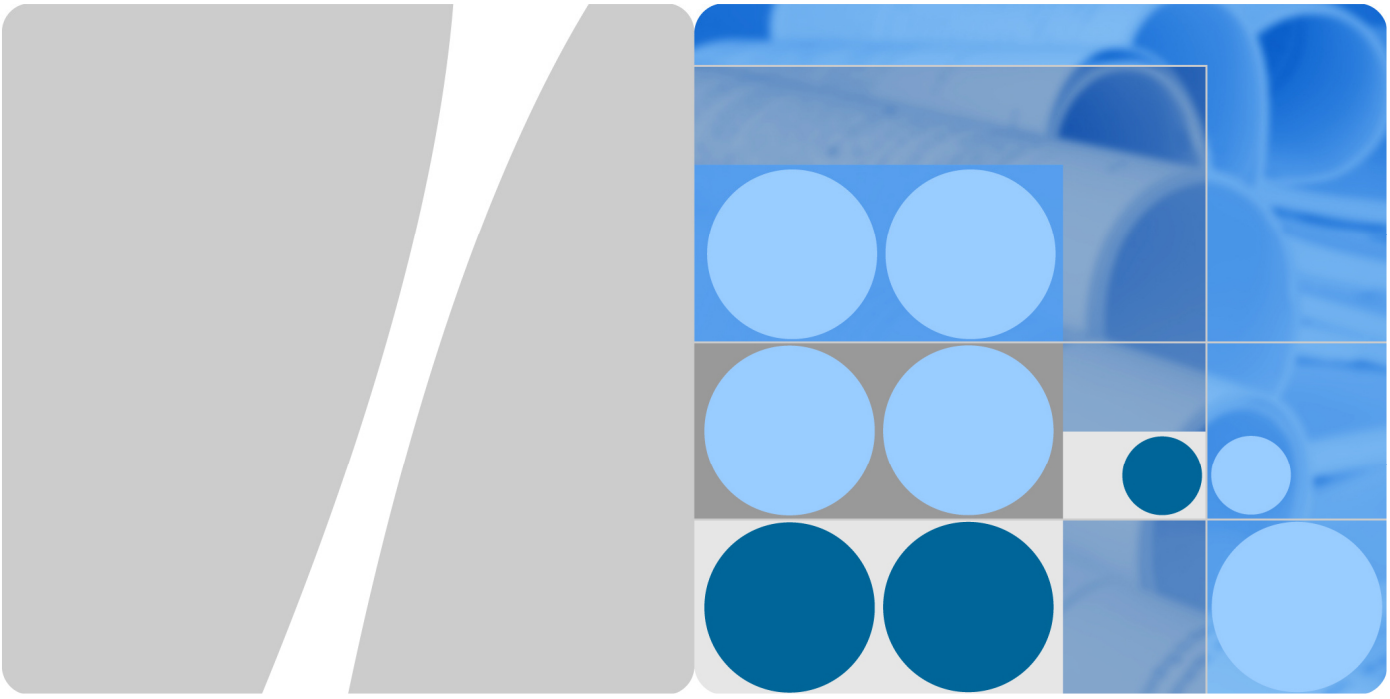

3900 Series Base Station Product Description

Issue V1.4

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1 Introduction

1.1 Overview

To keep abreast of rapidly advancing mobile communications technologies, mobile operators are continually seeking partners who provide cutting-edge technologies to set up high-quality, multi-mode-enabled, and future-oriented mobile networks efficiently and cost-effectively.

With this aim in mind, Huawei developed 3900 series base stations, which are designed based on a high-performance platform and use an optimized hardware and software architecture. These base stations can work in multi-mode due to their cutting-edge modular design. They also have broad bandwidth and are eco-friendly and easily upgradeable.

Specifically, 3900 series base stations use the newly developed power amplifiers (PAs), provide the temperature control function, and employ the innovated power saving technique. In addition, by adopting the cutting-edge modular design, 3900 series base stations use multi-mode modules with different appearances to meet requirements in various conditions.

Thanks to all these merits of 3900 series base stations, mobile operators can set up high-quality, multi-mode-enabled, and future-oriented mobile networks and capital expenditure (CAPEX) on site acquisition, capacity expansion, and environment protection can be greatly reduced.

Different types of 3900 series base stations can be delivered on request because the newly designed modules and auxiliary devices can be flexibly combined and configured.

Figure 1-1 shows the different types of 3900 series base stations.

Figure 1-1 3900 series base station types

NOTE

This document focuses on the BTS3900, BTS3900A, BTS3900L, BTS3900AL, and DBS3900 only. For a description of the other types of 3900 series base stations, see the product description for the base station in question.

1.2 Benefits

Smooth Evolution

Upgrading from Global System for Mobile Communications (GSM) to Universal Mobile Telecommunications System (UMTS) and then to Long Term Evolution (LTE) is easy thanks to the following factors:

- A BBU3900 is equipped with different boards, among which some work in one mode and the others work in another mode. The BBU3900 can process services for both of these modes. With two BBUs, the triple-mode application can be achieved.

- Developed with the Software-defined radio (SDR) technique, RF modules can work in GU or GL dual-mode. SDR RF modules and single-mode RF modules can be installed in the same cabinet to achieve multi-mode and multi-band applications.

Energy-Efficient and Eco-Friendly

Thanks to their small size and modular design, PAs do not take up much space in the equipment room and power resources are saved with the new power-saving technique.

The following measures also help save energy:

- RF channels are blocked and PA voltage is adjusted if the downlink load reaches a preset threshold.
- The power supply unit (PSU) shuts down if the base station is provided with sufficient power.
- The temperature control function controls board temperature, outdoor cabinets use a direct ventilation system, and RRUs adopt the natural heat dissipation mechanism.

Low CAPEX

In terms of the CAPEX for devices,

- 3900 series base stations use one set of multi-mode devices to support multi-mode applications.
- An external reference clock and transmission resources are shared across modes on a 3900 series base station, reducing the CAPEX for transmission resources and external clock sources.
- Various types of radio frequency (RF) modules are introduced, for example, software-defined radio (SDR) RF modules supporting antenna-sharing, dual-transmitter RF modules supporting the multiple-input multiple-output (MIMO) technology, and single-transmitter RF modules with high power and large capacity.
- The GU or GL refarming feature is introduced to facilitate the evolution from GSM to UMTS, and LTE and eventually to save the CAPEX for evolution.

In terms of operation and maintenance (O&M), different modes on a single 3900 series base station share the same auxiliary devices and are managed by the same network management system, which greatly reduces O&M costs. The O&M manpower required is also reduced, because 3900 series base stations are easy to install and maintain and it is easy to expand their capacities.

High Transmission Reliability and High Board Performance

The following features are introduced to ensure high transmission reliability and high board performance:

- Support for the Huawei SingleBTS platform
- Support for Co-Radio Resource Management (Co-RRM), Co-Transmission Resource Management (Co-TRM), Co-Operation and Management (Co-OAM), and Co-Radio Network Plan&Radio Network Optimization (Co-RNP&RNO)
- Support for route backup. Transmission paths can be switched over to protect high-priority service data.

- Support for priority-based GSM/UMTS/LTE-combined intelligent power-off. For example, if power is insufficient, some RF modules are powered off and therefore stop serving the related modes, which helps prolong the operating time for the base station.
- Support for the backup of important boards and power modules

2 Architecture

2.1 Overview

3900 series base stations are classified into macro base stations, distributed base stations, micro base stations, and Pico base stations. Each type of base station is applicable to a specific scenario, which enables operators to efficiently set up a network with low CAPEX.

- Macro base stations
  - Indoor

    BTS3900s using BTS3900 or BTS3900 (Ver.C) cabinets

    BTS3900Ls using BTS3900L or BTS3900L (Ver.C) cabinets
  - Outdoor

    BTS3900A using BTS3900A or BTS3900A (Ver.C) cabinets

    BTS3900ALs
  - Outdoor compact BTS

    BTS3900Cs
- Distributed base stations
  - DBS3900s
- Micro base stations
  - BTS3900Es
  - BTS3902Es
- Pico base stations
  - BTS3900Bs

NOTE

This document focuses on the BTS3900, BTS3900A, BTS3900L, BTS3900AL, and DBS3900 only. For details about the other base stations, see the product description of the base station in question.

2.2 Basic Modules

The basic modules of a 3900 series base station are the baseband unit (BBU), radio frequency units (RFUs), and remote radio units (RRUs). The BBU uses common public radio interfaces (CPRIs) and electrical or optical cables to communicate with the RFUs or RRUs.

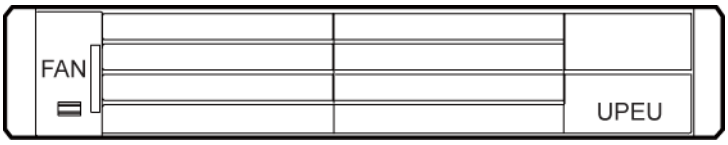
2.2.1 BBU3900

As a baseband control unit, a BBU3900 provides the following functions:

- Centrally manages the entire base station, including operation and maintenance, signaling processing, and the system clock.
- Processes uplink and downlink baseband signals.
- Provides physical ports, which are used to connect the base station to the transport network for information exchange; a maintenance channel, which is used to connect the BBU3900 to the operation and maintenance center (OMC); CPRI ports for communication with RF modules; and ports for communication with environment monitoring devices.

