

**BBU5900**

**V100R013C10**

## **Hardware Description**

**Issue 01**

**Date 2018-06-30**

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## **Huawei Technologies Co., Ltd.**

Address: Huawei Industrial Base  
Bantian, Longgang  
Shenzhen 518129  
People's Republic of China

Website: <http://www.huawei.com>

Email: [support@huawei.com](mailto:support@huawei.com)

# About This Document

## Overview

A BBU is a baseband unit. This document describes the exterior and functions of a BBU5900 as well as the configurations, functions, application scenarios, and specifications of boards in the BBU5900 to help users comprehensively understand the BBU5900 functions. Unless otherwise specified, "BBU" in this document refers to the BBU5900.

The exteriors of components or cables in this document are for reference only. The actual exteriors may be different.

### NOTE

Unless otherwise specified, in this document, LTE and eNodeB always include FDD, TDD, and NB-IoT. In scenarios where they need to be distinguished, LTE FDD, LTE TDD, and LTE NB-IoT are used. The same rules apply to the eNodeB. In addition, the "N", "L", "T", and "M" in RAT acronyms refer to NR, LTE FDD, LTE TDD, and LTE NB-IoT, respectively.

## Product Version

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

Product Name	Solution Version	Product Version
BTS5900 BTS5900L DBS5900 BTS5900A	<ul style="list-style-type: none"><li>● SRAN13.1 and later</li><li>● GBSS20.1 and later</li><li>● RAN20.1 and later</li><li>● eRAN13.1 and later</li><li>● eRAN TDD 13.1 and later</li><li>● 5G RAN1.0 and later</li></ul>	V100R013C10

## Intended Audience

- Base station installation personnel
- System engineers

- Site maintenance engineers

## Organization

### 1 Changes in BBU5900 Hardware Description

### 2 BBU Exterior

A BBU is a case with a width of 19 inches and a height of 2 U.

### 3 Working Principles and Functions of the BBU

A BBU is a baseband unit. It processes baseband signals of a base station.

### 4 Boards and Cabinets/Racks Supported by the BBU

This section describes boards and cabinets/racks supported by the BBU.

### 5 BBU Slot Assignment

This section describes the BBU slot distribution and the principles for BBU slot assignment in different modes.

### 6 BBU Boards

### 7 Indicators on BBU Boards




This chapter describes the indicators on BBU boards.



### 8 Equipment Specifications

## Conventions

### Symbol Conventions

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

Symbol	Description
 <b>DANGER</b>	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Symbol	Description
 <b>NOTICE</b>	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
 <b>NOTE</b>	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

### 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.
<b>Boldface</b>	Names of files, directories, folders, and users are in <b>boldface</b> . For example, log in as user <b>root</b> .
<i>Italic</i>	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
<b>Boldface</b>	The keywords of a command line are in <b>boldface</b> .
<i>Italic</i>	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.

Convention	Description
[ 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
<b>Boldface</b>	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 &gt; Create &gt; Folder</b> .

### Keyboard Operations

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

Format	Description
<b>Key</b>	Press the key. For example, press <b>Enter</b> and press <b>Tab</b> .
<b>Key 1+Key 2</b>	Press the keys concurrently. For example, pressing <b>Ctrl +Alt+A</b> means the three keys should be pressed concurrently.
<b>Key 1, Key 2</b>	Press the keys in turn. For example, pressing <b>Alt, 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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# 1 Changes in BBU5900 Hardware Description

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## 01 (2018-06-30)

This is the first commercial release of this document.

## Draft A (2018-04-10)

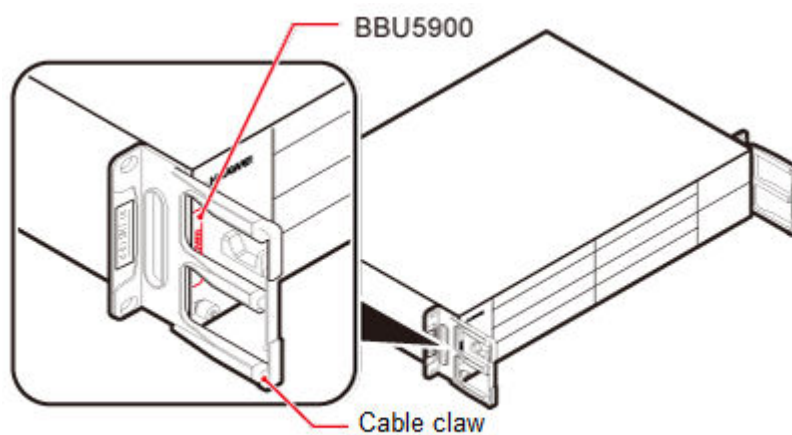
This is Draft A.



# 2 BBU Exterior

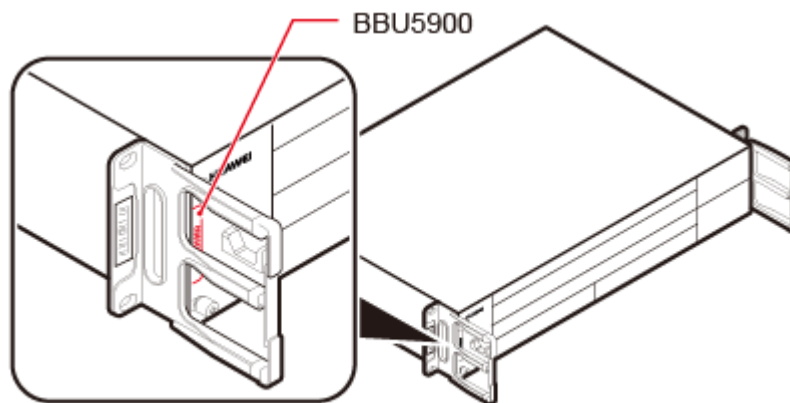
A BBU is a case with a width of 19 inches and a height of 2 U.  
The following shows the exterior of a BBU.

**Figure 2-1** BBU exterior (half-width boards)



PAB04C0004

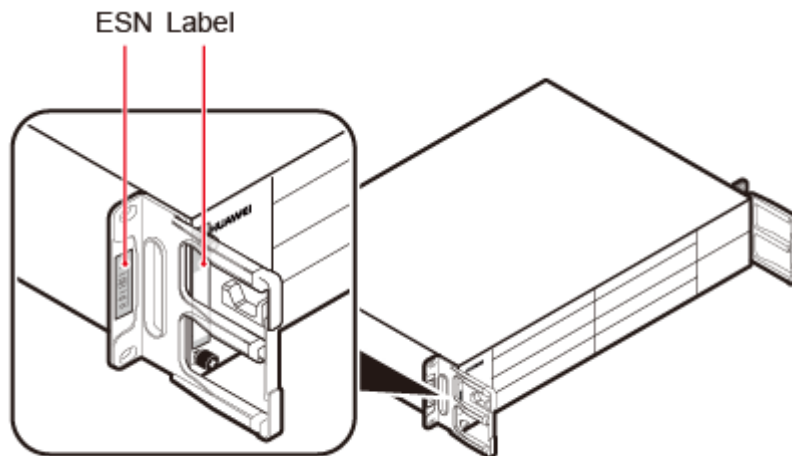
**Figure 2-2** BBU exterior (full-width boards)



PAB04C0004

A BBU is labeled with an electronic serial number (ESN). The following figure shows the ESN and label positions on the BBU.

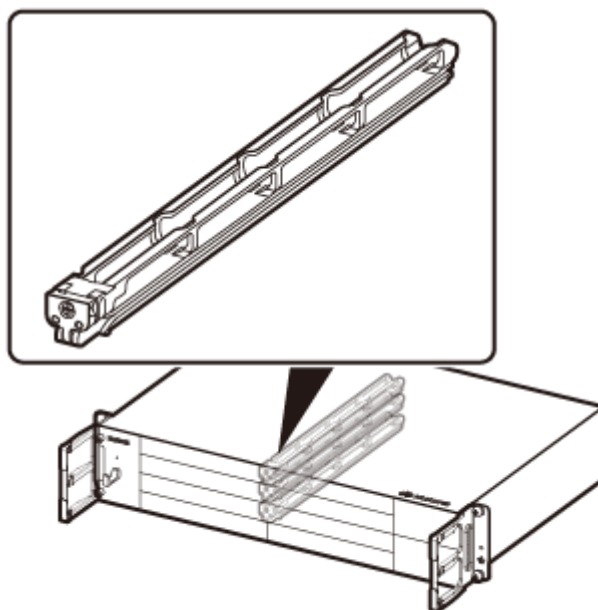
**Figure 2-3** ESN position



PAB04C0005

Three guide rails are placed between the two columns of BBU slots for installing half-width boards. The following figure shows the guide rail position.

