

DBS3900 GU Hardware Description

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Foreword

- DBS3900, Distributed Base Station, is the fourth generation base station developed by Huawei. It features a multi-mode modular design and supports three working modes: GSM mode (GO), GSM+UMTS dual mode (GU), and UMTS mode (UO) through configuration of different hardware and software. In addition, the DBS3900 supports smooth evolution to the Long Term Evolution (LTE) system



References

- “3900 Series Multi-Mode Base Station Product Description”
- “3900 Series Multi-Mode Base Station Co-Cabinet Solution Description”
- “BBU3900 Hardware Description”
- “RRU3908 Hardware Description”
- “RRU3804 Hardware Description”



Objectives

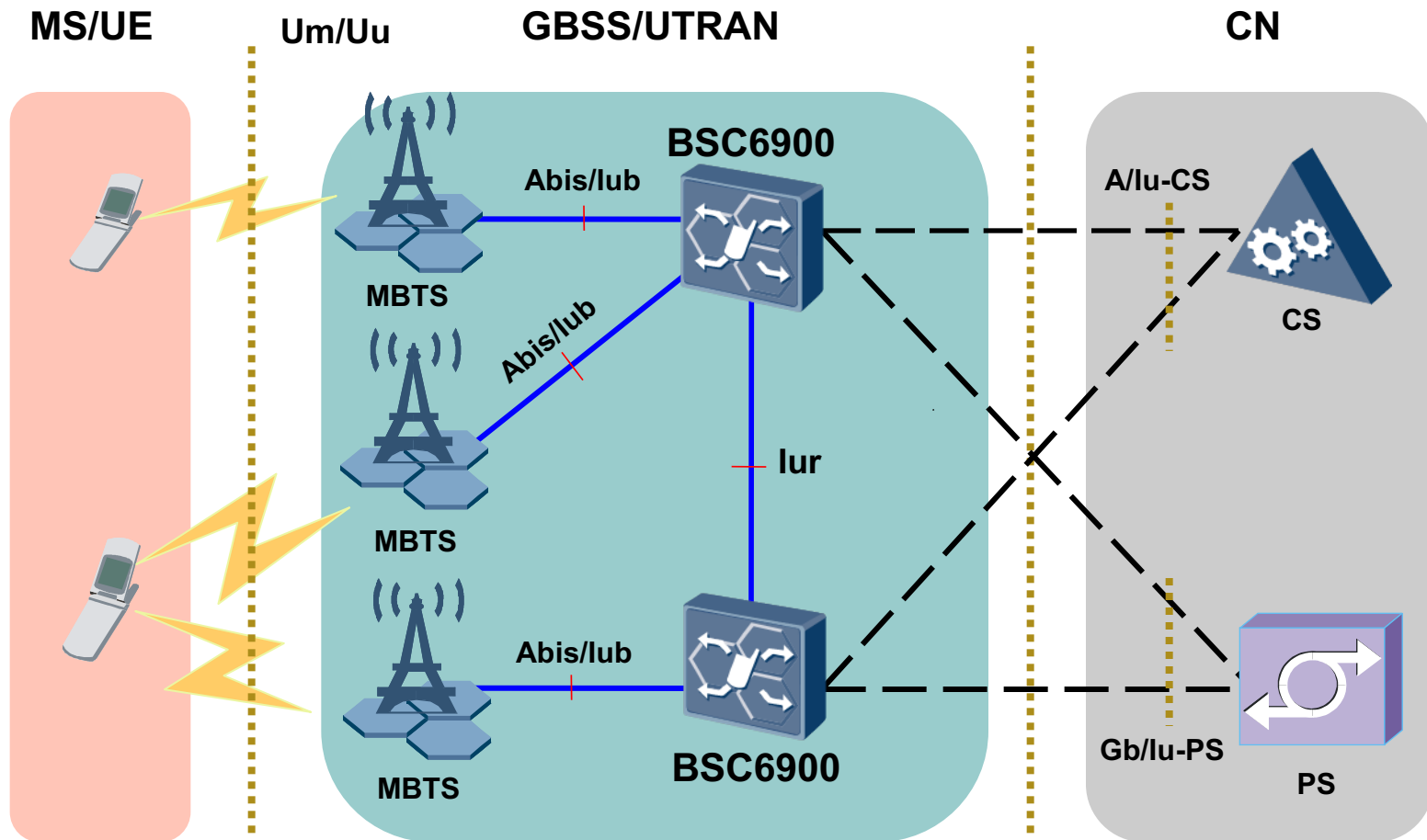
- Upon completion of this course, you will be able to:
 - Outline DBS3900 product functions
 - Detail the hardware structure of DBS3900
 - Detail the functions of different modules
 - Describe the typical CPRI interconnection modes of DBS3900



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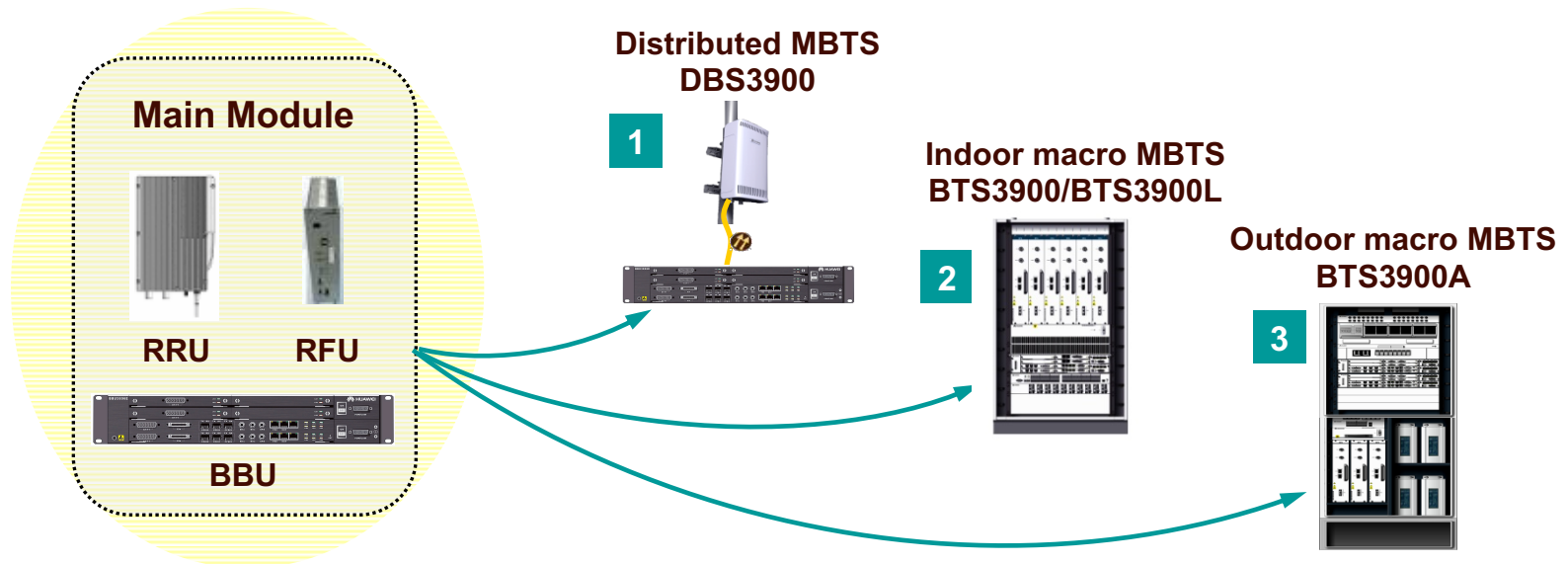
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MBTS in BSS/UTRAN Network