Figure 2-1 shows the slot layout of a BBU3900.

Figure 2-1 Slot layout of a BBU3900



NOTE

For more details about the BBU3900, see the *BBU3900 Description*.

2.2.2 RFU

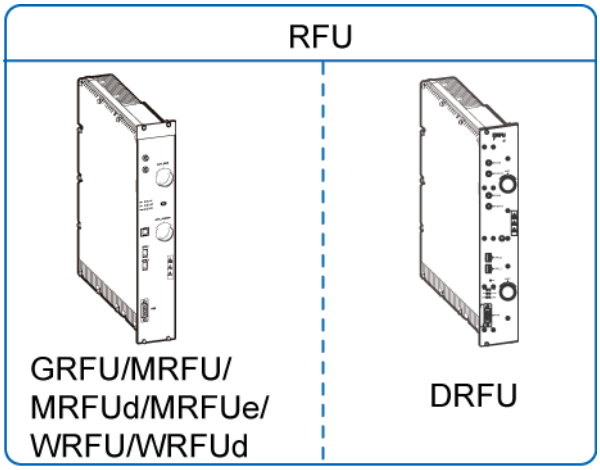
RFUs can be used in a BTS3900, BTS3900L, BTS3900A, or BTS3900AL. The RFU modulates and demodulates baseband and RF signals, processes data, amplifies power, and conducts VSWR detection.

RFUs fall into the following three types:

- Multi-mode modules: MRFUs, MRFUds, MRFUes
- GSM modules: GRFUs, DRFUs
- UMTS modules: WRFU, WRFUds

Figure 2-2 shows the appearance of an RFU.

Figure 2-2 Appearance of an RFU



The MRFUd and MRFUe can only be used in a BTS3900 (Ver.C), BTS3900L (Ver.C), BTS3900A (Ver.C), or BTS3900AL cabinet. Meanwhile, the WRFUd is recommended for use in BTS3900 (Ver.C), BTS3900L (Ver.C), BTS3900A (Ver.C), or BTS3900AL cabinets. When the WRFUd is used in a BTS3900, BTS3900L, or BTS3900A cabinet, some auxiliary devices must be reconstructed in the cabinet. The other types of RFU modules can be used in any cabinet type.

NOTE

- For the specifications and parameters of each type of RFU, see the description of the RFU in question.
- GRFU, MRFU, MRFUd, MRFUe, WRFU, and WRFUd modules have the same appearance but can be identified by different silkscreens.

2.2.3 RRU

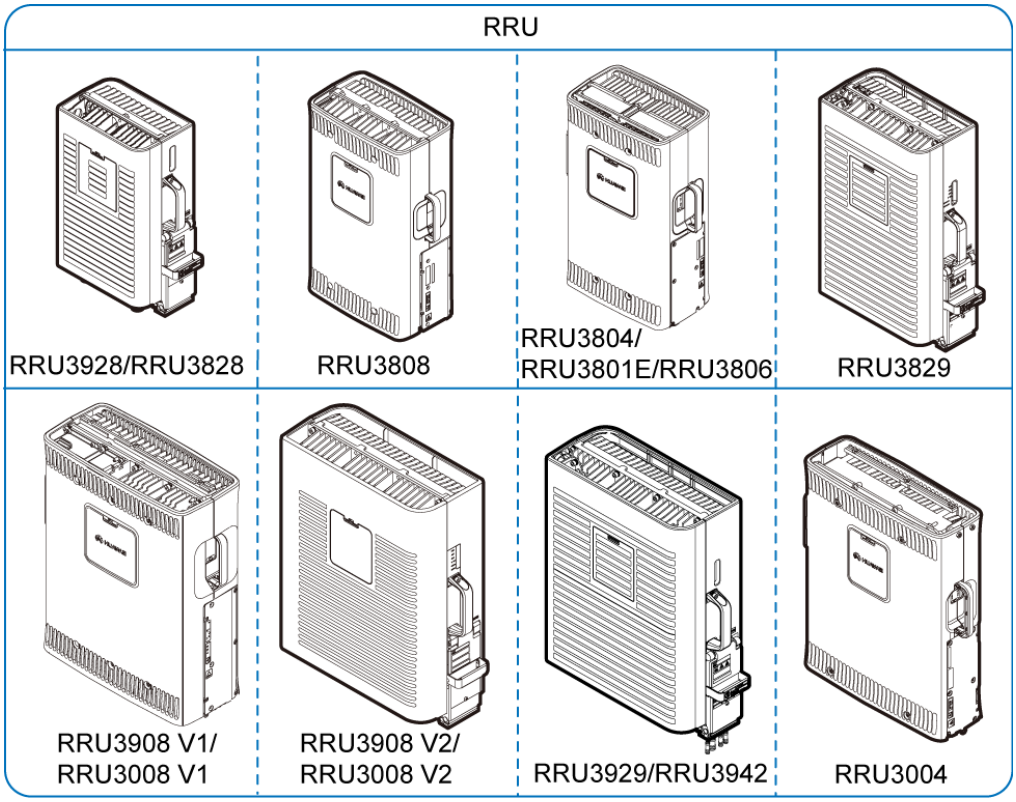
As an RF component on a distributed base station, the RRU modulates and demodulates baseband and RF signals, combines and divides baseband and RF signals, and processes data. RRUs are installed near antennas.

RRUs fall into the following three types:

- Multi-mode modules: RRU3908s, RRU3928s, RRU3929s, RRU3942s
- GSM modules: RRU3004s, RRU3008s
- UMTS modules: RRU3804s, RRU3806s, RRU3801Es, RRU3808s, RRU3829s, RRU3828s

Figure 2-3 shows the appearance of a direct current (DC) RRU.

Figure 2-3 Appearance of a DC RRU



RRU3829s and RRU3929s are recommended for use in APM30H (Ver.C) or TMC11H (Ver.C) cabinets. When RRU3929s or RRU3829s are used in an APM30H or TMC11H cabinet, some auxiliary devices must be reconstructed. Other types of RRUs can be used in any cabinet type.

NOTE

For the specifications and parameters of each type of RRU, see the description of the RRU in question.

2.3 BTS3900/BTS3900 (Ver.C) Cabinet

BTS3900 or BTS3900 (Ver.C) cabinets house indoor macro base stations because these cabinets have a large capacity and a small size, support multi-mode applications, and are easy to expand the capacities of.

BTS3900 cabinets support -48 V DC, +24 V DC, and AC power input while BTS3900 (Ver.C) cabinets support -48 V DC and AC power input.

Figure 2-4 shows the internal structure of a BTS3900 cabinet supporting -48 V DC power input, and Figure 2-5 shows the internal structure of a BTS3900 (Ver.C) cabinet supporting -48 V DC power input.

NOTE

A cabinet supporting +24 V DC or AC power input has the same internal structure as a cabinet supporting -48 V DC power input. However, the former uses different power modules.

Figure 2-4 Internal structure of a BTS3900 cabinet supporting -48 V DC power input

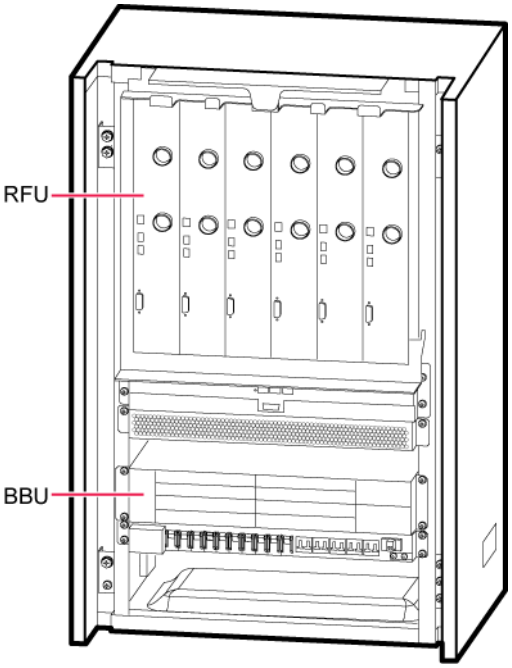


Figure 2-5 Internal structure of a BTS3900 (Ver.C) cabinet supporting –48 V DC power input

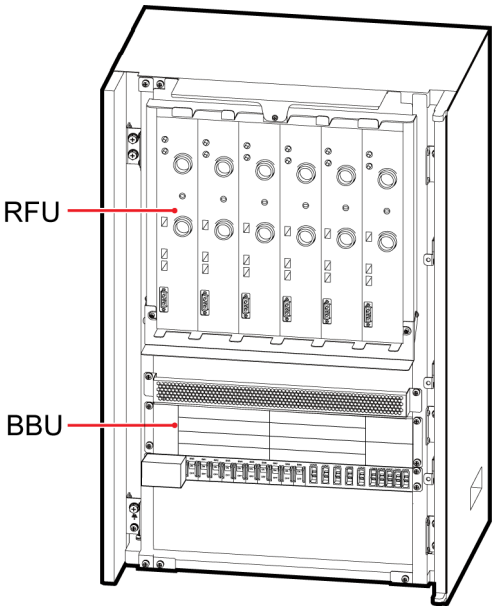


Table 2-1 lists typical configurations of a single-mode BTS3900 or BTS3900 (Ver.C) cabinet.