**Figure 2-4** Guide rail position



PAB04C0009

# 3 Working Principles and Functions of the BBU

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A BBU is a baseband unit. It processes baseband signals of a base station.

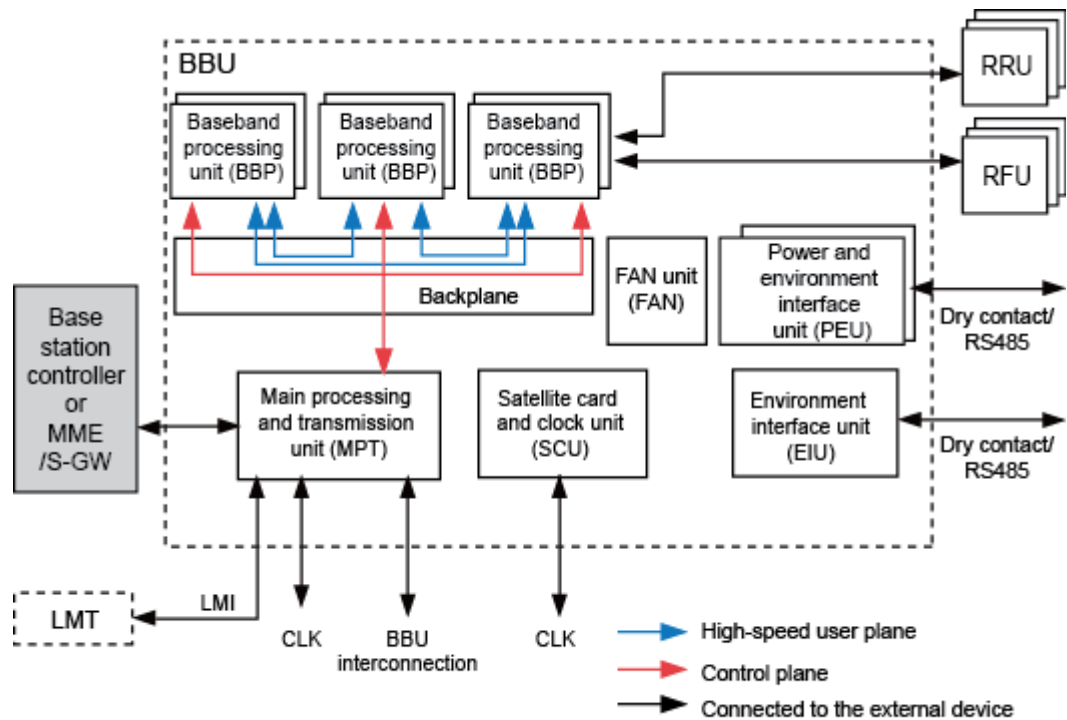
## Working Principle

A BBU consists of the following subsystems: baseband subsystem, power and mechanical subsystem, transmission subsystem, interconnection subsystem, main control subsystem, monitoring subsystem, and clock subsystem. Each subsystem consists of different modules.

- Baseband subsystem: baseband processing unit
- Power and mechanical subsystem: backplane, fan module, and power module
- Transmission subsystem: main control and transmission unit
- Interconnection subsystem: main control and transmission unit
- Main control subsystem: main control and transmission unit
- Monitoring subsystem: power module and monitoring unit
- Clock subsystem: main control and transmission unit as well as satellite card and clock unit

The following figure shows the working principle of a BBU.

Figure 3-1 Working principle of a BBU



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## Function

A BBU performs the following functions:

- Provides ports for connecting to the transmission equipment, RF modules, USB devices<sup>a</sup>, external reference clock, and LMT or U2000 to transmit signals, perform automatic base station software upgrade, receive reference clock signals, and support maintenance on the LMT or U2000.
- Manages the entire base station system. The management involves uplink and downlink data processing, signaling processing, resource management, and operation and maintenance.

### NOTE

a: The security of the USB loading port is ensured by encryption, and the USB loading port can be shut down using commands. The USB commissioning port is used for commissioning the base station rather than configuring and exporting information of the base station.

# 4 Boards and Cabinets/Racks Supported by the BBU

This section describes boards and cabinets/racks supported by the BBU.

## Boards Supported by the BBU

The following table describes boards supported by the BBU regardless of the mode and configuration.

**Table 4-1** Boards supported by the BBU

Board Type	Boards Supported by the BBU
Main control board	● UMPTe (UMPTe1 or UMPTe2)
Baseband processing board	● UBBPfw1
Satellite-card board	USCUB14 or USCUB11
Fan module	FANf
Power module	UPEUe
Environment monitoring unit	UEIUb

## Cabinets/Racks Supported by the BBU

The following table describes the cabinets/racks supported by the BBU.

**Table 4-2** Cabinets/Racks supported by the BBU

Base Station Type	Cabinets/Racks Supported by the BBU
BTS5900	BTS5900
BTS5900L	BTS3900L (Ver.E_B~D)
BTS5900A	<ul style="list-style-type: none"> <li>● APM30H (Ver.E), APM30H (Ver.E_B~D), APM30H (Ver.E_A2), or APM30 (Ver.E_A1)</li> <li>● TMC11H (Ver.E), TMC11H (Ver.E_B~D), TMC11H (Ver.E_A2), or TMC (Ver.E_A1)</li> </ul>
BTS5900AL	BTS3900AL (Ver.A)
DBS5900	<p>APM30H (Ver.E), APM30H (Ver.E_B~D), APM30H (Ver.E_A2), or APM30 (Ver.E_A1)</p> <p>TMC11H (Ver.E), TMC11H (Ver.E_B~D), TMC11H (Ver.E_A2), or TMC (Ver.E_A1)</p> <p>IMB05, INS12, or ILC29 (Ver.E)</p>

# 5 BBU Slot Assignment

## About This Chapter

This section describes the BBU slot distribution and the principles for BBU slot assignment in different modes.

### 5.1 Slot Distribution

This section describes BBU slot distribution.

#### 5.2 BBU Slot Assignment in NR Base Stations

#### 5.3 BBU Slot Assignment in LN Base Stations

## 5.1 Slot Distribution

This section describes BBU slot distribution.

A BBU has 11 slots. The following figure shows BBU slot distribution.

**Figure 5-1** BBU slot distribution

FAN	USCU/UBBP	USCU/UBBP	UPEU/UEIU
	USCU/UBBP	USCU/UBBP	UPEU
	USCU/UBBP	USCU/UBBP	
	UMPT	UMPT	

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Among slots 0 to 5, any two horizontally adjacent half-width slots can be reconstructed into a full-width slot. The number of the full-width slot is the same as that of the half-width slot on the left before the reconstruction.

The following table describes the general principles for BBU slot assignment. The specific slot assignment of the main control board, satellite-card board, and baseband processing board depends on the mode or modes supported by the base station. For details, see the principles for BBU slot assignment in base stations of different modes.

**Table 5-1** General principles for BBU slot assignment

Board Type	Board Name	Mandatory or Not	Maximum Quantity	Slot Assignment Priority (Descending from Left to Right)
Main control board	UMPT	Yes	2	Slot 7 > Slot 6
Satellite-card board	USCU	No	1	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5
Full-width baseband processing board	UBBPfwl	Yes	3	Slot 0 > Slot 2 > Slot 4
Fan board	FANf	Yes	1	Slot 16
Power supply board	UPEUe	Yes	2	Slot 19 > Slot 18
Environment control board	UEIUb	No	1	Slot 18

## 5.2 BBU Slot Assignment in NR Base Stations

This section describes the principles for BBU slot assignment in NR base stations.

The following table describes the principles for BBU slot assignment.

