UPEU has one indicator, which indicates the operating status of the UPEU. **Table 5-34** lists the indications of the indicator in different status.

Table 5-34 Indicator on the UPEU

Silkscreen	Color	Status	Indication
RUN	UN Green	Steady on	The board is functional.
		Off	There is no power supply, or the board is faulty.

#### **Port**

A UPEU provides ports for two RS485 signal inputs and eight Boolean signal inputs. **Figure 5-27** shows the positions of UPEUs in the BBU.

Figure 5-27 Positions of UPEUs in the BBU

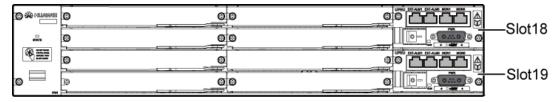


Table 5-35 describes the ports on the UPEU.

Table 5-35 Ports

Slot	Silkscree n	Connecto r Type	Quantity	Remarks
Slot 19	+24V or – 48V	3V3 connector	1	+24 V DC or –48 V DC power input
	EXT- ALM0	RJ45 connector	1	Port for Boolean signal inputs 0 to 3
	EXT- ALM1	RJ45 connector	1	Port for Boolean signal inputs 4 to 7
	MON0	RJ45 connector	1	Port for RS485 signal input 0
	MON1	RJ45 connector	1	Port for RS485 signal input 1
Slot 18	+24V or – 48V	3V3 connector	1	+24 V DC or –48 V DC power input
	EXT- ALM0	RJ45 connector	1	Port for Boolean signal inputs 0 to 3
	EXT- ALM1	RJ45 connector	1	Port for Boolean signal inputs 4 to 7
	MON0	RJ45 connector	1	Port for RS485 signal input 0
	MON1	RJ45 connector	1	Port for RS485 signal input 1

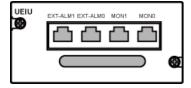
### **UEIU**

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

### **Panel**

Figure 5-28 shows the panel of the UEIU.

Figure 5-28 Panel of the UEIU



#### **Functions**

The UEIU performs the following functions:

- Provides two ports, each transmitting one RS485 signal.
- Provides two ports, each transmitting four Boolean signals.
- 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 5-36** describes the ports on the panel of the UEIU.

Table 5-36 Ports on the panel of the UEIU

Slot	Label	Connect or	Quanti ty	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

#### **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 5-37** describes the specifications of the UTRP.

**Table 5-37** Specifications of the UTRP

Board	Sub-board/Board Type	Port
UTRP2	UEOC	Two universal FE/GE optical port
UTRP3	UAEC	Ports for eight channels of ATM over E1/T1
UTRP4	UIEC	Ports for eight channels of IP over E1/T1

Board	Sub-board/Board Type	Port
UTRPb4	-	Ports for eight channels of TDM over E1/T1
UTRP6	UUAS	Port for one unchannelized STM-1/OC-3
UTRP9	UQEC	Four universal FE/GE electrical ports

### **Panels**

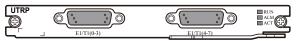
Figure 5-29 shows the panel of the UTRP2 supporting two optical ports.

Figure 5-29 Panel of the UTRP2 supporting two optical ports



Figure 5-30 shows the panel of the UTRP3, UTRP4, and UTRPb4 supporting eight E1s/T1s.

Figure 5-30 Panel of the UTRP3, UTRP4, and UTRPb4 supporting eight E1s/T1s



**Figure 5-31** shows the panel of the UTRP6 supporting one STM-1.

Figure 5-31 Panel of the UTRP6 supporting one STM-1



Figure 5-32 shows the panel of the UTRP9 supporting four electrical ports.

Figure 5-32 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 UTRP4 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 dualmode 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 5-38** describes the LEDs on the panel of the UTRP.

Table 5-38 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	ALM Red	ON or blinking rapidly	The board is reporting alarms.
		OFF	The board is running properly.

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

UTRP2 and UTRP9 provide two LEDs for indicating the status of the current link. **Table 5-39** describes the LEDs on the Ethernet ports of the UTRP2 and UTRP9.

Table 5-39 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	CT Orange		The link is receiving or transmitting data.
		OFF	The link is not receiving or transmitting data.

# **Ports**

Table 5-40 describes the ports of the UTRP2 supporting two optical ports.

Table 5-40 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 5-41** describes the ports on the UTRP3 and UTRP4 supporting eight E1s/T1s.

Table 5-41 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 5-42 describes the port of the UTRP6 supporting one STM-1.

Table 5-42 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 5-43 describes the ports of the UTRP9 supporting four electrical ports.

Table 5-43 Ports of the UTRP9 supporting four electrical ports

Label	Port Type	Quantity	Connector Type
FE/GE0 to FE/GE3	FE/GE electrical port	4	RJ-45 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 5-33** shows the DIP switch on the UTRP3 or UTRP4, **Figure 5-34** shows the DIP switch on the UTRPb4.

Figure 5-33 DIP switch on the UTRP3 or UTRP4



Figure 5-34 DIP switch on the UTRPb4



Table 5-44, Table 5-45, and Table 5-46 describe how to set the DIP switches on the UTRP.

Table 5-44 DIP switch SW1 on the UTRP

DIP	DIP Status				Description
Switch	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 5-45 DIP switch SW2 on the UTRP

DIP	DIP Status				Description
Switch	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 (balanced mode) by default. When the eight E1s are faulty, all the DIP bits of SW1 and SW2 should be set to ON to rectify faults. SW1 corresponds to E1s No.4 to No.7 and SW2 corresponds to E1s No.0 to No.3.

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

Table 5-46 DIP switch SW3 on the UTRP

# **USCU**

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

### **Panel**

There are two types of USCU: USCUb1 and USCUb2, as shown in **Figure 5-35** and **Figure 5-36**.

Figure 5-35 Panel of the USCUb1 (0.5 U)

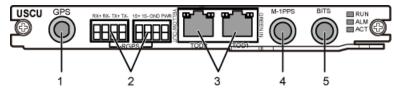
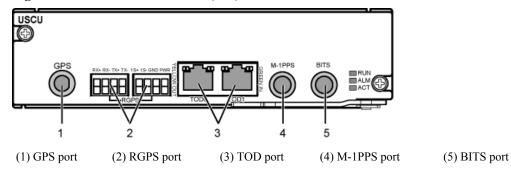


Figure 5-36 Panel of the USCUb2 (1 U)



# **Functions**

The USCU has the following functions:

- The USCU provides interface for an external RGPS device (such as a reused device of the operator), Metro 1000 device, BITS device, and TOD input.
- 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 5-47 and Table 5-48 describe the LEDs on the USCU.

Table 5-47 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.
		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 5-48 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 5-49 describes the ports on the USCU.

Table 5-49 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	RJ-45 connector	Receives or transmits 1PPS+TOD signals
TOD1 port	RJ-45 connector	Receives or transmits 1PPS+TOD signals, and receives TOD signals from the M1000
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

# **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 5-37 shows the panel of the UBRI.

Figure 5-37 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 5-50** describes the LEDs on the panel of the UBRI.

Table 5-50 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.
			The board works properly.
		0.125s ON, 0.125s OFF	The board is loading software.
ALM	M Red		The board is in the alarm status.
		OFF steady	No alarm is generated.
ACT Green	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 5-51** describes the CPRI link status LED.

Table 5-51 CPRI link status LED

Label	Color	State	Description
CPRIx	Red/Green	ON (green)	The CPRI link is available.

Label	Color	State	Description
		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 5-52** describes the ports on the panel of the UBRI.

Table 5-52 Ports on the panel of the UBRI

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

# **5.2 SLPU**

The signal lightning protection unit (SLPU), which can be optionally configured with the UFLP, UELP, or USLP2, provides the signal surge protection.

#### 5.2.1 Exterior of SLPU

The SLPU has a case structure, which requires a 19-inch wide and 1 U high space.

#### 5.2.2 Configuration of the SLPU

This section describes the configuration principles of the SPLU.

#### 5.2.3 UELP

Each Universal E1/T1 Lightning Protection Unit (UELP) provides surge protection for four paths of E1/T1 signals.

#### 5.2.4 UFLP

The universal FE/GE lightning protection (UFLP) board is a universal FE surge protection unit, each UFLP supports 2-way FE surge protection.

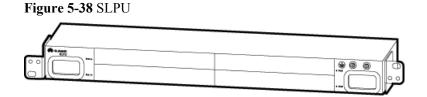
#### 5.2.5 USLP2

The Universal Signal Lightning Protection Unit Type 2 (USLP2) is a dry contact surge protection unit. It is optional and can be installed in the SLPU.

# **5.2.1** Exterior of SLPU

The SLPU has a case structure, which requires a 19-inch wide and 1 U high space.

Figure 5-38 shows the SLPU.



# 5.2.2 Configuration of the SLPU

This section describes the configuration principles of the SPLU.

# Slots of the SLPU

Figure 5-39 shows the slots of the SLPU.

Figure 5-39 Slots of the SLPU

Slot 0	Slot 2	
Slot 1	Slot 3	

# Configuration of the SLPU

When serving as a trunk signal protection unit, the SLPU is a mandatory component, and it is integrated with a UELP or UFLP and installed in the 1 U space in the upper part of the cabinet. **Table 5-53** lists the configuration principles of the SLPU.

Table 5-53 Configuration principles of the SLPU (1)

Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
UELP	Optional	4	Slots 0 to 3	The priorities of the slots in configuration are as follows in descending order: slot 2, slot 0, slot 1, and slot 3.

Board	Optional/ Mandatory	Maximum Quantity	Slot	Configuration Restriction
UFLP	Optional	1	Slot 3	If both the UELP and UFLP are configured, the UFLP is installed in a slot with a higher priority than the UELP.

When serving as a monitoring signal protection unit for not more than 16 dry contacts, the SLPU is an optional component, and it is integrated with two USLP2s and installed in the 1 U space at the bottom of the BBU. **Table 5-54** lists the configuration principles of the SLPU.

Table 5-54 Configuration principles of the SLPU (2)

Board	Optional/ Mandatory	Quantity	Slot	Configuration Restriction
USLP2	Optional	2	Slots 2 and 3	-

# **5.2.3 UELP**

Each Universal E1/T1 Lightning Protection Unit (UELP) provides surge protection for four paths of E1/T1 signals.

### **Panel**

Figure 5-40 shows the panel of the UELP.

Figure 5-40 UELP panel



### **Ports**

Table 5-55 lists the ports of the UELP.

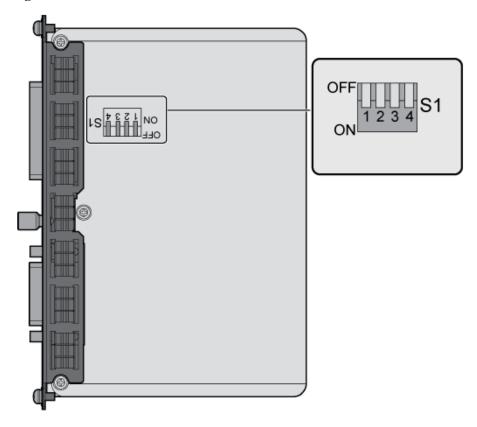
Table 5-55 Ports of the UELP

Label	Connector	Description
INSIDE	DB25 connector	Connected to the board for transmission in the base station
OUTSIDE	DB26 connector	Connected to the external transmission devices

# **DIP Switch**

The UELP has one DIP switch, which is used to determine whether the receiving end is grounded. The DIP switch has four DIP bits. **Figure 5-41** shows the DIP switch on the UELP.

Figure 5-41 DIP switch on the UELP



**Table 5-56** describes the DIP switch on the UELP.

Table 5-56 DIP switch on the UELP

DIP	Bit Status			Description	
Switch	1	2	3	4	
S1	OFF	OFF	OFF	OFF	Not grounded
	Other status			Grounded	

# ■ NOTE

The 75-ohm E1 cable can be either grounded or not grounded, whereas the 120-ohm E1 cable and the 100-ohm E1 cable cannot be grounded.

# 5.2.4 UFLP

The universal FE/GE lightning protection (UFLP) board is a universal FE surge protection unit, each UFLP supports 2-way FE surge protection.

### **Panel**

Figure 5-42 shows the panel of the UFLP.

Figure 5-42 Panel of the UFLP



### **Ports**

Table 5-57 describes the ports on the panel of the UFLP.

Table 5-57 Ports on the panel of the UFLP

Port Location	Label	Connector Type	Description
INSIDE side	FE0, FE1	RJ-45	Connected to the board for transmission in the base station
OUTSIDE side	FE0, FE1	RJ-45	Connected to the external transmission devices

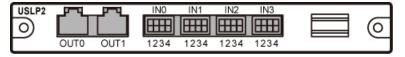
# 5.2.5 USLP2

The Universal Signal Lightning Protection Unit Type 2 (USLP2) is a dry contact surge protection unit. It is optional and can be installed in the SLPU.

### **Panel**

Figure 5-43 shows the panel of the USLP2.

Figure 5-43 Panel of the USLP2



#### **Port**

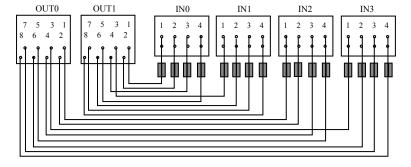
There are four input ports and two output ports on the USLP2. **Table 5-58** lists the ports on the panel of the USLP2.

Table 5-58 Ports on the panel of the USLP2

Label	Port Type	Quantity	Description
IN0, IN1, IN2, and IN3	4-pin	4	Input ports used to connect the customized alarm devices.
OUT0, OUT1	RJ45	2	Output ports used to connect the EXT-ALM port of the UEIU or UPEU in the cabinet.

**Figure 5-44** shows the mapping relationship between the pins in the input and output ports on the USLP2.

Figure 5-44 Mapping relationship between the pins in the input and output ports on the USLP2



**Table 5-59** lists the mapping relationship between the pins in the input and output ports on the USLP2.

Table 5-59 Mapping relationship between the pins in the input and output ports on the USLP2

Input		Output		
Label	Pin	Label	Pin	
IN0	IN0.1	OUT1	OUT1.1	
	IN0.2		OUT1.2	
	IN0.3		OUT1.4	
	IN0.4		OUT1.5	
IN1	IN1.1		OUT1.3	
	IN1.2		OUT1.6	
	IN1.3		OUT1.7	
	IN1.4		OUT1.8	
IN2	IN2.1	OUT0	OUT0.1	
	IN2.2		OUT0.2	
	IN2.3		OUT0.4	
	IN2.4		OUT0.5	
IN3	IN3.1		OUT0.3	
	IN3.2		OUT0.6	
	IN3.3		OUT0.7	
	IN3.4		OUT0.8	

For details about the application of the USLP2, see **5.2.2 Configuration of the SLPU**.

# **5.3 RFC**

The RFC components are the DCDU-01, fan box, RFU, ELU, and door status sensor.

#### 5.3.1 DCDU-01

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

#### 5.3.2 Fan Box

The fan box in the RFC consists of the fan subrack, fans, and CMUA.

#### 5.3.3 MRFU

A multi-mode radio frequency unit (MRFU) supports a maximum of six carriers.

#### 5.3.4 DRFU

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

#### 5.3.5 GRFU

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

#### 5.3.6 WRFU

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

#### 5.3.7 LRFU

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

#### 5.3.8 ELU

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

#### 5.3.9 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

#### 5.3.10 Temperature Sensor

The temperature sensor monitors temperature at the air inlet of the RFC in real time and reports related information to the CMUA.

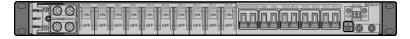
# 5.3.1 DCDU-01

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

### **Panel**

Figure 5-45 shows the panel of the DCDU-01.

Figure 5-45 Panel of the DCDU-01



## **Functions**

The DCDU-01 performs the following functions:

- Introduces -48 V DC input power
- Provides ten power outputs of -48 V DC as follows:
  - One 25 A output to the TMC11H through the SPARE2 port
  - Nine 12 A outputs for the BBU, fan box, and RFUs

#### M NOTE

The maximum output power of 25 A to the TMC11H is 800 W.

#### **Ports**

**Table 5-60** describes the ports on the panel of the DCDU-01.

Provides 10 outputs for the components such

Controls 10 outputs to components such as the

as the BBU, RFUs, and fan box

BBU, RFUs, and fan box

 Name
 Label
 Description

 Power input wiring terminal
 NEG(-)
 For low-level input

 For high-level input
 For high-level input

Table 5-60 Ports on the panel of the DCDU-01

SPARE2, SPARE1, BBU,

FAN, and RFU5 to RFU0

SPARE2, SPARE1, BBU,

FAN, and RFU5 to RFU0

# 5.3.2 Fan Box

The fan box in the RFC consists of the fan subrack, fans, and CMUA.

Figure 5-46 shows the fan box.

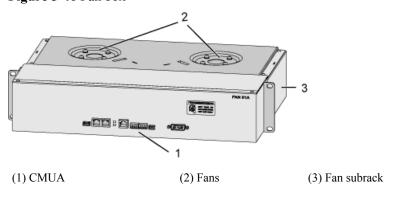
Figure 5-46 Fan box

Power

Power

switch

output port



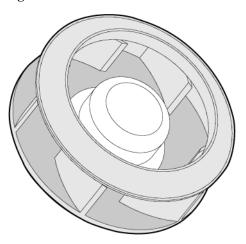
# Fan

The fan is installed in the fan box of the cabinet. It dissipates the heat for the cabinet.

### **Exterior**

Figure 5-47 shows a fan.

Figure 5-47 Fan



# **Technical Specifications**

Table 5-61 describes the technical specifications of the fan.

Table 5-61 Technical specifications of the fan

Item	Specification
Dimensions (Diameter x Height)	175 mm x 69 mm
Length of the lead  NOTE  The lead is delivered with the fan and is used for power input and monitoring.	450 mm
Definition of pins 1 to 4 of the lead	<ul> <li>Pin 1: red, connected to the positive pole of the power supply</li> <li>Pin 2: yellow, connected to the input of the speed-adjusting signals</li> <li>Pin 3: blue, connected to the output of the alarm or speed signals</li> <li>Pin 4: black, connected to the negative pole of the power supply</li> </ul>
	NOTE The colors of the cables of the fans vary according to the manufacturer.
Rated voltage	-48 V
Operating voltage range	-36 V to -57 V
Rated current	0.52 A
Maximum current	0.77 A
Rated power	24.96 W

Item	Specification
Maximum power	36.96 W
Rated speed	3100 r/min
Speed-adjusting mode	PWM mode

# **CMUA**

This section describes the central monitoring unit type A (CMUA).

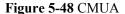
### **Functions**

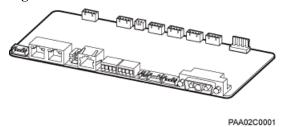
The CMUA has the following functions:

- Adjusts and controls temperature of the cabinet in different temperature control modes.
- Reserves a port for three Boolean inputs and detects Boolean alarms in the cabinet. The remote detection, however, is not supported.
- Provides a port for the RJ45 connector to enable electronic label and cabinet type detection.

# **Exterior**

Figure 5-48 shows a CMUA.





## **Ports**

Figure 5-49 shows the ports on the CMUA, and Table 5-62 describes the ports.

TEM/TEM\_BAT COM\_OUT COM\_IN ELU GATE IND IN1 IN2 SMOKE FAN\_EXT PAR

Figure 5-49 Ports on a CMUA (plan view)

PAA02C0002

Table 5-62 Ports on a CMUA

Silkscree n on the	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
● TEM (in the RFC) ● TEM_BAT (in the IBBS2 00D/IBBS2 00T)	<ul> <li>In the RFC: connects to the temperature sensor at the air inlet of the cabinet and receives temperature alarms.</li> <li>In the IBBS200D/ IBBS200T: connects to the storage battery temperature sensor in the IBBS200D/IBBS200T and receives storage battery temperature alarms.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory
COM_OU T	Communication port for lower-level cascading	-	-	-	-	-
	• Connecting to the PMU (in an APM30H)					
	<ul> <li>Connecting to the lower- level CMUA (in an RFC, TMC11H, IBBS200D, or IBBS200T)</li> </ul>					

Silkscree n on the	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
COM_IN	Communication port for upper-level cascading  Connecting to the BBU (in an APM30H)	-	-	-	-	-
	Connecting to the BBU or upper-level CMUA (in an RFC or TMC11H)					
	Connecting to the PMU or upper-level CMUA (in an IBBS200D or IBBS200T)					
ELU	Connects to the Electronic Label Unit (ELU) and receives ELU-related alarms.	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
GATE	Connects the door status sensor and receives door status alarms.	Reserv ed	Manda tory	Manda tory	Manda tory	Manda tory
IN0, IN1, IN2	Provides one Boolean input at each port.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
SMOKE	Connects to the smoke sensor and receives smoke alarms.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
FAN_EX T	Connects to the outer air circulation fan on the cabinet and receives alarms related to the outer air circulation fan.	Manda tory	Manda tory	Reserv ed	Reserv ed	Reserv ed
TEC cooler	Connects to the TEC cooler and receives alarms related to the TEC cooler.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Manda tory

Silkscree n on the	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
● FAN1 (in the APM3 0H, TMC1 1H, RFC, or IBBS2 00D)   ● FAN_EXT (in the IBBS2 00T)	<ul> <li>In the TMC11H or TMC11H: connects to the fan in the fan box.</li> <li>In the RFC or IBBS200D: connects to the fan on the right of the fan box.</li> <li>In the IBBS200T: connects to the outer air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Manda tory	Manda	Manda tory	Manda tory	Manda tory
• FAN2 (in the RFC and IBBS2 00D) • FAN_I NT (in the IBBS2 00T)	<ul> <li>In the RFC or IBBS200D: connects to the fan on the left of the fan box.</li> <li>In the IBBS200T: connects to the inner air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory
PWR	CMUA power port	-	-	-	-	-

# **□** NOTE

# **LED**

Table 5-63 describes the LEDs on the CMUA.

<sup>(1)</sup> Mandatory monitoring devices are installed in the cabinet before delivery, and related monitoring signal cables are connected before delivery. Optional devices are configured based on customer requirements, and related cables must be connected on site. For details about how to connect the cables, see *BTS3900A Installation Guide*.

<sup>(2)</sup> For details about the positions of devices monitored by the CMUA, see **2.2 Structure of the BTS3900A** Cabinet.

Table 5-63 LEDs

Label	Color	Status	Meaning
RUN	Green	Blinking (on for 1s and off for 1s)	The board is functional and communicates with the BBU properly.
		Blinking (on for 0.125s and off for 0.125s)	The board is functional, but fails to communicate with the BBUs. If the board does not communicate with the BBU for one minute, you can verify that communication fails.
		On or off	The board is faulty (when it is not in the power-on self-check status).
ALM	Red	Off	No alarm is generated.
		On	An alarm is generated, and the board must be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated. The alarm may be caused by the faults of related boards or ports. Therefore, you cannot determine whether to replace the board.

# **DIP Switches**

There are three DIP switches on the CMUA. They are SW1, SW2, and SW3, which are used to set the working mode of the CMUA according to the cabinet type. **Figure 5-50** shows the positions of the DIP switches on the CMUA.

SW3
2001
1000
SW2
2001
1000
SW2
2001
1000
SW1
2001
SW1

Figure 5-50 Positions of the DIP switches on the CMUA (plan view)

The DIP switches in different types of cabinet are set in different modes, as shown in **Figure 5-51**.

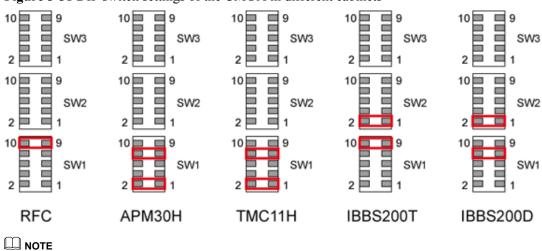


Figure 5-51 DIP switch settings of the CMUA in different cabinets

The red rectangles in Figure 5-51 show the positions for installing jumper caps.

# **5.3.3 MRFU**

A multi-mode radio frequency unit (MRFU) supports a maximum of six carriers.

### **Panel**

MRFUs include the MRFU V1, MRFU V2, and MRFU V2a. They are used in different frequency bands and distinguished from each other by the label on the panel, as shown in **Figure 5-52**.

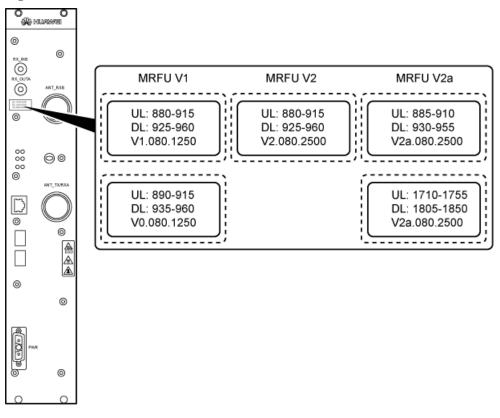


Figure 5-52 MRFU Panel

# **Function**

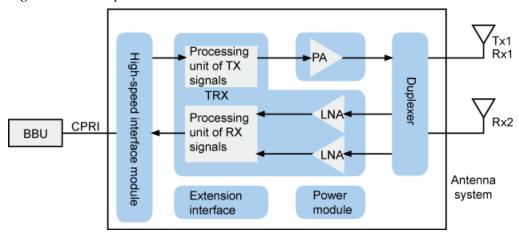
The functions of MRFU are as follows:

- 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 5-53** shows the principle of the MRFU.

Figure 5-53 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 5-64 describes the indicators on the MRFU.

**Table 5-64** Indicators on the MRFU

Indicato r	Color	Status	Description
RUN	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	Steady green	The CPRI link is available.
	green	Steady red	The optical module fails to receive signals.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link is out of lock.
		Off	The small form-factor pluggable (SFP) module is not properly installed, or the optical module is powered off.

Indicato r	Color	Status	Description
CPRI1	Red and	Steady green	The CPRI link is available.
	green	Steady red	The optical module fails to receive signals.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link is out of lock.
		Off	The SFP module is not properly installed, or the optical module is powered off.

# **Ports**

Table 5-65 describes the ports on the MRFU.

Table 5-65 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, or an upper-level MRFU during the cascading
	CPRI1	SFP female connector	Connects to the BBU, or an lower-level MRFU during the cascading
Interconnection port for	RX_INB	QMA female connector	Receives the diversity signals.
receiving RF signals	RX_OUTA	QMA female connector	Transmits the main signals.
Power supply port	PWR	3V3 power connector	Feeding -48 V DC power
Monitoring port	MON	RJ45 connector	Port for monitoring and maintenance

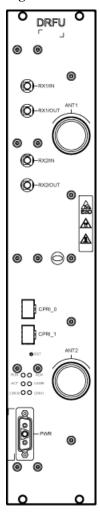
# 5.3.4 **DRFU**

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

### **Panel**

Figure 5-54 shows the DRFU panel.

Figure 5-54 DRFU panel



# **Function**

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

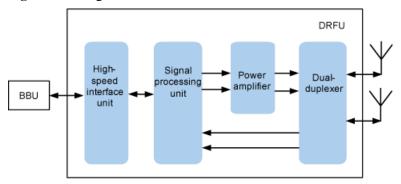
In addition, the DRFU provides the following functions:

- 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 5-55** shows the logical structure of the DRFU.

Figure 5-55 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 5-66** describes the status of the indicators on the DRFU.

Table 5-66 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.
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.

Indicator	Color	Status	Description
CPRI0	Red and	Steady green	The CPRI link is available.
	green	Steady red	The optical module fails to receive signals.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link is out of lock.
		Off	The small form-factor pluggable (SFP) module is not properly installed, or the optical module is powered off.
CPRI1	Red and	Steady green	The CPRI link is available.
	green	Steady red	The optical module fails to receive signals.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link is out of lock.
		Off	The SFP module is not properly installed, or the optical module is powered off.