Table 2-1 Typical configurations of a single-mode BTS3900 or BTS3900 (Ver.C) cabinet

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
GSM	S4/4/4	6 DRFU	20 W (900 MHz)/18 W (1800 MHz)
	S12/12/12	6 GRFU	12 W
	S12/12/12	6 MRFU	12 W
	S12/12/12	6 MRFUe	20 W
	S8/8/8 + S8/8/8	3 MRFUd + 3 MRFUd	20 W (900 MHz) + 20 W (1800 MHz)
UMTS	S4/4/4	3 WRFU	20 W
	S4/4/4 (MIMO)	3 WRFUd	30 W (1 x 15 W)
	S4/4/4	3 MRFU	20 W
	S4/4/4 (MIMO)	3 MRFUd	40 W (2 x 20 W)
LTE	S1/1/1 (20 MHz MIMO)	6 MRFU/3 MRFUd	80 W (2 x 40 W)/120W (2 x 60 W)

NOTE

The preceding configurations assume that each cell uses one dual-polarized antenna.

Table 2-2 lists typical configurations of a dual-mode BTS3900 or BTS3900 (Ver.C) cabinet.

Table 2-2 Typical configurations of a dual-mode BTS3900 or BTS3900 (Ver.C) cabinet

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
GU	GSM S4/4/4 + UMTS S2/2/2	3 MRFUd	20 W + 40 W
GL	GSM S8/8/8 + LTE S1/1/1 (20 MHz MIMO)	3 MRFUd (GO) + 3 MRFUd (LO)	20 W + 80 W (2 x 40 W)
UL	UMTS S2/2/2 (MIMO) + LTE S1/1/1 (20 MHz MIMO)	3 MRFUd (UO) + 3 MRFUd (LO)	80 W (2 x 40 W) + 120 W (2 x 60 W)

NOTE

- The preceding configurations assume that each cell uses one dual-polarized antenna.
- In Table 2-2, GU indicates that GSM and UMTS share one BBU, GL indicates that GSM and LTE share one BBU, and UL indicates that UMTS and LTE share one BBU.

2.4 BTS3900L/BTS3900L (Ver.C) Cabinet

BTS3900L/BTS3900L (Ver.C) cabinets house BBU3900s and RFUs and provide the power distribution and surge protection functions. A single BTS3900L/BTS3900L (Ver.C) cabinet can house a maximum of 12 RFUs and 2 BBU3900s. This saves installation space and facilitates smooth evolution.

Figure 2-6 shows the internal structure of a BTS3900L cabinet.

Figure 2-6 Internal structure of a BTS3900L cabinet

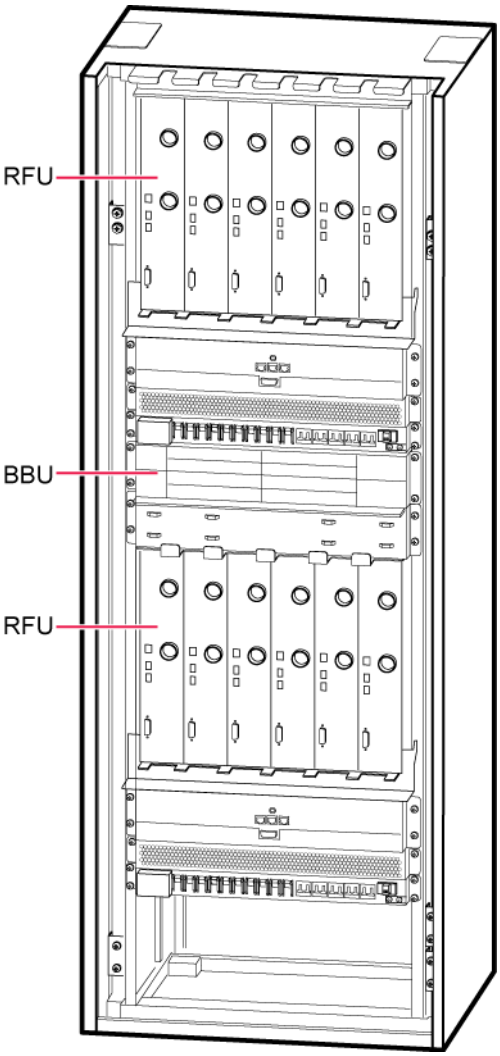


Figure 2-7 shows the internal structure of a BTS3900L (Ver.C) cabinet.

Figure 2-7 BTS3900L (Ver.C) cabinet

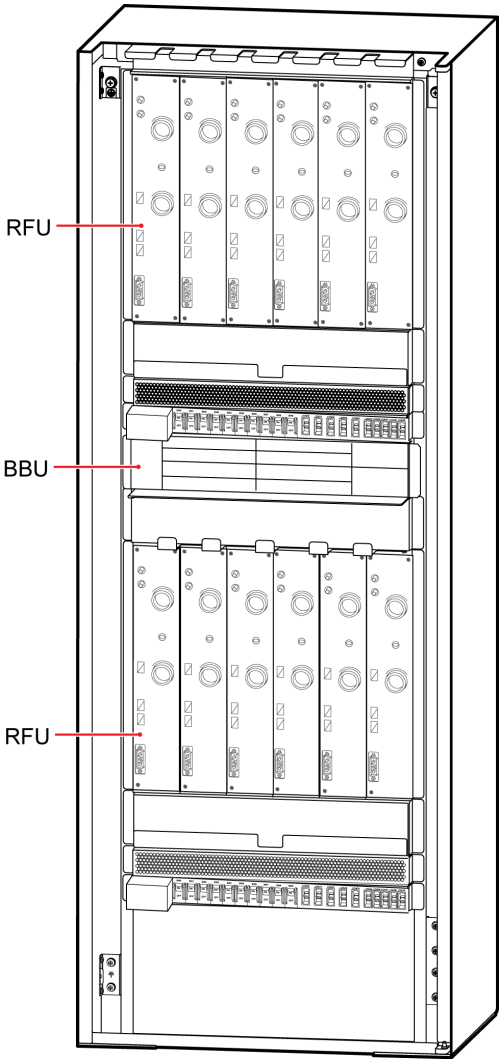


Table 2-3 lists typical configurations of a single-mode BTS3900L or BTS3900L (Ver.C) cabinet.

Table 2-3 Typical configurations of a single-mode BTS3900L or BTS3900L (Ver.C) cabinet

	Configuration	Number of Modules	Output Power of Each Carrier
GSM	S4/4/4	6 DRFU	20 W (900 MHz)/18 W (1800 MHz)
	S12/12/12	6 GRFU	12 W
	S12/12/12	6 MRFU	12 W
	S12/12/12	6 MRFUe	20 W
	S8/8/8 + S8/8/8	3 MRFUd + 3 MRFUd	20 W (900 MHz) + 20 W (1800 MHz)

	Configuration	Number of Modules	Output Power of Each Carrier
UMTS	S4/4/4	3 WRFU	20 W
	S4/4/4 (MIMO)	3 WRFUd	30 W (2 x 15 W)
	S4/4/4	3 MRFU	20 W
	S4/4/4 (MIMO)	3 MRFUd	40 W (2 x 20 W)
LTE	S1/1/1 (20 MHz MIMO)	6 MRFU/3 MRFUd	80 W (2 x 40 W)/120 W (2 x 60 W)

NOTE

The preceding configurations assume that each cell uses one dual-polarized antenna.

BTS3900L or BTS3900L (Ver.C) cabinets are mainly used in scenarios where multiple frequency bands are applied and multiple modes co-exist. Table 2-4 lists typical configurations of a multi-mode BTS3900L or BTS3900L (Ver.C) cabinet.

Table 2-4 Typical configurations of a multi-mode BTS3900L or BTS3900L (Ver.C) cabinet

	Configuration	Number of Modules	Output Power of Each Carrier
GU	GSM S8/8/8 + UMTS S2/2/2 (MIMO)	6 GRFU + 6 WRFU	20 W + 80 W (2 x 40 W)
		3 MRFUd (GO) + 3 MRFUd (UO)	
GL	GSM S8/8/8 + LTE S1/1/1 (20 MHz MIMO)	6 GRFU + 6 MRFU (LO)	20 W + 80 W (2 x 40 W)
		3 MRFUd (GO) + 3 MRFUd (LO)	20 W + 120 W (2 x 60 W)
UL	UMTS S2/2/2 (MIMO) + LTE S1/1/1 (20 MHz MIMO)	6 WRFU+6 MRFU (LO)	80 W (2 x 40 W) + 80 W (2 x 40 W)
		3 MRFUd (UO) + 3MRFUd (LO)	
GU+L/ GL+U	GSM S8/8/8 + UMTS S2/2/2 (MIMO) + LTE S1/1/1(20 MHz MIMO)	3 MRFUd+3 MRFUd (UO) + 3 MRFUd (LO)	20 W + 80 W (2 x 40 W) + 120 W (2 x 60 W)

NOTE

- The preceding configurations assume that each cell uses one dual-polarized antenna.
- In Table 2-4, GU indicates that GSM and UMTS share one BBU, GL indicates that GSM and LTE share one BBU, UL indicates that UMTS and LTE share one BBU, GU+L indicates that GSM and UMTS share one BBU and LTE uses the other BBU, and GL+U indicates that GSM and LTE share one BBU and UMTS uses the other BBU.

2.5 BTS3900A/BTS3900A (Ver.C) Cabinet

A BTS3900A or BTS3900A (Ver.C) cabinet consists of an RF cabinet and a power cabinet, or of an RF cabinet and a transmission cabinet.