**Table 5-2** Principles for BBU slot assignment

Priority	Board Type	Board	Mandatory or Not	Maximum Quantity	Slot Assignment Priority (Descending from Left to Right)
1	Main control board	UMPTe_NR	Yes	2	Slot 7 > Slot 6



Priority	Board Type	Board	Mandatory or Not	Maximum Quantity	Slot Assignment Priority (Descending from Left to Right)
2	Baseband processing board	UBBPfw1_NR	Yes	3	Slot 0 > Slot 2 > Slot 4
3	Clock board	<ul style="list-style-type: none"> <li>● USCUB14</li> <li>● USCUB11</li> </ul>	No	1	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5

## 5.3 BBU Slot Assignment in LN Base Stations

This section describes the principles for BBU slot assignment in LN base stations.

The following table describes the principles for BBU slot assignment.

**Table 5-3** Principles for BBU slot assignment

Priority	Board Type	Board	Mandatory or Not	Maximum Quantity	Slot Assignment Priority (Descending from Left to Right)
1	LTE main control board	<ul style="list-style-type: none"> <li>● UMPTe_L</li> <li>● UMPTb_L</li> </ul>	Yes	1	Slot 7
2	NR main control board	UMPTe_NR	Yes	1	Slot 6
3	NR baseband processing board	UBBPfw1_NR	Yes	3	Slot 0 > Slot 2 > Slot 4
4	Clock board	<ul style="list-style-type: none"> <li>● USCUB14</li> <li>● USCUB11</li> </ul>	No	1	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5

Priority	Board Type	Board	Mandatory or Not	Maximum Quantity	Slot Assignment Priority (Descending from Left to Right)
5	LTE baseband processing board with high-speed interfaces	UBBPei_L	No	4	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5
6	LTE baseband processing board	<ul style="list-style-type: none"> <li>● UBBPe_L</li> <li>● UBBPd_L</li> </ul>	No	4	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5

**Table 5-4** Principles for BBU slot assignment (BBUs interconnected)

BBU	Priority	Board Type	Board	Mandatory or Not	Maximum Quantity	Slot Assignment Priority (Descending from Left to Right)
BBU0	1	LTE main control board	<ul style="list-style-type: none"> <li>● UMPTe_L</li> <li>● UMPTb_L</li> </ul>	Yes	1	Slot 7
	2	Clock board	<ul style="list-style-type: none"> <li>● USCUB14</li> <li>● USCUB11</li> </ul>	No	1	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5

BBU	Priority	Board Type	Board	Mandatory or Not	Maximum Quantity	Slot Assignment Priority (Descending from Left to Right)
	3	LTE baseband processing board with high-speed interfaces	UBBPei_L	No	6	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5
	4	LTE baseband processing board	<ul style="list-style-type: none"> <li>● UBBPe_L</li> <li>● UBBPd_L</li> </ul>	No	6	Slot 4 > Slot 2 > Slot 0 > Slot 1 > Slot 3 > Slot 5
BBU1	1	NR main control board	UMPTe_NR	Yes	1	Slot 7
	2	NR baseband processing board	UBBPfw1_NR	Yes	3	Slot 0 > Slot 2 > Slot 4

# 6 BBU Boards

## About This Chapter

### 6.1 UMPT

A UMPT is a universal main processing and transmission unit.

### 6.2 UBBP

A UBBP is a universal baseband processing unit.

### 6.3 USCU

A USCU is a universal satellite card and clock unit.

### 6.4 UPEUe

A UPEUe is a universal power and environment interface unit of type e.

### 6.5 UEIUb

A UEIUb is a universal environment interface unit of type b.

### 6.6 FANf

A FANf is a fan module in a BBU.

### 6.7 Optical Modules

An optical module transmits optical signals between an optical port and a fiber optic cable.

## 6.1 UMPT

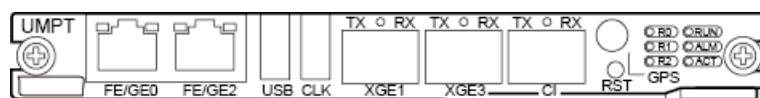
A UMPT is a universal main processing and transmission unit.

The following figures show UMPT panels.

#### NOTE

On the lower left corner of a UMPT, there is a silkscreen indicating its type.

**Figure 6-1** UMPTe panel



PAD00C0167

## Specifications

This section describes specifications of UMPT boards, such as transmission port specifications, carrier specifications, signaling specifications, and maximum number of UEs in RRC connected mode. If an item reaches the specified threshold, replace existing boards or add new boards to expand capacity.

### NOTE

A license is required to support board specifications.

The following table lists the RATs supported by UMPT boards.

**Table 6-1** RATs supported by UMPT boards

Board	Single Mode	Multimode
UMPTe	NR(TDD)/NR(TDD)	-

The following table lists the transmission port specifications of UMPT boards.

**Table 6-2** Transmission port specifications of UMPT boards

Board/Supported Satellite Card	Transmission Mode	Quantity of Ports	Port Capacity	Full/Half-Duplex
<ul style="list-style-type: none"> <li>● UMPTe1 (without a satellite card)</li> </ul>	Transmission over FE/GE electrical ports	2	10 Mbit/s, 100 Mbit/s, or 1000 Mbit/s	Full- or half-duplex
<ul style="list-style-type: none"> <li>● UMPTe2 (with a GPS satellite card)</li> </ul>	Transmission over FE/GE/10GE optical ports	2	100 Mbit/s, 1000 Mbit/s, or 10,000 Mbit/s	Full-duplex

The following table lists the signaling specifications of UMPT boards working in NR mode.

**Table 6-3** Signaling specifications

Board	Signaling Specifications <sup>b</sup> (BHCA)
UMPTe	648000
b: The specifications are based on the Huawei control plane traffic model.	

The following table lists the maximum number of UEs in RRC connected mode supported by UMPT boards working in NR mode.

**Table 6-4** Maximum number of UEs in RRC connected mode

Board	Maximum Number of UEs in RRC Connected Mode	Maximum Number of Uplink Synchronized UEs
UMPTe	3600	3600

**NOTE**

For specifications of the gNodeB, see section "Technical Specifications of the BBU" in xxxx *Technical Description*.

## Function

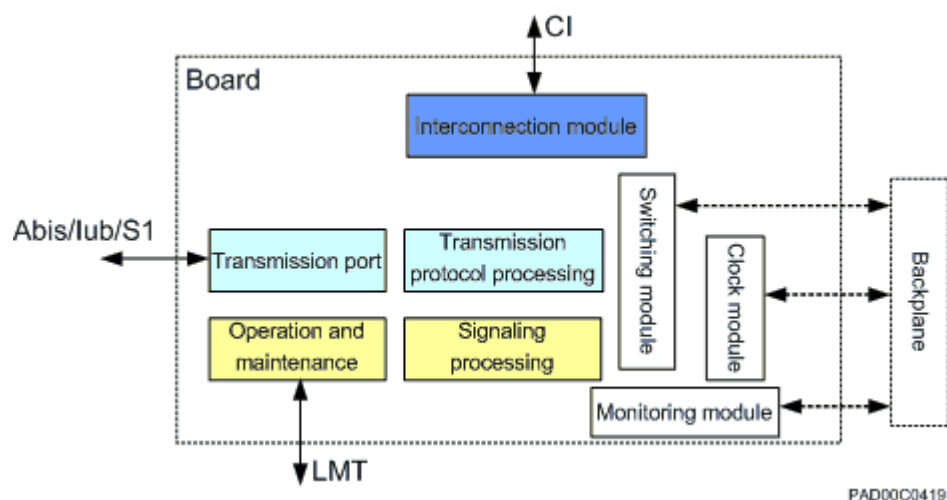
A UMPT performs the following functions:

- Manages configurations and devices, monitors performance, and processes signaling of a base station.
- Processes signaling and manages resources for other boards in the BBU.
- Provides a USB port, transmission ports, and a maintenance port, which are used for automatic software upgrade, signal transmission, and LMT- or U2000-based BBU maintenance.

## Working Principle

The following figure shows the working principle of a UMPT.

**Figure 6-2** Working principle of a UMPT



## Port

The following table describes the ports on a UMPT panel.