# **Ports**

**Table 5-67** describes the ports on the DRFU.

Table 5-67 Ports on the DRFU

Port Type	Connector Type	Silkscreen on the Port	Description
Port for	DIN female	ANT1	Connects to the antenna system.
transceiving RF signals	connector	ANT2	
CPRI port	SFP female connector	CPRI0	Connects to a lower-level radio frequency unit (RFU) during the cascading.
		CPRI1	Connects to the BBU, or an upper-level RFU in the cascading mode.
Interconnecti on 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.

Port Type	Connector Type	Silkscreen on the Port	Description
		RX2/OUT	Transmits the diversity signals in the antenna channel 2.
Power supply port	3V3 power connector	PWR	Feeds in power.

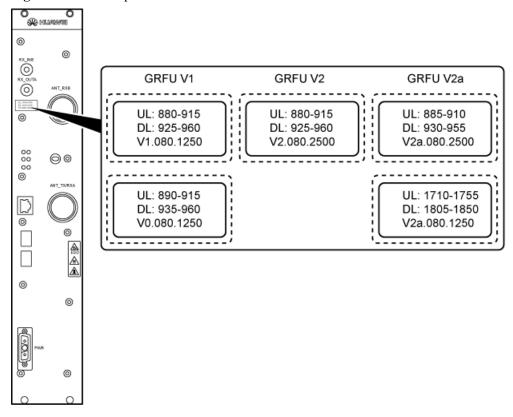
# 5.3.5 **GRFU**

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

# **Panel**

GRFUs include the GRFU V1, GRFU V2, and GRFU V2a. They are used in different frequency bands and distinguished by the label on the panel, as shown in **Figure 5-56**.

Figure 5-56 GRFU panel



### **Function**

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

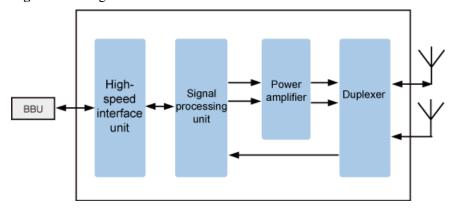
In addition, the GRFU has the following functions:

- 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 5-57** shows the logical structure of the GRFU.

Figure 5-57 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 5-68** describes the indicators on the GRFU panel.

Table 5-68 Indicators on the GRFU Panel

Indicato r	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.

Indicato r	Color	Status	Description
		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 optical module fails to receive signals.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link is out of lock.
		Off	The small form-factor pluggable (SFP) module is not properly installed, or the optical module is powered off.
CPRI1	Red and	Steady green	The CPRI link is available.
	green	Steady red	The optical module fails to receive signals.
		Blinking red (on for 0.1s and off for 0.1s)	The CPRI link is out of lock.
		Off	The SFP module is not properly installed, or the optical module is powered off.

# **Ports**

**Table 5-69** describes the ports on the GRFU panel.

Table 5-69 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.

Port Type	Silkscreen	Connector Type	Description
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	RX_INB	QMA female connector	Receives the diversity signals.
receiving RF 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.

# 5.3.6 WRFU

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

## **Panel**

Figure 5-58 shows the panel of the WRFU.

Figure 5-58 Panel of the WRFU



## **Functions**

The functions of the WRFU are as follows:

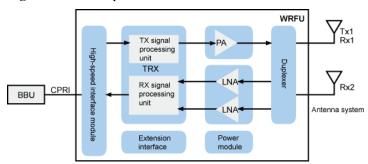
- Implements the direct frequency conversion technique in the transmit channel. The baseband signals are modulated to WCDMA RF signals. After being filtered and amplified or being combined, the RF signals are transmitted through the duplex filter to the antenna for radio transmission.
- Receives UL RF signals from the antenna system and then down-converts the received signals to IF signals. After amplification, analog-to-digital conversion, digital downconversion, 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 5-59** shows the principle of the WRFU.

Figure 5-59 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 5-70** describes the LEDs on the WRFU panel.

Table 5-70 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 5-71** describes the ports on the WRFU panel.

Table 5-71 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
Interconnectio	RX_INB	QMA female	Receives the diversity signals.
n port for RF RX signals	RX_OUTA	QMA female	Transmits the main signals.
Power supply socket	PWR	2V2 power	Feeding power
Commissionin g port	MON	RJ-45	Used for commissioning

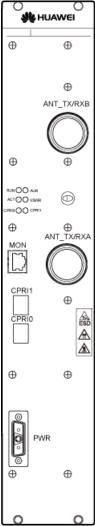
# 5.3.7 LRFU

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

## **Panel**

Figure 5-60 shows the panel of the LRFU.

Figure 5-60 Panel of the LRFU



# **Functions**

The LRFU processes uplink and downlink services and controls and monitors internal boards or modules. **Figure 5-61** shows the logical structure of the LRFU.

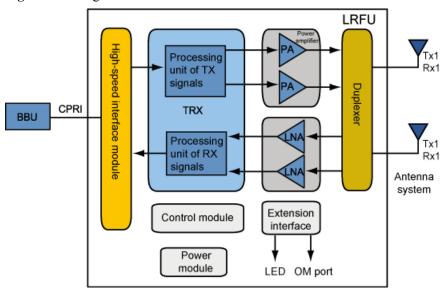


Figure 5-61 Logical structure of the LRFU

The uplink RX channels implement the following functions:

- Filters and amplifies two uplink signals and performs digital down-conversion, analog-todigital (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 5-72 describes the LEDs on the panel of the LRFU.

Table 5-72 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 (or the SFP 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.		

Label	Color	Status	Description
		On (red)	The reception of the optical module (or the SFP 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.

## **Port**

**Table 5-73** describes the ports on the panel of the LRFU.

**Table 5-73** Ports on the panel of the LRFU

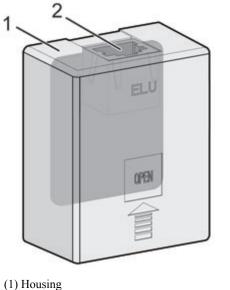
Label	Connector	Description
ANT_TX/RXB	DIN	TX/RX port for RF signals
ANT_TX/RXA	DIN	Used for the connection to the antenna system
CPRI0	SFP female connector	CPRI port Used for the connection to the BBU. CPRI0 port and CPRI1 port work in mutual backup mode.
CPRI1	SFP female connector	CPRI port Used for 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	RJ-45 connector	Monitoring port Port for monitoring and maintenance

# 5.3.8 ELU

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

The ELU is on the left inner side of the IBBS200D or IBBS200T or on the right inner side of the APM30H, TMC11H, or RFC. **Figure 5-62** shows the ELU.

Figure 5-62 ELU



(2) RJ-45 port

# 5.3.9 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

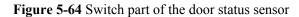
The door status sensor consists of the magnet part and switch part.

Figure 5-63 shows the magnet part of the door status sensor.

Figure 5-63 Magnet part of the door status sensor



Figure 5-64 shows the switch part of the door status sensor.







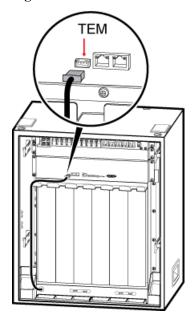
# 5.3.10 Temperature Sensor

The temperature sensor monitors temperature at the air inlet of the RFC in real time and reports related information to the CMUA.

## **Installation Position**

Figure 5-65 shows the position for installing the temperature sensor in the RFC.

Figure 5-65 Position for installing the temperature sensor in the RFC



# 5.4 APM30H Components

The components of the APM30H consist of the fan box, power equipment (AC/DC), core of the heat exchanger, junction box, Electronic Label Unit (ELU), heater, and Service Outlet Unit (SOU). The heater and the SOU are optional.

#### 5.4.1 Fan Box

The fan box consists of the fan subrack, fans, HPMI, and CMUA.

#### 5.4.2 Power Equipment (AC/DC)

The power equipment (AC/DC) converts 110 V AC or 220 V AC power into -48 V DC power.

### 5.4.3 Core of the Heat Exchanger

The core of the heat exchanger extends the area for the exchange of the air inside and outside the cabinet, speeding up the air circulation and effectively decreasing the working temperature of the cabinet. In addition, the core of the heat exchanger keeps the dust away from the cabinet.

#### 5.4.4 Junction Box

The junction box divides one AC input into four AC outputs. The AC outputs are used for the SOU and multiple heating films or heaters.

#### 545 ELLI

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

#### 5.4.6 Heater (Optional)

The heater provides proper operating temperature for the customer equipment working in the cabinet in low temperature. The heater is optional.

#### 5.4.7 SOU (Optional)

The Service Outlet Unit (SOU) feeds AC power to the customer equipment. The SOU is optional.

#### 5.4.8 Door Status Sensor

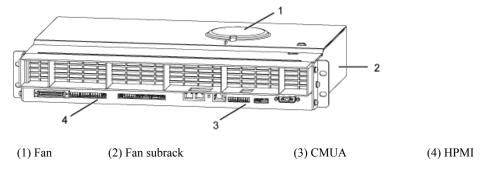
The door status sensor monitors the opening and closing of the front door of the cabinet.

## 5.4.1 Fan Box

The fan box consists of the fan subrack, fans, HPMI, and CMUA.

Figure 5-66 shows the fan box.

Figure 5-66 Fan Box



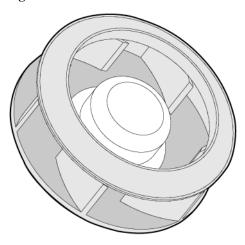
## Fan

The fan is installed in the fan box of the cabinet. It dissipates the heat for the cabinet.

## **Exterior**

Figure 5-67 shows a fan.

Figure 5-67 Fan



# **Technical Specifications**

Table 5-74 describes the technical specifications of the fan.

Table 5-74 Technical specifications of the fan

Item	Specification
Dimensions (Diameter x Height)	175 mm x 69 mm
Length of the lead  NOTE  The lead is delivered with the fan and is used for power input and monitoring.	450 mm

Item	Specification
Definition of pins 1 to 4 of the lead	Pin 1: red, connected to the positive pole of the power supply
	• Pin 2: yellow, connected to the input of the speed-adjusting signals
	• Pin 3: blue, connected to the output of the alarm or speed signals
	• Pin 4: black, connected to the negative pole of the power supply
	NOTE  The colors of the cables of the fans vary according to the manufacturer.
Rated voltage	-48 V
Operating voltage range	-36 V to -57 V
Rated current	0.52 A
Maximum current	0.77 A
Rated power	24.96 W
Maximum power	36.96 W
Rated speed	3100 r/min
Speed-adjusting mode	PWM mode

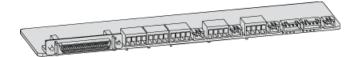
## **HPMI**

The Hert Power Monitoring Interface unit (HPMI) provides input and output ports for alarm signals.

## **Exterior**

Figure 5-68 shows an HPMI.

Figure 5-68 HPMI



## **Ports**

**Figure 5-69** shows the ports on the panel of an HPMI. **Table 5-75** lists the specifications of the ports.

Figure 5-69 Ports on the panel of an HPMI

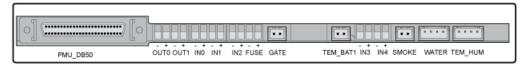


Table 5-75 Specifications of the ports on the panel of an HPMI

Silkscreen on the Port	Port Function	Port Relationship w Cabinet <sup>(1)</sup> (2)	vith the Related
		АРМ30Н	TMC11H
PMU_DB50	Connects to the PMU, and reports alarms collected by the HPMI to the BBU through the PMU.	-	-
OUT0, OUT1	Provides one Boolean output at each port.	Reserved	Reserved
IN0, IN1, IN2	Provides one Boolean input at each port.	Reserved	Reserved
FUSE	Reserved for fuse detection	-	-
GATE	Connects the door status sensor and receives door status alarms.	Mandatory	Reserved
IN3, IN4	Provides one Boolean input at each port.	Reserved	Reserved
TEM_BAT1	Connects to the storage battery temperature sensor in IBBS2.1 and IBBS2.2 and receives storage battery temperature alarms.	Optional	Reserved
SMOKE	Connects the smoke sensor and receives smoke alarms.	Reserved	Reserved

Silkscreen on the Port	Port Function	Port Relationship with the Related Cabinet <sup>(1)</sup> (2)		
		АРМ30Н	TMC11H	
WATER	Connects the water sensor and receives water damage alarms.	Reserved	Reserved	
TEM_HUM	Connects to the temperature and humidity sensor and receives temperature and humidity alarms.	Reserved	Reserved	

## ■ NOTE

- (1) Mandatory monitoring devices are installed in the cabinet before delivery, and related monitoring signal cables are connected before delivery. Optional devices are configured based on customer requirements, and related cables must be connected on site. For details about how to connect the cables, see *BTS3900A Installation Guide*.
- (2) For details about the positions of devices monitored by the HPMI, see **2.2 Structure of the BTS3900A Cabinet**.

## **CMUA**

This section describes the central monitoring unit type A (CMUA).

### **Functions**

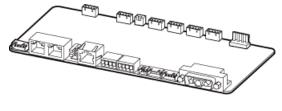
The CMUA has the following functions:

- Adjusts and controls temperature of the cabinet in different temperature control modes.
- Reserves a port for three Boolean inputs and detects Boolean alarms in the cabinet. The remote detection, however, is not supported.
- Provides a port for the RJ45 connector to enable electronic label and cabinet type detection.

#### **Exterior**

Figure 5-70 shows a CMUA.

Figure 5-70 CMUA

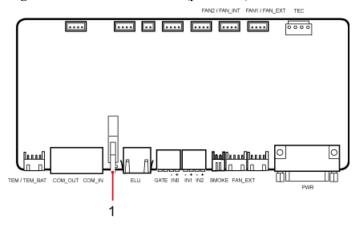


PAA02C0001

# **Ports**

Figure 5-71 shows the ports on the CMUA, and Table 5-76 describes the ports.

Figure 5-71 Ports on a CMUA (plan view)



PAA02C0002

Table 5-76 Ports on a CMUA

Silkscree n on the	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
● TEM (in the RFC) ● TEM_BAT (in the IBBS2 00D/IBBS2 00T)	<ul> <li>In the RFC: connects to the temperature sensor at the air inlet of the cabinet and receives temperature alarms.</li> <li>In the IBBS200D/IBBS200T: connects to the storage battery temperature sensor in the IBBS200D/IBBS200T and receives storage battery temperature alarms.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory

Silkscree n on the	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
COM_OU T	Communication port for lower-level cascading  Connecting to the PMU (in an APM30H)  Connecting to the lower-level CMUA (in an RFC, TMC11H, IBBS200D, or IBBS200T)	-	-	-	-	-
COM_IN	Communication port for upper-level cascading  Connecting to the BBU (in an APM30H)  Connecting to the BBU or upper-level CMUA (in an RFC or TMC11H)  Connecting to the PMU or upper-level CMUA (in an IBBS200D or IBBS200T)	-	-	-	-	-
ELU	Connects to the Electronic Label Unit (ELU) and receives ELU-related alarms.	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
GATE	Connects the door status sensor and receives door status alarms.	Reserv ed	Manda tory	Manda tory	Manda tory	Manda tory
IN0, IN1, IN2	Provides one Boolean input at each port.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
SMOKE	Connects to the smoke sensor and receives smoke alarms.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
FAN_EX T	Connects to the outer air circulation fan on the cabinet and receives alarms related to the outer air circulation fan.	Manda tory	Manda tory	Reserv ed	Reserv ed	Reserv
TEC cooler	Connects to the TEC cooler and receives alarms related to the TEC cooler.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Manda tory

Silkscree n on the	Port Function	Port Re Cabine		p with th	ne Relate	d
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
• FAN1 (in the APM3 OH, TMC1 1H, RFC, or IBBS2 O0D) • FAN_EXT (in the IBBS2 O0T)	<ul> <li>In the TMC11H or TMC11H: connects to the fan in the fan box.</li> <li>In the RFC or IBBS200D: connects to the fan on the right of the fan box.</li> <li>In the IBBS200T: connects to the outer air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Manda tory	Manda	Manda tory	Manda tory	Manda tory
• FAN2 (in the RFC and IBBS2 00D) • FAN_I NT (in the IBBS2 00T)	<ul> <li>In the RFC or IBBS200D: connects to the fan on the left of the fan box.</li> <li>In the IBBS200T: connects to the inner air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory
PWR	CMUA power port	-	-	-	-	-

## **◯** NOTE

## **LED**

Table 5-77 describes the LEDs on the CMUA.

<sup>(1)</sup> Mandatory monitoring devices are installed in the cabinet before delivery, and related monitoring signal cables are connected before delivery. Optional devices are configured based on customer requirements, and related cables must be connected on site. For details about how to connect the cables, see *BTS3900A Installation Guide*.

<sup>(2)</sup> For details about the positions of devices monitored by the CMUA, see **2.2 Structure of the BTS3900A** Cabinet.

Table 5-77 LEDs

Label	Color	Status	Meaning
RUN	Green	Blinking (on for 1s and off for 1s)	The board is functional and communicates with the BBU properly.
		Blinking (on for 0.125s and off for 0.125s)	The board is functional, but fails to communicate with the BBUs. If the board does not communicate with the BBU for one minute, you can verify that communication fails.
		On or off	The board is faulty (when it is not in the power-on self-check status).
ALM	Red	Off	No alarm is generated.
		On	An alarm is generated, and the board must be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated. The alarm may be caused by the faults of related boards or ports. Therefore, you cannot determine whether to replace the board.

## **DIP Switches**

There are three DIP switches on the CMUA. They are SW1, SW2, and SW3, which are used to set the working mode of the CMUA according to the cabinet type. **Figure 5-72** shows the positions of the DIP switches on the CMUA.

SW2

Figure 5-72 Positions of the DIP switches on the CMUA (plan view)

The DIP switches in different types of cabinet are set in different modes, as shown in **Figure 5-73**.

0000

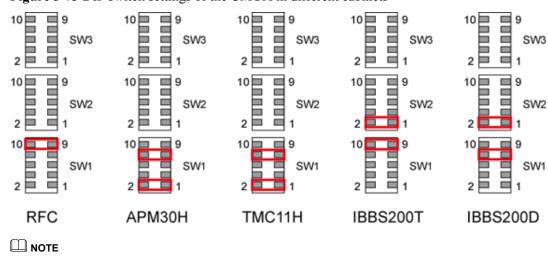


Figure 5-73 DIP switch settings of the CMUA in different cabinets

The red rectangles in Figure 5-73 show the positions for installing jumper caps.

# 5.4.2 Power Equipment (AC/DC)

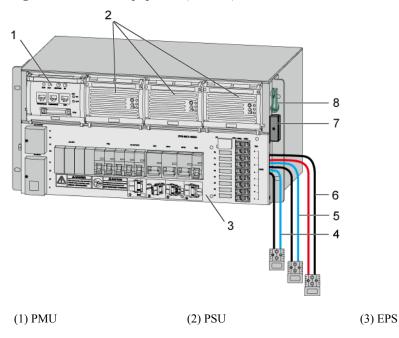
The power equipment (AC/DC) converts 110 V AC or 220 V AC power into -48 V DC power.

# Components of the Power Equipment (AC/DC)

The power equipment (AC/DC) consists of the PMU, PSU (AC/DC), and EPS.

Figure 5-74 shows the power equipment (AC/DC).

Figure 5-74 Power equipment (AC/DC)



- (4) Power output terminal of RFC1 (5) Power output terminal of RFC2 (6) Power supply terminal of storage batteries
- (7) Spare part box containing fuses (8) Extraction tool

**Table 5-78** describes the components of the power equipment (AC/DC).

**Table 5-78** Components of the power equipment (AC/DC)

Module	Description
EPS	For details, see EPS Subrack.
PMU	For details, see PMU.
PSU	For details, see <b>PSU (AC/DC)</b> .

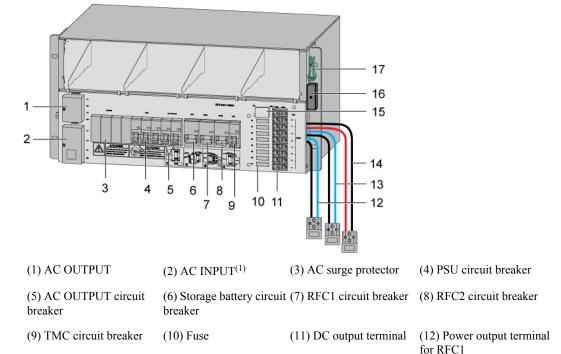
## **EPS Subrack**

There are two types of Embedded Power System (EPS) subracks, that is, the EPS subrack with 110 V AC input and EPS subrack with 220 V AC input.

### **Exterior**

The EPS subracks supplied with 110 V AC and 220 V AC power have the same exterior. **Figure** 5-75 uses an EPS subrack supplied with 110 V AC power as an example.

Figure 5-75 EPS subrack supplied with 110 V AC power



(13) Power output terminal (14) Output terminal for (15) Lithium battery for RFC2 the storage batteries control switch<sup>(2)</sup> containing fuses (17) Extraction tool - - - - - -

#### M NOTE

- (1) A short-circuiting bar is configured on the AC INPUT wiring terminals of the EPS subrack supplied with 220 V AC power. This enables the AC INPUT wiring terminals labeled L1, L2, and L3 to be connected for 220 V AC single-phase power input. If no short-circuiting bar is configured, the EPS subrack is used for 220 V AC three-phase power input.
- (2) The switch for controlling two types of battery does not need to be set. Before delivery, it is set to O:VRLA.

#### **Function**

The EPS provides AC power distribution and DC power distribution.

- The EPS performs the following AC power distribution functions:
  - Provides two AC outputs, one for the Service Outlet Unit (SOU) and the other for the
    junction box on the left of the cabinet. After the power distribution through the AC
    power distribution box, four AC outputs are supplied to the heater or heating film.
  - Reports the AC input surge protection alarms.
- Provides 12 DC outputs for the separated macro base station.

**Table 5-79** lists the DC power distribution functions of the EPS of the APM30H used for a separated macro base station.

**Table 5-79** DC power distribution functions of the EPS of the APM30H used for a separated macro base station

DC Power To	DC Output Terminal	Protection Componen t	Specificati on	Quantity	DC Output Terminal Type
RFC	-	Circuit breaker	80 A	2	Power series 120 connector (blue)
TMC	TMC		25 A	1	Easy power
FAN	LOAD0	Fuse	15 A	1	receptacle (pressfit
BBU	LOAD1 and LOAD2			2	type) connector
IBBS	LOAD3			1	
Transmissio n equipment	LOAD4 to LOAD7		5 A	4	

DC Power To	DC Output Terminal	Protection Componen t	Specificati on	Quantity	DC Output Terminal Type
Storage battery	-	Circuit breaker	100 A	1	Power series 120 connector (grey)

#### **PMU**

The Power Monitoring Unit (PMU) provides the functions of power system and storage battery management, power monitoring, and alarm reporting.

## **Functions**

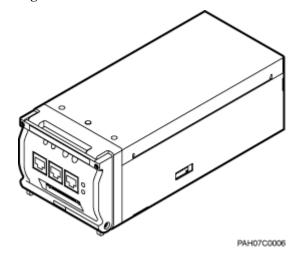
The PMU performs the following functions:

- Communicates with the BBU through an RS485 serial port.
- Manages the power system and charging and discharging the storage batteries.
- Checks and reports Boolean values of the door status sensor and standby sensor, and reports
  the analog values of the temperature and humidity, storage battery temperature, and standby
  analog value.
- Monitors power supply and reports alarms, including dry contact alarms.
- Communicates with the storage battery cabinet through an RS485 serial port.

## **Exterior**

Figure 5-76 shows the PMU.

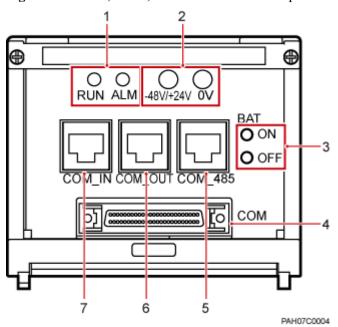
Figure 5-76 PMU



## **Ports and LEDs**

**Figure 5-77** shows the ports on the front panel of the PMU. **Figure 5-78** shows the rear panel of the PMU.

Figure 5-77 Ports, LEDs, and Switch on the front panel of a PMU

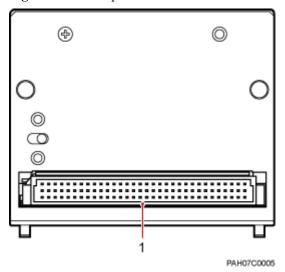


- (1) COM\_IN port
- (2) LEDs
- (3) COM\_OUT port
- (4) Power test ports
- (5) COM\_485 port
- (6) Storage battery control switch

(7) COM port

-

Figure 5-78 Rear panel of a PMU



(1) Port on the rear panel

**Table 5-80** lists the ports of the PMU.

Table 5-80 Ports and switch on a PMU

Port/Switch	Description	
COM_IN	Connects to the BBU or upper-level device and reports alarms to the BBU	
COM_OUT	Connects to lower-level devices such as the EMUA and collects alarms from lower-level devices	
COM_485	Connects to the CMUA in the IBBS200D/IBBS200T and collects alarms from the storage battery cabinet	
COM	Connects to the HPMI and collects alarms from the HPMI	
Storage battery control switch	Powers on and powers off storage batteries through the ON and OFF ports	
	• Insert a round bar into the ON port and hold it for 5s to 10s. When you hear a click, you can verify that the storage batteries are connected and the power-on operation is successful.	
	• Insert a round bar into the OFF port and hold it for 5s to 10s. When you hear a click, you can verify that the storage batteries are disconnected and the power-off operation is successful.	

Table 5-81 lists the LEDs on the panel of a PMU.

Table 5-81 LEDs on the panel of a PMU

Label	Color	Status	Meaning
RUN	Green	Blinking (on for 1s and off for 1s)	The PMU is functional and communicating with the BBU properly.
		Blinking (on for 0.125s and off for 0.125s)	The PMU is functional, but fails to communicate with the BBU. If the PMU does not communicate with the BBU for one minute, you can verify that communication fails.
		On or off	The PMU is faulty (when it is not in the power-on self-check status).
ALM	Red	On	The base station reports at least one of the following alarms:
			Mains failure alarm (including mains phase loss)
			Mains power overvoltage or undervoltage alarm
			Busbar overvoltage or undervoltage alarm
			Charging overcurrent
			Battery power-off alarm
			Battery group circuit failure alarm
			Environmental temperature alarm
			Ambient humidity alarm
			PSU alarm
			Load power-off
		Off	No alarm is generated.

### **□** NOTE

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

## **DIP Switch**

The DIP switch is located on the right of the PMU. The DIP switch has eight bits, where the four least significant bits (1, 2, 3, and 4) define the monitoring address of the PMU, and the four most significant bits (5, 6, 7, and 8) are not defined and are reserved for future use.

ON indicates the value 1, and OFF indicates the value 0. The default monitoring address of the PMU is set to 3 before delivery, as shown in **Figure 5-79**.

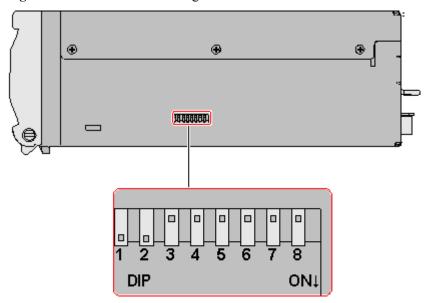


Figure 5-79 DIP switch on the right of a PMU

#### M NOTE

When two PMUs share the same RS485 bus in the case that two or more APM30Hs are configured in a base station, the monitoring address of the second PMU is set to 4.

# PSU (AC/DC)

The Power Supply Unit (PSU) converts 110 V AC or 220 V AC power into -48 V DC power.

#### **Functions**

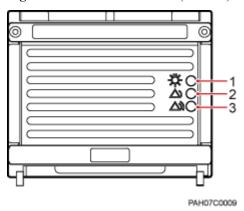
The PSU (AC/DC) implements the following functions:

- Converts 110 V AC or 220 V AC into -48 V DC power
- Monitors the alarms related to module faults (such as output overvoltage, no output, and fan faults), alarms related to module protection (such as overtemperature protection and input overvoltage/undervoltage protection), and module not-in-position alarm

## **Panel**

Figure 5-80 shows the panel of the PSU (AC/DC).