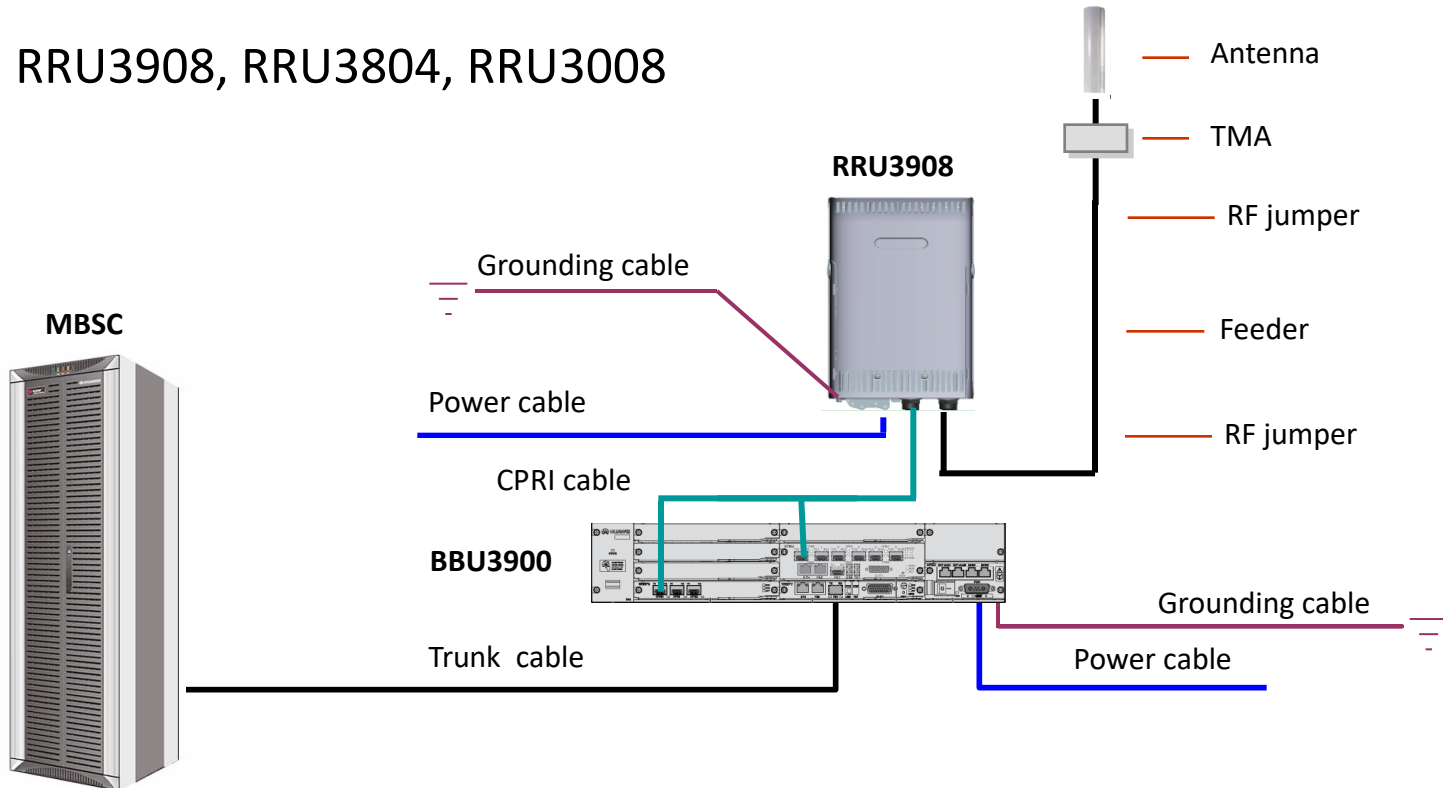
HUAWEI 3900 series MBTS

- Based on all IP platform
- Standardized modules shared by all MBTS types:
 - BBU and RRU for distributed MBTS
 - BBU and RFU for macro MBTS



DBS3900 System Overview

- DBS3900 components:
 - BBU3900
 - RRU3908, RRU3804, RRU3008



DBS3900 Features

- High Capacity:
 - When working in GSM mode, a single BBU supports the maximum cell configuration of S24/24/24. A single RRU3908 supports a maximum of 6 GSM TRX
 - When working in GSM+UMTS dual mode, a BBU supports the maximum cell configuration of GSM S24/24/24 + UMTS S8/8/8. An RRU3908 supports a maximum of 6 GSM+UMTS carriers
 - When working in UMTS mode, a BBU supports 24 cells, 1,536 CEs in the uplink, and 1,536 CEs in the downlink. An RRU3908 supports a maximum of 4 UMTS carriers

DBS3900 Features (*Cont.*)

- Investment Saving:
 - Networks working in different modes can share E1 transmission resources, the panels can be connected to share IP transmission resources, and transmission resources can also be shared in IP over E1
 - When the GSM network uses E1/T1 transport and UMTS uses IP transport, the UMTS network can use the GSM clock, thus implementing clock source sharing without additional GPS equipment or clock server
- High Reliability:
 - The ring topology between the BBU and the RRU can be configured. In this way, a backup channel is provided, and thus network reliability is enhanced
 - The baseband processing board supports the resource pool design

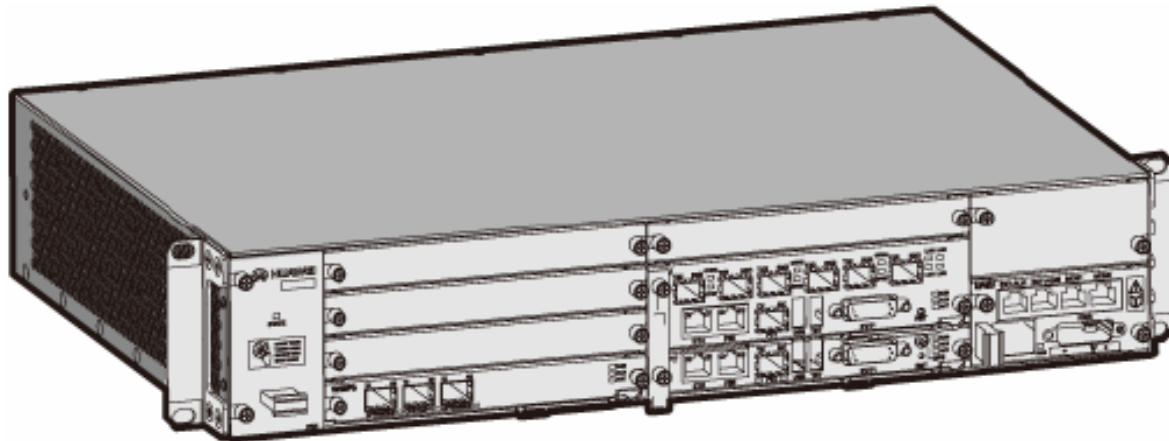


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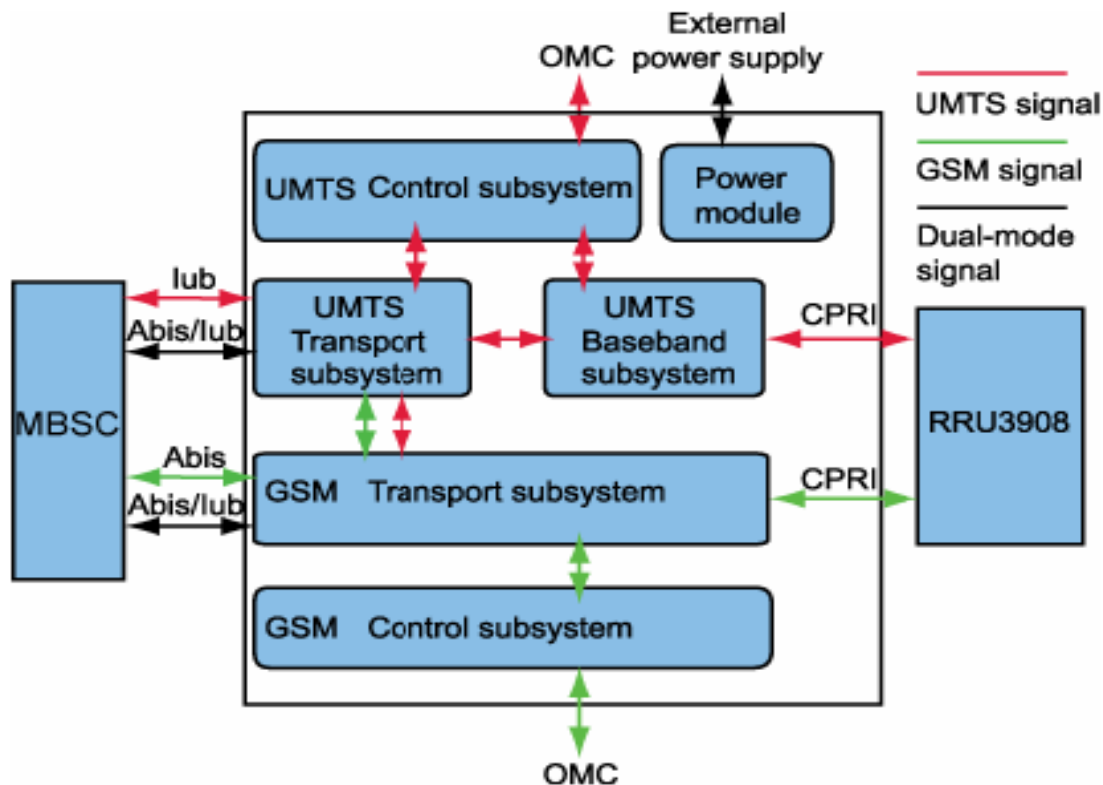
Appearance of the BBU3900