The RF cabinet is installed outdoors and uses a direct ventilation system. The power cabinet or transmission cabinet can be stacked on top of the RF cabinet. Together with the RF cabinet, the power cabinet or transmission cabinet provides the power distribution and surge protection functions for the BBU3900 and RFUs. An RF cabinet can house a maximum of six RFUs.

If a 110 V AC or 220 V AC power supply is applied, an APM30H or APM30H (Ver.C) power cabinet is used and the BBU3900 can be installed inside the power cabinet.

If a -48 V DC power supply is applied, a TMC11H or TMC11H (Ver.C) transmission cabinet is used and the BBU3900 can be installed inside the transmission cabinet.

Figure 2-8 shows the internal structure of a BTS3900A (AC) cabinet.

Figure 2-8 Internal structure of a BTS3900A (AC) cabinet

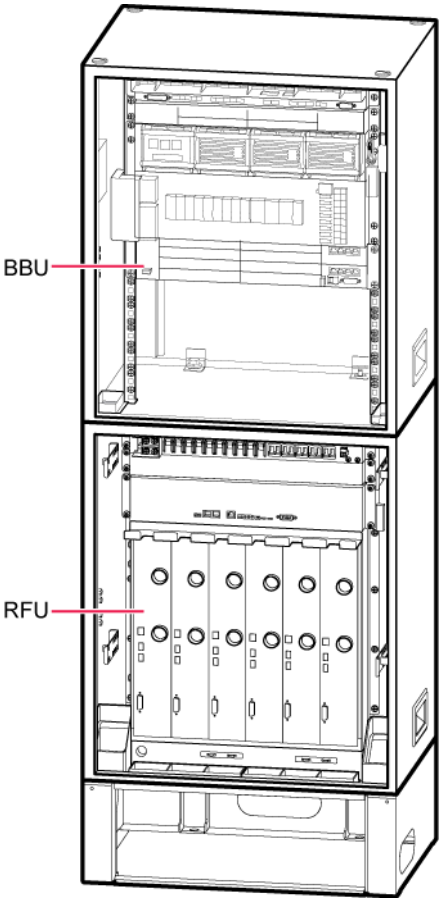


Figure 2-9 shows the internal structure of a BTS3900A (Ver.C) cabinet.

Figure 2-9 Internal structure of a BTS3900A (Ver.C) cabinet

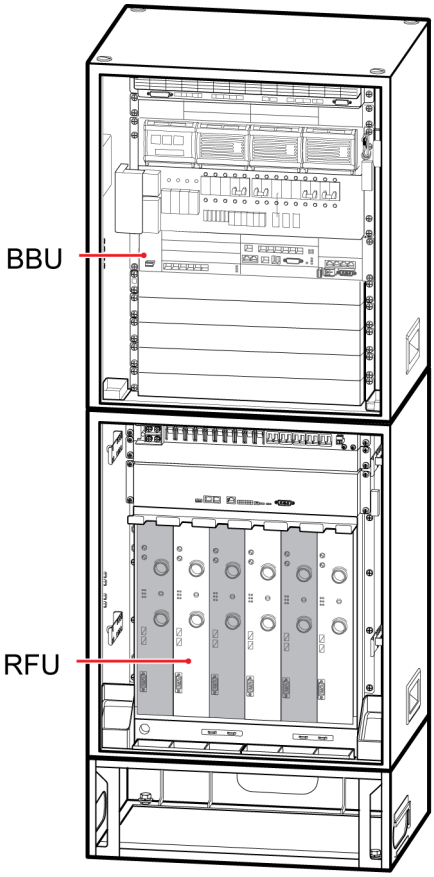


Table 2-5 lists typical configurations of a single-mode BTS3900A or BTS3900A (Ver.C) cabinet.

Table 2-5 Typical configurations of a single-mode BTS3900A or BTS3900A (Ver.C) cabinet

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
GSM	S4/4/4	6 DRFU	20 W (900 MHz)/18 W (1800 MHz)
	S12/12/12	6 GRFU	12 W
	S12/12/12	6 MRFU	12 W
	S12/12/12	6 MRFUe	20 W
	S8/8/8 + S8/8/8	3 MRFUd + 3 MRFUd	20 W (900 MHz) + 20 W (1800 MHz)
UMTS	S4/4/4	3 WRFU	20 W
	S4/4/4 (MIMO)	3 WRFUd	30 W (2 x 15 W)

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
	S4/4/4	3 MRFU	20 W
	S4/4/4 (MIMO)	3 MRFUd	40 W (2 x 20 W)
LTE	S1/1/1 (20 MHz MIMO)	6 MRFU/3 MRFUd	80 W (2 x 40 W)/120 W (2 x 60 W)

NOTE

The preceding configurations assume that each cell uses one dual-polarized antenna.

Table 2-6 lists typical configurations of a dual-mode BTS3900A or BTS3900A (Ver.C) cabinet.

Table 2-6 Typical configurations of a dual-mode BTS3900A or BTS3900A (Ver.C) cabinet

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
GU	GSM S4/4/4 + UMTS S2/2/2	3 MRFUd	20 W + 40 W
GL	GSM S8/8/8 + LTE S1/1/1 (20 MHz MIMO)	3 MRFUd (GO) + 3 MRFUd (LO)	20 W + 80 W (2 x 40 W)
UL	UMTS S2/2/2 (MIMO) + LTE S1/1/1 (20 MHz MIMO)	3 MRFUd (UO) + 3 MRFUd (LO)	80 W (2 x 40 W) + 120 W (2 x 60 W)

NOTE

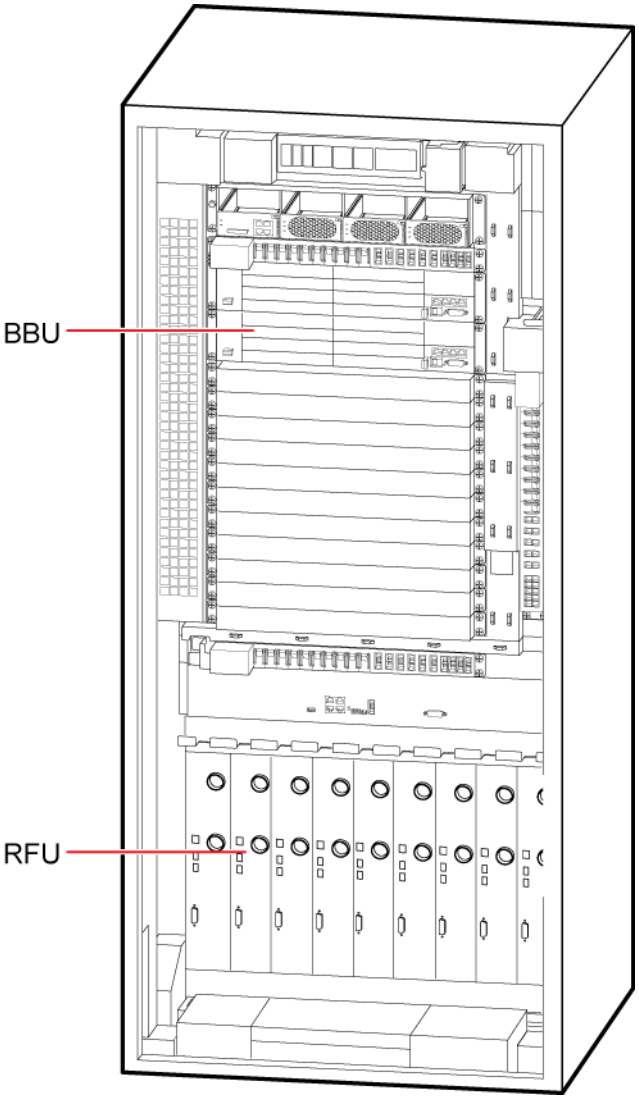
- The preceding configurations assume that each cell uses one dual-polarized antenna.
- In Table 2-6, GU indicates that GSM and UMTS share one BBU, GL indicates that GSM and LTE share one BBU, and UL indicates that UMTS and LTE share one BBU.

2.6 BTS3900AL Cabinet

A BTS3900AL cabinet performs power distribution and surge protection. It consists of BBU3900s and RFUs. As a high-integration outdoor site solution, the BTS3900AL cabinet houses a maximum of two BBU3900s and nine RFUs to save installation space and ensure smooth evolution.

Figure 2-10 shows the internal structure of a BTS3900AL cabinet.

Figure 2-10 Internal structure of a BTS3900AL cabinet



BTS3900AL cabinets mainly apply to large-capacity scenarios where multiple frequency bands or multiple modes co-exist. They also support single-mode applications. Table 2-7 lists typical configurations of a multi-mode BTS3900AL cabinet.