Figure 5-80 Panel of the PSU (AC/DC)



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

## **LEDs**

Table 5-82 describes the LEDs on the panel of the PSU (AC/DC).

Table 5-82 LEDs on the panel of the PSU (AC/DC)

Label	Color	Status	Description	
Power LED	Green	On	The PSU is normal.	
		Off	There are faults (such as no AC input, or overvoltage and undervoltage of AC input) related to the mains, or the PSU has no output.	
Protection LED	Yellow	Off	The PSU is normal.	
		On	Temperature pre- warning	
Fault LED	Red	Off	The PSU is normal, or the PSU has no output because of the faults (such as no AC input, or overvoltage and undervoltage of AC input) related to the mains.	

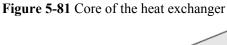
Label	Color	Status	Description
		On	The PSU has no output because of output overvoltage shutdown, fan fault, overtemperature shutdown, remote shutdown, or internal problems of the PSU.

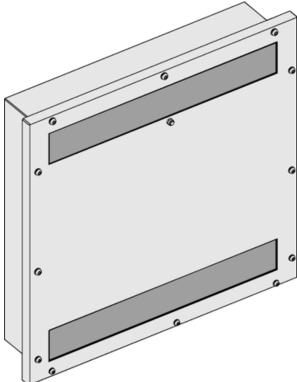
# 5.4.3 Core of the Heat Exchanger

The core of the heat exchanger extends the area for the exchange of the air inside and outside the cabinet, speeding up the air circulation and effectively decreasing the working temperature of the cabinet. In addition, the core of the heat exchanger keeps the dust away from the cabinet.

## **Exterior**

The core of the heat exchanger is positioned on the inner side of the front door of the APM30H cabinet. **Figure 5-81** shows the core of the heat exchanger.





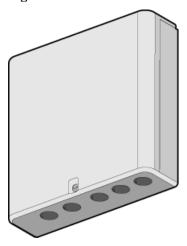
# 5.4.4 Junction Box

The junction box divides one AC input into four AC outputs. The AC outputs are used for the SOU and multiple heating films or heaters.

## **Exterior**

The junction box is on the left inner side of the APM30H. Figure 5-82 shows the junction box.

Figure 5-82 Junction box



## Structure

Figure 5-83 shows the structure of the junction box.

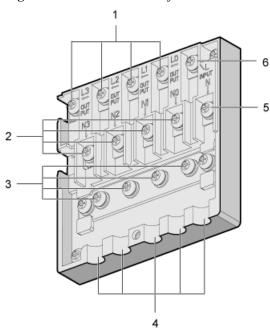


Figure 5-83 Structure of the junction box

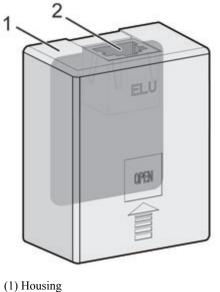
- outputs
- outputs
- (1) L wiring terminals for four AC (2) N wiring terminals for four AC (3) PE wiring terminals for four AC outputs
- (4) Cable holes
- (5) N wiring terminals for the AC input
- (6) L wiring terminal for the AC input

# 5.4.5 ELU

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

The ELU is on the left inner side of the IBBS200D or IBBS200T or on the right inner side of the APM30H, TMC11H, or RFC. Figure 5-84 shows the ELU.

Figure 5-84 ELU



(2) RJ-45 port

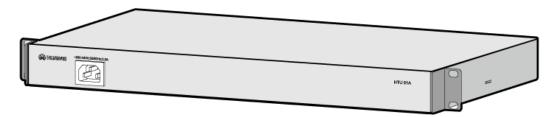
# 5.4.6 Heater (Optional)

The heater provides proper operating temperature for the customer equipment working in the cabinet in low temperature. The heater is optional.

### **Exterior**

The heater is 1 U high. Figure 5-85 shows the heater.

Figure 5-85 Heater



## **Technical Specifications**

The technical specifications of the heater are as follows:

- When the temperature in the cabinet is lower than +1°C (with ±6°C offset considered), the heater starts working. When the temperature in the cabinet is higher than +15°C (with ±3°C offset considered), the heater stops working.
- The rated heating power of the heater is 330 W.

# 5.4.7 SOU (Optional)

The Service Outlet Unit (SOU) feeds AC power to the customer equipment. The SOU is optional.

# **Technical Specifications**

Table 5-83 describes the technical specifications of the SOU.

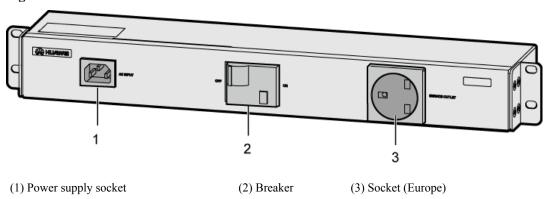
Table 5-83 Technical specifications of the SOU

Item	Specification
Dimensions (W x D x H)	482.6 mm x 91 mm x 55 mm
Weight	1.5 kg
Input voltage range	200 V AC to 240 V AC
Maximum input current	10 A
Output voltage range	200 V AC to 240 V AC
Maximum output current	10 A
Operating frequency	50 Hz or 60 Hz
Operating temperature	-40°C to + 55°C
Altitude	4,000 m     NOTE     Above the altitude of 3,000 m, the maximum operating temperature decreases by 1°C each time the altitude increases by 100 m.
Protection class	IP20

# **Exterior**

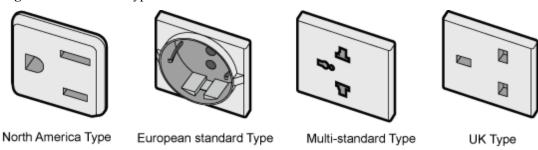
Figure 5-86 shows the SOU.

Figure 5-86 SOU



The SOU can be used for different types of sockets in different countries. The types of sockets that are supported are: North America, European standard, multi-standard, and UK types. **Figure 5-87** shows the different types of sockets.

Figure 5-87 Different types of sockets



## 5.4.8 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

The door status sensor consists of the magnet part and switch part.

Figure 5-88 shows the magnet part of the door status sensor.

Figure 5-88 Magnet part of the door status sensor



Figure 5-89 shows the switch part of the door status sensor.

Figure 5-89 Switch part of the door status sensor





# 5.5 IBBS200T Components

The components of the IBBS200T consist of the TEC cooler, power distribution box, CMUA, and storage batteries.

#### 5.5.1 TEC Cooler

The TEC cooler is installed in the TEC cooler hood on the front door of the cabinet. The TEC cooler consists of the TEC module, inner air circulation fan, outer air circulation fan, cooling fin, and monitoring board.

#### 5.5.2 Power Distribution Box

The power distribution box (PDB) is installed at the upper right of the cabinet, implementing conversion and distribution of power supply to the TEC cooler or fan box and to the storage batteries.

#### 5.5.3 CMUA

This section describes the central monitoring unit type A (CMUA).

#### 5.5.4 Storage Battery

This section provides the exterior of storage batteries and describes technical specifications and configuration of storage batteries.

#### 5.5.5 ELU

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

#### 5.5.6 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

#### 5.5.7 Temperature Sensor for the Storage Batteries

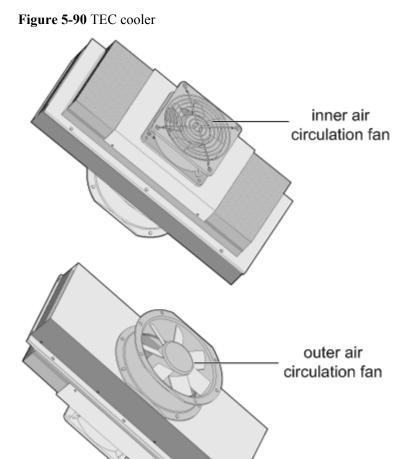
The temperature sensor for the storage batteries monitors the temperature in the storage battery cabinet in real time and reports the information to the CMUA.

### 5.5.1 TEC Cooler

The TEC cooler is installed in the TEC cooler hood on the front door of the cabinet. The TEC cooler consists of the TEC module, inner air circulation fan, outer air circulation fan, cooling fin, and monitoring board.

#### **Exterior**

Figure 5-90 shows the TEC cooler.



### **Functions**

The TEC cooler implements the following functions:

- The TEC cooler obtains -48 V DC power from the EPS of the APM30H.
- When the ambient temperature is 50°C without solar radiation and the storage battery is in the float charging state, the temperature in the cabinet is not greater than 40°C. If the storage battery is in the boost charging state, the temperature is not greater than 45°C.

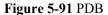
- When the ambient temperature is 50°C with solar radiation of 1120 W/m² and the storage battery is in the float charging state, the temperature in the cabinet is not greater than 45°C. If the storage battery is in the boost charging state, the temperature is not greater than 50°C.
- When the ambient temperature is 32°C and there is no temperature difference between the air inlets at the hot and cold sides of the TEC cooler, the refrigeration power of the TEC cooler is not less than 190 W ( $\pm 10\%$ ), and the COP is not less than 0.5.

# 5.5.2 Power Distribution Box

The power distribution box (PDB) is installed at the upper right of the cabinet, implementing conversion and distribution of power supply to the TEC cooler or fan box and to the storage batteries.

#### **Exterior**

Figure 5-91 shows a PDB.



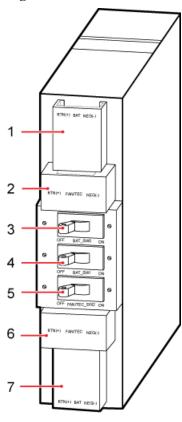


Table 5-84 Wiring terminals and switches on the panel of the PDB

SN	Wiring Term	inal/Switch	Description
(1)	BAT	RTN(+) NEG(-)	Wiring terminals in the upper PDB for connecting to the input power cable for the storage batteries
(2)	FAN/TEC	RTN(+) NEG(-)	Wiring terminals in the upper PDB for connecting to the input power cable for the fan box or TEC cooler
(3)	BAT_SW0	ON OFF	Circuit breaker for powering on or off the storage battery pack in the upper cabinet
(4)	BAT_SW1	ON OFF	Circuit breaker for powering on or off the storage battery pack in the lower cabinet
(5)	FAN/ TEC_SW2	ON OFF	Circuit breaker for powering on or off the fan box in the IBBS200D or the TEC cooler in the IBBS200T
(6)	FAN/TEC	RTN(+) NEG(-)	Wiring terminals in the lower PDB for connecting to the input power cable for the fan box or TEC cooler
(7)	BAT	RTN(+) NEG(-)	Wiring terminals in the lower PDB for connecting to the input power cable for the storage batteries

#### **Ⅲ** NOTE

The input power cables for the storage batteries and for the fan box or TEC cooler can be connected to the ports in the upper or lower PDB as required. The cables are connected to the ports in the lower PDB by default.

### **External Structure**

Figure 5-92 shows the external structure of a PDB.

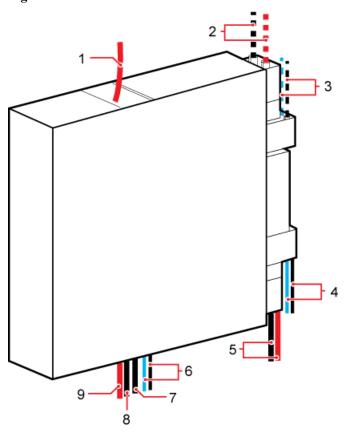


Figure 5-92 External structure of a PDB

CIA01C1001

- (1) RTN(+) power cable for the storage battery pack in (2) Input power cable for the storage batteries, which is the upper cabinet connected to the ports in the upper PDB
- (3) Input power cable for the fan box or TEC cooler, which is connected to the ports in the upper PDB
  - (4) Input power cable for the fan box or TEC cooler, which is connected to the ports in the lower PDB
- (5) Input power cable for the storage batteries, which is (6) Power transfer cables for the fan box or TEC cooler connected to the ports in the lower PDB
- (7) -48 V power cable for the storage battery pack in (8) -48V power cable for the storage battery pack in the the lower cabinet
  - upper cabinet
- (9) RTN(+) power cable for the storage battery pack in the lower cabinet

# 5.5.3 CMUA

This section describes the central monitoring unit type A (CMUA).

#### **Functions**

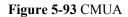
The CMUA has the following functions:

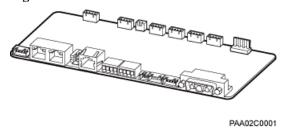
Adjusts and controls temperature of the cabinet in different temperature control modes.

- Reserves a port for three Boolean inputs and detects Boolean alarms in the cabinet. The remote detection, however, is not supported.
- Provides a port for the RJ45 connector to enable electronic label and cabinet type detection.

#### **Exterior**

Figure 5-93 shows a CMUA.

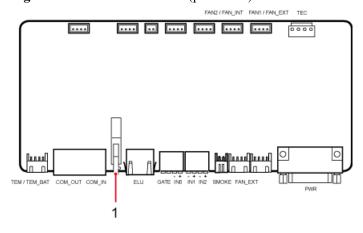




#### **Ports**

Figure 5-94 shows the ports on the CMUA, and Table 5-85 describes the ports.

Figure 5-94 Ports on a CMUA (plan view)



PAA02C0002

Table 5-85 Ports on a CMUA

Silkscree n on the	Port Function	Port Re		p with th	ne Relate	d
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
• TEM (in the RFC) • TEM_BAT (in the IBBS2 00D/IBBS2 00T)	<ul> <li>In the RFC: connects to the temperature sensor at the air inlet of the cabinet and receives temperature alarms.</li> <li>In the IBBS200D/ IBBS200T: connects to the storage battery temperature sensor in the IBBS200D/IBBS200T and receives storage battery temperature alarms.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory
COM_OU T	Communication port for lower-level cascading  Connecting to the PMU (in an APM30H)  Connecting to the lower-level CMUA (in an RFC, TMC11H, IBBS200D, or IBBS200T)	-	-	-	-	-
COM_IN	Communication port for upper-level cascading  Connecting to the BBU (in an APM30H)  Connecting to the BBU or upper-level CMUA (in an RFC or TMC11H)  Connecting to the PMU or upper-level CMUA (in an IBBS200D or IBBS200T)	-	-	-	-	-
ELU	Connects to the Electronic Label Unit (ELU) and receives ELU-related alarms.	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
GATE	Connects the door status sensor and receives door status alarms.	Reserv ed	Manda tory	Manda tory	Manda tory	Manda tory
IN0, IN1, IN2	Provides one Boolean input at each port.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed

Silkscree n on the	Port Function	Port Re		p with th	ne Relate	d
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
SMOKE	Connects to the smoke sensor and receives smoke alarms.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
FAN_EX T	Connects to the outer air circulation fan on the cabinet and receives alarms related to the outer air circulation fan.	Manda tory	Manda tory	Reserv ed	Reserv ed	Reserv ed
TEC cooler	Connects to the TEC cooler and receives alarms related to the TEC cooler.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Manda tory
• FAN1 (in the APM3 OH, TMC1 1H, RFC, or IBBS2 O0D) • FAN_EXT (in the IBBS2 O0T)	<ul> <li>In the TMC11H or TMC11H: connects to the fan in the fan box.</li> <li>In the RFC or IBBS200D: connects to the fan on the right of the fan box.</li> <li>In the IBBS200T: connects to the outer air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
• FAN2 (in the RFC and IBBS2 00D) • FAN_I NT (in the IBBS2 00T)	<ul> <li>In the RFC or IBBS200D: connects to the fan on the left of the fan box.</li> <li>In the IBBS200T: connects to the inner air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Reserv	Reserv ed	Manda tory	Manda tory	Manda tory
PWR	CMUA power port	-	_	_	-	-

#### ■ NOTE

- (1) Mandatory monitoring devices are installed in the cabinet before delivery, and related monitoring signal cables are connected before delivery. Optional devices are configured based on customer requirements, and related cables must be connected on site. For details about how to connect the cables, see *BTS3900A Installation Guide*.
- (2) For details about the positions of devices monitored by the CMUA, see **2.2 Structure of the BTS3900A Cabinet**.

#### **LED**

Table 5-86 describes the LEDs on the CMUA.

Table 5-86 LEDs

Label	Color	Status	Meaning
RUN	Green	Blinking (on for 1s and off for 1s)	The board is functional and communicates with the BBU properly.
		Blinking (on for 0.125s and off for 0.125s)	The board is functional, but fails to communicate with the BBUs. If the board does not communicate with the BBU for one minute, you can verify that communication fails.
		On or off	The board is faulty (when it is not in the power-on self-check status).
ALM	Red	Off	No alarm is generated.
		On	An alarm is generated, and the board must be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated. The alarm may be caused by the faults of related boards or ports. Therefore, you cannot determine whether to replace the board.

#### **DIP Switches**

There are three DIP switches on the CMUA. They are SW1, SW2, and SW3, which are used to set the working mode of the CMUA according to the cabinet type. **Figure 5-95** shows the positions of the DIP switches on the CMUA.

8888 0 0 (3) 0 SW3 SW2 10 9 SW1 (0)0000 0000 0000 0000 0000

Figure 5-95 Positions of the DIP switches on the CMUA (plan view)

The DIP switches in different types of cabinet are set in different modes, as shown in **Figure 5-96**.

10 9 9 10 🗐 **9** 10 10 🗐 10 🗐 9 Е SW3 SW3 SW3 SW3 SW3 2 🗎 2 🗎 1 **=** 1 2 = 1 10 9 9 9 **9** 10 🗐 **9** 10 10 🗐 10 🖃 SW2 SW2 SW2 SW2 SW2 2 🗐 9 **=** 9 **9** 10 🔳 10 🗐 10 ■ 9 10 🛅 2 SW<sub>1</sub> SW<sub>1</sub> SW<sub>1</sub> SW1 SW<sub>1</sub> 2 🗐 **=** 1 1 **RFC** APM30H TMC11H IBBS200T IBBS200D

Figure 5-96 DIP switch settings of the CMUA in different cabinets

The red rectangles in Figure 5-96 show the positions for installing jumper caps.

# 5.5.4 Storage Battery

This section provides the exterior of storage batteries and describes technical specifications and configuration of storage batteries.

#### NOTE

NOTE

The exterior and technical specifications of the storage battery may vary according to manufacturer. The following description is based on common 12 V 92 Ah storage batteries.

#### **Exterior**

Figure 5-97 shows the exterior of the 12 V 92 Ah storage battery.

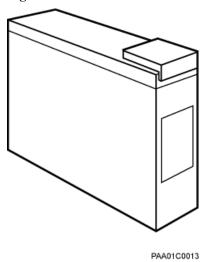


Figure 5-97 Exterior of the 12 V 92 Ah storage battery

# **Technical Specifications**

Table 5-87 describes the technical specifications of the 12 V 92 Ah storage battery.

Table 5-87 Technical specifications of the 12 V 92 Ah storage battery

Туре	Dimensions (W x H x D)	Weight
12 V 92 Ah	105 mm x 287 mm x 390 mm	33.5 kg
	108 mm x 287 mm x 393 mm	35 kg

# Configuration

The cabinet supports two types of storage battery packs: 48 V 92 Ah and 48 V 184 Ah.

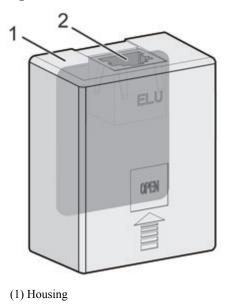
- The upper and lower 48 V 92 Ah storage battery packs can be connected in parallel to provide 48 V 184 Ah power.
- Each storage battery pack contains four single storage batteries.

# 5.5.5 ELU

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

The ELU is on the left inner side of the IBBS200D or IBBS200T or on the right inner side of the APM30H, TMC11H, or RFC. **Figure 5-98** shows the ELU.

Figure 5-98 ELU



(2) RJ-45 port

# 5.5.6 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

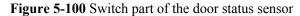
The door status sensor consists of the magnet part and switch part.

Figure 5-99 shows the magnet part of the door status sensor.

Figure 5-99 Magnet part of the door status sensor



Figure 5-100 shows the switch part of the door status sensor.





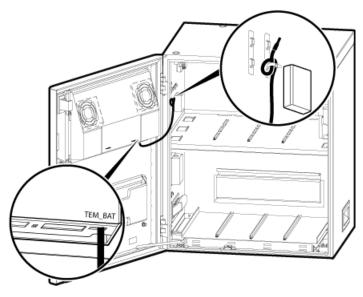
# **5.5.7** Temperature Sensor for the Storage Batteries

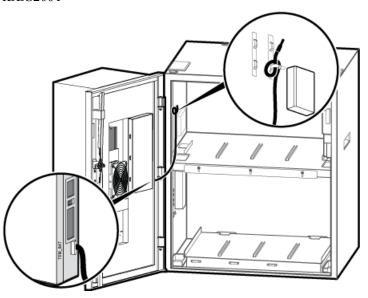
The temperature sensor for the storage batteries monitors the temperature in the storage battery cabinet in real time and reports the information to the CMUA.

#### **Installation Position**

**Figure 5-101** and **Figure 5-102** show the installation position of the temperature sensor for the storage batteries in the IBBS200D and IBBS200T.

**Figure 5-101** Installation position of the temperature sensor for the storage batteries in the IBBS200D





**Figure 5-102** Installation position of the temperature sensor for the storage batteries in the IBBS200T

# 5.6 IBBS200D Components

The components of the IBBS200D consist of the fans, fan box, CMUA, power distribution box, storage batteries, and heating film. The heating film is optional.

#### 5.6.1 Fan Box

The fan box is installed on the front door of the cabinet and houses the fans and CMUA.

#### 5.6.2 Power Distribution Box

The power distribution box (PDB) is installed at the upper right of the cabinet, implementing conversion and distribution of power supply to the TEC cooler or fan box and to the storage batteries.

#### 5.6.3 CMUA

This section describes the central monitoring unit type A (CMUA).

#### 5.6.4 Storage Battery

This section provides the exterior of storage batteries and describes technical specifications and configuration of storage batteries.

#### 5.6.5 Heating Film

This section describes the exterior, functions, and technical specifications of the heating film. The heating film is optional.

#### 5 6 6 ELU

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

#### 5.6.7 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

#### 5.6.8 Temperature Sensor for the Storage Batteries

The temperature sensor for the storage batteries monitors the temperature in the storage battery cabinet in real time and reports the information to the CMUA.

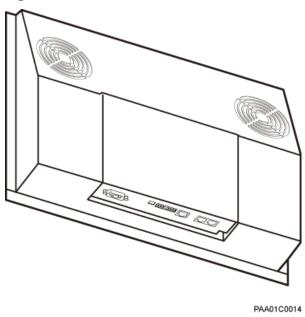
#### **5.6.1 Fan Box**

The fan box is installed on the front door of the cabinet and houses the fans and CMUA.

#### **Exterior**

Figure 5-103 shows the fan box.

Figure 5-103 Fan box



#### **Functions**

The fan box implements the following functions:

- The fans speed up the circulation of the air inside and outside the cabinet and keep the temperature in the cabinet in a normal range, ensuring optimum performance of the storage batteries.
- The CMUA collects the alarm signals from the components such as the door status sensor, temperature sensor of the storage battery, fan, and smoke sensor. Then, the monitoring unit transmits the alarm signals to the PMU through the RS485 signals.

### 5.6.2 Power Distribution Box

The power distribution box (PDB) is installed at the upper right of the cabinet, implementing conversion and distribution of power supply to the TEC cooler or fan box and to the storage batteries.

## **Exterior**

Figure 5-104 shows a PDB.

Figure 5-104 PDB

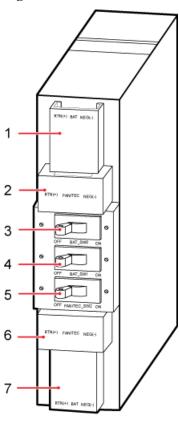


Table 5-88 Wiring terminals and switches on the panel of the PDB

PAA01C0012

SN	Wiring Terminal/Switch		Description
(1)	BAT	RTN(+) NEG(-)	Wiring terminals in the upper PDB for connecting to the input power cable for the storage batteries
(2)	FAN/TEC	RTN(+) NEG(-)	Wiring terminals in the upper PDB for connecting to the input power cable for the fan box or TEC cooler
(3)	BAT_SW0	ON OFF	Circuit breaker for powering on or off the storage battery pack in the upper cabinet
(4)	BAT_SW1	ON OFF	Circuit breaker for powering on or off the storage battery pack in the lower cabinet

SN	Wiring Terminal/Switch		Description
(5)	FAN/ TEC_SW2	ON OFF	Circuit breaker for powering on or off the fan box in the IBBS200D or the TEC cooler in the IBBS200T
(6)	FAN/TEC	RTN(+) NEG(-)	Wiring terminals in the lower PDB for connecting to the input power cable for the fan box or TEC cooler
(7)	BAT	RTN(+) NEG(-)	Wiring terminals in the lower PDB for connecting to the input power cable for the storage batteries

# ■ NOTE

The input power cables for the storage batteries and for the fan box or TEC cooler can be connected to the ports in the upper or lower PDB as required. The cables are connected to the ports in the lower PDB by default

### **External Structure**

Figure 5-105 shows the external structure of a PDB.

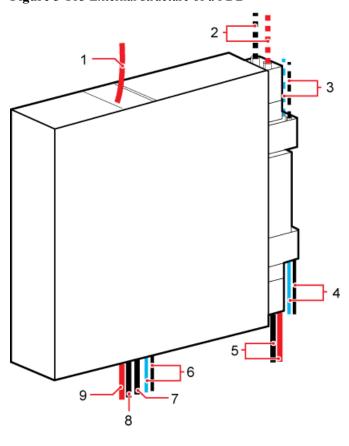


Figure 5-105 External structure of a PDB

CIA01C1001

- (1) RTN(+) power cable for the storage battery pack in (2) Input power cable for the storage batteries, which is the upper cabinet
  - connected to the ports in the upper PDB
- (3) Input power cable for the fan box or TEC cooler, which is connected to the ports in the upper PDB
  - (4) Input power cable for the fan box or TEC cooler, which is connected to the ports in the lower PDB
- (5) Input power cable for the storage batteries, which is (6) Power transfer cables for the fan box or TEC cooler connected to the ports in the lower PDB
- the lower cabinet
- (7) -48 V power cable for the storage battery pack in (8) -48V power cable for the storage battery pack in the upper cabinet
- (9) RTN(+) power cable for the storage battery pack in the lower cabinet

### 5.6.3 CMUA

This section describes the central monitoring unit type A (CMUA).

#### **Functions**

The CMUA has the following functions:

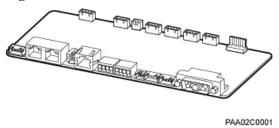
Adjusts and controls temperature of the cabinet in different temperature control modes.

- Reserves a port for three Boolean inputs and detects Boolean alarms in the cabinet. The remote detection, however, is not supported.
- Provides a port for the RJ45 connector to enable electronic label and cabinet type detection.

#### **Exterior**

Figure 5-106 shows a CMUA.

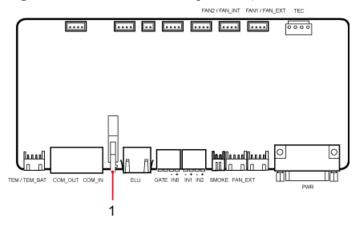
Figure 5-106 CMUA



#### **Ports**

Figure 5-107 shows the ports on the CMUA, and Table 5-89 describes the ports.