- The BBU3900 has a case structure. It can be installed in a 19-inch-wide and 2 U-high indoor space or outdoor protective cabinet
- The dimensions of the BBU3900 are 442 mm (width) x 310 mm (depth) x 86 mm (height)



Logical Structure of the BBU3900

- The BBU3900 consists of the transport subsystem, baseband subsystem, control subsystem, and power module

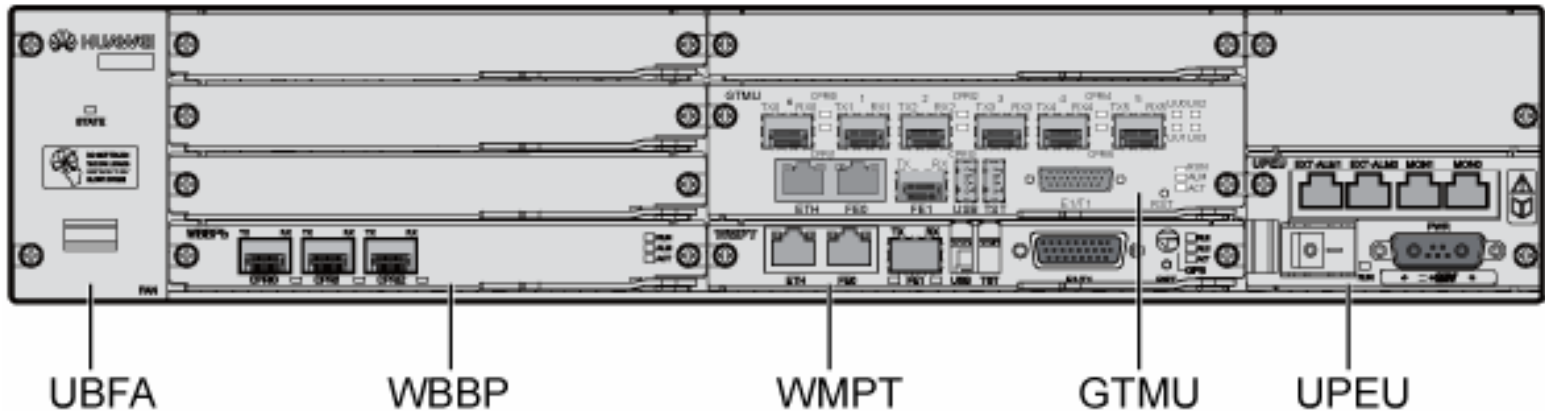


Board Configuration of the BBU3900

- Slot numbering:

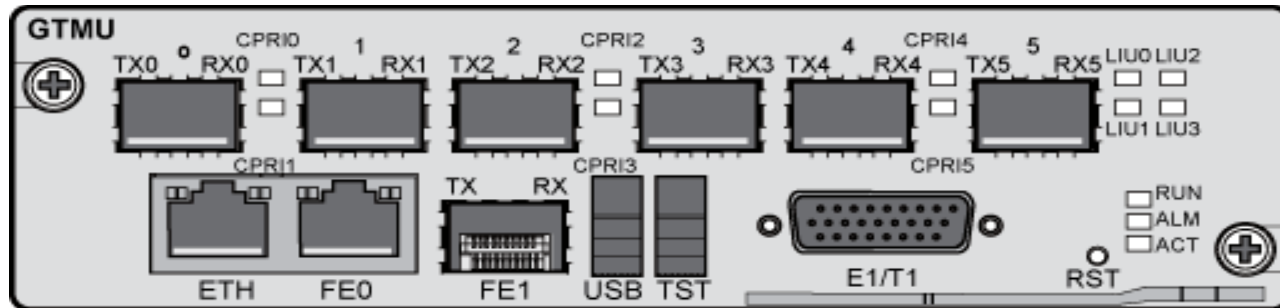
UBFA	Slot 0 WBBP/UTRP/USCU	Slot 4 UTRP	PWR1 UPEU/UEIU
	Slot 1 WBBP/UTRP/USCU	Slot 5 GTMU	
	Slot 2 WBBP/UBRI	Slot 6	PWR2 UPEU
	Slot 3 WBBP	Slot 7 WMPT	

- Typical board configuration:



GTMU

- The **GSM** Transmission, Timing, and Management Unit for BBU (GTMU) controls and manages the entire BTS. It provides interfaces related to the reference clock, power monitoring, OM, and external alarm collection

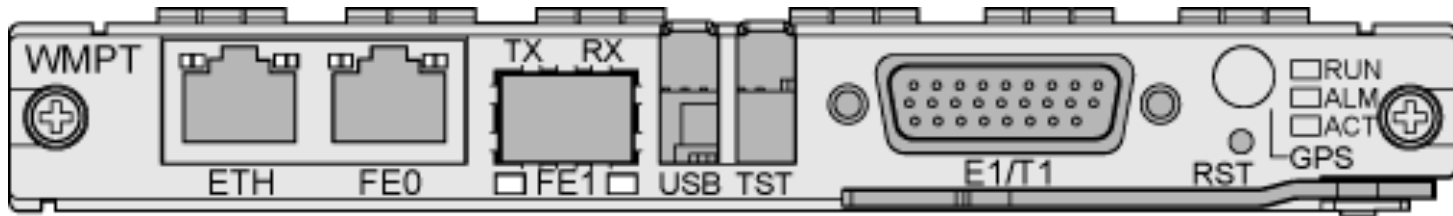


GTMU (Cont.)

Port	Connector Type	Description
CPRIO to CPRIS	SFP	Ports for the communication between the BBU and the RF module; support input and output of the optical and electrical signal.
ETH	RJ45	Port for local maintenance and commissioning.
FE0	RJ45	Connects the BBU to a routing device in the equipment room through the Ethernet cable to transmit network information.
FE1	DLC	Connects the BBU to a routing device in the equipment room through the optical cable to transmit network information.
USB	USB	Enables the automatic software upgrade from a USB disk.
TST	USB	Provides a reference clock for the tester.
E1/T1	DB26 female	Provides the input and output of the four E1/T1 signals between the GTMU and the UELP or between the GTMU and the BSC.

WMPT

- The WCDMA Main Processing and Transmission unit is the BBU3900 main control and transmission board that processes the signals and manages the resources for other boards

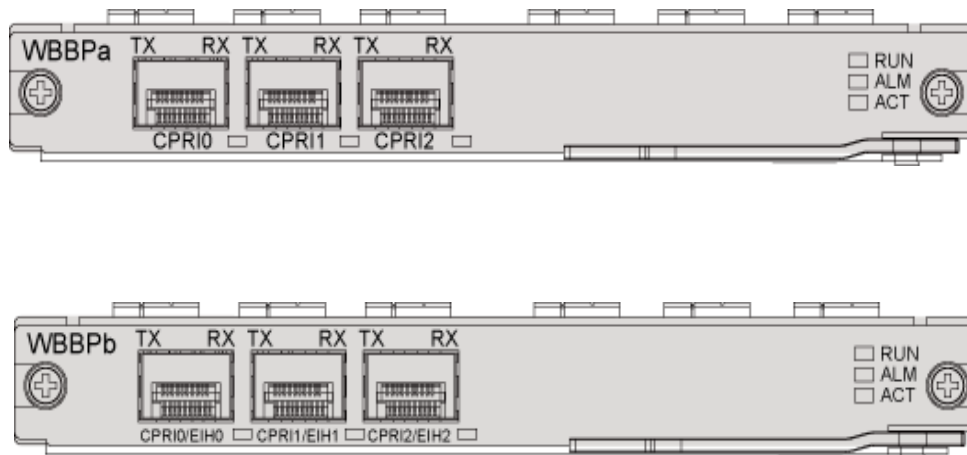


WMPT (Cont.)

Port	Connector Type	Description
E1/T1	DB26	four E1/T1 signals.
FE0	RJ45	FE electrical port.
FE1	SFP	FE optical port.
GPS	SMA	GPS antenna.
ETH	RJ45	Commissioning Ethernet port.
USB	USB	USB loading port.
TST	USB	USB testing port.