**Table 6-5** Ports on a UMPT panel

Silkscreen	Connector	Description
E1/T1	DB26 female connector	E1/T1 signal transmission port
UMPTe: FE/GE0, FE/GE2	RJ45 connector	FE/GE electrical signal transmission port <sup>a</sup> FE/GE electrical ports on a UMPTe provides surge protection. Therefore, no SLPUs are required if transmission cables are to be connected to Ethernet electrical ports on an outdoor cabinet.
UMPTe: XGE1, XGE3	SFP female connector	FE/GE/10GE optical signal transmission port <sup>b</sup>
GPS	SMA connector	The GPS ports on the UMPTe1 are reserved. Used for transmitting radio frequency (RF) signals received from the antenna to the satellite card (GPS ports on the UMPTe2.)
USB <sup>c</sup>	USB connector	Used for the software upgrade of a base station using a USB flash drive. This port also functions as a commissioning Ethernet port <sup>d</sup> .
CLK	USB connector	<ul style="list-style-type: none"> <li>● Used for receiving TOD signals</li> <li>● Port for clock signal outputs. The clock signals are used for testing.</li> </ul>
CI <sup>e</sup>	SFP female connector	Used for connecting to another BBU or a USU
RST	-	Used for resetting the board
<p>a and b: FE/GE electrical ports and FE/GE optical ports on a UMPT can be used at the same time.</p> <p>c: The security of the USB port is ensured by encryption, and the USB port can be shut down using commands.</p> <p>d: When the USB port functions as a commissioning Ethernet port, ensure that an OM port has been enabled and the user has obtained required authorities for accessing the base station through the OM port before accessing the base station through the USB port.</p> <p>e: When the status of the CI port on the UMPTe board is switched to DOWN, the transmission bearing configuration is deleted. In this case, the base station does not report transmission-related alarms because no transmission bearing configuration is available.</p> <ul style="list-style-type: none"> <li>● The possible reason for the DOWN status of CI port is that the fiber optic cable connected to the CI port is removed or that the peer device is powered off.</li> <li>● Transmission-related alarms include SCTP Link Fault, IP Address Conflict, and IP Excessive Frame Error Rate.</li> </ul>		

The following table lists the specifications of the CI port on a UMPT.

**Table 6-6** Specifications of the CI port on a UMPT

Board	Port Quantity	Port Protocol	Port Capacity <sup>a</sup> (Gbit/s)
UMPTe	1	1 x SCPRI	1 x 2.5
		1 x 10GE	1 x 10
a: The port capacity refers to the physical bandwidth of a port.			

## 6.2 UBBP

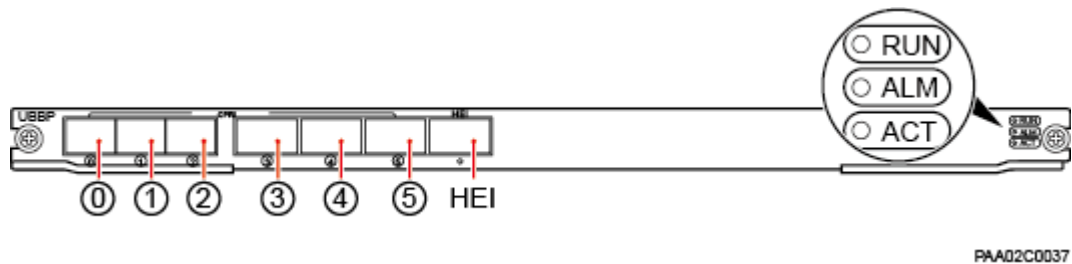
A UBBP is a universal baseband processing unit.

The following figures show UBBP panels.

**NOTE**

On the lower left corner of a board, there is a silkscreen indicating its type.

**Figure 6-3** UBBPfw1 panel



## Specifications

This section describes specifications of UBBP boards, such as carrier specifications, baseband specifications, cell specifications, maximum number of UEs in RRC connected mode, throughput specifications, and signaling specifications. If an item reaches the specified threshold, replace existing boards or add new boards to expand capacity.

The following table lists the RATs supported by the UBBP.

**NOTE**

A license is required to support board specifications.

**Table 6-7** RATs supported by UBBP boards

Board	Single-RAT	Multi-RAT
UBBPfw1	NR (FDD)/NR (TDD)	-

### Specifications of UBBP boards working in NR mode

The following table describes cell specifications of UBBP boards working in NR mode.



**Table 6-8** Cell specifications of a UBBP

Board	Number of Cells
UBBPfw1	NR FDD (sub-3 GHz): 6x20 MHz 2T2R/4T4R
	NR TDD (sub-6 GHz): 3x100 MHz, 64T64R
	NR TDD (sub-6 GHz)+SUL: 3x100 MHz 64T64R+3x20 MHz 2R/4R

 **NOTE**

- Sub-3 GHz indicates frequency bands below 3 GHz.
- Sub-6 GHz indicates frequency bands ranging from 3 GHz to 6 GHz. 3GPP defines the n77, n78, and n79 bands as sub-6 GHz.
- SUL indicates the Uplink and Downlink Decoupling specifications.

The following table lists the maximum number of UEs in RRC connected mode supported by UBBP boards working in NR mode.

**Table 6-9** Number of UEs in an NR cell or sector

Cell Configuration	Maximum Number of UEs in RRC Connected Mode per Cell	Maximum Number of Uplink Synchronized UEs per Cell
NR FDD (sub-3 GHz) 20 MHz 2T2R/4T4R	400	400
NR TDD (sub-6 GHz): 100 MHz, 64T64R	400	400

The following table describes the uplink throughput and downlink throughput of UBBP boards working in NR mode.

**Table 6-10** NR throughput per cell

Cell Configuration	Maximum DL Throughput per Cell (DL:UL = 4:1) (Gbit/s)	Maximum UL Throughput per Cell (DL:UL = 4:1) (Gbit/s)
NR TDD (sub-6 GHz): 100 MHz, 64T64R	5.89	0.71

## Function

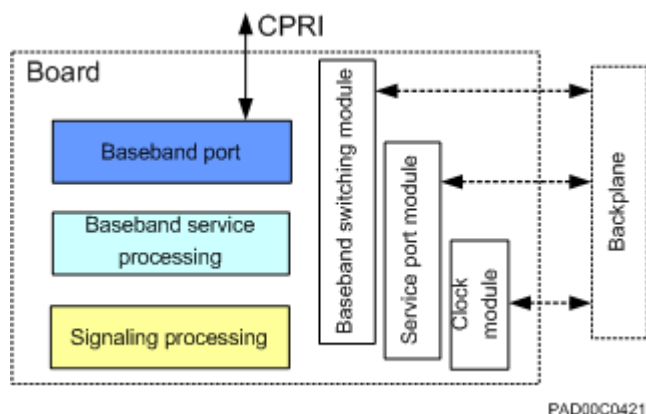
A UBBP performs the following functions:

- Provides CPRI ports for communication with RF modules.
- Processes uplink and downlink baseband signals.

## Working Principle

The following figure shows the working principle of a UBBP.

**Figure 6-4** Working principle of a UBBP



## Port

The following table describes the ports on UBBP boards.

**Table 6-11** Ports on UBBP boards

Board	Silkscreen	Connector	Port Quantity	Description
UBBPfw1	CPRI0 to CPRI2	SFP female connector	3	They are data transmission ports connecting the BBU to RF modules, and support the input and output of optical and electrical transmission signals.
	CPRI3 to CPRI5	QSFP connector	3	
	HEI	QSFP connector	1	The port connects two baseband processing boards, or a baseband processing board and a USU, to exchange signals between them.

The following table lists the specifications of CPRI ports on UBBP boards.

**Table 6-12** Specifications of CPRI ports on UBBP boards

Board	Port Quantity	CPRI Port Rate (Gbit/s)	Topology
UBBPfw1	6	2.457/4.915/6.144/9.830	Star, chain, ring, or trunk chain
		4x10.1376/4x24.33024	

The following table lists the specifications of CPRI ports on UBBP boards.

