BBU3910A Description

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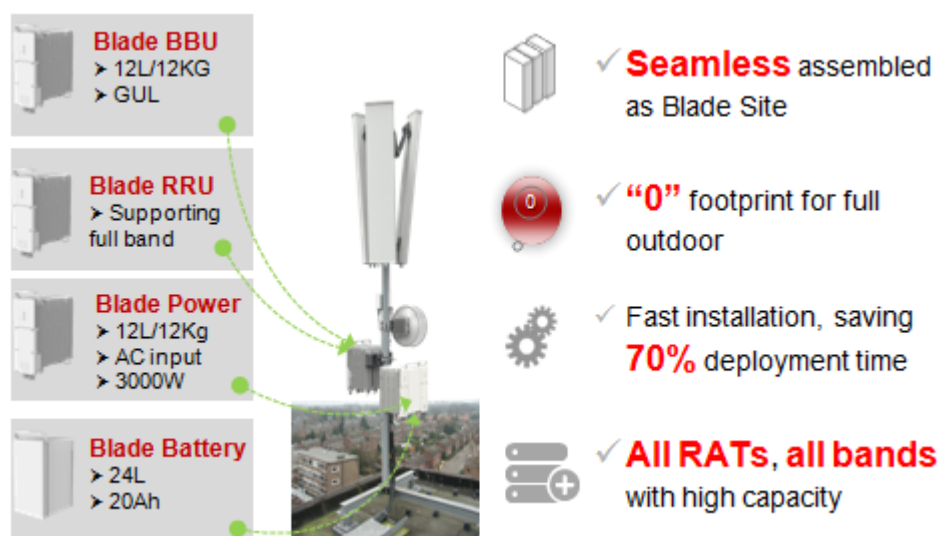Email: support@huawei.com

Contents

1 Overview

1.1 Product Positioning

With the rapid development of services in the MBB era, the wireless network is featured by multiple modes and multiple frequency bands and site acquisition is becoming a challenge to the network deployment. Inheriting the successful experience of the blade radio remote unit (RRU), Huawei applies the blade architecture into other products such as the baseband control unit (BBU), power supply module, and batteries. This reduces the size of equipment and unifies the form of products. In this way, different modules such as the RRU, BBU, power supply module, and battery can be randomly assembled, contributing to a more flexible network deployment and convenient maintenance. This helps operators rapidly expand the MBB network capacity with limited sites and costs.

A blade site supports multiple frequency bands, multiple modes, multiple carriers, and MIMO. This kind of sites can be installed on a pole, wall, and tower, thereby requiring little installation space. In addition, the blade site boasts multiple technological breakthroughs. For example, it improves the transmit power by 50% with the same size and can be applied in different outdoor scenarios with advanced heat conduction and heat dissipation technologies.

Supposed to be GA in Q4 of 2014, the blade site solution includes blade BBU (BBU3910A), blade power (OPM50M), blade battery (IBBS20D), and blade RRU. The blade BBU (BBU3910A) must be used in SRAN10.0 or later versions, but the blade power and blade battery can supply power to all blade RRUs in SRAN8.0.

Blade BBU
- 12L/12KG
- GUL

Blade RRU
- Supporting full band

Blade Power
- 12L/12Kg
- AC input
- 3000W

Blade Battery
- 24L
- 20Ah

✓ **Seamless** assembled as Blade Site

✓ **"0"** footprint for full outdoor

✓ Fast installation, saving **70%** deployment time

✓ **All RATs, all bands** with high capacity

1.2 Functions

The BBU3910A is an outdoor baseband control unit and integrates the main control board, transmission board, and baseband board. The BBU3910A has the following functions:

- Manages the entire base station system in terms of operation, maintenance, signaling processing, and system clock.
- Provides physical ports for information exchange between the base station and the transport network.
- Provides an OM channel between the base station and the operation and maintenance center (OMC).
- Processes uplink and downlink baseband signals and provides common public radio interfaces (CPRIs) for communication with the RF modules.
- Provides ports for receiving and transmitting signals from environment monitoring devices.
- Supports local commissioning through Wi-Fi.

A single base station in SRAN10.0 can be configured with a maximum of one BBU3910A and does not support the interconnection between BBU3910As.

The BBU3910A can apply to single-mode and multimode base stations. The BBU3910A does not support single-mode GBTSs or separate-MPT multimode base stations, but supports co-MPT multimode base stations.