WBBP

- The WCDMA Baseband Process Unit (WBBP) board processes UL and DL baseband signals
- The WBBP is classified into WBBPa and WBBPb:



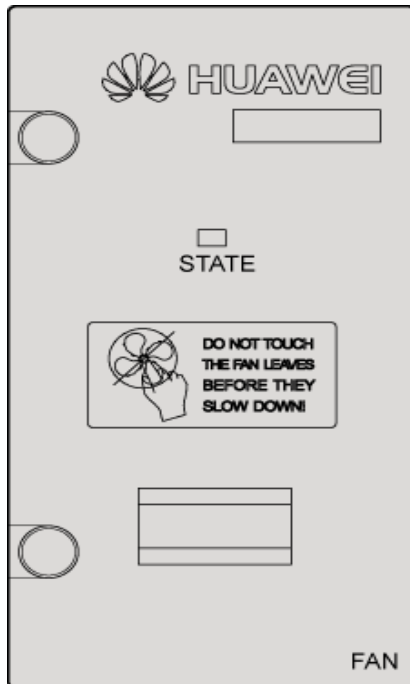
Board	Cell	UL CE	DL CE
WBBPa	3	128	256
WBBPb1	3	64	64
WBBPb2	3	128	128
WBBPb3	6	256	256
WBBPb4	6	384	384

WBBP (Cont.)

LED	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.
		1s ON, 1s OFF	The board is running properly.
		0.125s ON, 0.125s OFF	Software is being loaded to the board.
ACT	Green	ON	The board is running properly.
		OFF	The WBBP is not in use.
ALM	Red	ON	The board has alarms.
		OFF	The board is running properly.
CPRI0 to CPRI2	Red /green	OFF	The optical module is not configured with CPRI ports or the module is powered off.
		ON (green)	The CPRI link is operational, and the RRU hardware is functional.
		ON (red)	The optical module is not in position or the CPRI link is faulty.
		Blinking at 4 Hz (red, 0.125s ON, 0.125s OFF)	The hardware of the RRU connected to the CPRI link is faulty and needs to be replaced.
		Blinking at 0.5 Hz (red, 1s ON, 1s OFF)	The VSWR alarm, antenna alarm, or RRU external alarm occurs on the RRU connected to the CPRI link.

UBFA

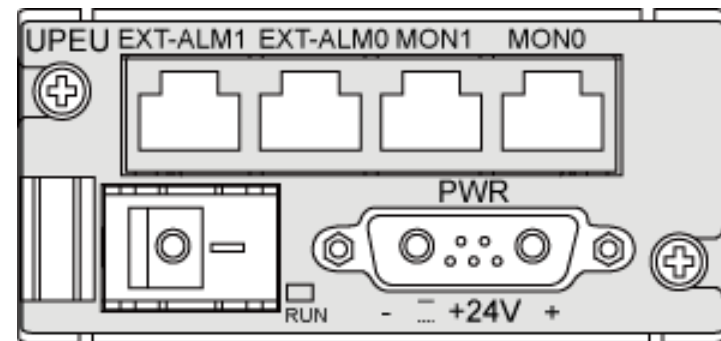
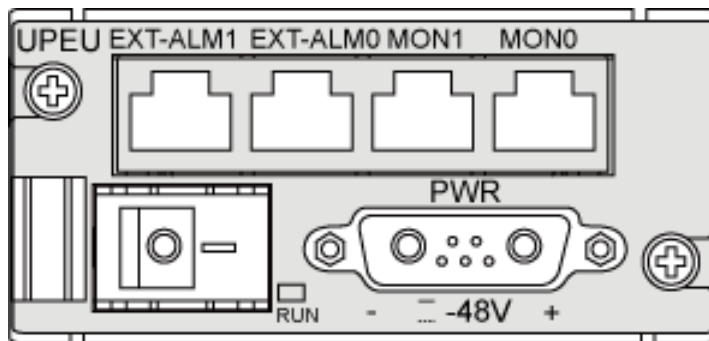
- The **Universal** BBU Fan type A (UBFA) is the fan unit, and it controls the fan speed, detects the temperature of the fan board, and dissipates the heat in the BBU



LED	Color	Status	Description
STATE	Green	0.125s ON, 0.125s OFF	The module is not registered, and no alarm is reported.
		1s ON, 1s OFF	The module is running properly.
	Red	OFF	No alarm is reported.
		1s ON, 1s OFF	The module is reporting alarms.

UPEU

- The Universal Power and Environment Interface Unit (UPEU) board provides power for other boards and monitors external alarms
- The UPEU is classified into UPEUA and UPEUB:
 - The UPEUA converts -48 V DC to +12 V DC
 - The UPEUB converts +24 V DC to +12 V DC



UPEU (Cont.)

Port	Connector Type	Quantity	Description
PWR	3V3	1	+24 V/-48 V DC power input.
EXT-ALM1	RJ45	1	Transmitting four dry contact alarms.
EXT-ALM0	RJ45	1	Transmitting four dry contact alarms.
MON1	RJ45	1	Transmitting one RS485 environment monitoring signal.
MON0	RJ45	1	Transmitting one RS485 environment monitoring signal.

LED	Color	Status	Description
RUN	Green	ON	The UPEU is operational.
		OFF	Power input is unavailable or the board is faulty.

Optional Boards

- UEIU:
 - The **Universal** Environment Interface Unit (UEIU) board transmits monitoring signals and alarm signals from external devices to the main control and transmission unit
- USCU:
 - The **Universal** Satellite Card and Clock Unit (USCU) is compatible with six types of satellite card, provides absolute timing information and the 1 Pulse Per Second (PPS) reference clock for the main control board, and provides the RGPS ports and BITS port
- UTRP:
 - The **Universal** Transmission Processing unit (UTRP) board, as the transmission extension board, it provides eight E1s/T1s, or one unchannelized STM-1/OC-3 port, or four FE/GE electrical ports, or two FE/GE optical ports
- 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



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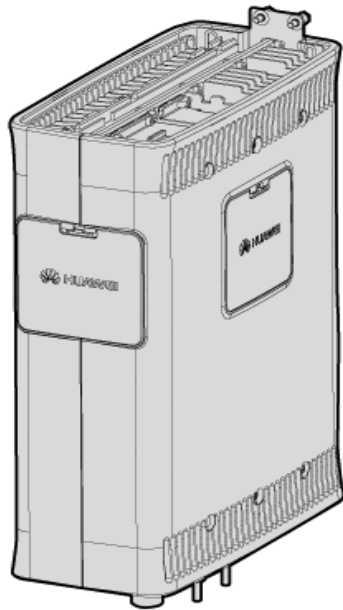
3. RRU hardware structure

3.1 RRU3908 hardware structure

3.2 RRU3804 hardware structure

Appearance of the RRU3908

- The RRU3908 is an outdoor remote radio unit that processes the baseband signals and the RF signals of the GSM, and processes the RF signals of the UMTS