**Table 6-13** Mapping between the CPRI port rate and the number of NR cells

Mode	CPRI Port Rate (Gbit/s)	Cell Type	Number of Supported Cells
CPRI	4x24.33024	NR (TDD)-Sub6G: 100MHz 64T64R	1
CPRI	1x4.9152	NR (FDD)-Sub3G: 20MHz 4T4R	1
CPRI	1x4.9152	NR (FDD)-Sub3G: 20MHz 4R	1

## 6.3 USCU

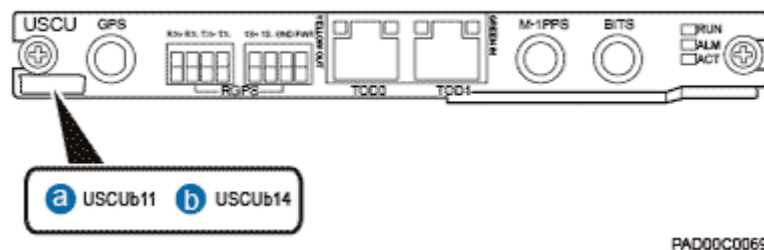
A USCU is a universal satellite card and clock unit.

The following figure shows the exterior of a USCU board.

**NOTE**

The exterior of a USCUB11 is the same as that of a USCUB14. A USCUB11 and a USCUB14 have labels USCUB11 and USCUB14 indicating their board types on the lower left corners, respectively.

**Figure 6-5** USCU exterior



## Specifications

The following table describes specifications of the USCU boards.

**Table 6-14** Specifications of USCU boards

Board	Working Mode	Supported Satellite Card
USCUB11	LTE or NR	None
USCUB14	NR, GSM, UMTS, or LTE	U-blox single-satellite card

## Function

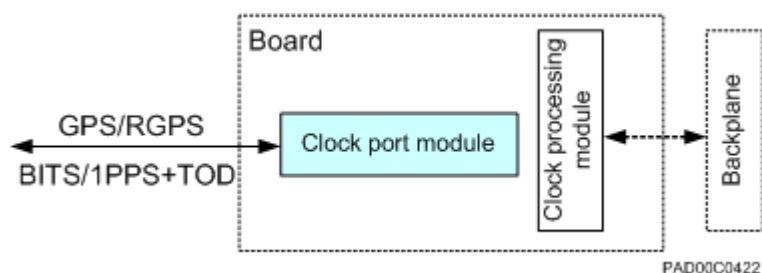
USCU boards perform the following functions:

- A USCUB11 provides ports for communicating with the Remote Global Positioning System (RGPS, for example, the RGPS on the reused customer equipment) and building integrated timing supply (BITS) equipment. It does not support GPS signals.
- A USCUB14 contains a u-blox single-satellite card and does not support RGPS signals.

## Working Principle

The following figure shows the working principle of a USCU.

**Figure 6-6** Working principle of a USCU



## Port

The following table describes the ports on a USCU panel.

**Table 6-15** Ports on a USCU panel

Silkscreen	Connector	Description
GPS	SMA connector	<ul style="list-style-type: none"> <li>● The GPS port on a USCUB14 is used for receiving GPS signals.</li> <li>● The GPS port on a USCUB11 is reserved, and it cannot receive GPS signals.</li> </ul>

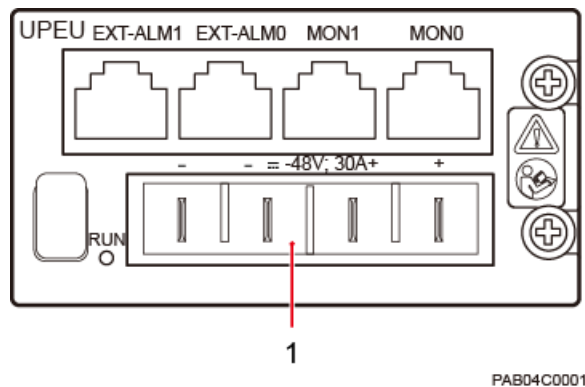
Silkscreen	Connector	Description
RGPS	PCB welded wiring terminal	<ul style="list-style-type: none"> <li>The RGPS port on a USCUB11 is used for receiving RGPS signals.</li> <li>The RGPS port on a USCUB14 is reserved, and it cannot receive RGPS signals.</li> </ul>
TOD0	RJ45 connector	Receives or transmits 1PPS+TOD signals.
TOD1	RJ45 connector	Receives or transmits 1PPS+TOD signals, and receives TOD signals from the M1000.
BITS	SMA connector	Receives BITS clock signals, and supports adaptive inputs of 2.048 MHz and 10 MHz reference clocks.
M-1PPS	SMA connector	Receives 1PPS signals from the M1000.

## 6.4 UPEUe

A UPEUe is a universal power and environment interface unit of type e.

The following figure shows the exterior of a UPEUe.

Figure 6-7 UPEUe panel



(1) HDEPC connector

## Specifications

The following table lists the specifications of the UPEUe boards and combinations.

Table 6-16 Output power of UPEUe boards

Board	One UPEU Board	Two UPEU Boards (Current Equalization Mode)	Two UPEU Boards (1+1 Redundancy Backup Mode)
UPEUe	1100 W	2000 W	1100 W

## Function

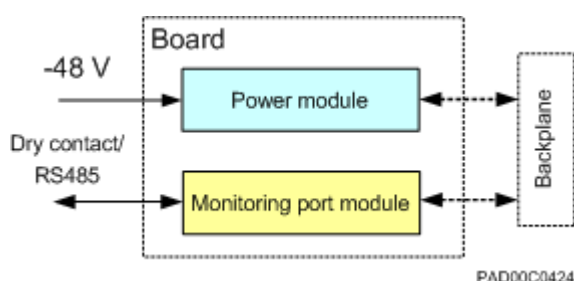
The UPEUe performs the following functions:

- Converts - 48 V DC input power into +12 V DC power.
- Provides two ports with each transmitting one RS485 signal and two ports with each transmitting four Boolean signals. The Boolean signals can only be dry contact or open collector (OC) signals.

## Working Principle

The following figure shows the working principle of a UPEUe.

**Figure 6-8** Working principle of a UPEUe



## Port

A UPEUe provides two ports with each transmitting one RS485 signal and two ports with each transmitting four Boolean signals.

The following table describes the ports on a UPEUe panel.

**Table 6-17** Ports on a UPEUe panel

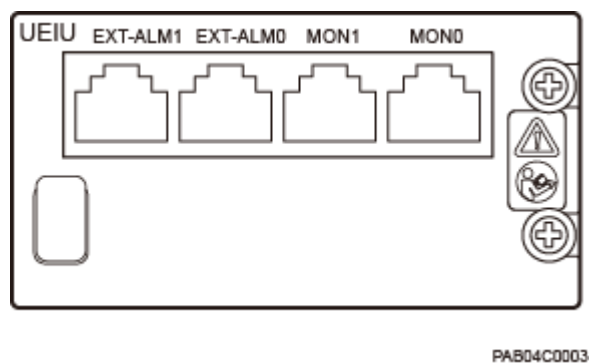
Silkscreen	Connector	Description
-48V; 30A	HDEPC connector	Feeding - 48 V DC power
EXT-ALM0	RJ45 connector	Ports for Boolean signal inputs 0 to 3
EXT-ALM1	RJ45 connector	Ports for Boolean signal inputs 4 to 7
MON0	RJ45 connector	Port for RS485 signal input 0
MON1	RJ45 connector	Port for RS485 signal input 1
a: The silkscreen is in the "A; B" format. A indicates the rated voltage, and B indicates the rated current. For example, "-48V; 8A".		

## 6.5 UEIUb

A UEIUb is a universal environment interface unit of type b.

The following figure shows a UEIUb panel.

**Figure 6-9** UEIUb panel



### Function

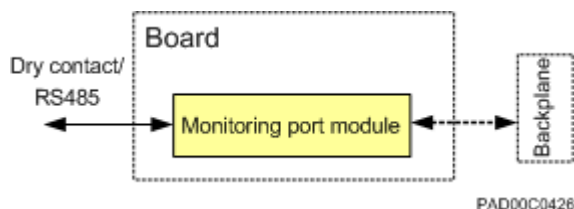
A UEIUb performs the following functions:

- Provides two ports with each transmitting one RS485 signal and two ports with each transmitting four Boolean signals. The Boolean signals can only be dry contact or OC signals.
- Reports monitoring and alarm signals from other devices to the main control board.

### Working Principle

The following figure shows the working principle of a UEIUb.

**Figure 6-10** Working principle of a UEIUb



### Port

The following table describes the ports on a UEIUb panel.