1.3 Appearance

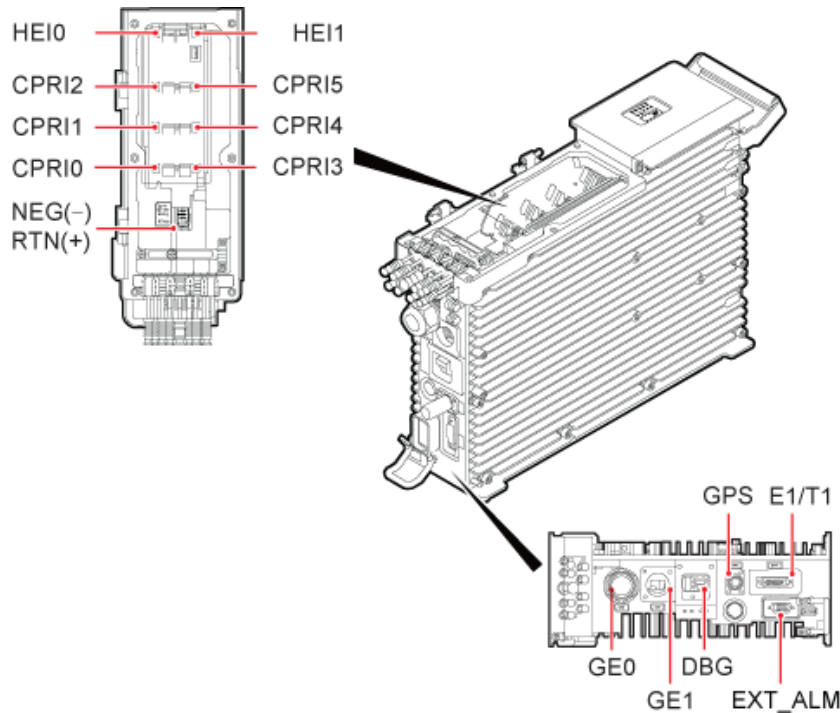Figure 1-1 shows the appearance of a BBU3910A.

Figure 1-1 Appearance of the BBU3910A

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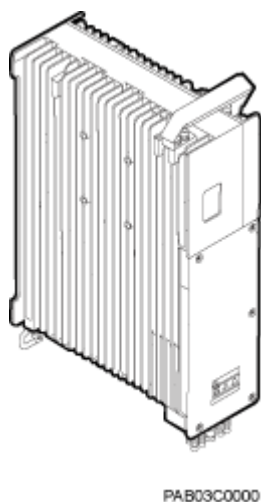
1.4 Ports

The BBU3910A has a modular structure. Its external ports are located at the bottom of the module and in the cabling cavity. Figure 1-2 shows the ports on the BBU3910A panels, as described in Table 1-1.

Figure 1-2 Ports on the BBU3910A panels

Table 1-1 Ports on the BBU3910A panels

Identifier	Connector	Quantity	Description
HEI 0~1	QSFP+	2	Reserved for interconnection
CPRI 0~5	SFP+	6	Data transmission ports that interconnect with the RF modules. These ports support optical signal input and output.
NEG(-) RTN(+)	EPC connector	1	Receives –48 V DC power
GPS	N	1	GPS port used for transmitting radio frequency (RF) signals received from the antenna to the satellite card.
DBG	RJ45	1	Debugging port used to connect to the local maintenance terminal (LMT) for base station debugging.

Identifier	Connector	Quantity	Description
	USB	1	• USB port used for inserting an USB flash drive to upgrade software for base stations • USB Wi-Fi port used as an local maintenance port • Clock test port used for clock signal outputs
GE0	RJ45	1	Transmission electrical port
GE1	SFP	1	Transmission optical port
E1/T1	DB26	1	E1/T1 transmission port
EXT-ALM	DB15	1	Monitoring port used to monitor environment alarms

2 Technical Specifications

2.1 Capacity

Table 2-1 Capacity of a BBU3910A working in GSM single-mode

Type	Specification
BBU3910A1/ BBU3910A2/ BBU3910A3	A single site supports a maximum of 12 cells and each cell supports a maximum of 24 TRXs. • IP over E1: 48 TRX • IP over FE: 72 TRX

Table 2-2 Capacity of a BBU3910A working in UMTS single-mode

Type	Specification
BBU3910A1	• Uplink: 6 cells, 512 CEs • Downlink: 6 cells, 512 CEs
BBU3910A2	• Uplink: 6 cells, 768 CEs • Downlink: 6 cells, 768 CEs
BBU3910A3	• Uplink: 12 cells, 1024 CEs • Downlink: 12 cells, 1024 CEs