Figure 5-107 Ports on a CMUA (plan view)



PAA02C0002

Table 5-89 Ports on a CMUA

Silkscree n on the	Port Function	Port Re		p with th	ne Relate	d
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
• TEM (in the RFC) • TEM_BAT (in the IBBS2 00D/IBBS2 00T)	<ul> <li>In the RFC: connects to the temperature sensor at the air inlet of the cabinet and receives temperature alarms.</li> <li>In the IBBS200D/ IBBS200T: connects to the storage battery temperature sensor in the IBBS200D/IBBS200T and receives storage battery temperature alarms.</li> </ul>	Reserv	Reserv ed	Manda tory	Manda tory	Manda tory
COM_OU T	Communication port for lower-level cascading  Connecting to the PMU (in an APM30H)  Connecting to the lower-level CMUA (in an RFC, TMC11H, IBBS200D, or IBBS200T)	-	-	-	-	
COM_IN	Communication port for upper-level cascading  Connecting to the BBU (in an APM30H)  Connecting to the BBU or upper-level CMUA (in an RFC or TMC11H)  Connecting to the PMU or upper-level CMUA (in an IBBS200D or IBBS200T)	-	-	-	-	-
ELU	Connects to the Electronic Label Unit (ELU) and receives ELU-related alarms.	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
GATE	Connects the door status sensor and receives door status alarms.	Reserv ed	Manda tory	Manda tory	Manda tory	Manda tory
IN0, IN1, IN2	Provides one Boolean input at each port.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed

Silkscree n on the	Port Function	Port Re Cabine		p with th	ne Relate	d
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
SMOKE	Connects to the smoke sensor and receives smoke alarms.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
FAN_EX T	Connects to the outer air circulation fan on the cabinet and receives alarms related to the outer air circulation fan.	Manda tory	Manda tory	Reserv ed	Reserv ed	Reserv ed
TEC cooler	Connects to the TEC cooler and receives alarms related to the TEC cooler.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Manda tory
● FAN1 (in the APM3 0H, TMC1 1H, RFC, or IBBS2 00D) ● FAN_ EXT (in the IBBS2 00T)	<ul> <li>In the TMC11H or TMC11H: connects to the fan in the fan box.</li> <li>In the RFC or IBBS200D: connects to the fan on the right of the fan box.</li> <li>In the IBBS200T: connects to the outer air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
• FAN2 (in the RFC and IBBS2 00D) • FAN_I NT (in the IBBS2 00T)	<ul> <li>In the RFC or IBBS200D: connects to the fan on the left of the fan box.</li> <li>In the IBBS200T: connects to the inner air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory
PWR	CMUA power port	-	-	-	-	-

#### ■ NOTE

- (1) Mandatory monitoring devices are installed in the cabinet before delivery, and related monitoring signal cables are connected before delivery. Optional devices are configured based on customer requirements, and related cables must be connected on site. For details about how to connect the cables, see *BTS3900A Installation Guide*.
- (2) For details about the positions of devices monitored by the CMUA, see **2.2 Structure of the BTS3900A Cabinet**.

#### **LED**

Table 5-90 describes the LEDs on the CMUA.

Table 5-90 LEDs

Label	Color	Status	Meaning
RUN	Green	Blinking (on for 1s and off for 1s)	The board is functional and communicates with the BBU properly.
		Blinking (on for 0.125s and off for 0.125s)	The board is functional, but fails to communicate with the BBUs. If the board does not communicate with the BBU for one minute, you can verify that communication fails.
		On or off	The board is faulty (when it is not in the power-on self-check status).
ALM	Red	Off	No alarm is generated.
		On	An alarm is generated, and the board must be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated. The alarm may be caused by the faults of related boards or ports. Therefore, you cannot determine whether to replace the board.

#### **DIP Switches**

There are three DIP switches on the CMUA. They are SW1, SW2, and SW3, which are used to set the working mode of the CMUA according to the cabinet type. **Figure 5-108** shows the positions of the DIP switches on the CMUA.

 $\mathbb{Q}$ 8888 0 0 (3) 0 SW3 SW2 10 9 SW1 0 0000 0000 0000 0000 0000

Figure 5-108 Positions of the DIP switches on the CMUA (plan view)

The DIP switches in different types of cabinet are set in different modes, as shown in **Figure 5-109**.

10 9 10 🗐 **9** 10 10 🗐 9 10 🗀 9 Е SW3 SW3 SW3 SW3 SW3 2 🗎 2 🗏 1 **=** 1 1 2 10 9 9 10 🗐 **9** 10 10 🗐 ■ 9 10 🖃 9 SW2 SW2 SW2 SW2 SW2 2 🗐 **=** 9 **9** 10 \equiv 10 🗐 10 ■ 9 10 🛅 9 10 2 SW<sub>1</sub> SW<sub>1</sub> SW<sub>1</sub> SW1 SW<sub>1</sub>  $\equiv$ 2 🗐 **=** 1 1 1 APM30H **RFC** TMC11H IBBS200T IBBS200D NOTE

Figure 5-109 DIP switch settings of the CMUA in different cabinets

The red rectangles in Figure 5-109 show the positions for installing jumper caps.

# 5.6.4 Storage Battery

This section provides the exterior of storage batteries and describes technical specifications and configuration of storage batteries.

#### **□** NOTE

The exterior and technical specifications of the storage battery may vary according to manufacturer. The following description is based on common 12 V 92 Ah storage batteries.

#### **Exterior**

Figure 5-110 shows the exterior of the 12 V 92 Ah storage battery.

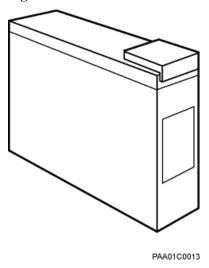


Figure 5-110 Exterior of the 12 V 92 Ah storage battery

# **Technical Specifications**

Table 5-91 describes the technical specifications of the 12 V 92 Ah storage battery.

Table 5-91 Technical specifications of the 12 V 92 Ah storage battery

Type	Dimensions (W x H x D)	Weight
12 V 92 Ah	105 mm x 287 mm x 390 mm	33.5 kg
	108 mm x 287 mm x 393 mm	35 kg

# Configuration

The cabinet supports two types of storage battery packs: 48 V 92 Ah and 48 V 184 Ah.

- The upper and lower 48 V 92 Ah storage battery packs can be connected in parallel to provide 48 V 184 Ah power.
- Each storage battery pack contains four single storage batteries.

# 5.6.5 Heating Film

This section describes the exterior, functions, and technical specifications of the heating film. The heating film is optional.

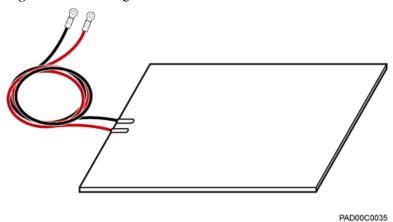
#### ■ NOTE

The IBBS200D has two heating films, which are installed on the upper and lower baffle plates.

#### **Exterior**

Figure 5-111 shows the heating film.

Figure 5-111 Heating film



#### **Functions**

The heating film ensures that the storage batteries are stored and function at the proper temperature when the ambient temperature is low. When the ambient temperature is lower than the normal working temperature of the storage battery, the battery capacity decreases. In this case, the heating film is required to guarantee the best performance of the storage batteries.

## **Technical Specifications**

The technical specifications of the heating film are as follows:

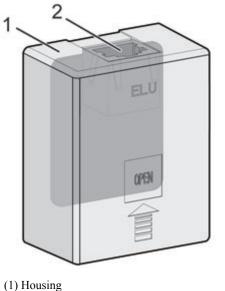
- The heating film works with the rated voltage of 220 V AC, and the rated heating power is 100 W.
- When the ambient temperature is lower than +1°C (with ±6°C offset considered), the heating film starts working; when the ambient temperature is higher than 15°C (with ±3°C offset considered), the heating film stops working.

### 5.6.6 ELU

The Electronic Label Unit (ELU) automatically reports the information about the cabinet type, facilitating fast troubleshooting.

The ELU is on the left inner side of the IBBS200D or IBBS200T or on the right inner side of the APM30H, TMC11H, or RFC. **Figure 5-112** shows the ELU.

Figure 5-112 ELU



(2) RJ-45 port

# 5.6.7 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

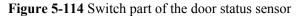
The door status sensor consists of the magnet part and switch part.

Figure 5-113 shows the magnet part of the door status sensor.

Figure 5-113 Magnet part of the door status sensor



Figure 5-114 shows the switch part of the door status sensor.





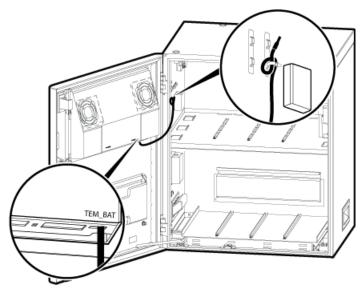
# **5.6.8 Temperature Sensor for the Storage Batteries**

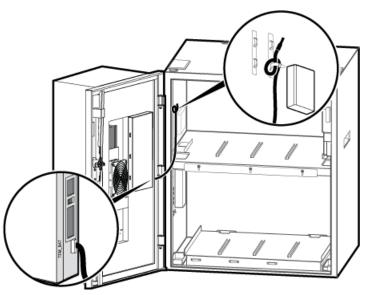
The temperature sensor for the storage batteries monitors the temperature in the storage battery cabinet in real time and reports the information to the CMUA.

#### **Installation Position**

**Figure 5-115** and **Figure 5-116** show the installation position of the temperature sensor for the storage batteries in the IBBS200D and IBBS200T.

**Figure 5-115** Installation position of the temperature sensor for the storage batteries in the IBBS200D





**Figure 5-116** Installation position of the temperature sensor for the storage batteries in the IBBS200T

# 5.7 TMC11H Components

The components of the TMC11H consist of the fan box, DCDU-03, and heater. The heater is optional.

#### 5.7.1 Fan Box

The fan box consists of the fan subrack, fans, HPMI, and CMUA.

#### 5.7.2 DCDU-03

The Direct Current Distribution Unit-03 (DCDU-03) supplies DC power to each component in the cabinet. The height of the DCDU-03 is 1 U. It can be classified into the DCDU-03B and DCDU-03C according to the configured MCBs and application scenarios. The two models have the same exterior and engineering specifications.

#### 5.7.3 Heater (Optional)

The heater provides proper operating temperature for the customer equipment working in the cabinet in low temperature. The heater is optional.

#### 5.7.4 Door Status Sensor

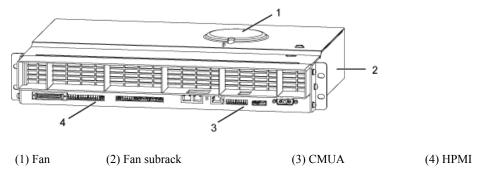
The door status sensor monitors the opening and closing of the front door of the cabinet.

### **5.7.1 Fan Box**

The fan box consists of the fan subrack, fans, HPMI, and CMUA.

Figure 5-117 shows the fan box.

Figure 5-117 Fan Box



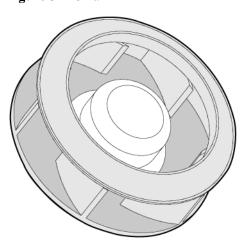
#### Fan

The fan is installed in the fan box of the cabinet. It dissipates the heat for the cabinet.

#### **Exterior**

Figure 5-118 shows a fan.

Figure 5-118 Fan



# **Technical Specifications**

Table 5-92 describes the technical specifications of the fan.

Table 5-92 Technical specifications of the fan

Item	Specification
Dimensions (Diameter x Height)	175 mm x 69 mm

Item	Specification
Length of the lead  NOTE  The lead is delivered with the fan and is used for power input and monitoring.	450 mm
Definition of pins 1 to 4 of the lead	<ul> <li>Pin 1: red, connected to the positive pole of the power supply</li> <li>Pin 2: yellow, connected to the input of the speed-adjusting signals</li> <li>Pin 3: blue, connected to the output of the alarm or speed signals</li> <li>Pin 4: black, connected to the negative pole of the power supply</li> <li>NOTE         The colors of the cables of the fans vary according to the manufacturer.     </li> </ul>
Rated voltage	-48 V
Operating voltage range	-36 V to -57 V
Rated current	0.52 A
Maximum current	0.77 A
Rated power	24.96 W
Maximum power	36.96 W
Rated speed	3100 r/min
Speed-adjusting mode	PWM mode

### **HPMI**

The Hert Power Monitoring Interface unit (HPMI) provides input and output ports for alarm signals.

## **Exterior**

Figure 5-119 shows an HPMI.

Figure 5-119 HPMI



### **Ports**

**Figure 5-120** shows the ports on the panel of an HPMI. **Table 5-93** lists the specifications of the ports.

Figure 5-120 Ports on the panel of an HPMI

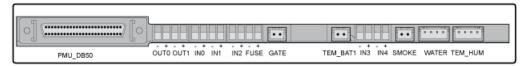


Table 5-93 Specifications of the ports on the panel of an HPMI

Silkscreen on the Port	Port Function	Port Relationship with the Related Cabinet <sup>(1)</sup> (2)	
		АРМ30Н	TMC11H
PMU_DB50	Connects to the PMU, and reports alarms collected by the HPMI to the BBU through the PMU.	-	-
OUT0, OUT1	Provides one Boolean output at each port.	Reserved	Reserved
IN0, IN1, IN2	Provides one Boolean input at each port.	Reserved	Reserved
FUSE	Reserved for fuse detection	-	-
GATE	Connects the door status sensor and receives door status alarms.	Mandatory	Reserved
IN3, IN4	Provides one Boolean input at each port.	Reserved	Reserved
TEM_BAT1	Connects to the storage battery temperature sensor in IBBS2.1 and IBBS2.2 and receives storage battery temperature alarms.	Optional	Reserved

Silkscreen on the Port	Port Function	Port Relationship with the Related Cabinet <sup>(1)</sup> (2)	
		АРМ30Н	TMC11H
SMOKE	Connects the smoke sensor and receives smoke alarms.	Reserved	Reserved
WATER	Connects the water sensor and receives water damage alarms.	Reserved	Reserved
TEM_HUM	Connects to the temperature and humidity sensor and receives temperature and humidity alarms.	Reserved	Reserved

## **◯** NOTE

- (1) Mandatory monitoring devices are installed in the cabinet before delivery, and related monitoring signal cables are connected before delivery. Optional devices are configured based on customer requirements, and related cables must be connected on site. For details about how to connect the cables, see *BTS3900A Installation Guide*.
- (2) For details about the positions of devices monitored by the HPMI, see **2.2 Structure of the BTS3900A Cabinet**.

#### **CMUA**

This section describes the central monitoring unit type A (CMUA).

#### **Functions**

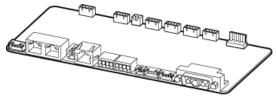
The CMUA has the following functions:

- Adjusts and controls temperature of the cabinet in different temperature control modes.
- Reserves a port for three Boolean inputs and detects Boolean alarms in the cabinet. The remote detection, however, is not supported.
- Provides a port for the RJ45 connector to enable electronic label and cabinet type detection.

#### **Exterior**

Figure 5-121 shows a CMUA.

Figure 5-121 CMUA



PAA02C0001

### **Ports**

Figure 5-122 shows the ports on the CMUA, and Table 5-94 describes the ports.

Figure 5-122 Ports on a CMUA (plan view)



PAA02C0002

Table 5-94 Ports on a CMUA

Silkscree n on the Port	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
● TEM (in the RFC) ● TEM_BAT (in the IBBS2 00D/IBBS2 00T)	<ul> <li>In the RFC: connects to the temperature sensor at the air inlet of the cabinet and receives temperature alarms.</li> <li>In the IBBS200D/ IBBS200T: connects to the storage battery temperature sensor in the IBBS200D/IBBS200T and receives storage battery temperature alarms.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory

Silkscree n on the	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
COM_OU T	Communication port for lower-level cascading  Connecting to the PMU (in an APM30H)  Connecting to the lower-level CMUA (in an RFC, TMC11H, IBBS200D, or IBBS200T)	-	-	-	-	-
COM_IN	Communication port for upper-level cascading  Connecting to the BBU (in an APM30H)  Connecting to the BBU or upper-level CMUA (in an RFC or TMC11H)  Connecting to the PMU or upper-level CMUA (in an IBBS200D or IBBS200T)	-	-	-	-	-
ELU	Connects to the Electronic Label Unit (ELU) and receives ELU-related alarms.	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
GATE	Connects the door status sensor and receives door status alarms.	Reserv ed	Manda tory	Manda tory	Manda tory	Manda tory
IN0, IN1, IN2	Provides one Boolean input at each port.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
SMOKE	Connects to the smoke sensor and receives smoke alarms.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Reserv ed
FAN_EX T	Connects to the outer air circulation fan on the cabinet and receives alarms related to the outer air circulation fan.	Manda tory	Manda tory	Reserv ed	Reserv ed	Reserv ed
TEC cooler	Connects to the TEC cooler and receives alarms related to the TEC cooler.	Reserv ed	Reserv ed	Reserv ed	Reserv ed	Manda tory

Silkscree n on the	Port Function	Port Relationship with the Related Cabinet <sup>(1)(2)</sup>				
Port		APM3 0H	TMC1 1H	RFC	IBBS2 00D	IBBS2 00T
• FAN1 (in the APM3 OH, TMC1 1H, RFC, or IBBS2 O0D) • FAN_EXT (in the IBBS2 O0T)	<ul> <li>In the TMC11H or TMC11H: connects to the fan in the fan box.</li> <li>In the RFC or IBBS200D: connects to the fan on the right of the fan box.</li> <li>In the IBBS200T: connects to the outer air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Manda tory	Manda tory	Manda tory	Manda tory	Manda tory
• FAN2 (in the RFC and IBBS2 00D) • FAN_I NT (in the IBBS2 00T)	<ul> <li>In the RFC or IBBS200D: connects to the fan on the left of the fan box.</li> <li>In the IBBS200T: connects to the inner air circulation fan on the TEC cooler and receives fanrelated alarms from cabinets.</li> </ul>	Reserv	Reserv	Manda tory	Manda tory	Manda tory
PWR	CMUA power port	-	-	-	-	-

#### **□** NOTE

### **LED**

Table 5-95 describes the LEDs on the CMUA.

<sup>(1)</sup> Mandatory monitoring devices are installed in the cabinet before delivery, and related monitoring signal cables are connected before delivery. Optional devices are configured based on customer requirements, and related cables must be connected on site. For details about how to connect the cables, see *BTS3900A Installation Guide*.

<sup>(2)</sup> For details about the positions of devices monitored by the CMUA, see **2.2 Structure of the BTS3900A** Cabinet.

Table 5-95 LEDs

Label	Color	Status	Meaning
RUN	Green	Blinking (on for 1s and off for 1s)	The board is functional and communicates with the BBU properly.
		Blinking (on for 0.125s and off for 0.125s)	The board is functional, but fails to communicate with the BBUs. If the board does not communicate with the BBU for one minute, you can verify that communication fails.
		On or off	The board is faulty (when it is not in the power-on self-check status).
ALM	Red	Off	No alarm is generated.
		On	An alarm is generated, and the board must be replaced.
		Blinking (on for 1s and off for 1s)	An alarm is generated. The alarm may be caused by the faults of related boards or ports. Therefore, you cannot determine whether to replace the board.

#### **DIP Switches**

There are three DIP switches on the CMUA. They are SW1, SW2, and SW3, which are used to set the working mode of the CMUA according to the cabinet type. **Figure 5-123** shows the positions of the DIP switches on the CMUA.

Figure 5-123 Positions of the DIP switches on the CMUA (plan view)

The DIP switches in different types of cabinet are set in different modes, as shown in **Figure 5-124**.

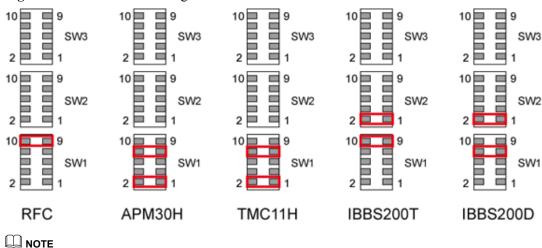


Figure 5-124 DIP switch settings of the CMUA in different cabinets

The red rectangles in Figure 5-124 show the positions for installing jumper caps.

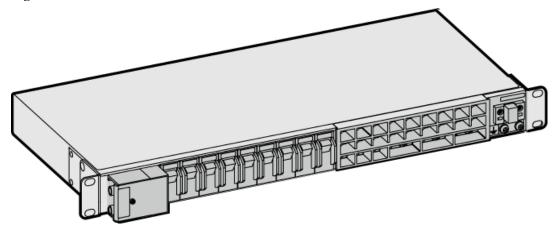
### 5.7.2 DCDU-03

The Direct Current Distribution Unit-03 (DCDU-03) supplies DC power to each component in the cabinet. The height of the DCDU-03 is 1 U. It can be classified into the DCDU-03B and DCDU-03C according to the configured MCBs and application scenarios. The two models have the same exterior and engineering specifications.

#### **Exterior**

Figure 5-125 shows the DCDU-03.

**Figure 5-125** DCDU-03



#### **Functions**

The DCDU-03 provides nine -48 V DC outputs and different MCB configurations to meet the power distribution requirements of the scenarios of distributed and separated base stations.

**Table 5-96** describes the DC power distribution functions of the DCDU-03.

Table 5-96 DC power distribution functions of the DCDU-03

DCDU Model	DC Output Terminal	Power Consumpti on Equipment	MCB Specificati on	MCB Quantity	Applicatio n Scenario	
DCDU-03B	LOAD0 to LOAD5	RRU	20 A	6	Distributed base station/	
	LOAD6 to LOAD8	BBU and the transmission equipment of the customer	12 A	3	Mini base station	
DCDU-03C	LOAD0 to LOAD5	Transmissio n equipment of the customer	12 A	6	Separated macro base station in the -48 V DC	
	LOAD6	BBU	12 A	1	power supply/	
	LOAD7	Transmissio n equipment of the customer	6 A	1	Transmissio n cabinet	
	LOAD8	Fan box	6 A	1		

#### **Ports**

Figure 5-126 describes the ports on the panel of the DCDU-03.

Figure 5-126 Ports on the panel of the DCDU-03

Table 5-97 describes the ports on the panel of the DCDU-03.

**Table 5-97** Ports on the panel of the DCDU-03

Port	Specification	Power Cable Cross- Sectional Area	Remarks
DC input terminal	Supports the M6 2-hole OT terminal (one input)	<ul> <li>DCDU-03B:         maximum = 25mm²,         default = 25mm²,</li> <li>DCDU-03C:         maximum = 25mm²,         default = 16mm²,</li> </ul>	When the DCDU-03C is used in the transmission cabinet, the cross-sectional area of the input power cable is 4 mm <sup>2</sup> .

Port	Specification	Power Cable Cross- Sectional Area	Remarks
DC output terminal	Supports the M4 single hole OT terminal (9 outputs)	Maximum = 6mm <sup>2</sup>	<ul> <li>The specification for a power cable depends on the device to which the cable is connected. For example, the specification for a fan power cable is 2.5 mm².</li> <li>Three rows of wiring terminals for outputs: NEG(-), RTN(+), and PGND, where, the last three pairs of the PGND wiring terminals support the grounding of the M4 2-hole OT terminals, which are marked in red in Figure 5-126</li> </ul>

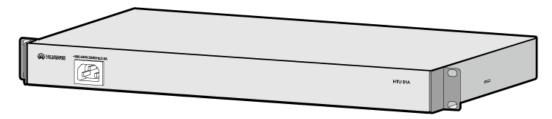
## 5.7.3 Heater (Optional)

The heater provides proper operating temperature for the customer equipment working in the cabinet in low temperature. The heater is optional.

#### **Exterior**

The heater is 1 U high. Figure 5-127 shows the heater.

Figure 5-127 Heater



## **Technical Specifications**

The technical specifications of the heater are as follows:

• When the temperature in the cabinet is lower than  $+1^{\circ}$ C (with  $\pm 6^{\circ}$ C offset considered), the heater starts working. When the temperature in the cabinet is higher than  $+15^{\circ}$ C (with  $\pm 3^{\circ}$ C offset considered), the heater stops working.

• The rated heating power of the heater is 330 W.

## 5.7.4 Door Status Sensor

The door status sensor monitors the opening and closing of the front door of the cabinet.

The door status sensor consists of the magnet part and switch part.

Figure 5-128 shows the magnet part of the door status sensor.

Figure 5-128 Magnet part of the door status sensor



Figure 5-129 shows the switch part of the door status sensor.

Figure 5-129 Switch part of the door status sensor





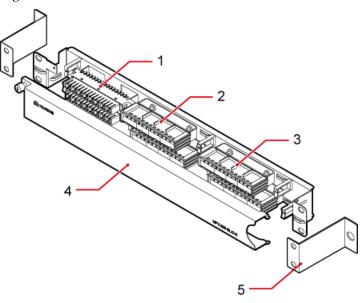
## 5.8 Overview of the DDF

This section describes the structure, functions, features, and technical specifications of the DDF.

#### Structure

Figure 5-130 shows the structure of the DDF.

Figure 5-130 Structure of the DDF



- (1) Alarm module (2) Digital distribution module
- module
- (3) Digital distribution (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 5-98 describes the technical specifications of the DDF.

**Table 5-98** 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	≥ 60 dB
Insertion loss	≤ 0.4 dB
Return loss	≥ 18 dB

## **5.9 EMUA**

The Environment Monitoring Unit (EMUA) monitors the internal environment of the cabinet and reports related alarms.

The EMUA is connected to the main equipment through alarm cables, monitoring the environment information of the equipment room and cabinet. The EMUA monitors the following items:

- Environment such as the temperature and humidity, water damage, and smoke
- Intrusion status through the infrared equipment and door status sensor
- Power distribution

For details about the structure and functions of the EMUA, see the EMUA User Guide.

# 6 BTS3900A Cables

## **About This Chapter**

The BTS3900A cables are the PGND cable, equipotential cable, power cable, transmission cable, CPRI cable, signal cable, and RF cable.

#### 6.1 List of BTS3900A Cables

The BTS3900A cables are classified into power cables, PGND cables, equipotential cables, transmission cables, signal cables, and RF cables.

#### 6.2 Cable Holes of the BTS3900A Cabinet

The BTS3900A is maintained from the front of the cabinet, and all the external cables are led into and out of the BTS3900A cabinet through the cable holes at the bottom of the cabinet.

#### 6.3 BTS3900A Cable Connections

The cable connections in the BTS3900A vary according to the power supply scenarios and configurations related to the cabinet, transmission system, CPRI port, and RF.

#### 6.4 BTS3900A PGND Cable

The BTS3900A PGND cables are classified into the PGND cable for the cabinet and PGND cables for the internal modules.

#### 6.5 BTS3900A Equipotential Cable

The equipotential cables of the BTS3900A are used to connect the PGND terminals between cabinets to ensure the equal potential among all cabinets and the normal operation of the base station.

#### 6.6 BTS3900A Power Cables

The BTS3900A power cables are the input power cables for each cabinet and power cables for the BBU, RFUs, fan box in each cabinet, and storage batteries.

#### 6.7 BTS3900A Transmission Cables

The BTS3900A transmission cables include the E1/T1 cable, E1/T1 surge protection transfer cable, FE/GE cable, and FE/GE surge protection transfer cable.

#### 6.8 CPRI Electrical Cable

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

#### 6.9 BTS3900A Signal Cables

The BTS3900A signal cables are the monitoring signal cables between cascaded CMUAs, temperature monitoring signal cable for the RFC, door status monitoring cable, monitoring signal cable between the CMUA and the BBU, environment monitoring signal cable, monitoring signal transfer cable, ELU signal cable, APM30H door status monitoring cable, monitoring signal cable for the fan on the front door, temperature sensor cable for the batteries, monitoring signal cable for the storage battery cabinet, BBU alarm cable, GPS clock signal cable, and EMUA monitoring signal cable.

#### 6.10 BTS3900A RF Cables

The BTS3900A RF cables are the RF jumpers and inter-RFU RF signal cables.

## 6.1 List of BTS3900A Cables

The BTS3900A cables are classified into power cables, PGND cables, equipotential cables, transmission cables, signal cables, and RF cables.

## Power Cables, PGND Cables, and Equipotential Cable

Table 6-1 lists the power cables, PGND cables, and equipotential cable.