Table 2-7 Typical configurations of a multi-mode BTS3900AL cabinet

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
GU	GSM S8/8/8 (900 MHz) + GSM S8/8/8 (1800 MHz) + UMTS S2/2/2 (2100 MHz)	3 MRFUd (GO) + 3 MRFUd (GO) + 3 WRFU (UO)	20 W + 20 W + 40 W

	GSM S6/6/6 (900 MHz) + UMTS S1/1/1(900 MHz) + GSM S8/8/8 (1800 MHz) + UMTS S2/2/2 (2100 MHz)	3 MRFUd (GU) + 3 MRFUd (GO) + 3 WRFUd (UO)	20 W + 40 W + 20 W + 80 W (2 x 40 W)
GL	GSM S4/4/4 (900 MHz) + GSM S4/4/4 (1800 MHz) + LTE S1/1/1 (20 MHz MIMO)	3 GRFU (GO) + 3 GRFU (GO) + 3 LRFU (LO)	20 W + 80 W (2 x 40 W)
	GSM S6/6/6 + LTE S1/1/1 (10 MHz 2T2R)+ LTE S1/1/1 (20 MHz MIMO)	6 MRFU (GL) + 3 LRFU (LO)	20 W + 2 x 20 W + 80 W (2 x 40 W)
	GSM S8/8/8 (900 MHz) + LTE S1/1/1 (800 MHz, 20 MHz MIMO)	3 MRFUd (GO) + 3 LRFU (LO)	20 W + 120 W (2 x 60 W)
UL	UMTS S2/2/2 + LTE S1/1/1 (20 MHz 2T2R)	3 WRFU + 3 MRFU (LO)	40 W + 80 W (2 x 40 W)
		3 MRFU (UO) + 3 MRFU (LO)	
	UMTS S2/2/2 (MIMO) + LTE S1/1/1 (20 MHz 4T4R)	3 WRFUd + 6 LRFU	80 W (2 x 40 W) + 80 W (2 x 40 W)
		3 MRFUd (UO) + 6 MRFUd (LO)	
GU+L/GL+U (independent BBUs)	GSM S8/8/8 + UMTS S2/2/2 (MIMO) + LTE S1/1/1 (20 MHz MIMO)	3 MRFUd (UO) + 3 WRFUd + 3 MRFUd (LO)	20 W + 80 W (2 x 40 W) + 120 W (2 x 60 W)
GU+L/GL+U (interconnected BBUs)	GSM S6/6/6 + UMTS S1/1/1 (MIMO) +GSM S6/6/6 + LTE S1/1/1 (10 MHz MIMO) + UMTS S2/2/2 (MIMO)	3 MRFUd (GU) + 3 MRFUd (GL) + 3 WRFU	20 W + 40 W (2 x 20 W) + 20 W + 40 W (2 x 20 W) + 80 W (2 x 40 W)

NOTE

- The preceding configurations assume that each cell uses one dual-polarized antenna.
- In Table 2-7, GU indicates that GSM and UMTS share one BBU, GL indicates that GSM and LTE share one BBU, and UL indicates that UMTS and LTE share one BBU; GU+L indicates that GSM and UMTS share one BBU and LTE uses another BBU, and GL+U indicates that GSM and LTE share one BBU and UMTS uses another BBU.

2.7 DBS3900

The DBS3900 facilitates site acquisition as well as network planning and optimization, and reduces network deployment time. It enables operators to efficiently deploy a high-performance GSM/UMTS/LTE network with a low total cost of ownership (TCO) by minimizing investment in electricity, space, and manpower.

The DBS3900 consists of BBU3900s and RRUs. In scenarios requiring distributed installation, RRUs can be installed near the antenna to reduce feeder loss.

- DBS3900 outdoor site: if 220 V AC, 110 V AC, or +24 V DC power supply is provided, an APM30H/APM30H (Ver.C) is used; if –48 V DC power supply is provided, a TMC11H/TMC11H (Ver.C) is used. See scenario 1 in Figure 2-11.
- When RRUs must be installed in centralized mode at a DBS3900 indoor site, the L-shaped stand can be used. See scenario 2 in Figure 2-11.
- When –48 V DC input power is available at a DBS3900 indoor site, the BBU + RRU configuration can be used, with the BBU mounted on a wall. See scenario 3 in Figure 2-11.

Figure 2-11 shows typical installation scenarios for the DBS3900.

Figure 2-11 Typical installation scenarios for the DBS3900

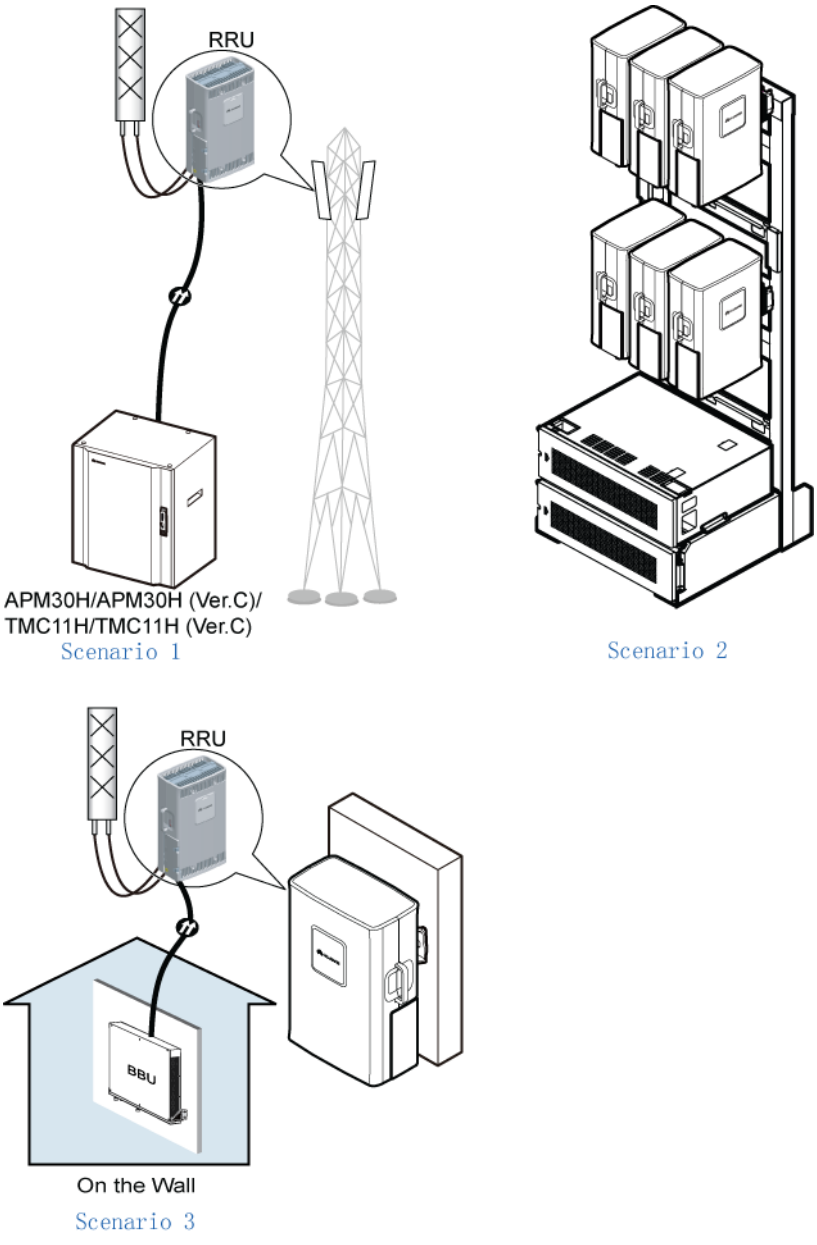


Table 2-8 lists typical configurations of a single-mode DBS3900.

Table 2-8 Typical configurations of a single-mode DBS3900

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
GSM	S4/4/4	6 RRU3004	15 W (900 MHz)/10 W (1800 MHz)
	S4/4/4	3 RRU3008	20 W
	S4/4/4	3 RRU3908	20 W
UMTS	S4/4/4	3 RRU3804	15 W
	S4/4/4	3 RRU3806	20 W
	S2/2/2 (MIMO)	3 RRU3908	40 W (2 x 20 W)
LTE	S1/1/1 (20 MHz MIMO)	3 RRU3908	40 W (2 x 20 W)

NOTE

The preceding configurations assume that each cell uses one dual-polarized antenna.

Table 2-9 lists typical configurations of a dual-mode DBS3900.

Table 2-9 Typical configurations of a dual-mode DBS3900

Mode	Typical Configurations	Number of RF Modules	Output Power of Each Carrier
GU	GSM S4/4/4 + UMTS S2/2/2 (MIMO)	3 RRU3008 + 6 RRU3804	20 W + 60 W (2 x 30 W)
		3 RRU3008 + 3 RRU3808	20 W + 40 W (2 x 20 W)
GL	GSM S4/4/4+ LTE S1/1/1 (20 MHz MIMO)	3 RRU3008 + 3 RRU3908 (LO)	20 W + 40 W (2 x 20 W)
UL	UMTS S2/2/2 (MIMO) + LTE S1/1/1 (20 MHz MIMO)	6 RRU3804 + 3 RRU3908 (LO)	60 W (2 x 30 W) + 40 W (2 x 20 W)
		3 RRU3808 +3 RRU3908 (LO)	40 W (2 x 20 W) + 40 W (2 x 20 W)

NOTE

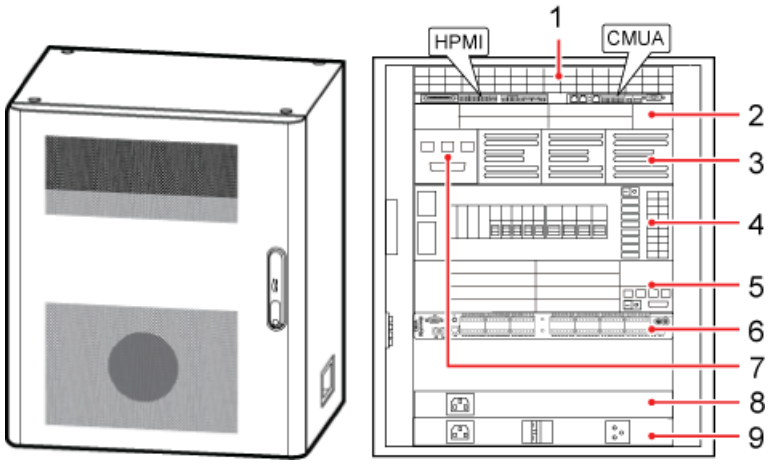
In Table 2-9, GU indicates that GSM and UMTS share one BBU, GL indicates that GSM and LTE share one BBU, and UL indicates that UMTS and LTE share one BBU.