Table 2-3 Capacity of a BBU3910A working in LTE single-mode

Type	Maximum number of cells per BBU	Maximum throughput per cell (bandwidth: 20 MHz)	Maximum throughput per eNodeB FDD (packet size: 550 bytes)	Maximum number of UEs in RRC_CONNECTED mode per eNodeB FDD	Maximum number of concurrent DRBs per UE
BBU3910A1	3 cells (2T2R/2T4R/4T4R , 20 MHz)	• Downlink data rate at the MAC layer: 150Mbit/s (2x2 MIMO or 4x2 MIMO) 300Mbit/s (4x4 MIMO) • Uplink data rate at the MAC layer: 55Mbit/s (1x4 SIMO or 1x2 SIMO) 110 Mbit/s (2x4 MU-MIMO or 2x2 MU-MIMO)	Uplink and downlink data rate at the MAC layer: 825Mbit/s	3600	8 DRBs per UE working at the same time
BBU3910A2	6 cells (2T2R/2T4R , 20 MHz) 3 cells (4T4R , 20 MHz)		Uplink and downlink data rate at the MAC layer: 900Mbit/s	3600	
BBU3910A3	6 cells (2T2R/2T4R/4T4R , 20 MHz)		Uplink and downlink data rate at the MAC layer: • SRAN10.1: 1350Mbit/s • SRAN11.0: 1800Mbit/s	3600	

📖 **NOTE**

- The BBU3910A1 does not support hybrid configuration of 2R and 4R cells.
- The BBU3910A2 supports hybrid configuration of 2R and 4R cells. In this configuration, a maximum of three cells are supported.
- The BBU3910A3 supports hybrid configuration of 2R and 4R cells. In this configuration, a maximum mumber of three 2R and three 4R cells are supported, respectively.
- The maximum number of UEs in RRC_CONNECTED mode varies depending on the bandwith.

Table 2-4 Capacity of a BBU3910A working in multiple modes

Mode	Type	Specifications
GU	BBU3910A1	GSM G16/16/16 + UMTS 3 x 2 (uplink: 512 CEs; downlink: 768 CEs)
	BBU3910A2	GSM G16/16/16 + UMTS 3 x 2 (uplink: 768 CEs; downlink: 768 CEs)

Mode	Type	Specifications
	BBU3910A3	GSM G16/16/16 + UMTS 3 x 4 (uplink: 1024 CEs; downlink: 1024 CEs)
GL	BBU3910A1/ BBU3910A2	GSM G16/16/16 + LTE 3 x 20MHz (4T4R, uplink data rate at the MAC layer per eNodeB + downlink data rate at the MAC layer per eNodeB: 900 Mbit/s)
	BBU3910A3	GSM G16/16/16+ LTE 6 x 20MHz (4T4R, uplink data rate at the MAC layer per eNodeB + downlink data rate at the MAC layer per eNodeB: 900 Mbit/s)
UL	BBU3910A1	UMTS 3 x 2 (uplink: 256 CEs; downlink: 384 CEs) + LTE 3 x 20 MHz (2T2R, uplink data rate at the MAC layer per eNodeB + downlink data rate at the MAC layer per eNodeB: 450 Mbit/s)
	BBU3910A2	UMTS 3 x 2 (uplink: 384 CEs; downlink: 512 CEs) + LTE 3 x 20 MHz (2T2R, uplink data rate at the MAC layer per eNodeB + downlink data rate at the MAC layer per eNodeB: 450 Mbit/s)
	BBU3910A3	UMTS 3 x 2 (uplink: 512 CEs; downlink: 768 CEs) + LTE 3 x 20 MHz (4T4R, uplink data rate at the MAC layer per eNodeB + downlink data rate at the MAC layer per eNodeB: 600 Mbit/s)
GUL	BBU3910A3	GSM G16/16/16[1] + UMTS 3 x 2 (uplink: 512 CEs; downlink: 768 CEs) + LTE 3 x 20 MHz (4T4R, uplink data rate at the MAC layer per eNodeB + downlink data rate at the MAC layer per eNodeB: 600 Mbit/s)

📖 **NOTE**

[1]: If GSM is configured with 48 carriers (G16/16/16), each carrier can be configured with one Standalone Dedicated Control CHannel (SDCCH) only; if GSM is configured with 24 carriers (G8/8/8), each carrirer can be configured three SDCCHs.