**Table 6-18** Ports on a UEIUb panel

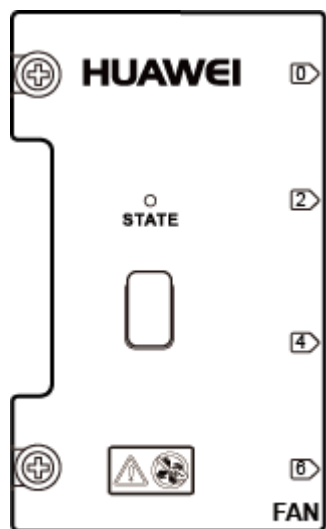
Silkscreen	Connector	Number of Ports	Description
EXT-ALM0	RJ45 connector	1	Ports for Boolean signal inputs 0 to 3
EXT-ALM1	RJ45 connector	1	Ports for Boolean signal inputs 4 to 7
MON0	RJ45 connector	1	Port for RS485 signal input 0
MON1	RJ45 connector	1	Port for RS485 signal input 1

## 6.6 FANf

A FANf is a fan module in a BBU.

The following figure shows the exterior of a FANf.

**Figure 6-11** FANf panel



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### Function

A FANf performs the following functions:

- Dissipates heat from other boards in the BBU.
- Controls the speed of fans, monitors the temperature of fans, and reports the status, temperature, and in-position signals of fans.



- Provides a read/write electronic label.

## 6.7 Optical Modules

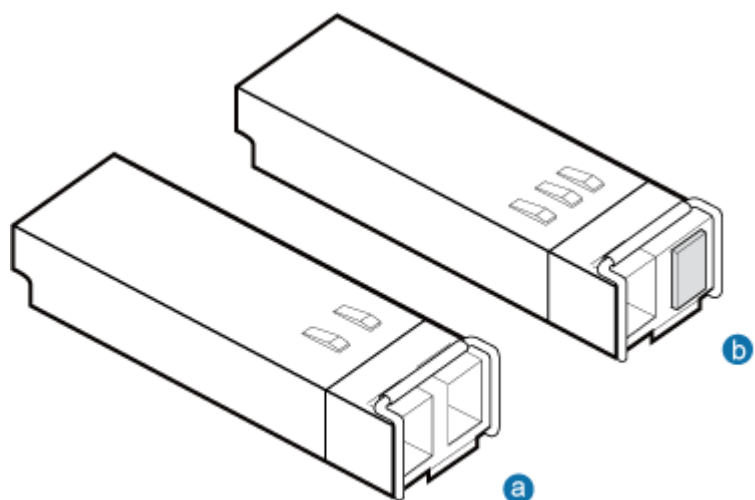
An optical module transmits optical signals between an optical port and a fiber optic cable.

### NOTE

- The exteriors of an optical module and the label on an optical module in this section are for reference only. The actual exteriors may be different.
- Boards or RF modules supporting only the 1.25 Gbit/s CPRI port rate, for example, a GTMU or RRU3908 V1, cannot use 10 Gbit/s optical modules.
- A fiber optic cable must use the same type of optical modules on its two ends. If different types of optical modules are used by a fiber optic cable, performance risks may arise, for example, alarms, bit errors, and interrupted links.
- Only Huawei-certified optical modules meeting the following requirements can be used for Huawei wireless devices:
  - Requirements of devices on which optical modules are to be installed
  - Laser safety in the IEC 60825-1 standard
  - General safety in the IEC 60950-1 standard
- For SFP or QSFP optical modules certified and provided by Huawei, see *Spare Parts Catalog*.

The following figures show the exteriors of optical modules.

**Figure 6-12** Exteriors of optical modules (SFP)

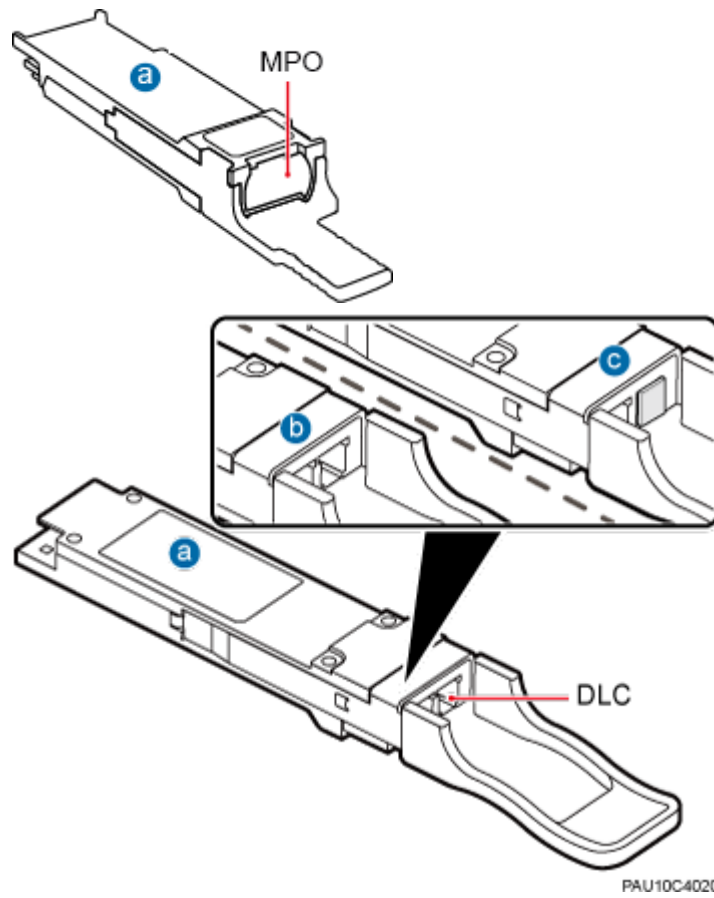


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a: Two-fiber bidirectional optical module

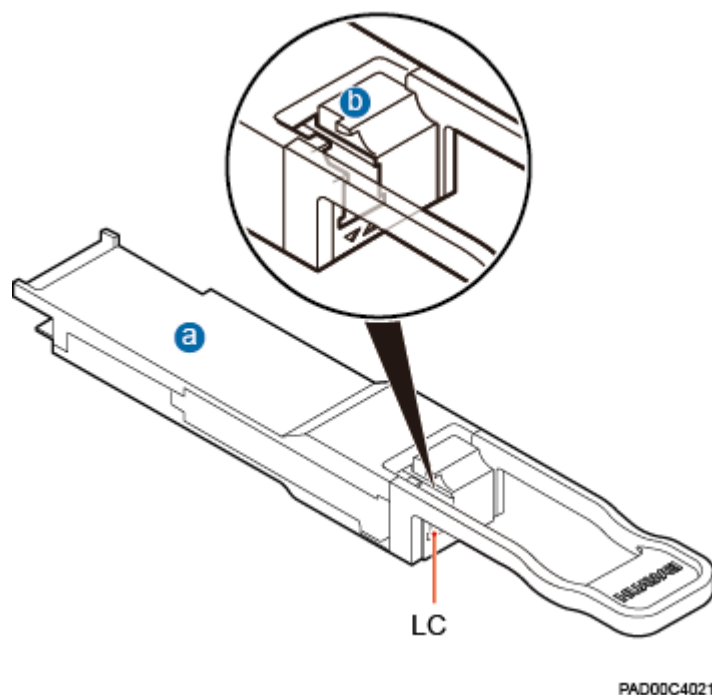
b: Single-fiber bidirectional optical module

**Figure 6-13** Exteriors of optical modules (QSFP)



a: 100G SR4 optical module b: Two-fiber bidirectional optical module

c: Single-fiber bidirectional optical module



a: 100G BIDI optical module

b: Single-fiber bidirectional optical module

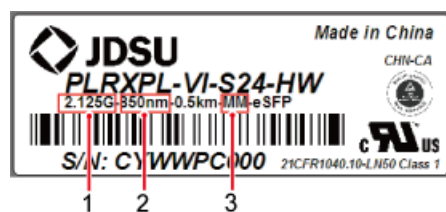
**NOTE**

QSFP optical modules are applicable only to BBUs, massive MIMO devices, and radio multiplex units (RMUs), but not to RRUs. In addition, only QSFP optical modules with a data rate of 40 Gbit/s are applicable to the RMUs.

### Label on an Optical Module

There is a label on each optical module, which provides information such as the rate, wavelength, and transmission mode, as shown in the following figure.