2.7.1 APM30H/APM30H (Ver.C) Power Cabinet

The APM30H/APM30H (Ver.C) power cabinet converts AC input power into DC power and provides DC power to the DBS3900. It also provides space for installing the BBU3900 and other equipment. The light and small APM30H/APM30H (Ver.C) dissipates heat using a heat exchanger and internal and external circulation fans.

Figure 2-12 shows the internal structure of the APM30H.

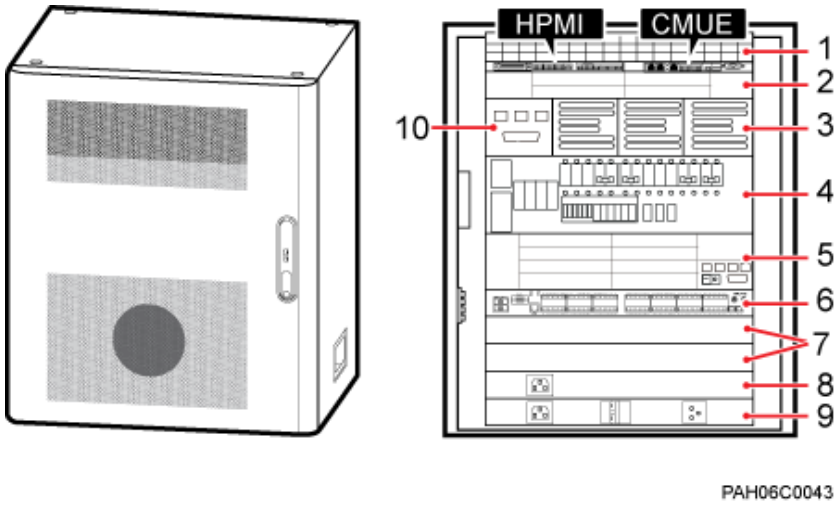
Figure 2-12 Internal structure of the APM30H



(1) Fan box	(2) SLPU	(3) PSU (AC/DC)
(4) EPS subrack	(5) BBU3900	(6) EMUA
(7) PMU	(8) HAU	(9) SOU

Figure 2-13 shows the internal structure of the APM30H (Ver.C).

Figure 2-13 Internal structure of the APM30H (Ver.C)



(1) Fan box	(2) SLPU	(3) PSU
(4) EPU subrack	(5) BBU3900	(6) EMUA
(7) Filler module	(8) AC HAU	(9) SOU
(10) PMU	-	-

2.7.2 TP48600A Power Cabinet

The TP48600A provides power to the DBS3900. It also provides space for installing the BBU3900 and other equipment. Figure 2-14 shows the internal structure of the TP48600A.

Figure 2-14 Internal structure of the TP48600A

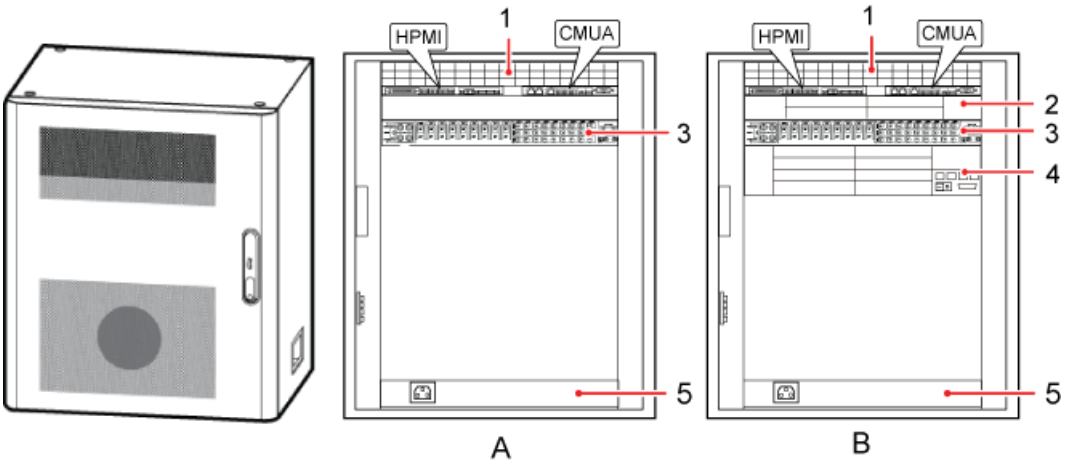
2.7.3 TMC11H/TMC11H (Ver.C) Transmission Cabinet

The TMC11H/TMC11H (Ver.C) transmission cabinet is used outdoors. It is small and easy to transport. The TMC11H/TMC11H (Ver.C) dissipates heat using a heat exchanger. If –48 V DC input power is available or more space is required for transmission equipment, the TMC11H/TMC11H (Ver.C) can be configured to accommodate either situation.

Figure 2-15 shows the internal structure of the TMC11H.

- If the TMC11H is only used to provide space for transmission equipment, the internal structure is as shown in part A of Figure 2-15.
- If the TMC11H is configured with the BBU3900 in a –48 V DC power supply scenario, the internal structure is as shown in part B of Figure 2-15.

Figure 2-15 Internal structure of the TMC11H



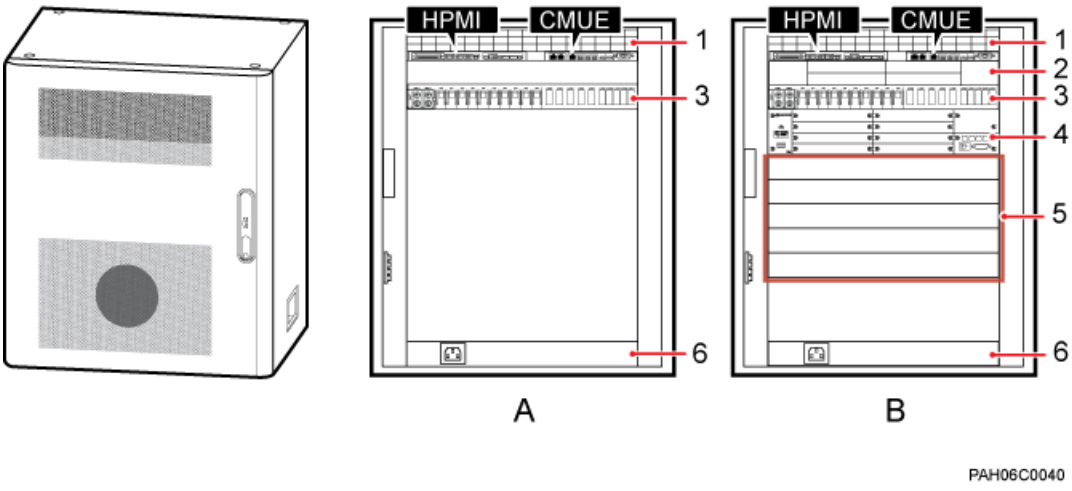
(1) Fan box (2) SLPU (3) DCDU-03

(4) BBU3900 (5) HAU

Figure 2-16 shows the internal structure of the TMC11H (Ver.C).

- If the TMC11H (Ver.C) is only used to provide space for transmission equipment, the internal structure is as shown in part A of Figure 2-16.
- If the TMC11H (Ver.C) is configured with the BBU3900 in a –48 V DC power supply scenario, the internal structure is as shown in part B of Figure 2-16.

Figure 2-16 Internal structure of the TMC11H (Ver.C)



(1) Fan box	(2) SLPU	(3) DCDU-11C
(4) BBU3900	(5) Filler module	(6) AC HAU

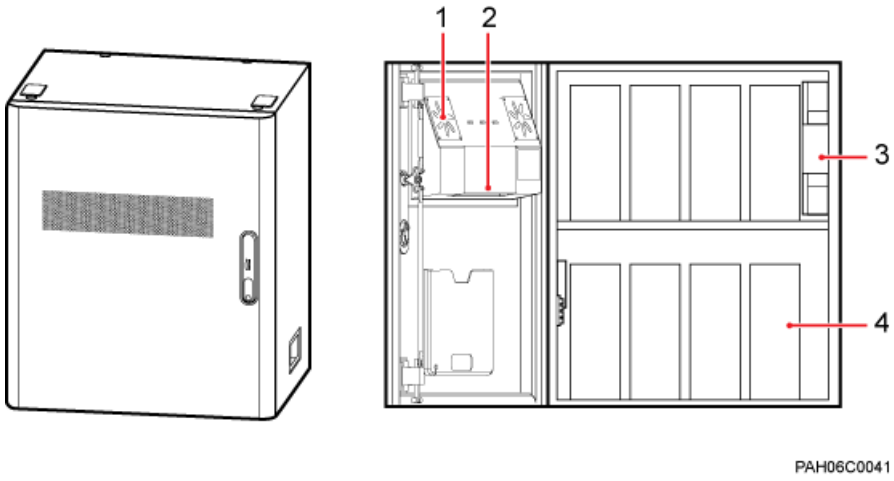
2.7.4 IBBS200T/IBBS200T (Ver.C)/IBBS200D/IBBS200D (Ver.C) Battery Cabinet

IBBS200T, IBBS200T (Ver.C), IBBS200D, and IBBS200D (Ver.C) battery cabinets are used in scenarios where long-term power backup is required. They are small and easy to transport and can be used outdoors. The IBBS200T/IBBS200T (Ver.C) can operate at high temperatures because it has a built-in air conditioner. The IBBS200D/IBBS200D (Ver.C) uses a direct ventilation system.