2.2 Signaling Specifications

Table 2-5 Signaling specifications

Mode	Type	Signaling Specifications
GSM	BBU3910A1/ BBU3910A2/ BBU3910A3	IP Over E1: 48TRX IP Over FE: 72TRX
UMTS	BBU3910A1/ BBU3910A2	500CNBAPS
	BBU3910A3	600CNBAPS

LTE	BBU3910A1	270000 BHCA
	BBU3910A2/ BBU3910A3	396000 BHCA
GU	BBU3910A1/ BBU3910A2	48TRX+200CNBAPS
	BBU3910A3	48TRX+300CNBAPS
GL	BBU3910A1	48TRX+270000BHCA
	BBU3910A2/ BBU3910A3	48TRX+396000BHCA
UL	BBU3910A1/ BBU3910A2	200CNBAPS+198000BHCA
	BBU3910A3	300CNBAPS+198000BHCA
LT	BBU3910A3	1980000BHCA
GUL	BBU3910A3	36TRX+300CNBAPS+198000BHCA

📖 **NOTE**

- The signaling specifications of LTE are based on Table 2-13 Definition of a combined call or one BHCA. For details, see 2.7 LTE Traffic Model.

- Busy hour call attempts (BHCA) is the number of calls attempted at a busy hour. Signaling procedures required for completing a call may include the following: call setup, call release (including CSFB if it occurs), handover, tracking area update (TAU), DRB setup and release, and transition from the uplink-synchronized state to the uplink-asynchronized state. BHCA indicates the signaling processing capabilities of a system.

- Common NodeB Application Protocol (CNBAP) indicates the signaling traffic of a NodeB over the Iub interface. The NBAP is defined in 3GPP specifications, and one CNBAP indicates one radio link (RL) establishment procedure.

2.3 Transmission Ports

- Four E1/T1 ports (used to transmit and receive four E1/T1 signals)
- 1 FE/GE electrical port
- 1 FE/GE optical port

2.4 Power Supply

Table 2-6 describes the input power of a BBU3910A.

Table 2-6 Input power

Item	Specifications
Input power	–48 V DC; voltage range: –38.4 V DC to –57 V DC

The blade site solution includes blade BBU (BBU3910A), blade power (OPM50M), blade battery (IBBS20D), and blade RRU. For details about IBBS20D, see *3900 Series Base Station Hardware Description*. For details about OPM50M, see *OPM50M User Guide*.

Table 2-7 shows the technical specifications of an OPM50M.

Table 2-7 Technical specifications of an OPM50M

Item	Specifications
Dimensions (H x W x D)	400 mm x 120 mm x 300 mm
Weight	≤ 12 kg
Input power	220 V AC/110 V AC; voltage range: 85 V AC to 290 V AC
Output power	• 3000 W (voltage range: 176 V AC to 290 V AC) • 1500 W (voltage range: 85 V AC to 176 V AC)
Operating temperature	-40ºC to +55ºC
Relative humidity	5% RH to 95% RH
Protection class	IP65
Atmospheric pressure	55 kPa to 106 kPa
Heat dissipation capability	200 W

2.5 Equipment Specifications

Table 2-8 Equipment specifications

Item	Specifications
Dimensions (H x W x D)	400 mm x 300 mm x 100 mm
Weight	BBU3910A ≤ 12 kg

2.6 Environmental Specifications

Table 2-9 Environmental specifications

Item	Specifications
Operating temperature	–40ºC to +55ºC (without solar radiation)
Relative humidity	5% RH to 100% RH

Item	Specifications
Protection class	IP65
Atmospheric pressure	60 kPa to 106 kPa
Heat dissipation capability	150 W

2.7 LTE Traffic Model

On live networks, the service capacity of an eNodeB FDD depends on system processing capacities as well as the traffic model.This section describes two traffic models, traffic model 1 and traffic model 2.

- Traffic model 1 derives from a typical LTE network where smartphones make up a large proportion of all admitted terminals. UEs in this traffic model are characterized by short online duration, frequent network access and connection release, high mobility, and a number of small-packet data services.

- Traffic model 2 derives from a typical LTE network where data cards make up a large proportion of all admitted terminals. LTE dongle and customer premises equipment (CPE) are examples of such data cards. UEs in this traffic model are characterized by long online duration, low mobility, and a number of large-packet data services.

Traffic models used on carrier networks may differ from those defined by Huawei. Operators can use either of the two traffic models based on network characteristics to perform initial network planning, and construct an industry-leading LTE network through continuous capacity monitoring and capacity expansion.

The following table describes the control plane (CP) specifications for traffic model 1 and traffic model 2.

📖 NOTE

[1]: @BH means "at busy hour". Traffic models described in the following table are obtained during busy hours.