**Figure 6-14** Label on an optical module (SFP)

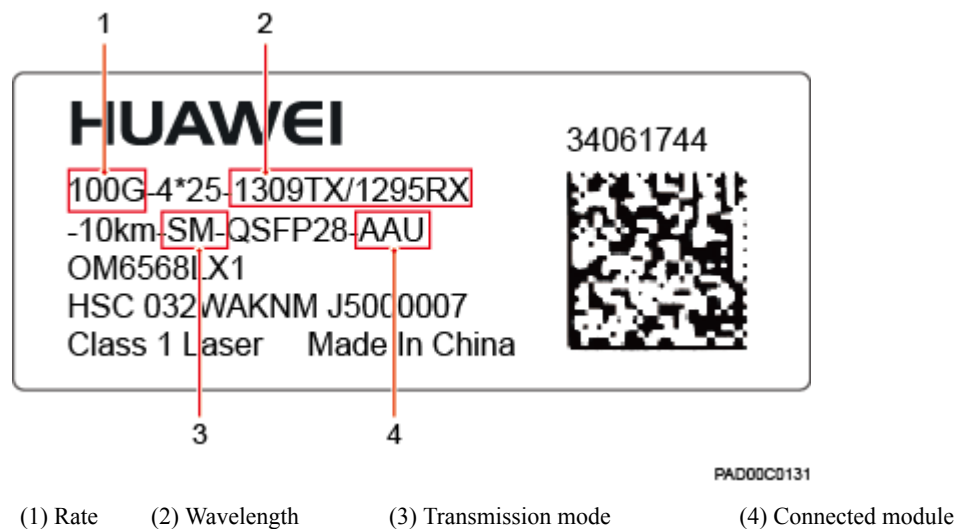
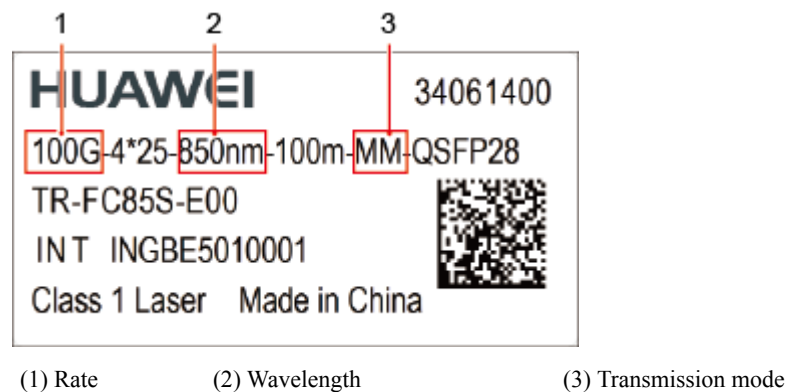


(1) Rate

(2) Wavelength

(3) Transmission mode

Figure 6-15 Label on an optical module (QSFP)



There are different types of optical modules which are configured depending on the actual application scenarios, see **CPRI Fiber Optic Cable** in *5900 Series Base Station Cables*.

## Optical Module Type

Optical modules can be divided into single- and multimode optical modules, which can be distinguished as follows:

- The puller of a single-mode optical module is blue and the puller of a multimode optical module is black or gray.
- The transmission mode is displayed as "SM" on the label of a single-mode optical module and "MM" on the label of a multimode optical module.

# 7 Indicators on BBU Boards

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## About This Chapter

This chapter describes the indicators on BBU boards.

### [7.1 Status Indicators](#)

This section describes the indicators showing the running status of BBU boards.

### [7.2 Indicators for Ports](#)

This section describes the indicators indicating the status of links connected to ports on BBU boards.

## 7.1 Status Indicators

This section describes the indicators showing the running status of BBU boards.

The following figure shows the indicator status on BBU boards. The following table describes the meanings of the indicators.

Figure 7-1 Status indicators

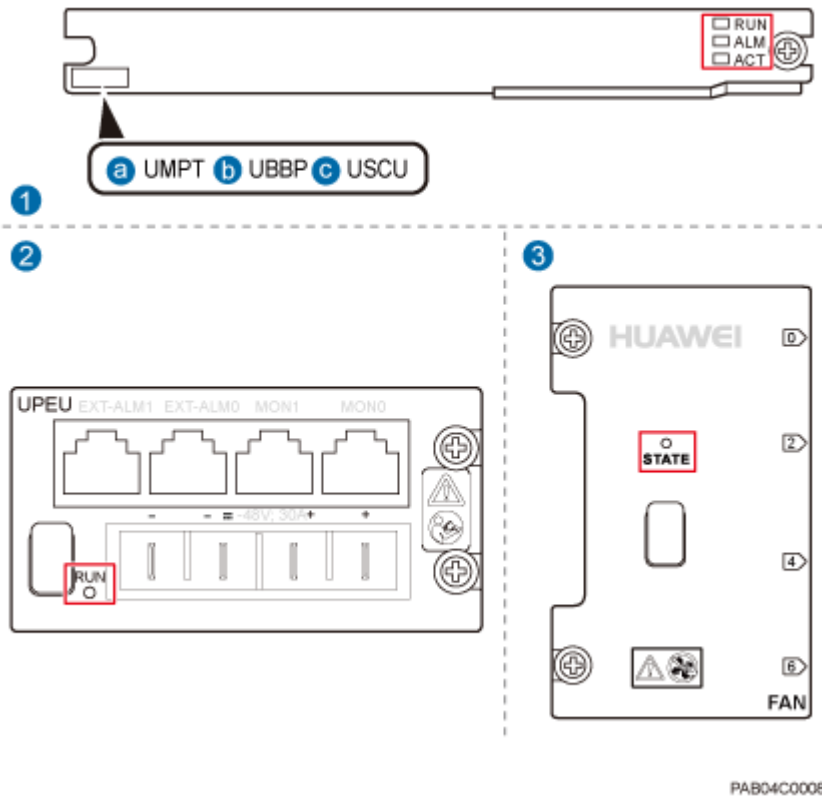


Table 7-1 Meanings of status indicators

Exterior	Silkscreen	Color	Status	Description
See illustration 1.	RUN	Green	Steady on	There is power supply, but the board is faulty.
			Steady 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)	<ul style="list-style-type: none"> <li>The board is being loaded or configured.</li> <li>The board is not started.</li> </ul>
	ALM	Red	Steady on	An alarm is generated, and the board needs to be replaced.
			Steady off	The board is running properly.
			Blinking (on for 1s and off for 1s)	An alarm is generated, and you need to locate the fault before determining whether to replace the board.

Exterior	Silkscreen	Color	Status	Description
	ACT	Green	Steady on	<ul style="list-style-type: none"> <li>● Main control board: The board is serving as an active board.</li> <li>● Boards other than main control boards: The boards have been activated and are providing services.</li> </ul>
			Steady off	<ul style="list-style-type: none"> <li>● Main control board: The board is not serving as an active board.</li> <li>● Boards other than main control boards: The boards have not been activated or are not providing services.</li> </ul>
			Blinking (on for 0.125s and off for 0.125s)	<ul style="list-style-type: none"> <li>● Main control board: The operation and maintenance link (OML) is disconnected.</li> <li>● Boards other than main control boards: N/A</li> </ul>
			Blinking (on for 1s and off for 1s)	<ul style="list-style-type: none"> <li>● UMPT supporting the UMTS single mode or UMPT deployed with multiple modes including UMTS: The board is being tested, for example, going through an RF module voltage standing wave ratio (VSWR) test by using a USB flash drive<sup>a</sup>.</li> <li>● Other boards: N/A</li> </ul>
			Blinking (In every 4s, the indicator is on for 0.125s and off for 0.125s [eight times] in the first 2s and then off for 2s.)	<ul style="list-style-type: none"> <li>● UMPT supporting the LTE single mode or UMPT deployed with multiple modes including LTE: <ul style="list-style-type: none"> <li>- All cells configured for the subrack that houses this board are not activated.</li> <li>- The S1 link is faulty.</li> </ul> </li> <li>● UMPT supporting the GSM single mode, UMPT supporting the UMTS single mode, UMPT deployed with multiple modes including GSM or UMTS: <ul style="list-style-type: none"> <li>- The board is running properly.</li> </ul> </li> <li>● Other boards: N/A</li> </ul>
See illustration 2.	RUN	Green	Steady on	The board is running properly.
			Steady off	There is no power supply, or the board is faulty.
See illustration 3.	STATE	Red or green	Blinking green (on for 0.125s and off for 0.125s)	The module is not registered, and no alarm is reported.