Table 6-1 Power cables, PGND cables, and equipotential cable

Item	Cable	One End	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position	
Cables to be install ed on site	6.6.1 Input Power Cables for the APM30H (AC)	OT terminal	EPS/AC INPUT	None	External power equipment	
	6.6.4 Input Power Cable for the TMC11H (AC)	Easy power receptacle (pressfit type) connector	EPS/TMC	OT terminal	DCDU-03/ INPUT/RTN (+) and NEG (-)	
	6.6.4 Input Power Cable for the TMC11H (-48 V DC)	Parallel terminal	DCDU-01/ SPARE2			
	6.6.3 Power Cables for the Storage Batteries	Power series 120 connector (grey)	EPS/Power series 120 connector (grey)	OT terminal	Power distribution box in the IBBS200D or in the IBBS200T/BAT/RTN(+) and NEG(-)	
	6.6.2 Input Power Cables for the RFC (-48 V DC)	None	External power equipment	OT terminal	DCDU-01/ INPUT/RTN (+) and NEG (-)	

Item	Cable	One End		The Other E	ıd
		Connector	Installation Position	Connector	Installation Position
	6.6.9 Power Cables for the Fans in the IBBS200D	Easy power receptacle (pressfit type) connector	EPS/LOAD3	OT terminal	Power distribution box in the IBBS200D/ FAN/RTN(+) and NEG(-)
	6.6.11 Power Cables for the TEC Cooler	Easy power receptacle (pressfit type) connector	EPS/LOAD3	OT terminal	Power distribution box in the IBBS200T/TEC/RTN(+) and NEG(-)
	6.6.13 Power Cable for the Heating Film	OT terminal	Junction box/ L1 and N1 or L2 and N2	OT terminal	Junction box for the heating film in the IBBS200D/L and N
	6.6.15 Power Cable for the EMUA (AC)	Easy power receptacle (pressfit type) connector	EPS/LOAD7	Cord end terminal	EMUA/PWR1
	6.6.15 Power Cable for the EMUA (-48 V DC)	OT terminal	DCDU-03/ LOAD7		
	6.4 BTS3900A PGND Cable	OT terminal	Ground bar of the cabinet	OT terminal	Ground busbar outside the cabinet
	6.5 BTS3900A Equipotential Cable	OT terminal	Ground bar of the upper cabinet	OT terminal	Ground bar of the lower cabinet
Cables install ed before	6.6.2 Input Power Cables for the RFC (AC)	Power series 120 connector (blue)	EPS/Power series 120 connector (blue)	OT terminal	DCDU-01/ INPUT/RTN (+) and NEG (-)
deliver y	6.6.5 BBU Power Cable (AC)	Easy power receptacle (pressfit type) connector	EPS/LOAD1	3V3 power connector	BBU/UPEU/ PWR

Item	Cable	One End		The Other En	nd
		Connector	Installation Position	Connector	Installation Position
	6.6.5 BBU Power Cable (-48 V DC)	OT terminal	DCDU-03/ LOAD6		
	Power cable for the DCDU-03	OT terminal	Wiring unit of the PSU (DC/ DC)/DC OUTPUT/ LOAD1(-) and RTN (+)	OT terminal	DCDU-03/ INPUT/NEG (-) and RTN (+)
	6.6.7 Power Cable for the Fan Box in the APM30H	Easy power receptacle (pressfit type) connector	EPS/LOAD0	3V3 power connector	Fan box in the APM30H/ PWR
	6.6.10 Power Cable for the Fan Box in the TMC11H	OT terminal	DCDU-03/ LOAD8	3V3 power connector	Fan box in the TMC11H/ PWR
	6.6.6 Power Cable for the RFU	Parallel terminal	DCDU-01/ RFU0 to RFU5	3V3 power connector	RFU0 to RFU5/PWR
	6.6.8 Power Cable for the Fan Box in the RFC	Parallel terminal	DCDU-01/ FAN	3V3 power connector	Fan box in the RFC/PWR
	6.6.12 Power Cable for the Heater	OT terminal	Junction box in the APM30H/L0, N0, and ground bar of the cabinet	C13 connector	Heater/Power socket
	6.6.14 Power Cable for the SOU	OT terminal	EPS/M4 ground screw, L1, and N1 (AC OUTPUT)	C13 connector	SOU/AC INPUT

## **Transmission Cables and CPRI Cables**

**Table 6-2** lists the transmission cables and CPRI cables.

Table 6-2 Transmission cables and CPRI cables

Item	Cable	One End		The Other	End
		Connecto r	Installation Position	Connect or	Installation Position
Cables to be install	6.7.1 E1/T1 Cable	DB26 male connector	BBU/UELP/ OUTSIDE	None	External transmission equipment
ed on site	6.7.6 FE/ GE Cable	RJ-45 connector	SLPU/UFLP/ OUTSIDE/FE0	RJ-45 connector	Router that is connected to the BSC
	6.7.3 FE/ GE Optical Cable	LC connector	<ul> <li>BBU/GTMU or WMPT or UTRP/FE1</li> <li>BBU/LMPT/SFP0 or SFP1</li> </ul>	<ul> <li>FC connec tor</li> <li>SC connec tor</li> <li>LC connec tor</li> </ul>	Router that is connected to the BSC
Cables install ed before deliver y	6.8 CPRI Electrical Cable	SFP20 male connector	BBU/GTMU or WBBP or LBBP/ CPRI0 to CPRI5, or CPRI0 to CPRI2	SFP20 male connector	<ul> <li>MRFU0 to         MRFU5/CPRI0         or CPRI1</li> <li>GRFU0 to         GRFU5/CPRI0</li> <li>WRFU0 to         WRFU5/CPRI0</li> <li>LRFU0 to         WRFU5/CPRI0</li> </ul>
	6.7.2 E1/T1 Surge Protection Transfer Cable	DB25 connector	SLPU/UELP/ INSIDE	DB26 connector	GTMU or WMPT or UTRP/ E1/T1
	6.7.7 FE Surge Protection Transfer Cable	RJ-45 connector	<ul><li>BBU/GTMU or WMPT/FE0</li><li>BBU/LMPT/FE0 or FE1</li></ul>	RJ-45 connector	SLPU/UFLP/ INSIDE/FE0
	6.7.4 Cable Between Two FE Electrical Ports	RJ-45 connector	BBU/GTMU/FE0	RJ-45 connector	BBU/WMPT/FE0

Item	Cable	One End		The Other End	
		Connecto r	Installation Position	Connect or	Installation Position
	6.7.5 Cable Between Two FE Optical Ports	LC connector	BBU/GTMU/FE1	LC connector	BBU/WMPT/FE1

## **Signal Cables**

**Table 6-3** lists the signal cables.

Table 6-3 Signal cables

Item	Cable	One End		The Other	End
		Connecto r	Installation Position	Connect or	Installation Position
Cables to be install ed on site	6.9.1 Monitoring Signal Cable Between Cascaded CMUAs	RJ-45 connector	CMUA in the upper level/COM_OUT	RJ-45 connector	CMUA in the lower level/COM_IN
	6.9.10 Monitoring Signal Cable for the Storage Battery Cabinet	RJ-45 connector	IBBS200D or IBBS200T/ CMUA/COM_IN	RJ-45 connector	PMU/COM_485
	6.9.12 GPS Clock Signal Cable	SMA male connector	BBU/USCU/GPS	N-type female connector	GPS surge protector
	6.9.13 EMUA Monitoring Signal Cable	RJ-45 connector	EMUA/RS485	RJ-45 connector	PMU/COM_OUT
	6.9.11 BBU Alarm Cable	RJ-45 connector	BBU/UPEU or UEIU/ EXT_ALM0 or EXT_ALM1	RJ-45 connector	External alarm equipment

Item Cable		One End		The Other	End
		Connecto r	Installation Position	Connect or	Installation Position
Cables install ed before deliver y	6.9.2 Temperatu re Monitoring Signal Cable for the RFC	4-pin connector	Fan box in the RFC/CMUA/ TEM	Temperat ure sensor	Air inlet at the bottom of the RFC
	6.9.4 Monitoring Signal Cable Between the CMUA and the BBU	RJ-45 connector	<ul> <li>CMUA in the RFC/COM_IN</li> <li>CMUA in the APM30H/COM_IN</li> </ul>	RJ-45 connector	<ul> <li>BBU in the RFC/UPEU/MON0</li> <li>BBU in the APM30H/UPEU/MON1</li> </ul>
	6.9.5 Environme nt Monitoring Signal Cable	DB50 male connector	PMU/COM	DB50 male connector	Fan box in the APM30H/HPMI/ PMU_DB50
	6.9.6 Monitoring Signal Transfer Cable	RJ-45 connector	PMU/COM_IN	RJ-45 connector	Fan box in the APM30H/CMUA/ COM_OUT
	6.9.7 ELU Signal Cable	RJ-45 connector	ELU	RJ-45 connector	CMUA/ELU
	6.9.8 APM30H Door Status Monitoring Cable	2-pin connector	HPMI/GATE	Bare wire	Door status sensor
	6.9.9 Monitoring Signal Cable for the Fan on the Front Door	4-pin connector	Front door of the APM30H/ Transfer box	4-pin connector	CMUA/FAN_EXT

#### **RF Cables**

Table 6-4 lists the RF cables.

Table 6-4 RF cables

Item	Cable	One End		The Other End	
		Connector	Installation Position	Connector	Installation Position
Cables to be install	6.10.1 RF Jumper	DIN straight male connector	Feeder for the antenna system	DIN elbow male connector	RFU/ ANT_TX/RXA or ANT_RXB
ed on site	6.10.2 Inter- RFU RF Signal Cable	QMA elbow male connector	RFU/ RX_OUTA	QMA elbow male connector	RFU/RX_INB

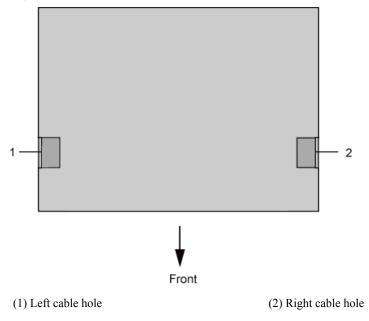
## 6.2 Cable Holes of the BTS3900A Cabinet

The BTS3900A is maintained from the front of the cabinet, and all the external cables are led into and out of the BTS3900A cabinet through the cable holes at the bottom of the cabinet.

#### Cable Holes of the APM30H Cabinet

Figure 6-1 shows the plan view of the cable holes at the bottom of the APM30H cabinet.

Figure 6-1 Plan view of the cable holes of the APM30H cabinet



**Table 6-5** describes the cable routing at the cable holes of the APM30H cabinet.

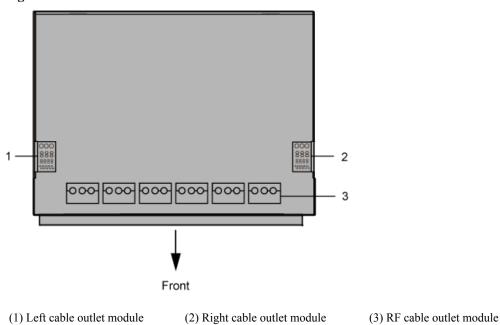
Table 6-5 Cable routing at the cable holes

Item	Description
Left cable hole	Routes the AC input/output power cables, DC output power cables, equipotential cables, PGND cables, GPS clock signal cables, and CPRI cables
Right cable hole	Routes the DC output power cables, power cable for the storage batteries, Boolean value alarm cables, E1/T1 cables, and RS485 signal cables

#### Cable Holes of the RFC

**Figure 6-2** shows the plan view of the cable holes at the bottom of the RFC. **Figure 6-3** shows the exterior of the outlet module.

Figure 6-2 Plan view of the cable holes at the bottom of the RFC



**Table 6-6** describes the cable routing at the cable holes of the RFC.

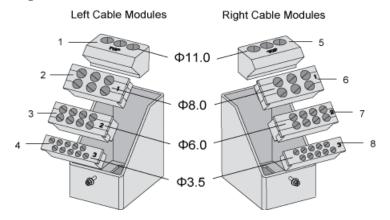
Table 6-6 Cable routing at the cable holes

Item	Description
Left cable outlet module	Routes PGND cables, equipotential cables, AC input/output power cables, DC input power cables, CPRI cables, and GPS clock signal cables

Item	Description
Right cable outlet module	Routes the DC output power cables, power cables for the storage battery cabinet, CPRI cables, E1/T1 cables, Boolean alarm signal cables, and RS485 monitoring signal cables
RF cable outlet module	Routes RF jumpers

Figure 6-3 shows the exterior of the cable outlet modules of the RFC.

Figure 6-3 Exterior of the cable outlet modules of the RFC



- (1) Cable holes for the AC input power cables and GPS (5) Cable hole for Boolean alarm signal cables clock signal cables
- (2) Cable hole for the microwave IF cable and diesel generator monitoring cable
- (6) Cable hole for E1/T1 cables and storage battery power cables
- (3) AC output power cables, PGND cables, and DC input (7) Cable hole for RS485 signal cables power cables
- (4) Cable holes for CPRI cables and Bias-Tee feeders
- (8) Cable holes for CPRI cables, Bias-Tee feeders, and DC output power cables (of the TMC and IBBS's FAN/TEC)

## 6.3 BTS3900A Cable Connections

The cable connections in the BTS3900A vary according to the power supply scenarios and configurations related to the cabinet, transmission system, CPRI port, and RF.

#### 6.3.1 Power Cable Connections

This section describes the power cable connections of the BTS3900A in the 110 V/220 V AC power supply scenario and-48 V DC power supply scenario.

#### 6.3.2 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.

#### 6.3.3 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.

#### 6.3.4 Monitoring Signal Cable Connections

This section describes the monitoring signal cable connections for the BTS3900A in a 110 V AC or 220 V AC power supply scenario and a –48 V DC power supply scenario.

#### 6.3.5 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.

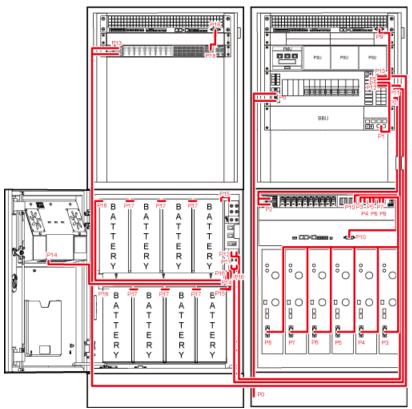
#### 6.3.1 Power Cable Connections

This section describes the power cable connections of the BTS3900A in the 110 V/220 V AC power supply scenario and-48 V DC power supply scenario.

#### Power Cable Connections for a 110 V AC or 220 V AC Power Supply Scenario

**Figure 6-4** shows the power cable connections for the BTS3900A configured with one RFC, one APM30H, one IBBS200D, and one TMC11H in a single-mode or dual-mode scenario where there is a 110 V AC or 220 V AC power supply.

**Figure 6-4** Power cable connections for the BTS3900A configured with one RFC, one APM30H, one IBBS200D, and one TMC11H in a single-mode or dual-mode scenario

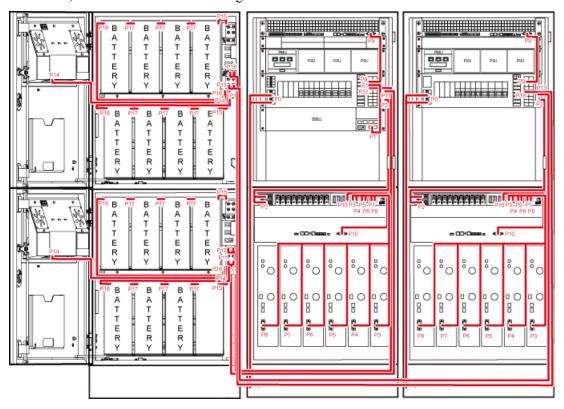


**Table 6-7** lists the power cables.

**Table 6-7** Power cables of the BTS3900A configured with one RFC, one APM30H, one IBBS200D, and one TMC11H in a single-mode or dual-mode scenario

SN	Description
P0	For details, see 6.6.1 Input Power Cables for the APM30H.
P1	For details, see <b>6.6.5 BBU Power Cable</b> .
P2	For details, see <b>6.6.2 Input Power Cables for the RFC</b> .
P3 to P8	For details, see <b>6.6.6 Power Cable for the RFU</b> .
P9	For details, see 6.6.7 Power Cable for the Fan Box in the APM30H.
P10	For details, see 6.6.8 Power Cable for the Fan Box in the RFC.
P11 and P15 to P17	For details, see 6.6.3 Power Cables for the Storage Batteries.
P12 and P14	For details, see 6.6.9 Power Cables for the Fans in the IBBS200D.
P13	For details, see 6.6.4 Input Power Cable for the TMC11H.
P18	For details, see 6.6.10 Power Cable for the Fan Box in the TMC11H.

**Figure 6-5** shows the power cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a single-mode or dual-mode scenario.



**Figure 6-5** Power cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a single-mode or dual-mode scenario

Table 6-8 lists the power cables.

**Table 6-8** Power cables of the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a single-mode or dual-mode scenario

SN	Description
P0	For details, see 6.6.1 Input Power Cables for the APM30H.
P1	For details, see 6.6.5 BBU Power Cable.
P2	For details, see 6.6.2 Input Power Cables for the RFC.
P3 to P8	For details, see 6.6.6 Power Cable for the RFU.
P9	For details, see 6.6.7 Power Cable for the Fan Box in the APM30H.
P10	For details, see 6.6.8 Power Cable for the Fan Box in the RFC.
P11, P13, and P15 to P18	For details, see 6.6.3 Power Cables for the Storage Batteries.

SN	Description
	For details, see 6.6.9 Power Cables for the Fans in the IBBS200D.

Two BBUs are configured in a triple-mode scenario. **Figure 6-6** shows the power cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a triple-mode scenario.

**Figure 6-6** Power cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a triple-mode scenario

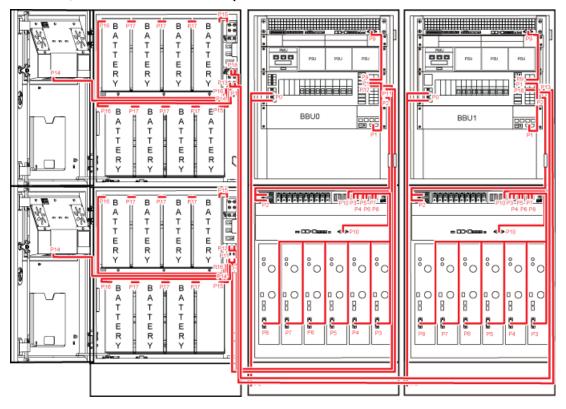


Table 6-9 lists the power cables.

**Table 6-9** Power cables of the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a triple-mode scenario

SN	Description
P0	For details, see 6.6.1 Input Power Cables for the APM30H.
P1	For details, see <b>6.6.5 BBU Power Cable</b> .
P2	For details, see 6.6.2 Input Power Cables for the RFC.

SN	Description
P3 to P8	For details, see <b>6.6.6 Power Cable for the RFU</b> .
P9	For details, see 6.6.7 Power Cable for the Fan Box in the APM30H.
P10	For details, see 6.6.8 Power Cable for the Fan Box in the RFC.
P11, P13, and P15 to P18	For details, see 6.6.3 Power Cables for the Storage Batteries.
P12 and P14	For details, see 6.6.9 Power Cables for the Fans in the IBBS200D.

## Power Cable Connections for a -48 V DC Power Supply Scenario

**Figure 6-7** shows the power cable connections for the BTS3900A configured with one RFC and one TMC11H in a single-mode or dual-mode scenario where there is a –48 V DC power supply.

#### ■ NOTE

If the BTS3900A is configured with two RFCs and one TMC11H, the power cable connections for the second RFC are the same as those for the first RFC.

**Figure 6-7** Power cable connections for the BTS3900A configured with one RFC and one TMC11H in a single-mode or dual-mode scenario

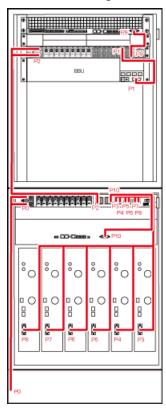


Table 6-10 lists the power cables.

**Table 6-10** Power cables of the BTS3900A configured with one RFC and one TMC11H in a single-mode or dual-mode scenario

SN	Description
P0	For details, see <b>6.6.2 Input Power Cables for the RFC</b> .
P1	For details, see <b>6.6.5 BBU Power Cable</b> .
P2	For details, see 6.6.4 Input Power Cable for the TMC11H.
P3 to P8	For details, see 6.6.6 Power Cable for the RFU.
P9	For details, see 6.6.10 Power Cable for the Fan Box in the TMC11H.
P10	For details, see 6.6.8 Power Cable for the Fan Box in the RFC.

Two BBUs are configured in a triple-mode scenario. **Figure 6-8** shows the power cable connections for the BTS3900A configured with two RFCs and two TMC11Hs in a triple-mode scenario.

BBU0

BBU1

**Figure 6-8** Power cables of the BTS3900A configured with two RFCs and two TMC11Hs in a triple-mode scenario

Table 6-11 lists the power cables.

**Table 6-11** Power cables of the BTS3900A configured with two RFCs and two TMC11Hs in a triple-mode scenario

SN	Description
P0	For details, see 6.6.2 Input Power Cables for the RFC.
P1	For details, see 6.6.5 BBU Power Cable.
P2	For details, see 6.6.4 Input Power Cable for the TMC11H.
P3 to P8	For details, see 6.6.6 Power Cable for the RFU.
P9	For details, see 6.6.10 Power Cable for the Fan Box in the TMC11H.
P10	For details, see 6.6.8 Power Cable for the Fan Box in the RFC.

#### 6.3.2 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.

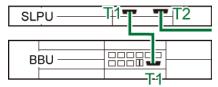
#### Transmission Cable Connections in the GSM Only Base Station

In a GSM only 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 6-9** 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 6-9 E1/T1 cable connections



**Table 6-12** describes the cable connections.

Table 6-12 E1/T1 cable connections

Cable Number	Cable Description
T1	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	See 6.7.1 E1/T1 Cable.

**Figure 6-10** 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 6-10 E1/T1 cable connections

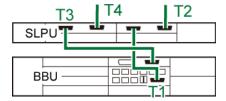


Table 6-13 describes the cable connections.

Table 6-13 E1/T1 cable connections

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 E1/T1 Cable.

#### Transmission over the FE Cable

**Figure 6-11** shows the transmission cable connections for a GSM only base station when the FE/GE Ethernet cable is used for data transmission.

Figure 6-11 FE/GE Ethernet cable connections



**Table 6-14** describes the cable connections.

Table 6-14 FE/GE Ethernet cable connections

Cable Number	Cable Description
T1	See 6.7.7 FE Surge Protection Transfer Cable.
T2	See 6.7.6 FE/GE Cable.

**Figure 6-12** shows the transmission cable connections for a GSM only base station when the FE/GE optical cable is used for data transmission.

Figure 6-12 FE/GE optical cable connections

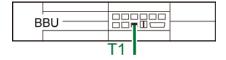


Table 6-15 describes the cable connections.

Table 6-15 FE/GE optical cable connections

Cable Number	Cable Description
T1	See 6.7.3 FE/GE Optical Cable.

#### Transmission Cable Connections in a 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 6-13** 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 6-13 E1/T1 cable connections (1)

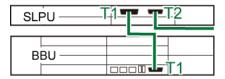


Table 6-16 describes the cable connections.

Table 6-16 E1/T1 cable connections (1)

Cable Number	Cable Description
T1	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	See 6.7.1 E1/T1 Cable.

**Figure 6-14** shows the transmission cable connections when only the E1/T1 cable is used for data transmission in a base station where the WMPT and UTRP3 (or UTRP4) are configured as the main control board in the BBU.

Figure 6-14 E1/T1 cable connections (2)

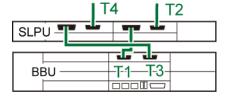


Table 6-17 describes the cable connections.

**Table 6-17** E1/T1 cable connections (2)

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 E1/T1 Cable.

#### Transmission over the FE Cable

**Figure 6-15** 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 6-15 FE/GE Ethernet cable connections (1)

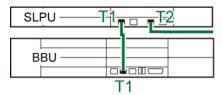


Table 6-18 describes the cable connections.

Table 6-18 FE/GE Ethernet cable connections (1)

Cable Number	Cable Description
T1	See 6.7.7 FE Surge Protection Transfer Cable.
T2	See 6.7.6 FE/GE Cable.

**Figure 6-16** shows the transmission cable connections when only the FE/GE Ethernet cable is used for data transmission in a base station where the WMPT and the UTRP9 are configured in the BBU.

Figure 6-16 FE/GE Ethernet cable connections (2)

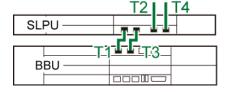


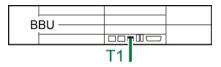
Table 6-19 describes the cable connections.

Table 6-19 FE/GE Ethernet cable connections (2)

Cable Number	Cable Description
T1 and T3	See 6.7.7 FE Surge Protection Transfer Cable.
T2 and T4	See 6.7.6 FE/GE Cable.

**Figure 6-17** 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 6-17 FE/GE optical cable connections (1)



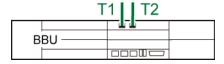
**Table 6-20** describes the cable connections.

**Table 6-20** FE/GE optical cable connections (1)

Cable Number	Cable Description
T1	See 6.7.3 FE/GE Optical Cable.

**Figure 6-18** shows the transmission cable connections when only the FE/GE optical cable is used for data transmission in a base station where the WMPT and the UTRP2 are configured in the BBU.

Figure 6-18 FE/GE optical cable connections (2)



**Table 6-21** describes the cable connections.

**Table 6-21** FE/GE optical cable connections (2)

Cable Number	Cable Description
T1 and T2	See 6.7.3 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 6-19** shows the transmission cable connections.

Figure 6-19 E1/T1 cable connections

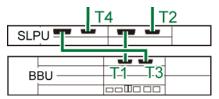


Table 6-22 describes the cable connections.

Table 6-22 E1/T1 cable connections

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 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 6-20** shows the transmission cable connections.

Figure 6-20 FE/GE optical cable connections



**Table 6-23** describes the cable connections.

Table 6-23 FE/GE optical cable connections

Cable Number	Cable Description
T1	See 6.7.3 FE/GE Optical Cable.

#### Transmission Cable Connection in a GSM+UMTS Base Station in Co-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 6-21** 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 6-21** Transmission cable connection for a GSM+UMTS base station in TDM common transmission mode (1)

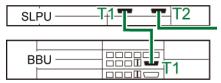


Table 6-24 describes the cables.

**Table 6-24** Transmission cable for a GSM+UMTS base station in TDM common transmission mode (1)

SN	Description
T1	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	For details, see 6.7.1 E1/T1 Cable.

**Figure 6-22** 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.

#### M 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 6-22** Transmission cable connection for a GSM+UMTS base station in TDM common transmission mode (2)

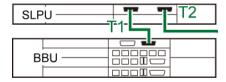


Table 6-25 describes the cables.

**Table 6-25** Transmission cable for a GSM+UMTS base station in TDM common transmission mode (2)

SN	Description
T1	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	For details, see 6.7.1 E1/T1 Cable.

#### **IP Over E1 Common Transmission**

**Figure 6-23** 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 6-23**, which are not described here.

**Figure 6-23** Transmission cable connections for a GSM+UMTS base station in IP over E1 common transmission mode (1)

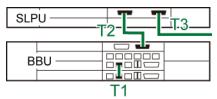


Table 6-26 describes the cables.

**Table 6-26** Transmission cables for a UMTS+LTE base station in IP over E1 common transmission mode (1)

SN	Description
T1	For details, see 6.7.4 Cable Between Two FE Electrical Ports.
T2	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
Т3	For details, see 6.7.1 E1/T1 Cable.

**Figure 6-24** shows the transmission cable connections for a GSM+UMTS base station in IP cotransmission mode when the WMPT E1/T1 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.