Table 2-10 CP specifications for traffic model 1 and traffic model 2

Signaling Procedure	Specifications for Traffic Model 1	Specifications for Traffic Model 2
PS Call Attempt Number per User @BH[1] (times) i.e. PS Call Density	180	20
Dedicated Bearer Attempt Number per User @BH (times)	5	1
TAU & Attach & Detach per User @BH (times)	30	5
Intra-eNodeB Handover Number per User @BH (times)	10	1

Signaling Procedure	Specifications for Traffic Model 1	Specifications for Traffic Model 2
Inter-eNodeB X2 Based Handover Out Attempt Number per User @BH (times)	40	2
Inter-eNodeB X2 Based Handover In Attempt Number per User @BH (times)	40	2
Inter-eNodeB S1 Based Handover Out Attempt Number per User @BH (times)	0	0
Inter-eNodeB S1 Based Handover In Attempt Number per User @BH (times)	0	0
Inter-RAT Handover Attempt Number per User @BH (times)	3	0
Inter-RAT Redirection Attempt Number per User @BH (times)	12	0
CSFB Based Inter-RAT Handover Attempt Number per User @BH (times)	0	0
CSFB Based Inter-RAT Redirection Attempt Number per User @BH (times)	5	0
CA SCell Configuration Update Attempt Number per User @BH (times)	10	0
Syn2Unsyn Attempt Number per User @BH (times)	0	0
Unsyn2Syn Attempt Number per User @BH (times)	0	0
RRC Re-Establish Number per User @BH (times)	2	0
Paging number @BH (times)	1260000	100000

The following table describes the user plane (UP) specifications for traffic model 1 and traffic model 2.

Table 2-11 UP specifications for traffic model 1

Service Type	PS Call Attempt Ratio (%)	DL Traffic Volume per PS Call (KB)	DL:UL Traffic Volume Ratio
Web browsing & E-mail	35.00	250	15
Video downloading, uploading & streaming	0.35	20000	50
SNS	15.00	200	4
IM	15.00	5	0.7
Music & APP downloading & Streaming	0.50	5000	30
File sharing & Storage	0.10	400	0.1
Video Call	0.20	3000	1
Heart beat	25.00	0.1	1
Other	8.85	50	1

The following table describes the UP specifications for traffic model 2.

Table 2-12 UP specifications for traffic model 2

Service Type	PS Call Attempt Ratio (%)	UL Traffic Volume per PS Call (KB)	DL Traffic Volume per PS Call (KB)
FTP	100	600	6000

Based on the definition of traffic model 1, one BHCA, i.e. one combined PS call, is defined by taking every item in traffic model 1 divided by the PS call density. The details of one BHCA are listed below. Upon this table, the BHCA specifications of equipment can be defined in later chapters.

Table 2-13 Definition of a combined call or one BHCA

Definition of a Combined Call or One BHCA	Times
PS Call Attempts	1
Dedicated Bearer Attempts	0.0278
TAU & Attach & Detach Attempts	0.1667

Definition of a Combined Call or One BHCA	Times
Intra-eNodeB Handover Attempts	0.0556
Inter-eNodeB X2 Based Handover Out Attempts	0.2222
Inter-eNodeB X2 Based Handover In Attempts	0.2222
Inter-eNodeB S1 Based Handover Out Attempts	0
Inter-eNodeB S1 Based Handover In Attempts	0
Inter-RAT Handover Attempts	0.0167
Inter-RAT Redirection Attempts	0.0167
CSFB Based Inter-RAT Handover Attempts	0
CSFB Based Inter-RAT Redirection Attempts	0.0278
CA SCell Configuration Update Attempts	0.0556
Syn2Unsyn Attempts	0
Unsyn2Syn Attempts	0
RRC Re-Establish Attempts	0.0111

3 Acronyms and Abbreviations

Table 3-1 Acronyms and abbreviations

Acronym and Abbreviation	Full Name
ATM	Asynchronous transfer mode
BBU	Baseband unit
BITS	Building integrated timing supply system
CAPS	Call attempt per second
CE	Channel element
CNBAPS	Common NodeB Application Parts
CPRI	Common public radio interface
DL	Downlink
EDGE	Enhanced Data rates for GSM Evolution
FE	Fast Ethernet
GE	Gigabit Ethernet
GLONASS	Global Navigation Satellite System
GPS	Global Positioning System
GSM	Global Service Mobile
HDLC	High-Level Data Link Control
HSDPA	High Speed Downlink Packet Access
IC	Interference cancellation
IP	Internet Protocol
LMT	Local maintenance terminal
LTE	Long Term Evolution

Acronym and Abbreviation	Full Name
MAC	Media Access Control
MIMO	Multi-input and multi-output
OC-3	Optical carrier level 3
OM	Operation and maintenance
OMC	Operation and maintenance center
RGPS	Remote Global Positioning System
SMT	Site maintenance terminal
STM-1	Synchronous transport mode-1
TOD	Time of day
UL	Uplink
UMTS	Universal Mobile Telecommunications System