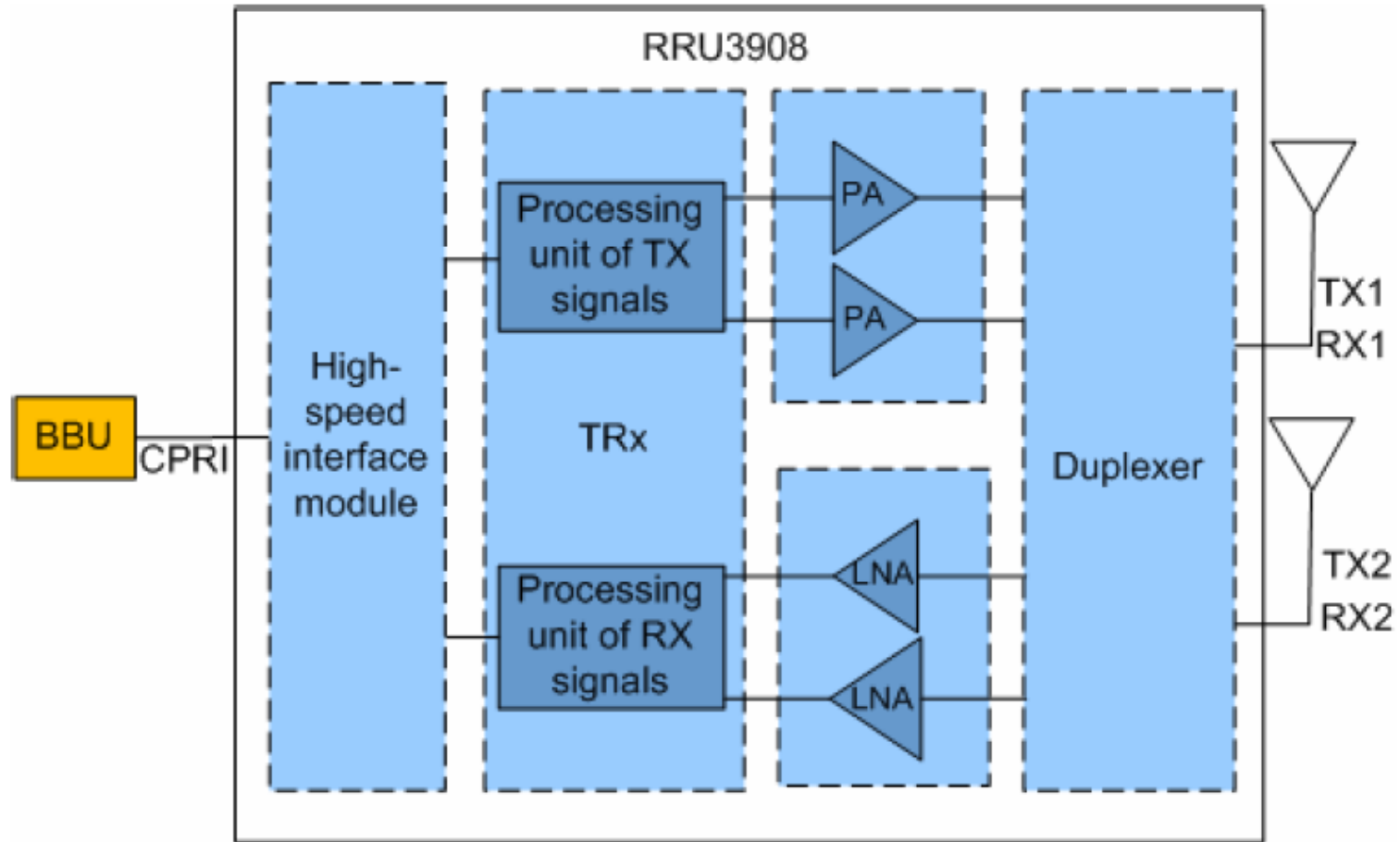


-48 V DC RRU



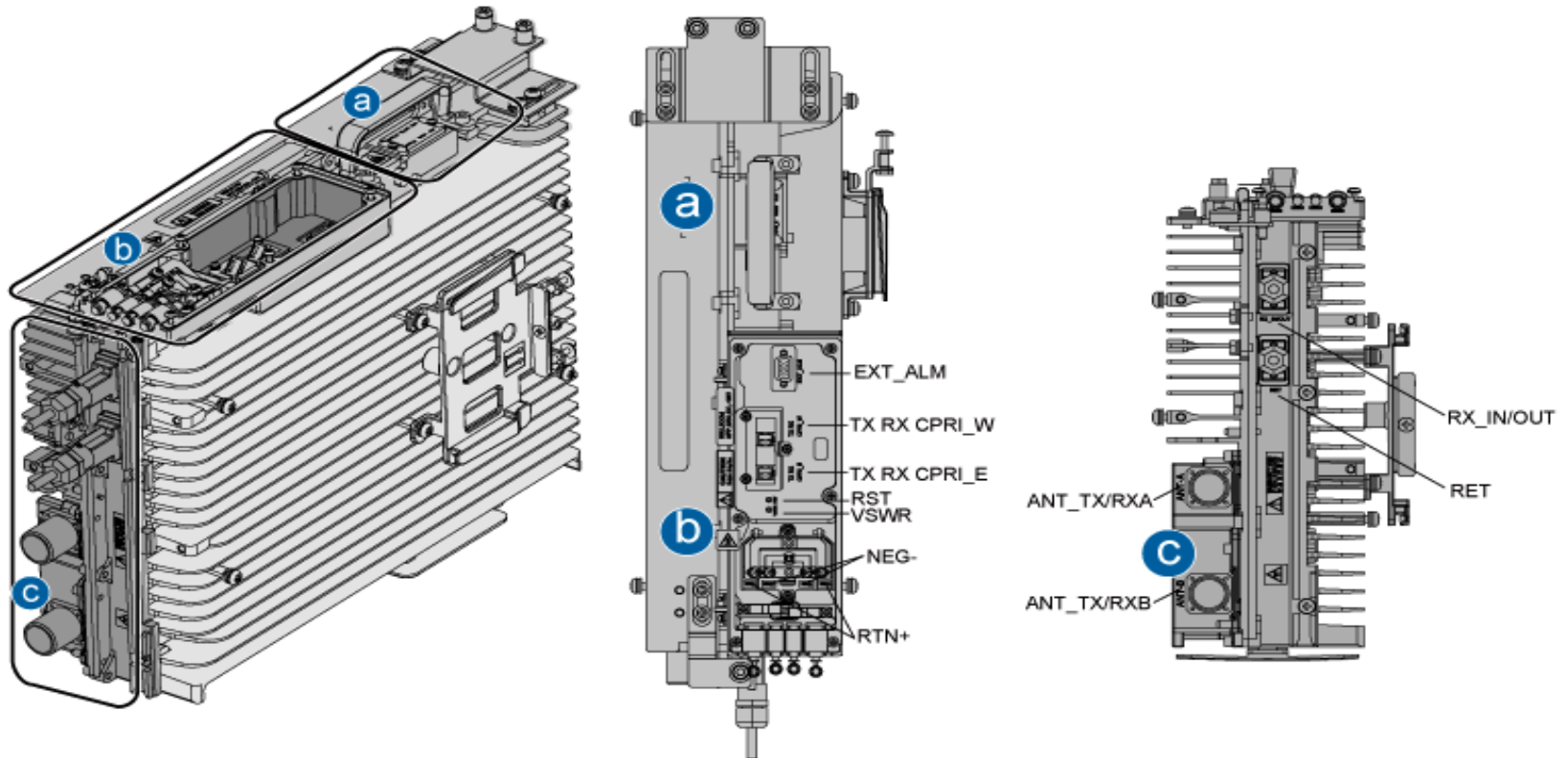
+220V AC RRU

Logical Structure of the RRU3908



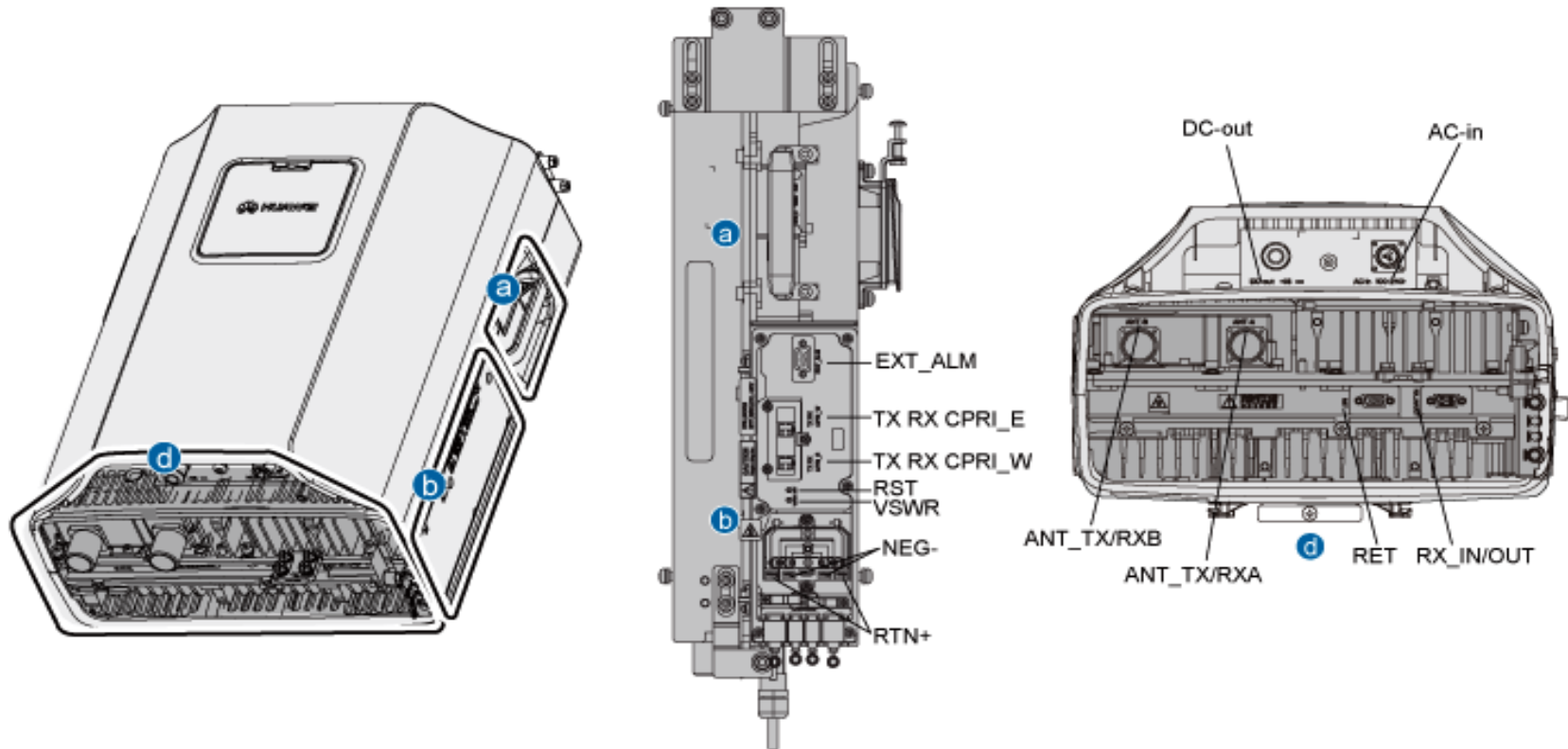
Panels of the DC RRU module

- The RRU module has a bottom panel, a cabling cavity panel, and an area attached with LEDs