#### 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 6-24**, which are not described here.

**Figure 6-24** Transmission cable connections for a GSM+UMTS base station in IP over E1 common transmission mode (2)

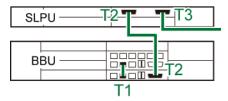


Table 6-27 describes the cables.

**Table 6-27** Transmission cables for a GSM+UMTS base station in IP over E1 common transmission mode (2)

SN	Description
T1	For details, see 6.7.4 Cable Between Two FE Electrical Ports.
T2	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
Т3	For details, see 6.7.1 E1/T1 Cable.

#### **IP Over FE Common Transmission**

**Figure 6-25** shows the transmission cable connections for a GSM+UMTS base station in IP cotransmission 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 6-25** Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (1)

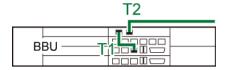


Table 6-28 describes the cables.

**Table 6-28** Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (1)

SN	Description
T1	For details, see 6.7.4 Cable Between Two FE Electrical Ports.
T2	For details, see <b>6.7.3 FE/GE Optical Cable</b> .

**Figure 6-26** shows the transmission cable connections for a GSM+UMTS base station in IP cotransmission 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 6-26** Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (2)

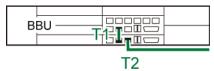


Table 6-29 describes the cables.

**Table 6-29** Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (2)

SN	Description
T1	For details, see 6.7.4 Cable Between Two FE Electrical Ports.
T2	For details, see 6.7.3 FE/GE Optical Cable.

**Figure 6-27** 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 6-27** Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (3)

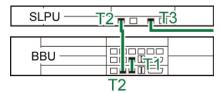


Table 6-30 describes the cables.

**Table 6-30** Transmission cable connections for a GSM+UMTS base station in IP over FE common transmission mode (3)

SN	Description
T1	For details, see 6.7.5 Cable Between Two FE Optical Ports.
T2	For details, see 6.7.7 FE Surge Protection Transfer Cable.
T3	For details, see <b>6.7.6 FE/GE Cable</b> .

## 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 6-28** 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 6-28** Transmission cable connections with FE optical ports for interconnection and FE electrical ports connected to the base station controller

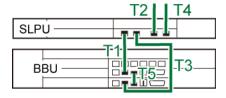


Table 6-31 describes the cables.

**Table 6-31** Transmission cables with FE optical ports for interconnection and FE electrical ports connected to the base station controller

SN	Description
T1 and T3	For details, see 6.7.7 FE Surge Protection Transfer Cable.
T2 and T4	For details, see 6.7.6 FE/GE Cable.
T5	For details, see 6.7.5 Cable Between Two FE Optical Ports.

**Figure 6-29** 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 6-29** Transmission cable connections with FE electrical ports for interconnection and FE optical ports connected to the base station controller

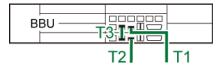


Table 6-32 describes the cables.

**Table 6-32** 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 <b>6.7.3 FE/GE Optical Cable</b> .
T3	For details, see 6.7.4 Cable Between Two FE Electrical Ports.

## Transmission Cable Connection 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 6-30** 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 6-30** Transmission cable connections in a base station in GSM E1/T1+UMTS E1/T1 mode

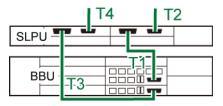


Table 6-33 describes the cable connections.

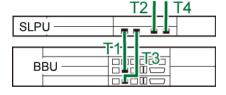
Table 6-33 Transmission cable connections in a base station in GSM E1/T1+UMTS E1/T1 mode

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 E1/T1 Cable.

# **GSM FE/GE+UMTS FE/GE**

**Figure 6-31** 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 6-31** Transmission cable connections in a base station in GSM FE/GE+UMTS FE/GE mode (1)



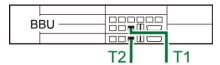
**Table 6-34** describes the cable connections.

**Table 6-34** Transmission cable connections in a base station in GSM FE/GE+UMTS FE/GE mode (1)

Cable Number	Cable Description
T1 and T3	See 6.7.7 FE Surge Protection Transfer Cable.
T2 and T4	See 6.7.6 FE/GE Cable.

**Figure 6-32** 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 6-32** Transmission cable connections in a base station in GSM FE/GE+UMTS FE/GE mode (2)



**Table 6-35** describes the cable connections.

**Table 6-35** Transmission cable connections in a base station in GSM FE/GE+UMTS FE/GE mode (2)

Cable Number	Cable Description
T1 and T2	See 6.7.3 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 6-33** 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.

**Figure 6-33** Transmission cable connections for a GSM+LTE base station in IP over E1 common transmission mode (1)

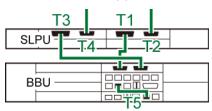


Table 6-36 describes the cables.

**Table 6-36** Transmission cables for a GSM+LTE base station in IP over E1 common transmission mode (1)

SN	Description
T1 and T3	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	For details, see 6.7.1 E1/T1 Cable.
T5	For details, see 6.7.4 Cable Between Two FE Electrical Ports.

**Figure 6-34** 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 6-34** Transmission cable connections for a GSM+LTE base station in IP over E1 common transmission mode (2)

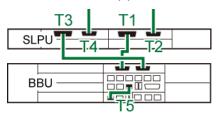


Table 6-37 describes the cables.

**Table 6-37** Transmission cables for a GSM+LTE base station in IP over E1 common transmission mode (2)

SN	Description
T1 and T3	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.

SN	Description
T2 and T4	For details, see 6.7.1 E1/T1 Cable.
T5	For details, see 6.7.5 Cable Between Two FE Optical Ports.

# IP over FE/GE Common Transmission

**Figure 6-35** 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 6-35** Transmission cable connections for a GSM+LTE base station in IP over FE/GE common transmission mode (1)

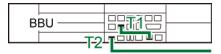


Table 6-38 describes the cables.

**Table 6-38** Transmission cables for a GSM+LTE base station in IP over FE/GE common transmission mode (1)

SN	Description
T1	For details, see <b>6.7.4 Cable Between Two FE Electrical Ports</b> .
T2	For details, see 6.7.3 FE/GE Optical Cable.

**Figure 6-36** 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 6-36** Transmission cable connections for a GSM+LTE base station in IP over FE/GE common transmission mode (2)

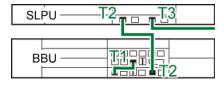


Table 6-39 describes the cables.

transmission mode (2)	
SN	Description
T1	For details, see 6.7.5 Cable Between Two FE Optical Ports.
T2	For details, see 6.7.7 FE Surge Protection

**Transfer Cable.** 

For details, see 6.7.6 FE/GE Cable.

**Table 6-39** Transmission cables for a GSM+LTE base station in IP over FE/GE common transmission mode (2)

# Route Backup Mode with IP Common Transmission

T3

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

- IP transmission is applied. The GTMU and WMPT are connected to the transmission equipment respectively using the active channel.
- The GTMU and the LMPT are interconnected through 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 LTE 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+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 common 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 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 transmission equipment.

**Figure 6-37** 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 transmission equipment.

**Figure 6-37** Transmission cable connections with FE electrical ports for interconnection and FE optical ports connected to the transmission equipment

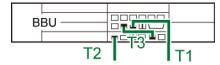


Table 6-40 describes the cables.

**Table 6-40** Transmission cables with FE electrical ports for interconnection and FE optical ports connected to the transmission equipment

SN	Description
T1 and T2	For details, see <b>6.7.3 FE/GE Optical Cable</b> .
T3	For details, see 6.7.4 Cable Between Two FE Electrical Ports.

**Figure 6-38** 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 transmission equipment.

**Figure 6-38** Transmission cable connections with FE optical ports for interconnection and FE electrical ports connected to the transmission equipment

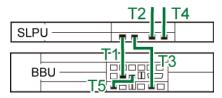


Table 6-41 describes the cables.

**Table 6-41** Transmission cables with FE optical ports for interconnection and FE electrical ports connected to the transmission equipment

SN	Description
T1 and T3	For details, see 6.7.7 FE Surge Protection Transfer Cable.
T2 and T4	For details, see <b>6.7.6 FE/GE Cable</b> .
T5	For details, see 6.7.5 Cable Between Two FE Optical Ports.

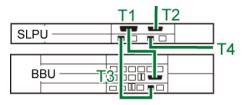
# Transmission Cable Connections in the GSM+LTE Base Station in Separate Transmission Mode

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 6-39** 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 6-39** Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (1)



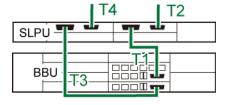
**Table 6-42** describes the cable connections.

**Table 6-42** Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	See 6.7.1 E1/T1 Cable.
T3	See 6.7.7 FE Surge Protection Transfer Cable.
T4	See 6.7.6 FE/GE Cable.

**Figure 6-40** 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 6-40** Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (2)



**Table 6-43** describes the cable connections.

**Table 6-43** Transmission cable connections in a base station in GSM 4E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	See 6.7.1 E1/T1 Cable.
Т3	See 6.7.3 FE/GE Optical Cable.

**Figure 6-41** 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 6-41** Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (1)

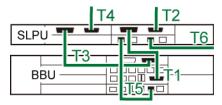


Table 6-44 describes the cable connections.

**Table 6-44** Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 E1/T1 Cable.
T5	See 6.7.7 FE Surge Protection Transfer Cable.
T6	See 6.7.6 FE/GE Cable.

**Figure 6-42** 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 6-42** Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (2)

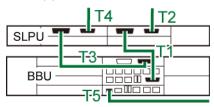


Table 6-45 describes the cable connections.

**Table 6-45** Transmission cable connections in a base station in GSM 8E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 E1/T1 Cable.
Т5	See 6.7.3 FE/GE Optical Cable.

# **GSM FE/GE+LTE FE/GE**

**Figure 6-43** 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 6-43** Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (1)

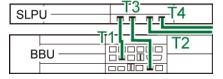


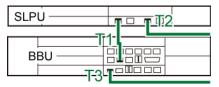
Table 6-46 describes the cable connections.

**Table 6-46** Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T3	See 6.7.7 FE Surge Protection Transfer Cable.
T2 and T4	See 6.7.6 FE/GE Cable.

**Figure 6-44** 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 6-44** Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (2)



**Table 6-47** describes the cable connections.

**Table 6-47** Transmission cable connections in a base station in GSM FE/GE+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See 6.7.7 FE Surge Protection Transfer Cable.
T2	See 6.7.6 FE/GE Cable.
Т3	See 6.7.3 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 6-45** 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 6-45** Transmission cable connections for a UMTS+LTE base station in IP over E1 common transmission mode (1)

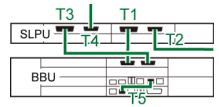


Table 6-48 describes the cables.

**Table 6-48** Transmission cables for a UMTS+LTE base station in IP over E1 common transmission mode (1)

SN	Description
T1 and T3	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	For details, see 6.7.1 E1/T1 Cable.
T5	For details, see 6.7.4 Cable Between Two FE Electrical Ports.

**Figure 6-46** 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 6-46** Transmission cable connections for a UMTS+LTE base station in IP over E1 common transmission mode (2)

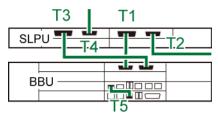


Table 6-49 describes the cables.

**Table 6-49** Transmission cable connections for a UMTS+LTE base station in IP over E1 common transmission mode (2)

SN	Description
T1 and T3	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	For details, see 6.7.1 E1/T1 Cable.
T5	For details, see 6.7.5 Cable Between Two FE Optical Ports.

# IP Over FE/GE Common Transmission

**Figure 6-47** 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 6-47** Transmission cable connections for a UMTS+LTE base station in IP over FE/GE common transmission mode (1)



Table 6-50 describes the cables.

**Table 6-50** Transmission cables for a UMTS+LTE base station in IP over FE/GE common transmission mode (1)

SN	Description
T1	For details, see <b>6.7.4 Cable Between Two FE Electrical Ports</b> .
T2	For details, see <b>6.7.3 FE/GE Optical Cable</b> .

**Figure 6-48** 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 6-48** Transmission cable connections for a UMTS+LTE base station in IP over FE/GE common transmission mode (2)

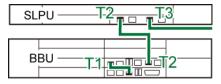


Table 6-51 describes the cables.

**Table 6-51** Transmission cables for a UMTS+LTE base station in IP over FE/GE common transmission mode (2)

SN	Description
T1	For details, see 6.7.5 Cable Between Two FE Optical Ports.
T2	For details, see 6.7.7 FE Surge Protection Transfer Cable.
T3	For details, see <b>6.7.6 FE/GE Cable</b> .

## 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 GTMU and WMPT are connected to the transmission equipment respectively using the active channel.
- The WMPT and the LMPT are interconnected through 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 LTE services is larger than the processing capability of the UMTS 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 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 common 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 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 transmission equipment.

**Figure 6-49** 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 6-49** Transmission cable connections for a UMTS+LTE base station in route backup mode with IP common transmission (1)

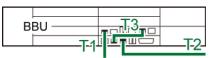


Table 6-52 describes the cables.

**Table 6-52** 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 6.7.3 FE/GE Optical Cable.
T3	For details, see 6.7.4 Cable Between Two FE Electrical Ports.

**Figure 6-50** 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 6-50** Transmission cable connections for a UMTS+LTE base station in route backup mode with IP common transmission (2)

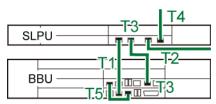


Table 6-53 describes the cables.

**Table 6-53** Transmission cables for a UMTS+LTE base station in route backup mode with IP common transmission (2)

SN	Description
T1 and T3	For details, see 6.7.7 FE Surge Protection Transfer Cable.
T2 and T4	For details, see 6.7.6 FE/GE Cable.
T5	For details, see 6.7.5 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 6-51** shows the transmission cable connections in hybrid transmission mode (UMTS E1/T1 port + LTE FE/GE optical port).

Figure 6-51 Transmission cable connections in hybrid transmission mode (1)

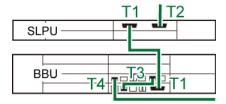


Table 6-54 describes the cables.

**Table 6-54** Transmission cables in hybrid transmission mode (1)

SN	Description
T1	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	For details, see 6.7.1 E1/T1 Cable.
T3	For details, see 6.7.4 Cable Between Two FE Electrical Ports.
T4	For details, see 6.7.3 FE/GE Optical Cable.

**Figure 6-52** shows the transmission cable connections in hybrid transmission mode (UMTS E1/T1 port + LTE FE/GE electrical port).

Figure 6-52 Transmission cable connections in hybrid transmission mode (2)

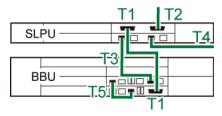


Table 6-55 describes the cables.

**Table 6-55** Transmission cables in hybrid transmission mode (2)

SN	Description
T1	For details, see 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	For details, see 6.7.1 E1/T1 Cable.
T3	For details, see 6.7.7 FE Surge Protection Transfer Cable.
T4	For details, see 6.7.6 FE/GE Cable.
T5	For details, see 6.7.5 Cable Between Two FE Optical Ports.

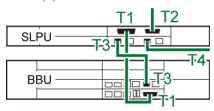
# Transmission Cable Connection in the UMTS+LTE Base Station in Separate Transmission Mode

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 6-53** 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 6-53** Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (1)



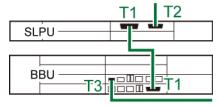
**Table 6-56** describes the cable connections.

**Table 6-56** Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	See 6.7.1 E1/T1 Cable.
T3	See 6.7.7 FE Surge Protection Transfer Cable.
T4	See 6.7.6 FE/GE Cable.

**Figure 6-54** 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 6-54** Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (2)



**Table 6-57** describes the cable connections.

**Table 6-57** Transmission cable connections in a base station in UMTS 4E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2	See 6.7.1 E1/T1 Cable.
Т3	See 6.7.3 FE/GE Optical Cable.

**Figure 6-55** 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 6-55** Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (1)

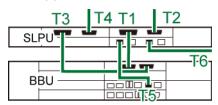


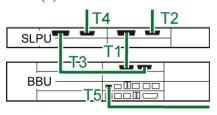
Table 6-58 describes the cable connections.

**Table 6-58** Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 E1/T1 Cable.
T5	See 6.7.7 FE Surge Protection Transfer Cable.
Т6	See 6.7.6 FE/GE Cable.

**Figure 6-56** 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 6-56** Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (2)



**Table 6-59** describes the cable connections.

**Table 6-59** Transmission cable connections in a base station in UMTS 8E1/T1+LTE FE/GE mode (2)

Cable Number	Cable Description
T1 and T3	See 6.7.2 E1/T1 Surge Protection Transfer Cable.
T2 and T4	See 6.7.1 E1/T1 Cable.
T5	See 6.7.3 FE/GE Optical Cable.

# UMTS FE/GE+LTE FE/GE

**Figure 6-57** 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 6-57** Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (1)

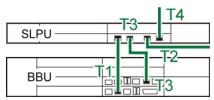


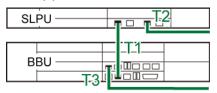
Table 6-60 describes the cable connections.

**Table 6-60** Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (1)

Cable Number	Cable Description
T1 and T3	See 6.7.7 FE Surge Protection Transfer Cable.
T2 and T4	See 6.7.6 FE/GE Cable.

**Figure 6-58** 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 6-58** Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (2)



**Table 6-61** describes the cable connections.

**Table 6-61** Transmission cable connections in a base station in UMTS FE/GE+LTE FE/GE mode (2)

Cable Number	Cable Description
T1	See 6.7.7 FE Surge Protection Transfer Cable.
T2	See 6.7.6 FE/GE Cable.
Т3	See 6.7.3 FE/GE Optical 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, see **Transmission Cable Connection** 

in a GSM+UMTS Base Station in Co-Transmission Mode and Transmission Cable Connection 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, 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 a 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 a 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, 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.

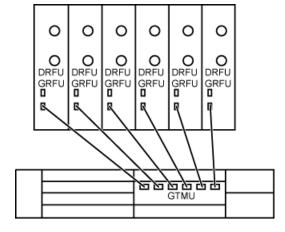
## 6.3.3 CPRI Cable Connections

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 6-59 and Figure 6-60 show the CPRI cable connections of the DRFU/GRFU.

Figure 6-59 Star topology



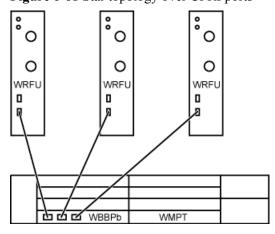
0 0 0 0 0 О O DRFU GRFU O DRFU DRFU O DRFU O DRFU O DRFU GRFU GRFU GRFU GRFU GRFU 0 0 0 0 DRFU ) O DRFU O DRFU DRF 0 DRFU DRFU ンベFU GRFU **B** GRFU GRFU GRFU GRF

Figure 6-60 Chain topology

# **CPRI Cable Connections in the UMTS Only Base Station**

**Figure 6-61** 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.

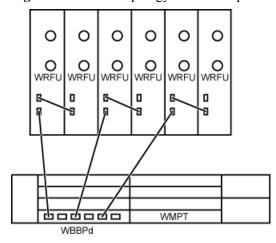
Figure 6-61 Star topology over CPRI ports



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 6-62** and **Figure 6-63**.

Figure 6-62 Chain topology over CPRI ports

Figure 6-63 Chain topology over CPRI ports on the WBBPd



# **CPRI Cable Connections in the LTE Only Base Station**

Figure 6-64 shows the CPRI cable connections in the 3 x 10 MHz 2T2R configuration.

Figure 6-64 CPRI cable connections in the 3 x 10 MHz 2T2R configuration

**Figure 6-65** shows the CPRI cable connections in the 3 x 20 MHz 2T2R configuration.

Figure 6-65 CPRI cable connections in the 3 x 20 MHz 2T2R configuration

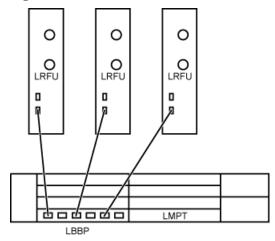


Figure 6-66 shows the CPRI cable connections in the 3 x 10 MHz 4T4R configuration.

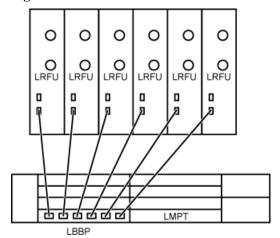
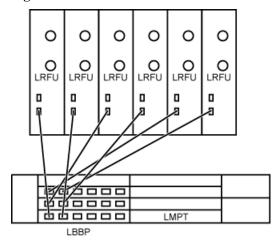


Figure 6-66 CPRI cable connections in the 3 x 10 MHz 4T4R configuration

Figure 6-67 shows the CPRI cable connections in the 3 x 20 MHz 4T4R configuration.

Figure 6-67 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

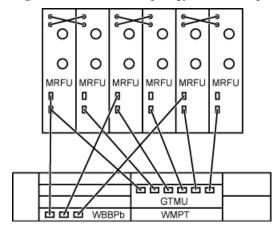
When the MRFUs support not more than three sectors, one WBBPb is configured. When the MRFUs support more than three sectors, two WBBPbs or one WBBPd are configured.

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 6-68** and **Figure 6-69**.

O O O MRFU MRFU MRFU GTMU WBBPb WMPT

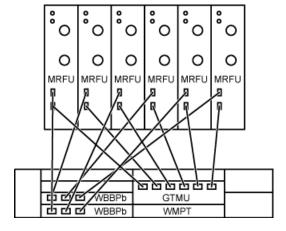
Figure 6-68 Dual-star topology over CPRI ports (1)

Figure 6-69 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 6-70 and Figure 6-71.

Figure 6-70 Dual-star topology over CPRI ports (3)



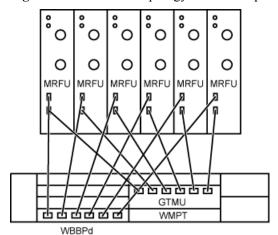


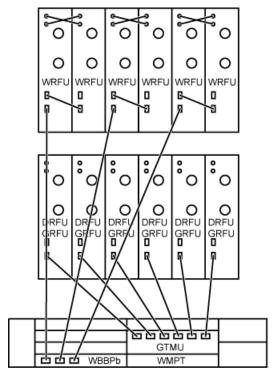
Figure 6-71 Dual-star topology over CPRI ports (4)

### CPRI Cable Connections in the Co-Cabinet GSM+UMTS Base Station

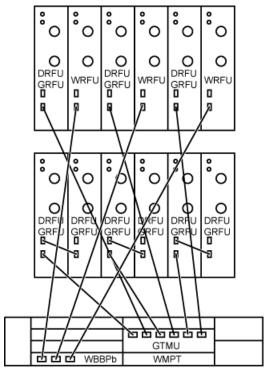
When a GSM+UMTS base station works in co-cabinet mode, the base station supports a maximum of 12 RFUs.

**Figure 6-72** and **Figure 6-73** show the CPRI cable connections in a base station in co-cabinet mode.

**Figure 6-72** CPRI cable connections in a co-cabinet base station with WRFUs and DRFUs/GRFUs (1)



**Figure 6-73** 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 6-74**.

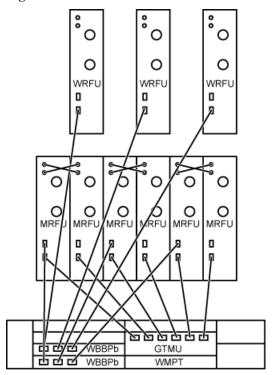
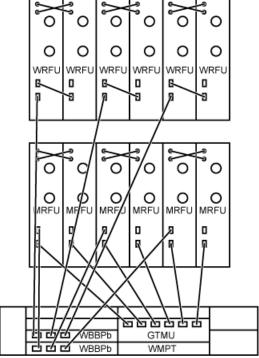


Figure 6-74 CPRI cable connections in a co-cabinet base station with MRFUs and WRFUs (1)

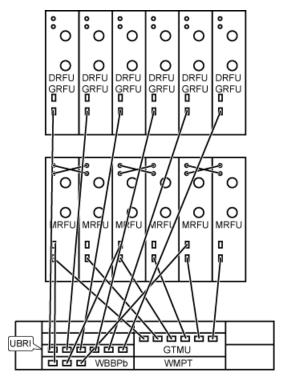
When the MRFUs work in dual-mode and support three sectors and when the WRFU support three sectors in a base station with MIMO supported, the CPRI cables are connected in the manner shown in Figure 6-75.

Figure 6-75 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 6-76**.

**Figure 6-76** 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 6-77**.

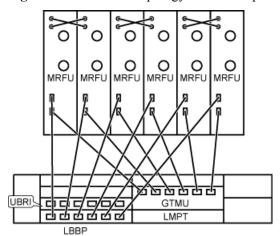


Figure 6-77 Dual-star topology over CPRI ports

# CPRI Cable Connections in the Co-Cabinet GSM+UMTS Base Station

Figure 6-78 shows the CPRI cable connections in a base station in co-cabinet mode.

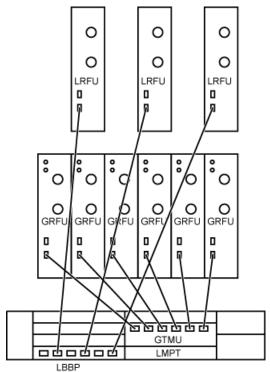
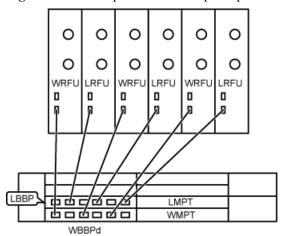


Figure 6-78 CPRI cable connections in co-cabinet mode

# **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 6-79**.

Figure 6-79 CPRI port connection principles

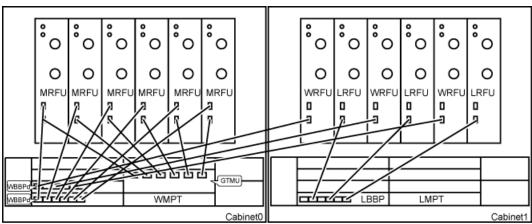


### CPRI Cable Connections for a GU+LO Base Station

### CPRI Cable Connections for a 6GU+3UO+3LO Base Station

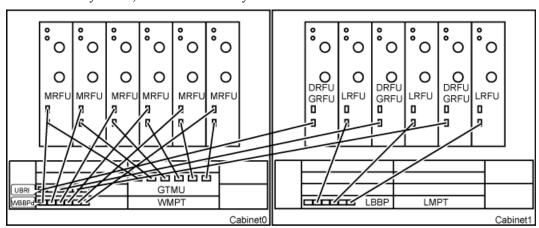
**Figure 6-80** shows the CPRI cable connections for a base station configured with six GSM +UMTS RFUs, three UMTS only RFUs, and three LTE only RFUs.

**Figure 6-80** CPRI cable connections for a base station configured with six GSM+UMTS RFUs, three UMTS only RFUs, and three LTE only RFUs



#### CPRI Cable Connections for a 6GU+3GO+3LO Base Station

**Figure 6-81** shows the CPRI cable connections for a base station configured with six GSM +UMTS RFUs, three GSM only RFUs, and three LTE only RFUs.

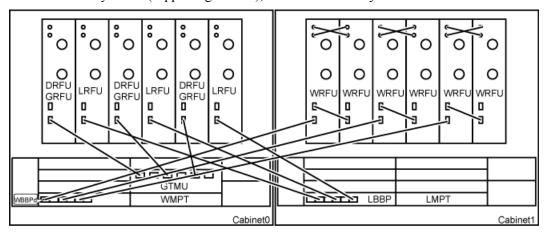


**Figure 6-81** CPRI cable connections for a base station configured with six GSM+UMTS RFUs, three GSM only RFUs, and three LTE only RFUs

# CPRI Cable Connections for a 3GO+3UO (MIMO)+3LO Base Station

**Figure 6-82** shows the CPRI cable connections for a base station configured with three GSM only RFUs, three UMTS only RFUs (supporting MIMO), and three LTE only RFUs.