Configured with built-in battery groups, two IBBS200T/IBBS200T (Ver.C)/IBBS200D/IBBS200D (Ver.C) cabinets provide a maximum backup DC power capacity of 368 Ah.

Figure 2-17 shows the internal structure of the IBBS200D.

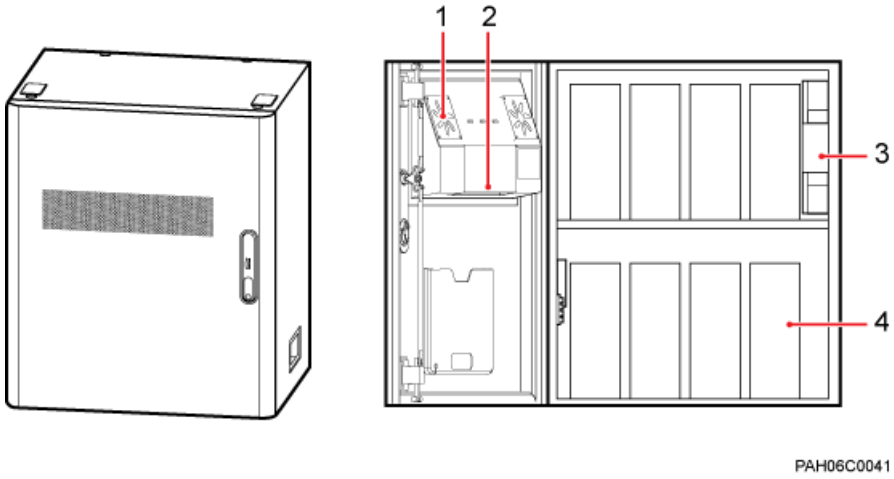
Figure 2-17 Internal structure of the IBBS200D



(1) Fan box	(2) CMUA	(3) PDB
(4) Storage battery	-	-

Figure 2-18 shows the internal structure of the IBBS200D (Ver.C).

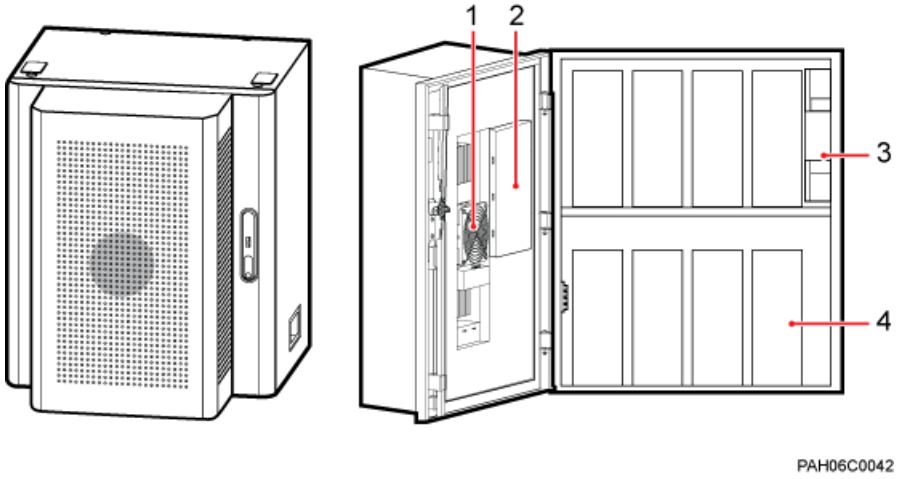
Figure 2-18 Internal structure of the IBBS200D (Ver.C)



(1) Fan box	(2) CMUE	(3) PDB
(4) Storage battery	-	-

Figure 2-19 shows the internal structure of the IBBS200T.

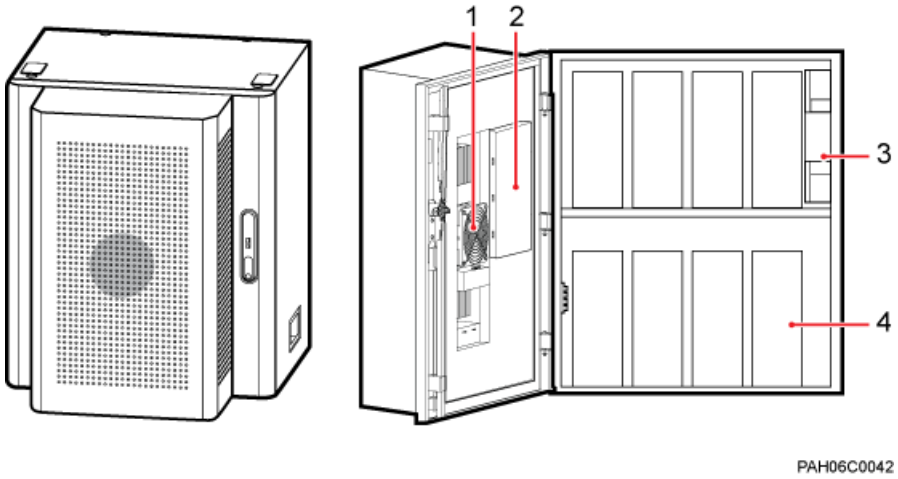
Figure 2-19 Internal structure of the IBBS200T



(1) TEC	(2) CMUA	(3) PDB
(4) Storage battery	-	-

Figure 2-20 shows the internal structure of the IBBS200T (Ver.C).

Figure 2-20 Internal structure of the IBBS200T (Ver.C)



(1) TEC	(2) CMUE	(3) PDB
(4) Storage battery	-	-

2.7.5 IBBS700D/IBBS700T Battery Cabinet

IBBS700D and IBBS700T battery cabinets are used in scenarios where long-term power backup is required. They can be used outdoors. The IBBS700D uses a direct ventilation system. The IBBS700T can operate at high temperatures because it has a built-in air conditioner.

Configured with built-in battery groups, one BBS700D/IBBS700T cabinet provides a maximum backup DC power capacity of 700 Ah.

Figure 2-21 shows the internal structure of the IBBS700D.

Figure 2-21 Internal structure of the IBBS700D

Figure 2-22 shows the internal structure of the IBBS700T.

Figure 2-22 Internal structure of the IBBS700T

2.8 Macro Base Station + Distributed Base Station

The 3900 series base stations allow a macro base station and a distributed base station to be deployed at the same site. In this scenario, the RFUs and RRUs are connected to the same BBU3900. This deployment provides flexible networking of base stations, enabling further capacity expansion and evolution in the future.

In single- or dual-mode scenarios, a maximum of 6 RFUs and 6 RRUs can be connected to 1 BBU.

In triple-mode scenarios, a maximum of 12 RFUs and 6 RRUs can be configured for a BTS3900 or BTS3900L, a maximum of 6 RFUs and 6 RRUs can be configured for a BTS3900A, and a maximum of 9 RFUs and 9 RRUs can be configured for a BTS3900AL.

Table 2-10 lists the maximum configuration when a macro base station and a distributed base station are deployed at the same site.

Table 2-10 Maximum configuration when a macro base station and a distributed base station are deployed at the same site

Base Station	Mode	Number of BBUs	Number of Cabinets	Number of RFUs	Number of RRUs
BTS3900	Single-mode/ dual-mode	1	1	6	6
	Triple-mode	2	2	12	6
BTS3900L	Single-mode/ dual-mode	1	1	6	6
	Triple-mode	2	1	12	6
BTS3900A	Single-mode/ dual-mode	1	APM30H/APM30H (Ver.C): 2 TMC11H/ TMC11H (Ver.C): 1	6	6
	Triple-mode	2	APM30H/APM30H (Ver.C): 2 TMC11H/ TMC11H (Ver.C): 1	6	6
BTS3900AL	Triple-mode	2	1	9	9