Panels of the AC RRU module

- The RRU module has a bottom panel, a cabling cavity panel, and an area attached with LEDs





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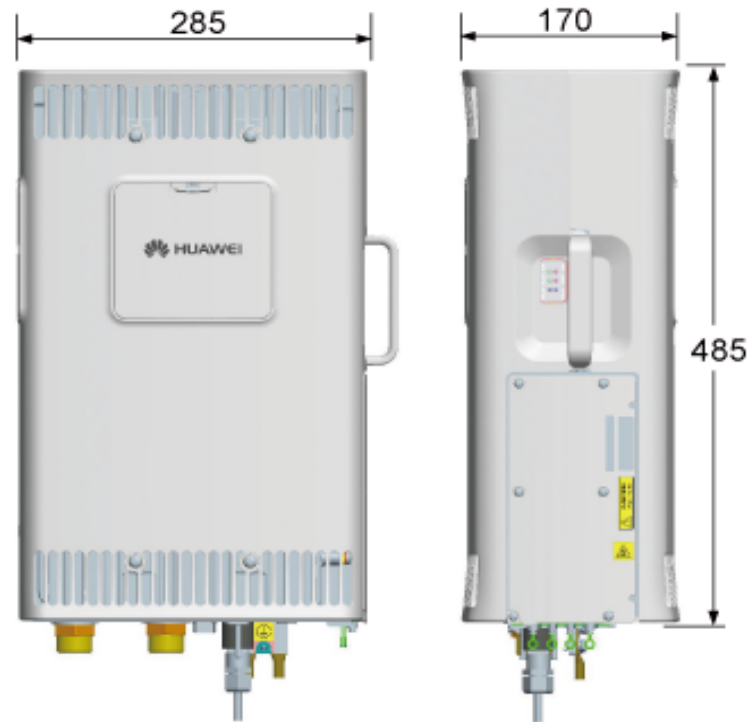
3. RRU hardware structure

3.1 RRU3908 hardware structure

3.2 RRU3804 hardware structure

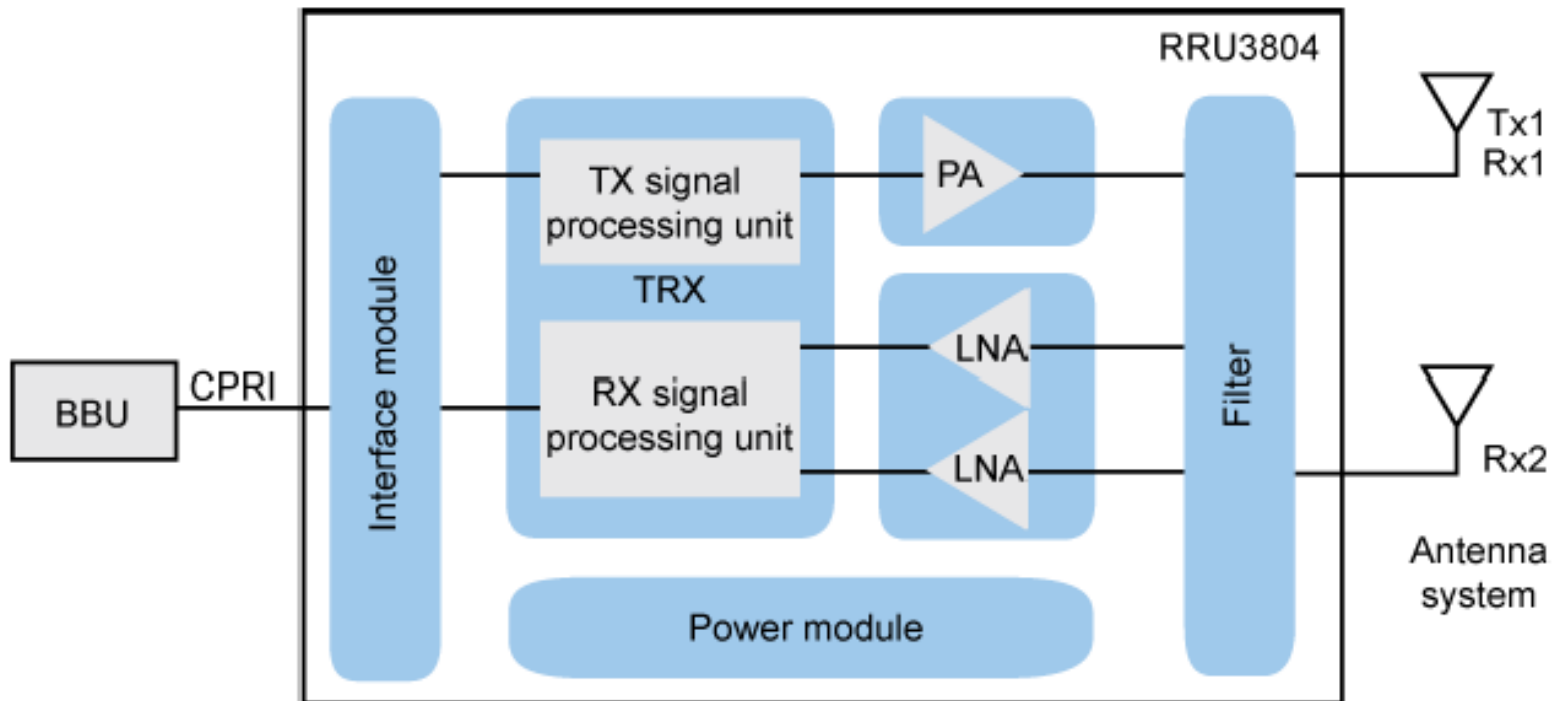
Appearance of the RRU3804

- The RRU3804 is an outdoor remote radio unit that processes the RF signals of the UMTS