**Figure 6-82** CPRI cable connections for a base station configured with three GSM only RFUs, three UMTS only RFUs (supporting MIMO), and three LTE only RFUs



### **CPRI Cable Connections for a GL+UO Base Station**

# CPRI Cable Connections for a 6GL+3UO (MIMO) Base Station

**Figure 6-83** shows the CPRI cable connections for a base station configured with six GSM+LTE RFUs and three UMTS only RFUs (supporting MIMO).

Cabinet

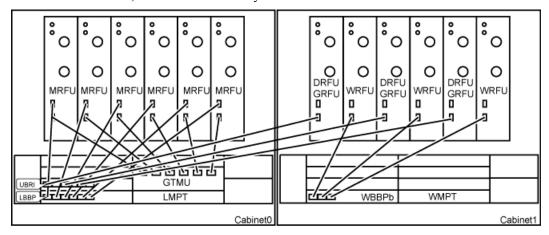
0 MRFU MRFU MRFU MRFU MRFU MRFU WRFU WRFU WRFU WRFU WRFU WRFU 0 WMPT LMPT WBBPb Cabinet0

Figure 6-83 CPRI cable connections for a base station configured with six GSM+LTE RFUs and three UMTS only RFUs (supporting MIMO)

### CPRI Cable Connections for a 3GO+6GL+3UO Base Station

Figure 6-84 shows the CPRI cable connections for a base station configured with three GSM only RFUs, six GSM+LTE RFUs, and three UMTS only RFUs.

Figure 6-84 CPRI cable connections for a base station configured with three GSM only RFUs, six GSM+LTE RFUs, and three UMTS only RFUs



### CPRI Cable Connections for a UO+GL Base Station

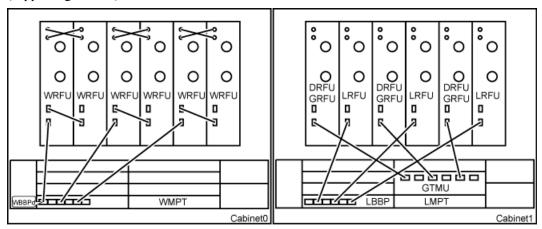
# **Background Information**

The UO+GL scenario is applicable only to an expanded base station, while the GL+UO scenario is applicable to a new base station.

# CPRI Cable Connections for a 3UO (MIMO)+6GL Base Station

**Figure 6-85** shows the CPRI cable connections for a base station configured with three UMTS only RFUs (supporting MIMO) and six GSM+LTE RFUs.

**Figure 6-85** CPRI cable connections for a base station configured with three UMTS only RFUs (supporting MIMO) and six GSM+LTE RFUs

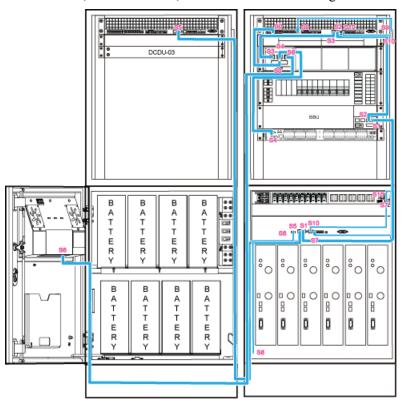


# 6.3.4 Monitoring Signal Cable Connections

This section describes the monitoring signal cable connections for the BTS3900A in a 110 V AC or 220 V AC power supply scenario and a –48 V DC power supply scenario.

# Monitoring Signal Cable Connections for a 110 V AC or 220 V AC Power Supply Scenario

**Figure 6-86** shows the monitoring signal cable connections for the BTS3900A configured with one RFC, one APM30H, one IBBS200D, and one TMC11H in a single-mode or dual-mode scenario where there is a 110 V AC or 220 V AC power supply.



**Figure 6-86** Monitoring signal cable connections for the BTS3900A configured with one RFC, one APM30H, one IBBS200D, and one TMC11H in a single-mode or dual-mode scenario

**Table 6-62** lists the monitoring signal cables.

**Table 6-62** Monitoring signal cables for the BTS3900A configured with one RFC, one APM30H, one IBBS200D, and one TMC11H in a single-mode or dual-mode scenario

SN	Description
S0	For details, see 6.9.5 Environment Monitoring Signal Cable.
S1 and S2	For details, see 6.9.4 Monitoring Signal Cable Between the CMUA and the BBU.
S3 and S6	For details, see 6.9.6 Monitoring Signal Transfer Cable.
S4	For details, see 6.9.13 EMUA Monitoring Signal Cable.
S5	For details, see 6.9.1 Monitoring Signal Cable Between Cascaded CMUAs.
S7	For details, see 6.9.3 Door Status Monitoring Cable.
S8	For details, see 6.9.2 Temperature Monitoring Signal Cable for the RFC.

SN	Description
S9	For details, see <b>6.9.8 APM30H Door Status Monitoring Cable</b> .
S10	For details, see 6.9.7 ELU Signal Cable.

**Figure 6-87** shows the monitoring signal cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a single-mode or dual-mode scenario.

**Figure 6-87** Monitoring signal cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a single-mode or dual-mode scenario

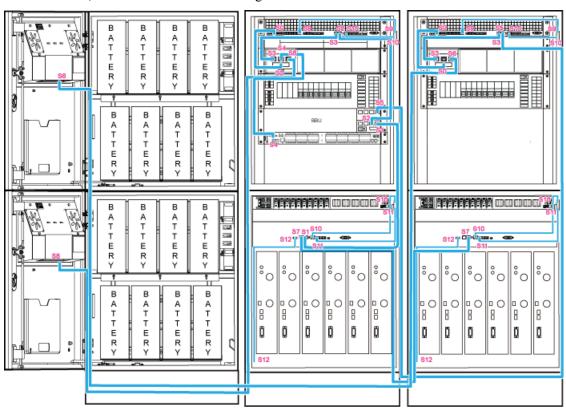


Table 6-63 lists the monitoring signal cables.

**Table 6-63** Monitoring signal cables for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a single-mode or dual-mode scenario

SN	Description
S0	For details, see <b>6.9.5 Environment Monitoring Signal Cable</b> .
S1, S2, and S5	For details, see 6.9.4 Monitoring Signal Cable Between the CMUA and the BBU.

SN	Description
S3 and S8	For details, see 6.9.6 Monitoring Signal Transfer Cable.
S4	For details, see <b>6.9.13 EMUA Monitoring Signal Cable</b> .
S6 and S7	For details, see 6.9.1 Monitoring Signal Cable Between Cascaded CMUAs.
S9	For details, see 6.9.8 APM30H Door Status Monitoring Cable.
S10	For details, see 6.9.7 ELU Signal Cable.
S11	For details, see 6.9.3 Door Status Monitoring Cable.
S12	For details, see 6.9.2 Temperature Monitoring Signal Cable for the RFC.

Two BBUs are configured in a triple-mode scenario. The basic BBU is BBU 0, which is installed in the APM30H on the left. The extension BBU is BBU 1, which is installed in the APM30H on the right. In this scenario, all the monitoring boards are connected only to BBU 0. The monitoring signal cable connections for a triple-mode scenario are the same as those for a single-mode or dual-mode scenario. **Figure 6-88** shows the monitoring signal cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a triple-mode scenario.

9 30 30 35 510 BATTERY B A T BATTERY BATTERY BATTERY BBU1 BBU0 BATTERY BATTERY -0 -0 00 -0 - O 0 00 -0 0 0 0 О 8 Ö Õ Ö Ö Ö Õ Õ Õ Ö Õ đ

**Figure 6-88** Monitoring signal cable connections for the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a triple-mode scenario

**Table 6-64** lists the monitoring signal cables.

**Table 6-64** Monitoring signal cables of the BTS3900A configured with two RFCs, two APM30Hs, and two IBBS200Ds in a triple-mode scenario

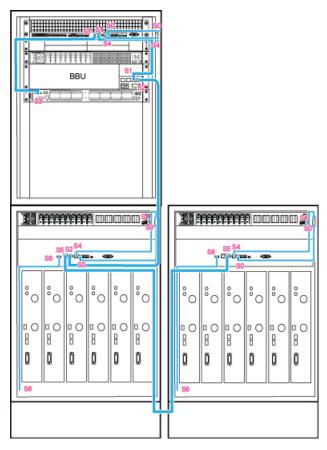
SN	Description
S0	For details, see 6.9.5 Environment Monitoring Signal Cable.
S1, S2, and S5	For details, see 6.9.4 Monitoring Signal Cable Between the CMUA and the BBU.
S3 and S8	For details, see 6.9.6 Monitoring Signal Transfer Cable.
S4	For details, see 6.9.13 EMUA Monitoring Signal Cable.
S6 and S7	For details, see 6.9.1 Monitoring Signal Cable Between Cascaded CMUAs.
S9	For details, see 6.9.8 APM30H Door Status Monitoring Cable.
S10	For details, see 6.9.7 ELU Signal Cable.

SN	Description
S11	For details, see <b>6.9.3 Door Status Monitoring Cable</b> .
S12	For details, see 6.9.2 Temperature  Monitoring Signal Cable for the RFC.

# Monitoring Signal Cable Connections for a -48 V DC Power Supply Scenario

**Figure 6-89** shows the monitoring signal cable connections for the BTS3900A configured with two RFCs and one TMC11H in a –48 V DC power supply scenario.

**Figure 6-89** Monitoring signal cable connections for the BTS3900A configured with two RFCs and one TMC11H



**Table 6-65** lists the monitoring signal cables.

**Table 6-65** Monitoring signal cables of the BTS3900A configured with two RFCs and one TMC11H

SN	Description
S0	For details, see 6.9.3 Door Status Monitoring Cable.
S1 and S2	For details, see 6.9.4 Monitoring Signal Cable Between the CMUA and the BBU.
S3	For details, see 6.9.13 EMUA Monitoring Signal Cable.
S4	For details, see 6.9.7 ELU Signal Cable.
S5	For details, see 6.9.1 Monitoring Signal Cable Between Cascaded CMUAs.
S6	For details, see 6.9.2 Temperature Monitoring Signal Cable for the RFC.

# 6.3.5 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 6-90 describes the RF cable connections.

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Figure 6-90 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 6-90 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 6-91 describes the RF cable connections.

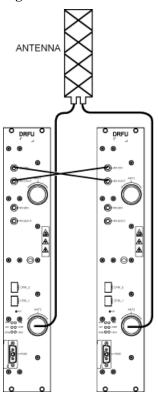


Figure 6-91 Cable connections in 1T2R mode (2)

### 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 6-90 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 6-91 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**

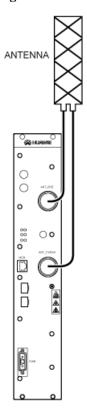
The following items are configured for three carriers:

• A pair of dual-polarized antennas

#### One GRFU

Figure 6-92 describes the RF cable connections.

Figure 6-92 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 6-93 describes the RF cable connections.

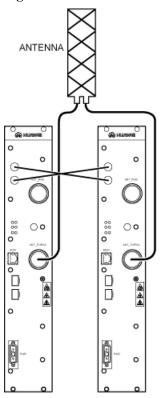


Figure 6-93 Cable Connections with Nine Carriers

## **Cable Connections with 14 Carriers**

The following items are configured for 14 carriers:

- Two pairs of dual-polarized antennas
- Three GRFUs

Figure 6-94 describes the RF cable connections.

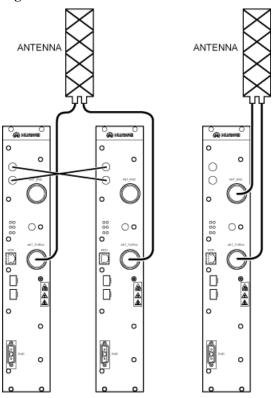


Figure 6-94 Cable connections with 14 carriers

## **Cable Connections with 24 Carriers**

The following items are configured for 24 carriers:

- Two pairs of dual-polarized antennas
- Four GRFUs

Figure 6-95 describes the RF cable connections.

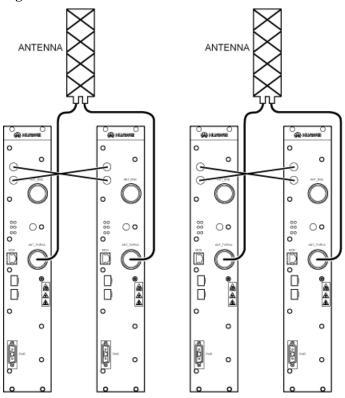


Figure 6-95 Cable connections with 24 carriers

### **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 6-96 describes the RF cable connections.

Figure 6-96 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 6-97 describes the RF cable connections.

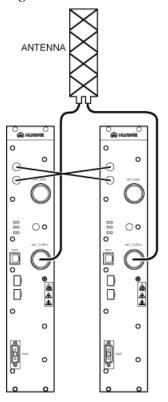


Figure 6-97 Cable connections in 1T2R mode (2)

### 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 6-97 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 6-98 describes the RF cable connections.

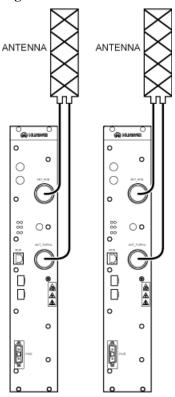


Figure 6-98 Cable connections in 2T4R mode

### Cable Connections in 2x2 MIMO Mode

The base station in UMTS only mode supports 2x2 MIMO. Figure 6-97 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 6-99 shows RF cable connections.

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Figure 6-99 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 6-100 shows RF cable connections.

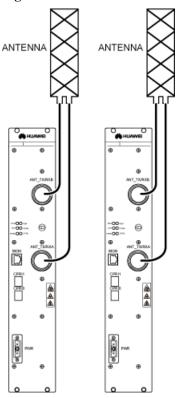


Figure 6-100 RF cable connections in 4T4R mode

### **RF Cable Connections for MRFUs**

The MRFU supports six carriers.

The following description is based on the RF cable connections for MRFUs supporting a single sector.

The MRFU supports only the 1T2R configuration.

### RF Cable Connections in G3U1 mode

When three GSM carriers and one UMTS carrier are configured, the following items are required:

- A dual-polarized antenna
- An MRFU

Figure 6-101 shows RF cable connections.

Figure 6-101 RF cable connections in G3U1 mode



### RF Cable Connections in G9U1 mode

When nine GSM carriers and one UMTS carrier are configured, the following items are required:

- A dual-polarized antenna
- Two MRFUs

Figure 6-102 shows RF cable connections.

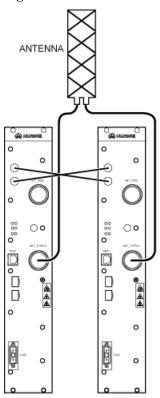


Figure 6-102 RF cable connections in G9U1 mode

### RF Cable Connections in G2U2 Mode

When two GSM carriers and two UMTS carriers are configured, the following items are required:

- A dual-polarized antenna
- An MRFU

Figure 6-101 shows RF cable connections.

## RF Cable Connections in G6U2 Mode

When six GSM carriers and two UMTS carriers are configured, the following items are required:

- A dual-polarized antenna
- Two MRFUs

Figure 6-102 shows RF cable connections.

### RF Cable Connections in G4L1 MIMO Mode

When the MRFU works in LTE 2T2R MIMO mode, with four GSM carriers and one LTE carrier configured, the following items are required:

- A dual-polarized antenna
- Two MRFUs

Figure 6-102 shows RF cable connections.

### RF Cable Connections in G8L1 MIMO Mode

When the MRFU works in LTE 2T2R MIMO mode, with eight GSM carriers and one LTE carrier configured, the following items are required:

- A dual-polarized antenna
- Two MRFUs

Figure 6-102 shows RF cable connections.

# 6.4 BTS3900A PGND Cable

The BTS3900A PGND cables are classified into the PGND cable for the cabinet and PGND cables for the internal modules.

### Structure

All PGND cables of the BTS3900A are yellow and green. Each end of a PGND cable is an OT terminal. **Figure 6-103** and **Figure 6-104** show a PGND cable.

Figure 6-103 PGND cable for the cabinet

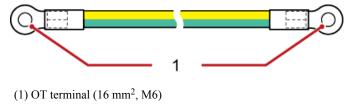
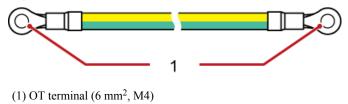


Figure 6-104 PGND cable for the internal modules



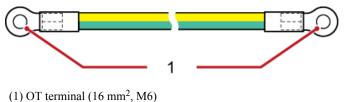
# 6.5 BTS3900A Equipotential Cable

The equipotential cables of the BTS3900A are used to connect the PGND terminals between cabinets to ensure the equal potential among all cabinets and the normal operation of the base station.

### Structure

Figure 6-105 shows the equipotential cables of the BTS3900A.

Figure 6-105 Equipotential cables of the BTS3900A



## 6.6 BTS3900A Power Cables

The BTS3900A power cables are the input power cables for each cabinet and power cables for the BBU, RFUs, fan box in each cabinet, and storage batteries.

#### 6.6.1 Input Power Cables for the APM30H

The input power cables for the APM30H lead external power to the power system. Different configurations of the power system can support different types of input power, including the 220 V AC single-phase input power, 220 V AC three-phase input power and 110 V AC or 120 V AC dual live wire input power.

#### 6.6.2 Input Power Cables for the RFC

The input power cables for the RFC lead -48 V DC power to the DCDU-01 in the RFC.

#### 6.6.3 Power Cables for the Storage Batteries

This section describes the input power cables for the storage batteries, power cables between the storage batteries and the copper bar in the junction box, and inter-battery connection copper bar.

#### 6.6.4 Input Power Cable for the TMC11H

The input power cable for the TMC11H varies according to the power supply scenario.

#### 6.6.5 BBU Power Cable

This section describes the BBU power cable. Either -48 V power cable or +24 V power cable can be used, depending on the power supply scenario.

### 6.6.6 Power Cable for the RFU

The power cable for the RFU feeds -48 V DC power into the RFU in the RFC.

### 6.6.7 Power Cable for the Fan Box in the APM30H

The power cable feeds -48 V DC power into the fan box in the APM30H.

#### 6.6.8 Power Cable for the Fan Box in the RFC

The power cable feeds -48 V DC power into the fan box in the RFC.

#### 6.6.9 Power Cables for the Fans in the IBBS200D

The power cables for the fans in the IBBS200D consist of the input power cable for the fans in the IBBS200D and the power transfer cable for the fans in the IBBS200D.

#### 6.6.10 Power Cable for the Fan Box in the TMC11H

The power cable feeds -48 V DC power cable into the fan box in the transmission cabinet from the DCDU-03.

### 6.6.11 Power Cables for the TEC Cooler

The power cables for the TEC cooler consist of the input power cable for the TEC cooler and the power transfer cable for the TEC cooler.

#### 6.6.12 Power Cable for the Heater

The power cable for the heater feeds the AC input power into the heater from the junction box.

#### 6.6.13 Power Cable for the Heating Film

The power cable for the heating film connects the output terminal on the junction box on the left of the AMP30H cabinet to the AC power input terminal on the heating film.

#### 6.6.14 Power Cable for the SOU

The power cable for the SOU feeds AC power into the SOU from the AC OUTPUT port of the EPS.

#### 6.6.15 Power Cable for the EMUA

The power cable for the EMUA feeds -48 V DC power into the EMUA.

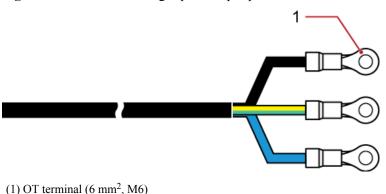
# 6.6.1 Input Power Cables for the APM30H

The input power cables for the APM30H lead external power to the power system. Different configurations of the power system can support different types of input power, including the 220 V AC single-phase input power, 220 V AC three-phase input power and 110 V AC or 120 V AC dual live wire input power.

### **Exterior**

Figure 6-106 shows the 220 V AC single-phase input power cable.

Figure 6-106 220 V AC single-phase input power cable



### M NOTE

The number of wires of an AC input power cable varies according to the cable type. Figure 6-106 shows the 220 V AC single-phase input power cable.

# Specifications

6-86

**Table 6-66** describes the specifications of different types of AC input power cables.

Table 6-66 Specifications of different types of AC input power cables

Cable Type	Wire Type	Wire Color	Wire Diameter and OT Aperture Type
220 V AC three-	L1 wire	Yellow	2.5 mm <sup>2</sup> , M6
phase power cable	L2 wire	Green	
	L3 wire	Red	
	N wire	Blue	
220 V AC single- phase power cable	L wire	Brown	6 mm <sup>2</sup> , M6
	N wire	Blue	
	PE wire	Yellow green	
110 V AC or 120 V AC dual-live-wire	L1 wire	Black	6 mm <sup>2</sup> , M6
	L2 wire	Red	
	N wire	White	
	PE wire	Green	

### **□** NOTE

The colors and appearance of cables delivered by Huawei vary with countries and areas. If cables are purchased at local markets, the cables must comply with local rules and regulations.

# 6.6.2 Input Power Cables for the RFC

The input power cables for the RFC lead -48 V DC power to the DCDU-01 in the RFC.

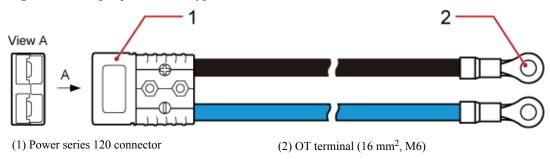
### NOTE

The BTS3900A supports different types of external power supplies. As a component of the BTS3900A, the RFC supports two types of the input power cables.

# Power Input Cable Type I of the RFC

**Figure 6-107** shows the input power cables for the RFC when the BTS3900A is fed by AC power and the RFC is supplied with power directly by the APM30H.

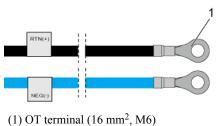
Figure 6-107 Input power cable type I of the RFC



# Input power cable type II of the RFC

**Figure 6-108** shows the input power cables for the RFC when the BTS3900A is fed by DC -48 V power and the RFC is supplied with power directly from external power supply equipment.

Figure 6-108 Input power cable type II of the RFC



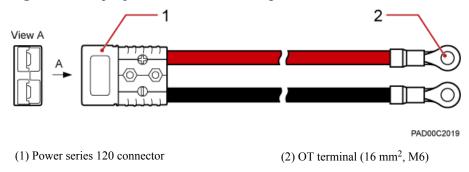
# **6.6.3 Power Cables for the Storage Batteries**

This section describes the input power cables for the storage batteries, power cables between the storage batteries and the copper bar in the junction box, and inter-battery connection copper bar.

### **Exterior**

Figure 6-109 shows the input power cables for the storage batteries.

Figure 6-109 Input power cables for the storage batteries



**Figure 6-110** shows the power cable between the storage batteries and the copper bar in the junction box.

Figure 6-110 Power cable between the storage batteries and the copper bar in the junction box



(1) OT terminal (16 mm<sup>2</sup>, M6)

The inter-battery connection copper bar between storage batteries is delivered with the storage batteries. **Figure 6-111** shows the inter-battery connection copper bar.

Figure 6-111 Inter-battery connection copper bar



### **Specifications**

- Of the input power cables for the storage batteries, the RTN(+) cable is red, with a cross-sectional area of 16 mm<sup>2</sup>, and the NEG(-) cable is black, with a cross-sectional area of 16 mm<sup>2</sup>.
- Of the power cables between the storage batteries and the copper bar in the junction box, the RTN(+) cable is red, with a cross-sectional area of 16 mm<sup>2</sup>, and the NEG(-) cable is black, with a cross-sectional area of 16 mm<sup>2</sup>.

# 6.6.4 Input Power Cable for the TMC11H

The input power cable for the TMC11H varies according to the power supply scenario.

### Input Power Cable for the TMC11H (1)

**Figure 6-112** shows the input power cable for the TMC11H in the AC power supply scenario. The APM30H supplies power to the TMC11H.

Figure 6-112 Input power cable for the TMC11H (1)

View A

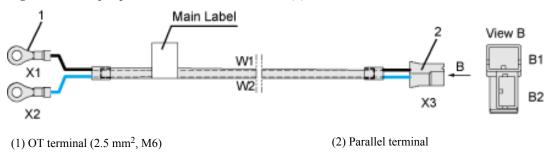
(1) Easy power receptacle (pressfit type) connector

(2) OT terminal (4 mm², M6)

# Input Power Cable for the TMC11H (2)

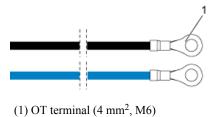
**Figure 6-113** shows the input power cable for the TMC11H in the -48 V DC power supply scenario. The RFC supplies power to the TMC11H.

Figure 6-113 Input power cable for the TMC11H (2)



**Figure 6-114** shows the input power cable for the TMC11H in the -48 V DC power supply scenario. The external power equipment supplies power to the TMC11H.

Figure 6-114 Input power cable for the TMC11H (3)



### 6.6.5 BBU Power Cable

This section describes the BBU power cable. Either -48 V power cable or +24 V power cable can be used, depending on the power supply scenario.

#### **Exterior**

The BBU power cable depends on the type of the cabinet containing the BBU, because different types of cabinet use different power supplies.

When the power supply device is the DCDU or PDU, the BBU power cable has a 3V3 connector at one end and bare wires at the other end. Based on the connector of the power distribution device, appropriate terminals are added to the bare wire end on site. **Figure 6-115** shows the BBU power cable with OT terminals at the bare wire end as an example.

Figure 6-115 BBU power cable (1)



(1) 3V3 connector

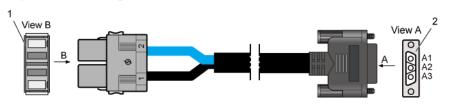
(2) OT terminal (6 mm<sup>2</sup>, M4)

#### M NOTE

There are two wires in the -48 V power cable with a blue wire and a black wire. The +24 V power cable and the -48 V power cable have the same exterior, but they differ in color. The +24 V power cable has a red wire and a black wire.

When the power supply device is the EPS, the BBU power cable has a 3V3 connector at one end and an easy power receptacle (pressfit type) connector at the other end. **Figure 6-116** shows the BBU power cable.

Figure 6-116 BBU power cable (2)



(1) Easy power receptacle (pressfit type) connector

(2) 3V3 power connector

### **Pin Assignment**

The power cable is a 2-wire cable. **Table 6-67** and **Table 6-68** describe the pin assignment for the wires of the power cable.

Table 6-67 Pin assignment for the wires of the -48 V power cable

Pin on the 3V3 Connector	Color	Description
A1	Blue	-48 V
A2	-	-
A3	Black	GND

Table 6-68 Pin assignment for the wires of the +24 V power cable

Pin on the 3V3 Connector	Color	Description
A1	Red	+24 V
A2	-	-
A3	Black	GND

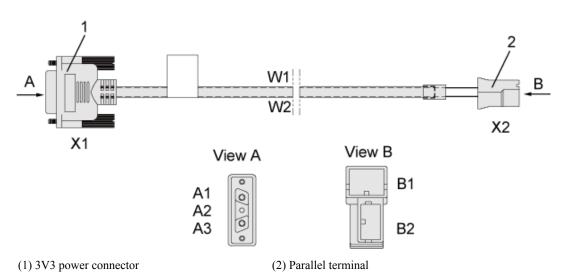
# 6.6.6 Power Cable for the RFU

The power cable for the RFU feeds -48 V DC power into the RFU in the RFC.

### **Exterior**

One end of the power cable for the RFU is a parallel terminal, and the other end is a 3V3 power connector. Each RFU is configured with a separate power cable. All these cables have the same exterior. **Figure 6-117** shows the power cable for the RFU.

Figure 6-117 Power cable for the RFU



## **Pin Assignment**

**Table 6-69** describes the pin assignment for the wires of the power cable for the RFU.

**Table 6-69** Pin assignment for the wires of the power cable for the RFU

Wire	X1 End	X2 End	Wire Color
W1	X1.A1	X2.B2	Blue
W2	X1.A3	X2.B1	Black

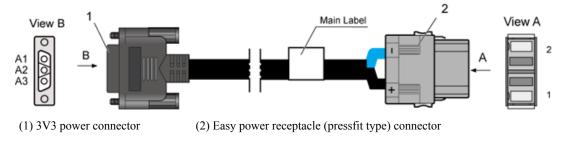
# 6.6.7 Power Cable for the Fan Box in the APM30H

The power cable feeds -48 V DC power into the fan box in the APM30H.