Exterior	Silkscreen	Color	Status	Description
			Blinking green (on for 1s and off for 1s)	The module is running properly.
			Blinking red (on for 1s and off for 1s)	The module is reporting alarms.
			Steady off	There is no power supply.

## 7.2 Indicators for Ports

This section describes the indicators indicating the status of links connected to ports on BBU boards.

### Indicators for FE/GE Ports

On a main control board or transmission board, the indicator for an FE/GE electrical or optical port is located on either sides of the port or above the port, as shown in the following figure. There is no silkscreen for these indicators.

Figure 7-2 Positions of indicators for FE/GE ports



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The following table describes the indicators for FE/GE ports.

Table 7-2 Indicators for FE/GE ports

Exterior	Indicator	Color	Status	Description
See illustration 1.	TX RX	Red or green	Steady green	The Ethernet link is functioning properly.
			Steady red	The optical module fails to transmit or receive signals.

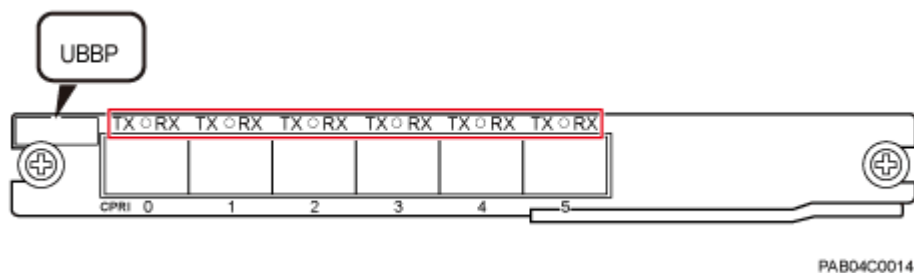


Exterior	Indicator	Color	Status	Description
			Blinking red (on for 1s and off for 1s)	Ethernet negotiation is faulty.
			Steady off	The SFP module cannot be detected, or the optical module is powered off.

### Indicators for CPRI/XCI Ports

Indicators for a CPRI/XCI port are above the port, as shown in the following figure.

**Figure 7-3** Positions of indicators for CPRI ports



The indicators for a CPRI/XCI port indicate the status of links connected to the CPRI port. The following table describes these indicators.

**Table 7-3** Indicators for CPRI ports

Silkscreen	Color	Status	Description
TX RX	Red or green	Steady green	The CPRI link is functioning properly.
		Steady red	The optical module fails to transmit or receive signals due to one of the following causes: <ul style="list-style-type: none"> <li>● The optical module is faulty.</li> <li>● The fiber optic cable is broken.</li> </ul>
		Blinking red (on for 0.125s and off for 0.125s)	The RF module connected to the CPRI port has a hardware fault.

Silkscreen	Color	Status	Description
		Blinking red (on for 1s and off for 1s)	<p>The CPRI link is out of lock due to one of the following causes:</p> <ul style="list-style-type: none"> <li>● There is no mutual lock between dual-mode reference clocks.</li> <li>● The CPRI port rate does not match the rate of the optical module.</li> <li>● The VSWR alarm is reported on the RF module connected to the CPRI port when the USB flash drive<sup>a</sup> connected to the main control board is under test. (This is only for the baseband processing board working in UMTS mode.)</li> </ul>
		Steady off	<ul style="list-style-type: none"> <li>● The optical module cannot be detected.</li> <li>● The CPRI electrical cable is not connected.</li> </ul>
<p>a: The security of the USB port is ensured by encryption, and the USB port can be shut down using commands.</p>			

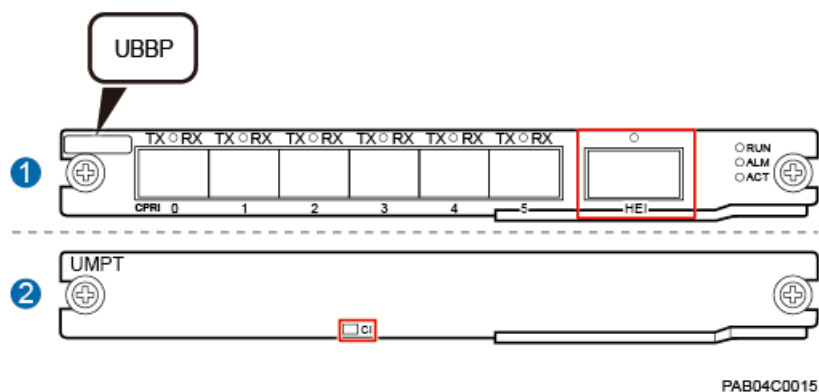
**Table 7-4** Indicators for XCI ports

Silkscreen	Color	Status	Description
TX RX	Red or green	Steady green	The interconnection link is functioning properly.
		Steady red	The optical module fails to transmit or receive signals.
		Blinking red (on for 0.125s and off for 0.125s)	The interconnection link is out of lock.
		Blinking red (on for 1s and off for 1s)	The optical module cannot be detected.

## Indicators for Interconnection Ports

Indicators for an interconnection port are either above or below the port, as shown in the following figure.

Figure 7-4 Positions of indicators for interconnection ports



The indicators for an interconnection port indicate the status of links connected to the interconnection port. The following table describes these indicators.

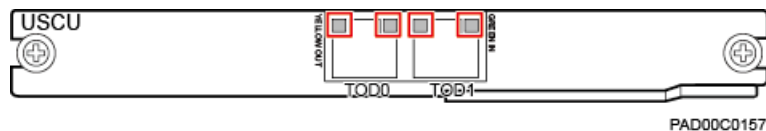
Table 7-5 Indicators for interconnection ports

Exterior	Silkscreen	Color	Status	Description
See illustration 1.	HEI	Red or green	Steady green	The interconnection link is functioning properly.
			Steady red	The optical module fails to transmit or receive signals due to one of the following causes: <ul style="list-style-type: none"> <li>● The optical module is faulty.</li> <li>● The fiber optic cable is broken.</li> </ul>
			Blinking red (on for 1s and off for 1s)	The interconnection link is out of lock due to one of the following causes: <ul style="list-style-type: none"> <li>● Mutual locking between two interconnected BBUs fails.</li> <li>● The QSFP port rate does not match the rate of the optical module.</li> </ul>
			Steady off	The optical module cannot be detected.
See illustration 2.	CI	Red or green	Steady green	The interconnection link is functioning properly.

## Indicators for TOD Ports

On a USCU, indicators for a TOD port are located on both sides of the TOD port, as shown in the following figure.

**Figure 7-5** Positions of indicators for TOD ports



The following table describes the indicators for TOD ports.

**Table 7-6** Indicators for TOD ports

Silkscreen	Color	Status	Description
TOD $n$ ( $n$ represents the number in the silkscreen.)	Green	Steady on	The port is configured as an input port.
	Orange	Steady on	The port is configured as an output port.

# 8 Equipment Specifications

**Table 8-1** Input power

Type	Input Power	Voltage Range
BBU5900 (configured with the UPEUe)	- 48 V DC	- 38.4 V DC to - 57 V DC

**Table 8-2** Dimensions and weight

Item	Specifications
Dimensions (H x W x D)	86 mm x 442 mm x 310 mm (3.39 in. x 17.40 in. x 12.20 in.)
Weight	BBU5900 ≤ 18 kg (39.69 lb) (full configuration)

**Table 8-3** Heat dissipation

Item	Specifications
FANf	2100 W

**Table 8-4** Environmental specifications

Item	Specifications
Operating temperature	- 20°C to +55°C (- 4°F to +131°F) (long term)
Relative humidity	5% RH to 95% RH
Ingress Protection Rating	IP20

Item	Specifications
Atmospheric pressure	70 kPa to 106 kPa
Noise power level	ETS 300 753 3.1 $\leq 7.2$ bels
Storage time	It is recommended that the product be installed and put into use within a year after being delivered. Otherwise, it may malfunction.