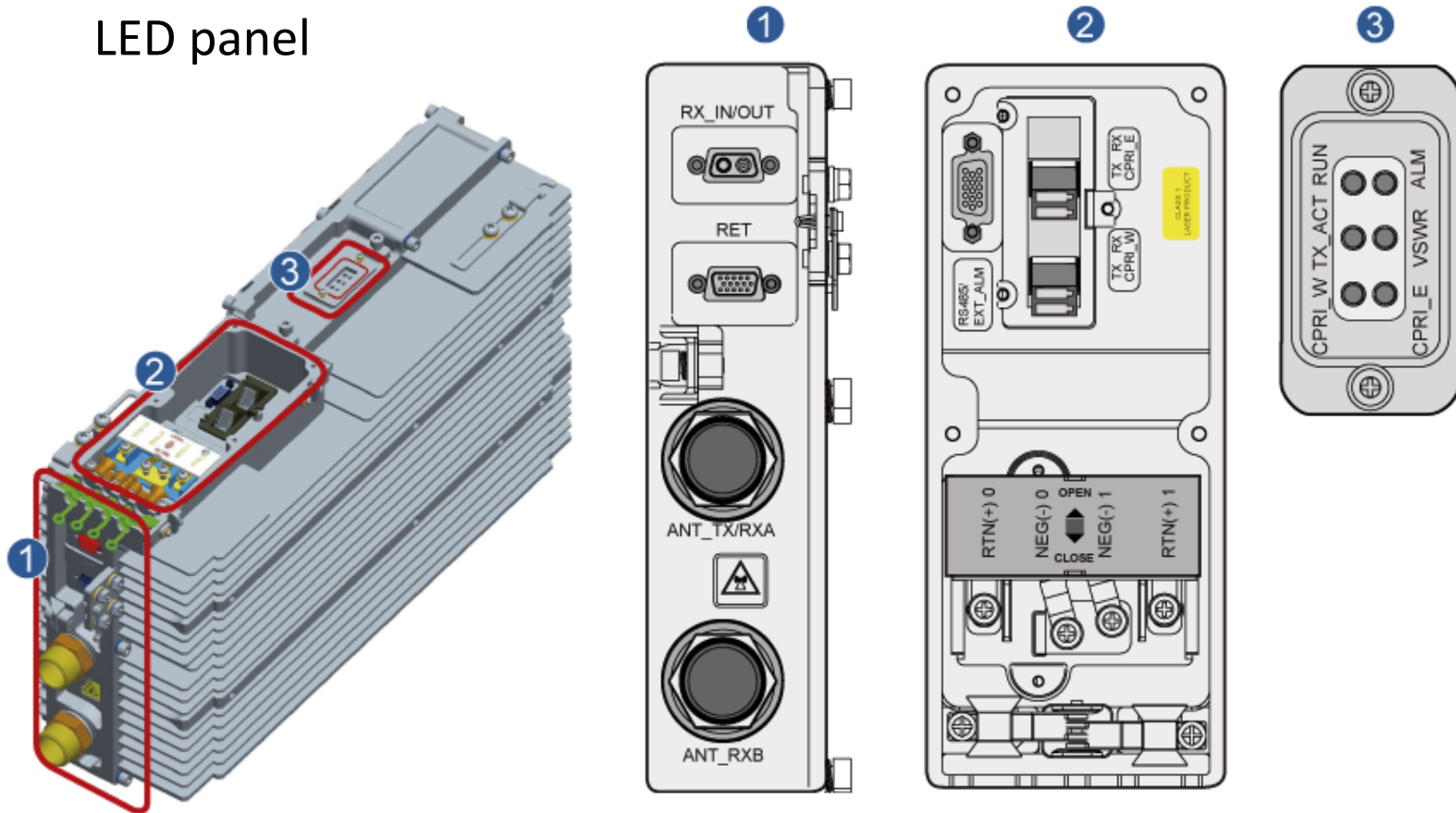
-48 V DC RRU

Logical Structure of the RRU3804



Panels of the RRU3804

- The RRU3804 has a bottom panel, a cabling cavity panel, and an LED panel



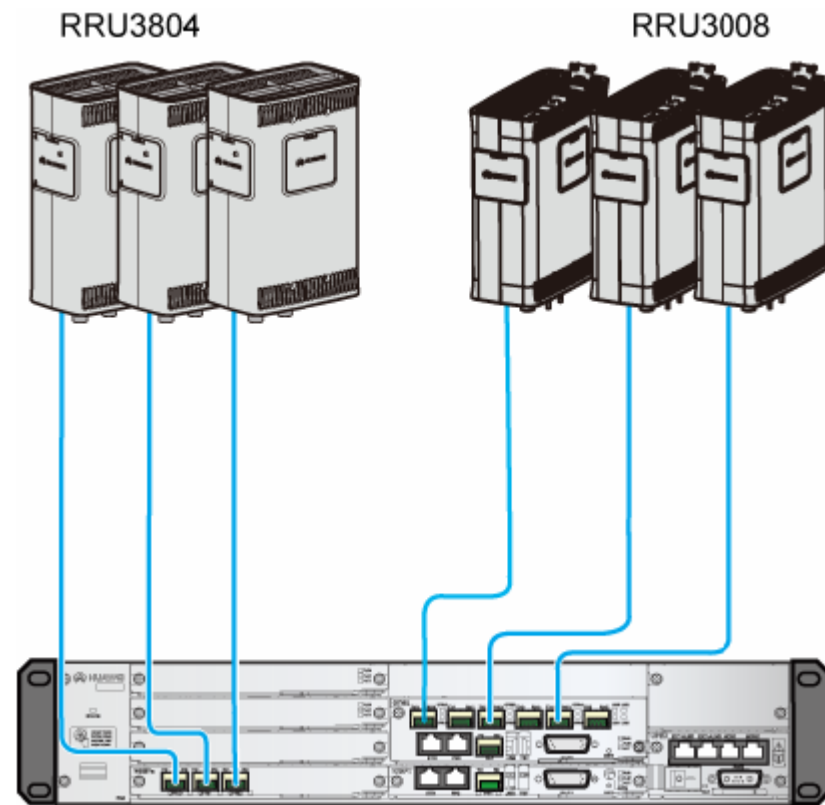


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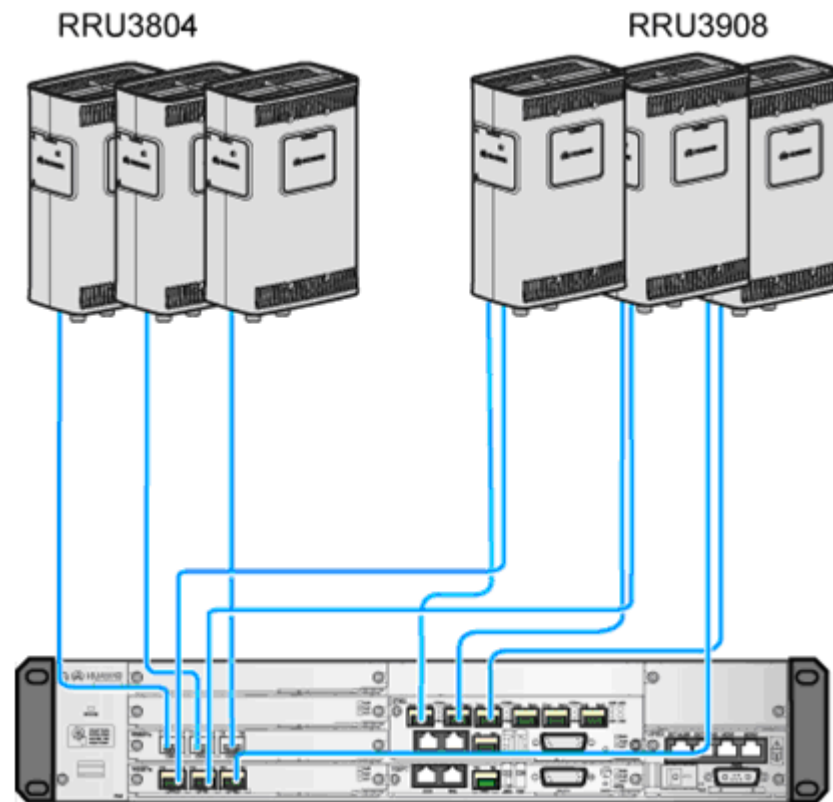
CPRI Interconnection Type

- Scenario 1:



CPRI Interconnection Type (*Cont.*)

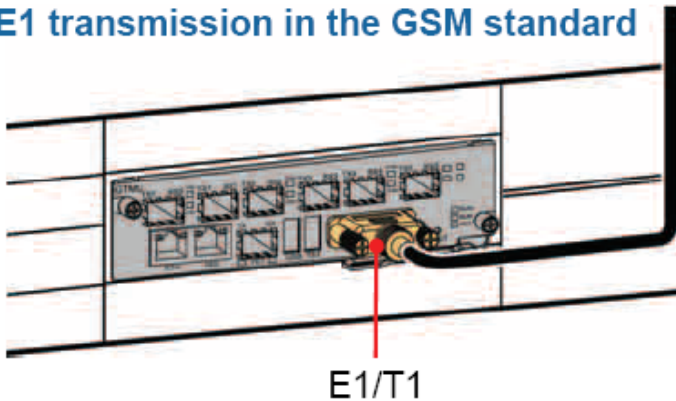
- Scenario 2:



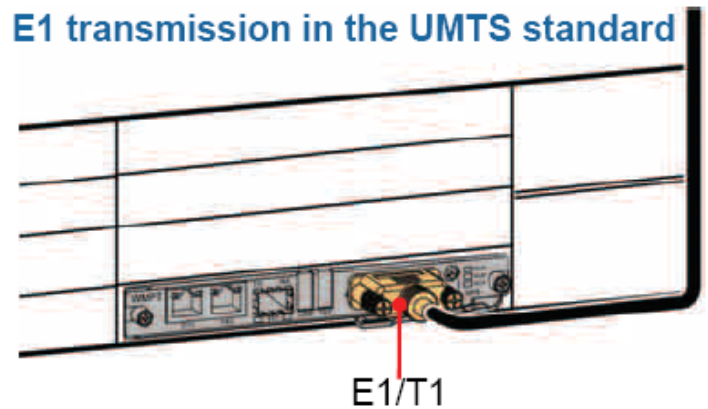
Transmission Cable Connection

- E1 cable connection:

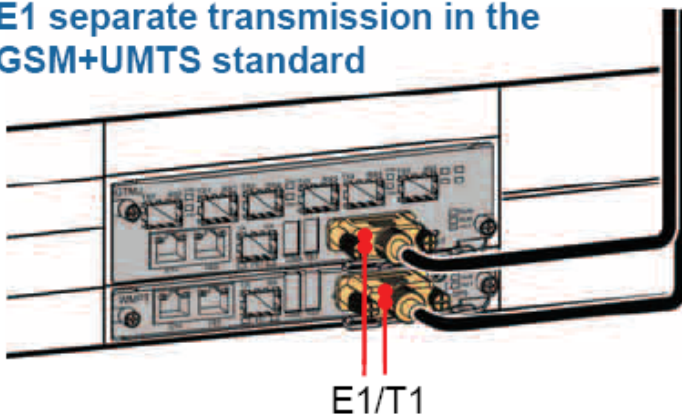
E1 transmission in the GSM standard



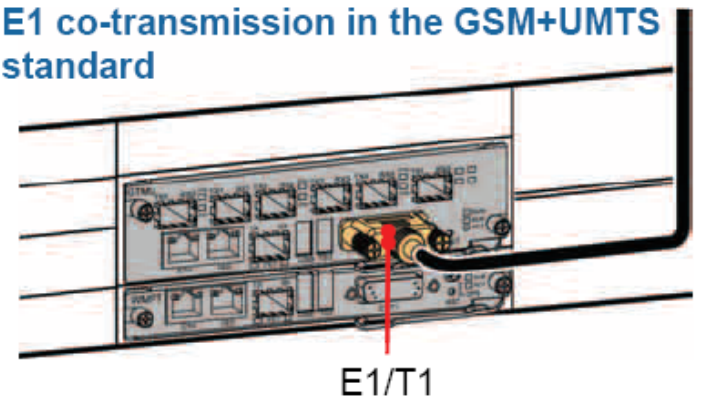
E1 transmission in the UMTS standard



E1 separate transmission in the GSM+UMTS standard

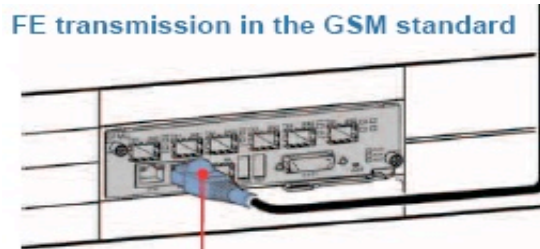


E1 co-transmission in the GSM+UMTS standard

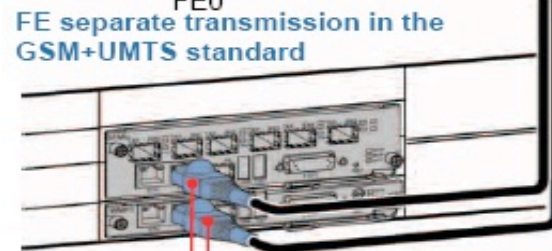


Transmission Cable Connection (Cont.)

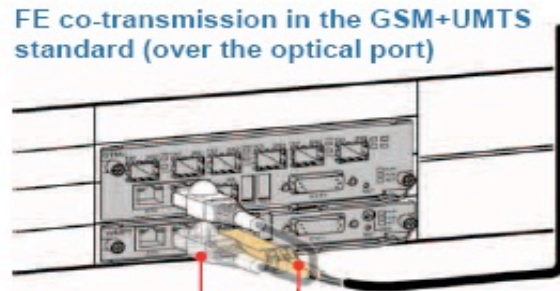
- FE/GE cable connection:



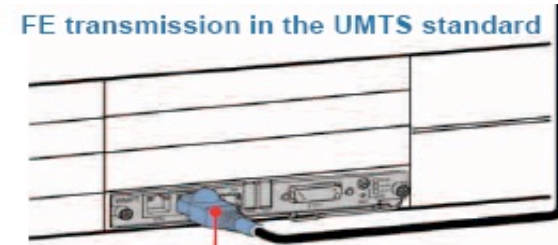
FE0



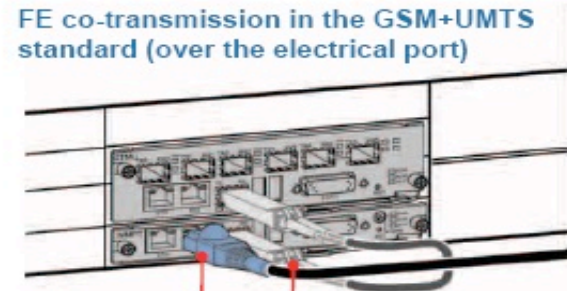
FE0



Installed cable FE1



FE0



FE0 Installed cable



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Specification of Engineering

Item	Specification
Dimensions (height x width x depth)	BBU3900: 86 mm × 442mm × 310 mm
	RRU3908: 485mm × 380mm × 170mm (with the housing)
	RRU3908: 480mm × 356mm × 140mm (without the housing)
	RRU3804: 485 mm x 285 mm x 170 mm (with the housing)
	RRU3804: 480 mm x 270 mm x 140 mm (without the housing)
Weight	BBU3900: 12 kg (in full configuration)
	BBU3900: 7 kg (in typical configuration)
	RRU3908: 21 kg (without the housing)
	RRU3908: 23 kg (with the housing)
	RRU3804: 15 kg (without the housing) RRU3804: 17 kg (with the housing)

Specification of Capacity

Item	Specification
BBU3900 (GSM)	S24/24/24
BBU3900 (UMTS)	S8/8/8 1,536 CEs in the UL and 1,536 CEs + 15 × 24 HSDPA codes in the DL
BBU3900 (GSM+UMTS)	GSM S24/24/24+UMTS S8/8/8 1,536 CEs in the UL and 1,536 CEs + 15 × 24 HSDPA codes in the DL
RRU3908 (3GPP class2: GSM)	6TRX per RRU3908
RRU3908 (3GPP class2: GSM +UMTS)	G5U1 or G4U2
RRU3908 (3GPP class2: UMTS)	4 carriers per RRU3908
RRU3908 (ETSI: GSM)	6 TRX per RRU3908
RRU3908 (ETSI: GSM+UMTS)	G3U2
RRU3804	4 carriers per RRU3804

Specification of Frequency Band

RRU	Frequency band	RX band (MHz)	TX band (MHz)
RRU3908	900 MHz	890 to 915	935 to 960
		880 to 905	925 to 950
	850 MHz	824 to 849	869 to 894
	1800 MHz	1,710 to 1,755	1,805 to 1,850
		1,740 to 1,785	1,835 to 1,880
	1900 MHz	1,850 to 1,890	1,930 to 1,970
		1,870 to 1,910	1,950 to 1,990
	RRU3804	Band I (2100 MHz)	1,920 to 1,980
Band II (1900 MHz)		1,850 to 1,910	1,930 to 1,990
Band IV (AWS)		1,710 to 1,755	2,110 to 2,155
Band V/VI (850 MHz)		824 to 849	869 to 894

Specification of Output Power

- The typical configuration of RRU3908 in compliance with the specifications for multi-carrier base station (Class2) in 3GPP TS 45.005 V8.2.0

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
1/2/3/4/5/6	0/0/0/0/0/0	40/40/20/15/12/10	0/0/0/0/0/0
1/1/1	1/1/2	40/30/30	30/40/20
2/2/2	1/1/2	20/15/15	30/40/20
3	2	10	10
4/4	1/2	7.5	20/10
5	1	6	20
0/0/0/0	1/2/3/4	0/0/0/0	40/30/20/15

Specification of Output Power (*Cont.*)

- The typical configuration of RRU3908 in compliance with ETSI TS 100 910 V8.20.0

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
1/2/3/4/5/6	0/0/0/0/0/0	20/20/15/15/10/10	0/0/0/0/0/0
1/1	1/2	20/20	40/20
2/2	1/2	15/10	30/20
3/3	1/2	10/10	30/15
0/0/0/0	1/2/3/4	0/0/0/0	40/30/20/15

Specification of Output Power (*Cont.*)

- The RRU3804 supports 4 carriers, and the output power at the antenna connector is 60 W
 - One-carrier configuration: 60 W per carrier
 - Two-carrier configuration: 30 W per carrier (in 1001 configuration: 20 W per carrier)
 - Three-carrier configuration: 20 W per carrier
 - Four-carrier configuration: 15 W per carrier



Glossary

- 3GPP: 3rd Generation Partnership Project
- CE: Channel Elements
- CPRI: Common Public Radio Interface
- ETSI: European Telecommunications Standards Institute
- RET: Remote Electrical antenna Tilt
- TMA: Tower Mounted Amplifier

Thank you

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