### **Exterior**

Figure 6-118 shows the power cable for the fan box in the APM30H.

Figure 6-118 Power cable for the fan box in the APM30H



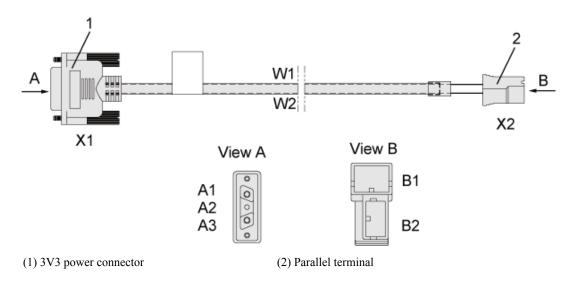
### 6.6.8 Power Cable for the Fan Box in the RFC

The power cable feeds -48 V DC power into the fan box in the RFC.

### **Exterior**

One end of the power cable for the fan box in the RFC is a parallel terminal, and the other end is a 3V3 power connector. **Figure 6-119** shows the power cable for the fan box in the RFC.

Figure 6-119 Power cable for the fan box in the RFC



## **Pin Assignment**

**Table 6-70** describes the pin assignment for the wires of the power cable for the fan box in the RFC.

Table 6-70 Pin assignment for the wires of the power cable for the fan box in the RFC

Wire	X1 End	X2 End	Wire Color
W1	X1.A1	X2.B2	Blue
W2	X1.A3	X2.B1	Black

# 6.6.9 Power Cables for the Fans in the IBBS200D

The power cables for the fans in the IBBS200D consist of the input power cable for the fans in the IBBS200D and the power transfer cable for the fans in the IBBS200D.

### **Exterior**

Figure 6-120 shows the input power cable for the fans in the IBBS200D.

Figure 6-120 Input power cable for the fans in the IBBS200D

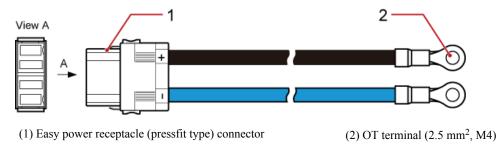
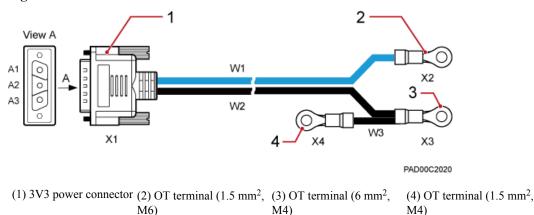


Figure 6-121 shows the power transfer cable for the fans in the IBBS200D.

Figure 6-121 Power transfer cable for the fans in the IBBS200D



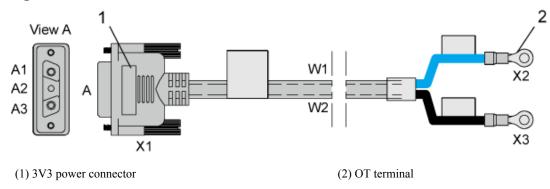
## 6.6.10 Power Cable for the Fan Box in the TMC11H

The power cable feeds -48 V DC power cable into the fan box in the transmission cabinet from the DCDU-03.

### **Exterior**

Figure 6-122 shows the power cable for the fan box in the TMC11H.

Figure 6-122 Power cable for the fan box in the TMC11H



# 6.6.11 Power Cables for the TEC Cooler

The power cables for the TEC cooler consist of the input power cable for the TEC cooler and the power transfer cable for the TEC cooler.

### **Exterior**

Figure 6-123 shows the input power cable for the TEC cooler.

Figure 6-123 Input power cable for the TEC cooler

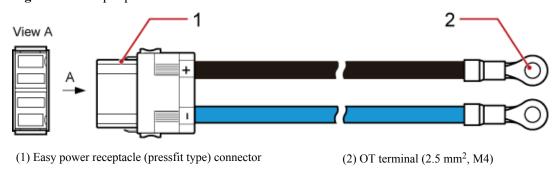
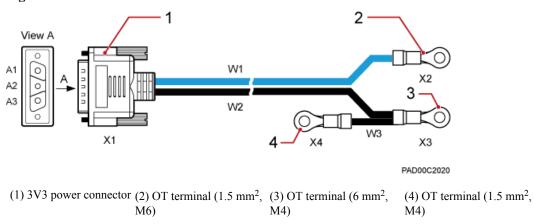


Figure 6-124 shows the power transfer cable for the TEC cooler.

Figure 6-124 Power transfer cable for the TEC cooler



### 6.6.12 Power Cable for the Heater

The power cable for the heater feeds the AC input power into the heater from the junction box.

### **Exterior**

Figure 6-125 shows the power cable for the heater.

View A

N E L

X1

(1) C13 connector

(2) OT terminal (1.5 mm², M4)

Figure 6-125 Power cable for the heater

# **Pin Assignment**

**Table 6-71** describes the pin assignment for the wires of the power cable for the heater.

**Table 6-71** Pin assignment for the wires of the power cable for the heater

SN	Wire Color	Connector Type	Label
W1	Brown	OT terminal	L
W2	Green and yellow	OT terminal	PE
W3	Blue	OT terminal	N

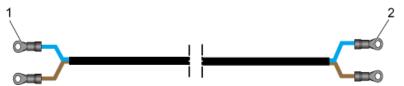
# 6.6.13 Power Cable for the Heating Film

The power cable for the heating film connects the output terminal on the junction box on the left of the AMP30H cabinet to the AC power input terminal on the heating film.

### **Exterior**

Figure 6-126 shows the power cable for the heating film.

Figure 6-126 Power cable for the heating film



(1) OT terminal (1.5 mm<sup>2</sup>, M4) for the APM30H cabinet (2) OT terminal (1.5 mm<sup>2</sup>, M4) for the battery cabinet

### **Specifications**

The AC power cable for the heating film has a cross-sectional area of 1.5 mm<sup>2</sup> with a black jacket. The cable consists of the blue and brown wires.

## 6.6.14 Power Cable for the SOU

The power cable for the SOU feeds AC power into the SOU from the AC OUTPUT port of the EPS.

### **Exterior**

Figure 6-127 shows the power cable for the SOU.

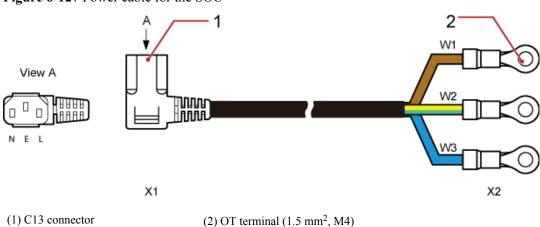


Figure 6-127 Power cable for the SOU

# Pin Assignment

**Table 6-72** describes the pin assignment for the wires of the power cable for the SOU.

Table 6-72 Pin assignment for the wires of the power cable for the SOU

Pin	Wire Color	Connector Type	Label
W1	Brown	OT terminal	L
W2	Green and yellow	OT terminal	PE
W3	Blue	OT terminal	N

# 6.6.15 Power Cable for the EMUA

The power cable for the EMUA feeds -48 V DC power into the EMUA.

#### NOTE

There are two types of power cable for the EMUA, depending on the power supply equipment in different cabinets.

Figure 6-128 shows the power cable for the EMUA installed in the APM30H cabinet.

Figure 6-128 Power cables for the EMUA (1)

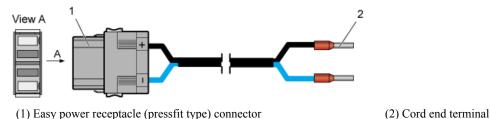
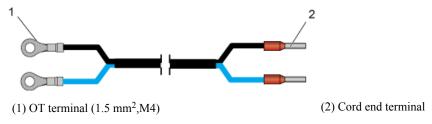


Figure 6-129 shows the power cable for the EMUA installed in the TMC11H cabinet.

Figure 6-129 Power cables for the EMUA (2)



# 6.7 BTS3900A Transmission Cables

The BTS3900A transmission cables include the E1/T1 cable, E1/T1 surge protection transfer cable, FE/GE cable, and FE/GE surge protection transfer cable.

#### 6.7.1 E1/T1 Cable

The E1/T1 cable connects the BBU to the external transmission device and transmits baseband signals.

### 6.7.2 E1/T1 Surge Protection Transfer Cable

This section describes the E1/T1 surge protection transfer cable connecting the UELP to the transmission board. This cable is optional.

#### 6.7.3 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.

#### 6.7.4 Cable Between Two FE Electrical Ports

The cable between two FE electrical ports connects the GTMU and the WMPT to implement IP transmission.

### 6.7.5 Cable Between Two FE Optical Ports

The cable between two FE optical ports connects the GTMU and the WMPT to implement IP transmission.

#### 6.7.6 FE/GE Cable

The FE/GE cable connects the BBU to the transmission device through routing devices and transmits baseband signals.

#### 6.7.7 FE Surge Protection Transfer Cable

The FE surge protection transfer cable is an optional cable that connects the main control board to the UFLP.

# 6.7.1 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 and 120-ohm E1 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 6-130** shows an E1/T1 cable.

Figure 6-130 E1/T1 cable



(1) DB26 male connector

Table 6-73 describes the connectors of the 75-ohm E1 coaxial cable.

Table 6-73 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 6-74** and **Table 6-75** describe the pin assignment for the wires of the E1/T1 cable.

## $\square$ NOTE

In Table 6-74, "Tip" refers to a wire in the E1 coaxial cable, and "Ring" refers to an external conductor of the cable.

**Table 6-74** 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-
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 6-75** 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-

Pins of the DB26 Male Connector	Wire Color	Wire Type	Cable Labels
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+
X.24	Red		TX3-
X.25	Green	Twisted pair	TX4+
X.26	Red		TX4-

# 6.7.2 E1/T1 Surge Protection Transfer Cable

This section describes the E1/T1 surge protection transfer cable connecting the UELP to the transmission board. This cable is optional.

### **Exterior**

The E1/T1 surge protection transfer cable has a DB26 male connector at one end and a DB25 male connector at the other end, as shown in **Figure 6-131**.

Figure 6-131 E1/T1 surge protection transfer cable



## **Pin Assignment**

**Table 6-76** describes the pin assignment for the wires of the E1/T1 surge protection transfer cable

Table 6-76 Pin assignment for the wires of the E1/T1 surge protection transfer cable

Pin on the DB26 Male Connector	Туре	Pin on the DB25 Male Connector
X1.20	Twisted pair cable	X2.2
X1.19		X2.3
X1.4	Twisted pair cable	X2.4
X1.3		X2.5
X1.22	Twisted pair cable	X2.6
X1.21		X2.7
X1.6	Twisted pair cable	X2.8
X1.5		X2.9
X1.24	Twisted pair cable	X2.10
X1.23		X2.11
X1.8	Twisted pair cable	X2.12
X1.7		X2.13
X1.1	Twisted pair cable	X2.14
X1.2		X2.15
X1.25	Twisted pair cable	X2.24
X1.26		X2.25

## 6.7.3 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 6-132**, **Figure 6-133**, and **Figure 6-134** respectively.

Figure 6-132 FE/GE optical cable (FC and LC connectors)



Figure 6-133 FE/GE optical cable (SC and LC connectors)



Figure 6-134 FE/GE optical cable (LC and LC connectors)





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.

## 6.7.4 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 RJ-45 connector at each end, as shown in **Figure 6-135**.

Figure 6-135 Cable between two FE electrical ports



(1) RJ-45 connector

## 6.7.5 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 6-136**.

Figure 6-136 Cable between two FE optical ports



## 6.7.6 FE/GE Cable

The FE/GE cable connects the BBU to the transmission device through routing devices and transmits baseband signals.

### ■ NOTE

(1) LC connector

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 RJ-45 connector at each end, as shown in **Figure 6-137**.

Figure 6-137 FE/GE cable



(1) RJ-45 connector

## Pin Assignment

Table 6-77 describes the pin assignment for the wires of the FE/GE cable.

Pin on the RJ-45 Connector	Wire Color	Wire Type	Pin on the RJ-45 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

Table 6-77 Pin assignment for the wires of the FE/GE cable

## 6.7.7 FE Surge Protection Transfer Cable

The FE surge protection transfer cable is an optional cable that connects the main control board to the UFLP.

## **Exterior**

The FE surge protection transfer cable has an RJ-45 connector at each end, as shown in **Figure 6-138**.

Figure 6-138 FE surge protection transfer cable



## **Pin Assignment**

**Table 6-78** describes the pin assignment for the wires of the FE surge protection transfer cable.

Pin on the RJ-45 Connector	Wire Color	Wire Type	Pin on the RJ-45 Connector
X1.2	Orange	Twisted pair	X2.2
X1.1	White		X2.1
X1.6	Green	Twisted pair	X2.6
X1.3	White		X2.3
X1.4	Blue	Twisted pair	X2.4
X1.5	White		X2.5
X1.8	Brown	Twisted pair	X2.8
X1.7	White		X2.7

**Table 6-78** Pin assignment for the wires of the FE surge protection transfer cable

## 6.8 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 6-139**.

Figure 6-139 CPRI electrical cable



# 6.9 BTS3900A Signal Cables

The BTS3900A signal cables are the monitoring signal cables between cascaded CMUAs, temperature monitoring signal cable for the RFC, door status monitoring cable, monitoring signal cable between the CMUA and the BBU, environment monitoring signal cable, monitoring signal transfer cable, ELU signal cable, APM30H door status monitoring cable, monitoring signal cable for the fan on the front door, temperature sensor cable for the batteries, monitoring signal cable for the storage battery cabinet, BBU alarm cable, GPS clock signal cable, and EMUA monitoring signal cable.

#### 6.9.1 Monitoring Signal Cable Between Cascaded CMUAs

The monitoring signal cable between cascaded CMUAs connects two CMUAs. Thus, the lower-level CMUA communicates with the BBU through the upper-level CMUA.

6.9.2 Temperature Monitoring Signal Cable for the RFC

The temperature monitoring signal cable for the RFC enables the CMUA to monitor the temperature at the air inlet at the bottom of the RFC.

#### 6.9.3 Door Status Monitoring Cable

The door status monitoring cable transmits the information about the opening and closing of the door to the CMUA from the door status sensor of the RFC, IBBS200D, or IBBS200T.

#### 6.9.4 Monitoring Signal Cable Between the CMUA and the BBU

The monitoring signal cable between the CMUA and the BBU connects the CMUA to the BBU and transmits the monitoring signals collected by the CMUA to the BBU.

#### 6.9.5 Environment Monitoring Signal Cable

The environment monitoring signal cable connects the PMU to the HPMI. It reports the alarm signals collected by the HPMI to the PMU.

#### 6.9.6 Monitoring Signal Transfer Cable

The monitoring signal transfer cable connects the PMU to the CMUA, and it transmits the RS485 signals collected by the PMU to the BBU through the CMUA.

#### 6.9.7 ELU Signal Cable

The ELU (Electronic Label Unit) signal cable transmits the information about the cabinet type reported by the ELU to the CMUA.

#### 6.9.8 APM30H Door Status Monitoring Cable

The APM30H door status monitoring cable transmits the alarm signals to the PMU through the HPMI.

### 6.9.9 Monitoring Signal Cable for the Fan on the Front Door

The monitoring signal cable feeds power into the fan on the front door of the APM30H or TMC11H and transmits fan monitoring signals to the CMUA.

#### 6.9.10 Monitoring Signal Cable for the Storage Battery Cabinet

The monitoring signal cable for the storage battery cabinet collects and transmits the monitoring signals of the IBBS200D or IBBS200T to the PMU.

#### 6.9.11 BBU Alarm Cable

The BBU alarm cable transmits alarm signals from an external alarm device to the BBU.

#### 6.9.12 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.

#### 6.9.13 EMUA Monitoring Signal Cable

This section describes the EMUA monitoring signal cable. It transmits monitoring signals from the EMUA to the BBU. This cable is delivered with the EMUA.

## 6.9.1 Monitoring Signal Cable Between Cascaded CMUAs

The monitoring signal cable between cascaded CMUAs connects two CMUAs. Thus, the lower-level CMUA communicates with the BBU through the upper-level CMUA.

### **Exterior**

Figure 6-140 shows the monitoring signal cable between cascaded CMUAs.

View A

View A

X1

X2

Figure 6-140 Monitoring signal cable between cascaded CMUAs

## **Pin Assignment**

(1) RJ-45 connector

**Table 6-79** describes the pin assignment for the wires of the monitoring signal cables between cascaded CMUAs.

**Table 6-79** Pin assignment for the wires of the monitoring signal cables between cascaded CMUAs

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	
X1.4	X2.4	White	Twisted pair
X1.5	X2.5	Blue	
X1.7	X2.7	White	Twisted pair
X1.8	X2.8	Brown	

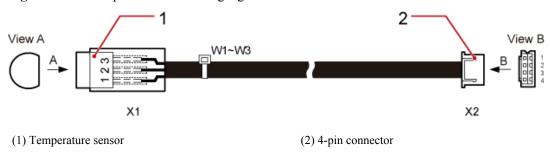
## 6.9.2 Temperature Monitoring Signal Cable for the RFC

The temperature monitoring signal cable for the RFC enables the CMUA to monitor the temperature at the air inlet at the bottom of the RFC.

#### **Exterior**

**Figure 6-141** shows the temperature monitoring signal cable for the RFC.

Figure 6-141 Temperature monitoring signal cable for the RFC



## Pin Assignment

**Table 6-80** describes the pin assignment for the wires of the temperature monitoring signal cable for the RFC.

Table 6-80 Pin assignment for the wires of the temperature monitoring signal cable for the RFC

Wire	X1 End	X2 End	Color
W1	X1.1	X2.3	Black
W2	X1.2	X2.2	Black
W3	X1.3	X2.1	Black

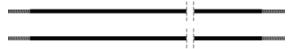
## 6.9.3 Door Status Monitoring Cable

The door status monitoring cable transmits the information about the opening and closing of the door to the CMUA from the door status sensor of the RFC, IBBS200D, or IBBS200T.

### **Exterior**

The door status monitoring cables are two black cables, and both ends of each cable are bare wires. **Figure 6-142** shows the door status monitoring cable.

Figure 6-142 Door status monitoring cable



## 6.9.4 Monitoring Signal Cable Between the CMUA and the BBU

The monitoring signal cable between the CMUA and the BBU connects the CMUA to the BBU and transmits the monitoring signals collected by the CMUA to the BBU.

#### **Exterior**

Figure 6-143 shows the monitoring signal cable between the CMUA and the BBU.

Figure 6-143 Monitoring signal cable between the CMUA and the BBU



(1) RJ-45 connector

## Pin Assignment

**Table 6-81** describes the pin assignment for the wires of the monitoring signal cable between the CMUA and the BBU.

**Table 6-81** Pin assignment for the wires of the monitoring signal cable between the CMUA and the BBU

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	

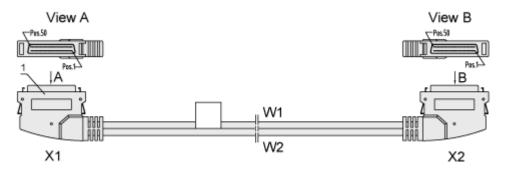
## 6.9.5 Environment Monitoring Signal Cable

The environment monitoring signal cable connects the PMU to the HPMI. It reports the alarm signals collected by the HPMI to the PMU.

### **Exterior**

The environment monitoring signal cable between the PMU and the HEUA is black. It is 0.5~m long, with a DB50 connector at each end.

Figure 6-144 Environment monitoring signal cable



(1) DB50 male connector

## Pin Assignment

**Table 6-82** describes the pin assignment for the wires of the environment monitoring signal cable.

Table 6-82 Pin assignment for the wires of the environment monitoring signal cable

X1 End	X2 End	Description	
1	1	Wire	
3	3	Twisted pair	
4	4		
5	5	Twisted pair	
8	8		
9	9	Twisted pair	
10	10		
11	11	Twisted pair	
12	12		
13	13	Twisted pair	
14	14		
16	16	Twisted pair	
17	17		
18	18	Twisted pair	
19	19		
20	20	Twisted pair	

X1 End	X2 End	Description	
21	21		
22	22	Twisted pair	
23	23		
24	24	Twisted pair	
25	25		
27	27	Twisted pair	
28	28		
29	29	Twisted pair	
30	30		
31	31	Twisted pair	
32	32		
33	33	Twisted pair	
34	34		
43	43	Twisted pair	
44	44		

## 6.9.6 Monitoring Signal Transfer Cable

The monitoring signal transfer cable connects the PMU to the CMUA, and it transmits the RS485 signals collected by the PMU to the BBU through the CMUA.

## **Exterior**

The monitoring signal transfer cable is black. It is 0.6 m long, with an RJ45 connector at each end, as shown in **Figure 6-145**.

Figure 6-145 Monitoring signal transfer cable



(1) RJ-45 connector

## **Pin Assignment**

**Table 6-83** describes the pin assignment for the wires of the monitoring signal transfer cable.

Table 6-83 Pin assignment of the monitoring signal transfer cable

X1 End	X2 End	Pin Assignment
X1.1	X2.1	Twisted pair
X1.2	X2.2	
X1.3	X2.3	Twisted pair
X1.6	X2.6	
X1.4	X2.4	Twisted pair
X1.5	X2.5	
X1.7	X2.7	Twisted pair
X1.8	X2.8	

# 6.9.7 ELU Signal Cable

The ELU (Electronic Label Unit) signal cable transmits the information about the cabinet type reported by the ELU to the CMUA.

## **Exterior**

Figure 6-146 shows the ELU signal cable.

Figure 6-146 ELU signal cable



(1) RJ-45 connector

## **Pin Assignment**

**Table 6-84** describes the pin assignment for the wires of the ELU signal cable.

X1 End	X2 End	Wire Color	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	

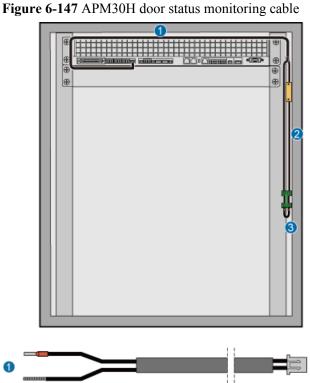
Table 6-84 Pin assignment for the wires of the ELU signal cable

# 6.9.8 APM30H Door Status Monitoring Cable

The APM30H door status monitoring cable transmits the alarm signals to the PMU through the HPMI.

## **Exterior**

Figure 6-147 shows the APM30H door status monitoring cable.



The APM30H door status monitoring cable is described as follows:

- The cable labeled 1 has a straight 2-pin connector at one end, which is connected to the HPMI. The other end of the cable is a bare wire and a cord end terminal, which are connected to the door status sensor and wiring terminal block respectively.
- The cable labeled 2 has a bare wire at one end, which is connected to the door status sensor. The other end of the cable is a cord end terminal, which is connected to the wiring terminal block
- The cable labeled 3 has two cord end terminals at both ends, which are connected to two ports in the wiring terminal block at a side.

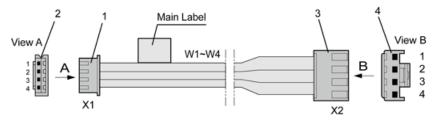
## 6.9.9 Monitoring Signal Cable for the Fan on the Front Door

The monitoring signal cable feeds power into the fan on the front door of the APM30H or TMC11H and transmits fan monitoring signals to the CMUA.

#### **Exterior**

Figure 6-148 shows the monitoring signal cable for the fan on the front door.

Figure 6-148 Monitoring signal cable for the fan on the front door



## **Pin Assignment**

**Table 6-85** describes the pin assignment for the wires of the monitoring signal cable for the fan on the front door.

**Table 6-85** Pin assignment for the wires of the monitoring signal cable for the fan on the front door

Wire	X1 End	X2 End	Color
W1	X1.1	X2.1	Black
W2	X1.2	X2.2	Black
W3	X1.3	X2.3	Black
W4	X1.4	X2.4	Black

## 6.9.10 Monitoring Signal Cable for the Storage Battery Cabinet

The monitoring signal cable for the storage battery cabinet collects and transmits the monitoring signals of the IBBS200D or IBBS200T to the PMU.

### **Exterior**

Figure 6-149 shows the monitoring signal cable for the storage battery cabinet.

Figure 6-149 Monitoring signal cable for the storage battery cabinet



(1) RJ45 connector

## Pin Assignment

**Table 6-86** describes the pin assignment for the wires of the monitoring signal cable for the storage battery cabinet.

**Table 6-86** Pin assignment for the wires of the monitoring signal cable for the storage battery cabinet

X1 End	X2 End	Wire Color	Туре
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	

## 6.9.11 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 RJ-45 connector at each end, as shown in **Figure 6-150**. However, an RJ-45 connector at one end may be removed, and an appropriate terminal may be added according to the field requirements.

Figure 6-150 BBU alarm cable



(1) RJ-45 connector

## Pin Assignment

Table 6-87 describes the pin assignment for the wires of the BBU alarm cable.

Table 6-87 Pin assignment for the wires of the BBU alarm cable

BBU Alarm Port	Pin on the RJ45 Connecto r at One End	Wire Color	Wire Type	Pin on the RJ45 Connecto r 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+
	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)

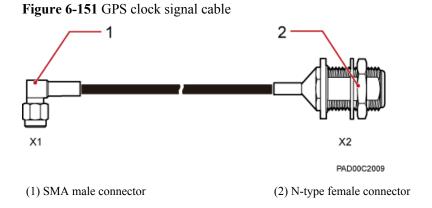
BBU Alarm Port	Pin on the RJ45 Connecto r at One End	Wire Color	Wire Type	Pin on the RJ45 Connecto r at the Other End	Description
EXT- ALM0	X1.1	White and orange	Twisted pair	X2.1	Boolean value input 0+
	X1.2	Orange		X2.2	Boolean value input 0-(GND)
	X1.3	White and green	Twisted pair	X2.3	Boolean value 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)

## 6.9.12 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 6-151**.



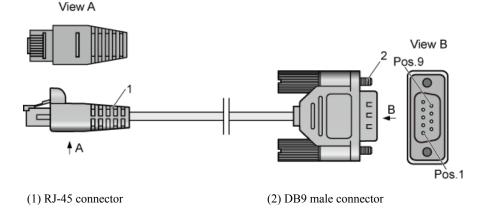
## 6.9.13 EMUA Monitoring Signal Cable

This section describes the EMUA monitoring signal cable. It transmits monitoring signals from the EMUA to the BBU. This cable is delivered with the EMUA.

### **Exterior**

Figure 6-152 shows the EMUA monitoring signal cable.

Figure 6-152 EMUA monitoring signal cable



## Pin Assignment

Table 6-88 describes the pin assignment for the wires of the EMUA monitoring signal cable.

Table 6-88 Pin assignment for the wires of the EMUA monitoring signal cable

Pin on the RJ-45 Connector	Pin on the DB9 Male Connector	Color	Description	Terminal on the APMI
X1.1	X2.3	White	Twisted pair	TX+

Pin on the RJ-45 Connector	Pin on the DB9 Male Connector	Color	Description	Terminal on the APMI
X1.2	X2.7	Orange		TX-
X1.5	X2.6	White	Twisted pair	RX-
X1.4	X2.2	Blue		RX+

# 6.10 BTS3900A RF Cables

The BTS3900A RF cables are the RF jumpers and inter-RFU RF signal cables.

### 6.10.1 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.

#### 6.10.2 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.

## 6.10.1 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 6-153 shows an RF jumper.

(1) DIN straight male connector (2) DIN elbow male connector



Macro base stations use super-flexible 1/2-inch jumpers.

## 6.10.2 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 6-154 shows the inter-RFU RF signal cable.

Figure 6-154 Inter-RFU RF signal cable



(1) QMA elbow male connector