3 Operation and Maintenance

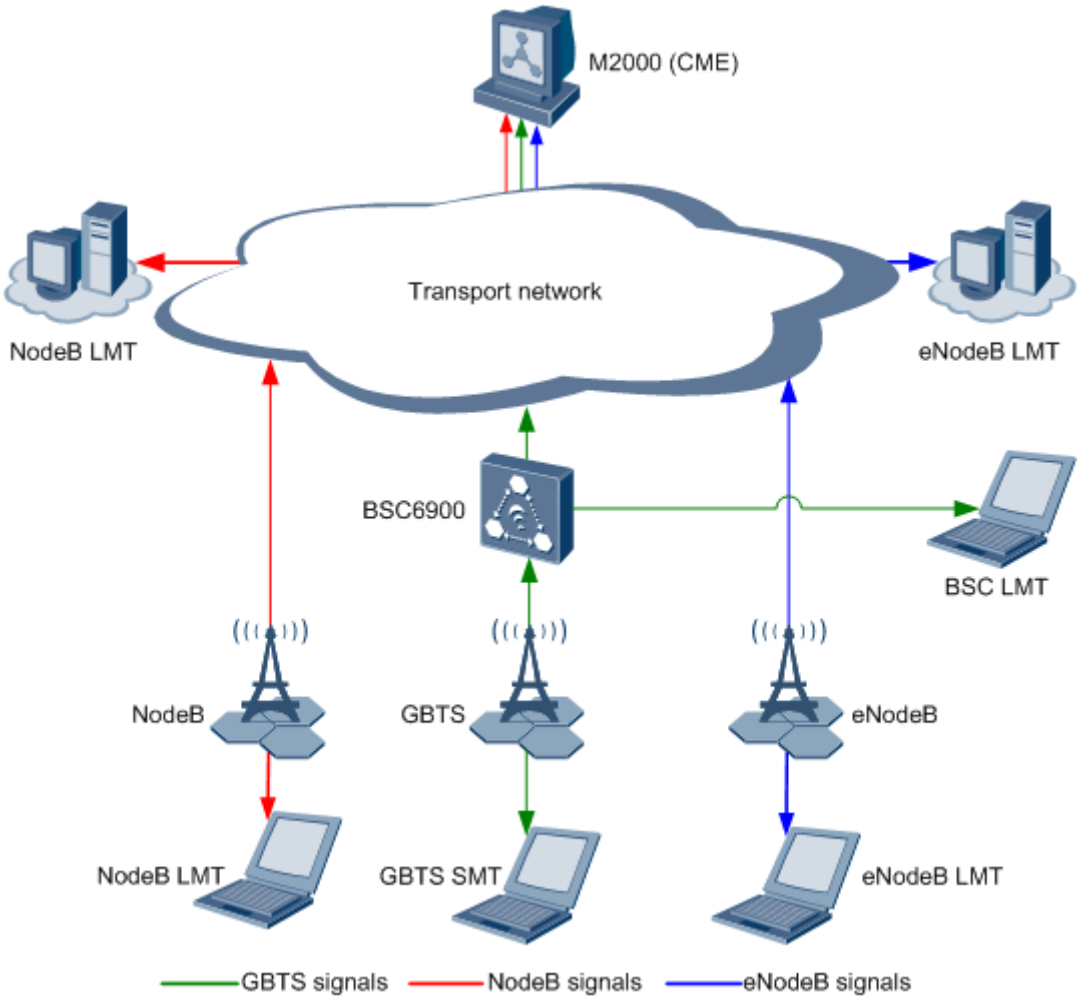
3.1 Overview

3900 series base stations are managed by an O&M system using either MML commands or a graphical user interface (GUI). This system is hardware-independent and provides comprehensive functions to meet users' various O&M requirements.

3.2 O&M System Structure

Figure 3-1 shows the O&M system structure.

Figure 3-1 O&M system structure



The O&M system consists of the following items:

- GBTS SMT: locally manages one GBTS. O&M personnel use network cables to connect the PC running the GBTS SMT to the O&M port of the GBTS that the GBTS SMT will manage.
- BSC LMT: remotely manages multiple GBTSs. O&M personnel use the BSC LMT to remotely manage multiple GBTSs in a centralized manner.
- NodeB LMT: manages one NodeB. O&M personnel can use network cables to connect the PC running the NodeB LMT to the O&M port of the NodeB that the NodeB LMT will manage. Alternatively, O&M personnel can remotely manage a NodeB through O&M channels by connecting the PC running the NodeB LMT to the NodeB.
- eNodeB LMT: manages one eNodeB. O&M personnel can use network cables to connect the PC running the eNodeB LMT to the O&M port of the eNodeB that the eNodeB LMT will manage. Alternatively, O&M personnel can remotely manage an eNodeB through O&M channels by connecting the PC running the eNodeB LMT to the eNodeB.
- M2000: Huawei central O&M system. It centrally manages multiple base stations, provides a data configuration device called Configuration Management Express (CME),

and incorporates the alarm monitoring, performance monitoring, software update, and inventory device management functions.

4 Technical Specifications

4.1 Input Power Specifications

Table 4-1 lists the input power specifications for the different base station types.

Table 4-1 Input power specifications

Item	Input Power
BTS3900	–48 V DC; voltage range: –38.4 V DC to –57 V DC +24 V DC; voltage range: +21.6 V DC to +29 V DC 110 V AC; voltage range: 90 V AC to 135 V AC 220 V AC; voltage range: 176 V AC to 290 V AC
BTS3900A	–48 V DC; voltage range: –38.4 V DC to –57 V DC 110 V AC; voltage range: 90 V AC to 135 V AC 220 V AC; voltage range: 176 V AC to 290 V AC
BTS3900L	–48 V DC; voltage range: –38.4 V DC to –57 V DC
DBS3900	BBU3900: –48 V DC; voltage range: –38.4 V DC to –57 V DC RRU: –48 V DC; voltage range: –36 V DC to –57 V DC
BTS3900AL	220 V AC (single-phase), voltage range: 176 V AC to 290 V AC 220 V AC (triple-phase), voltage range: 176 or 304 V AC to 290 or 500 V AC

4.2 Equipment Specifications

Table 4-2 lists the equipment specifications for the different base station types.

Table 4-2 Equipment specifications

Item	Specification		
Dimension (H x W x D)	BTS3900/BTS3900 (Ver.C) cabinet		900 mm x 600 mm x 450 mm
	BTS3900A/ BTS3900A (Ver.C) cabinet	RFC/RFC (Ver.C)	700 mm x 600 mm x 480 mm
		APM30H / APM30H (Ver.C)	700 mm x 600 mm x 480 mm
	BTS3900L/BTS3900L (Ver.C) cabinet		1600 mm x 600 mm x 450 mm
	BTS3900AL cabinet		1925 mm x 770 mm x 750 mm (including the base) Base: 200 mm x 770 mm x 700 mm
Weight	BTS3900/BTS3900 (Ver.C) cabinet		• Full configuration ≤ 154 kg
	BTS3900A cabinet		• With APM30H in full configuration ≤ 92 kg • With RFC in full configuration ≤ 116 kg
	BTS3900A (Ver.C) cabinet		• With APM30H in full configuration ≤ 82 kg • With RFC in full configuration ≤ 116 kg
	BTS3900L/BTS3900L (Ver.C) cabinet		• Full configuration ≤ 266 kg
	BTS3900AL cabinet		Full configuration ≤ 550 kg (including the base and fully configured batteries, excluding transmission equipment)

NOTE

The weights provided in Table 4-2 are the maximum weights when the cabinets are in full configuration.

4.3 Environment Specifications

NOTE

For details about the environment specifications of DBS3900, see the *BBU3900 Description* and the description documents of the RRUs.

Table 4-3 lists the environment specifications for the different base station types.

Table 4-3 Environment specifications

Item	Specification	
Operating temperature	BTS3900/BTS3900L	–20°C to +55°C
	BTS3900A/ BTS3900AL	–40°C to +50°C and 1120 W/M2 solar radiation An AC heater assembly unit (HAU) is required if the operating temperature is below –20°C.
Relative humidity	BTS3900/BTS3900L	5% RH to 95% RH
	BTS3900A/ BTS3900AL	5% RH to 100% RH
Atmospheric pressure	70 kPa to 106 kPa	

NOTE

In Table 4-3, "short term" means continuous operation for not more than 72 hours or accumulated operation of no more than 15 days a year.

4.4 Standards

Table 4-4 lists the standards for the different base station types.

Table 4-4 Standards

Item	Specification	
Protection rating	BTS3900	IP20
	BTS3900A	IP55
	BTS3900L	IP20
	BTS3900AL	IP55
Storage	ETSI EN300019-1-1 V2.1.4 (2003-04) class1.2 "Weatherprotected, not temperature-controlled storage locations"	
Transportation	ETSI EN300019-1-2 V2.1.4 (2003-04) class 2.3 "Public transportation"	
Anti-seismic performance	IEC 60068-2-57: Environmental testing -Part 2-57: Tests -Test Ff: Vibration -Time-history method YD5083: Interim Provisions for Test of Anti-seismic Performances of Telecommunications Equipment (telecom industry standard in People's Republic of China)	
Anti-earthquake	DBS3900	ETSI EN 300019-1-4: "Earthquake"

Item	Specification	
performance	BTS3900	ETSI EN 300019-1-3: "Earthquake"
	BTS3900A	ETSI EN 300019-1-4: "Earthquake"
	BTS3900L	ETSI EN 300019-1-3: "Earthquake"
	BTS3900AL	ETSI EN 300019-1-4: "Earthquake"
EMC	The MBTS meets the Electromagnetic Compatibility (EMC) requirements and complies with the following standards: • R&TTE Directive 1999/5/EC • R&TTE Directive 89/336/EEC • ETSI EN 301489-1/8/23 • 3GPP TS 25.113 • ETSI EN 301908-1 • ITU-T SM 329-10 • FCC PART15	
	The GBTS meets the EMC requirements and complies with the following standards: • R&TTE Directive 1999/5/EC • R&TTE Directive 89/336/EEC • ETSI EN 301489-1/8 • ETSI EN 301908-1 • ITU-T SM 329-10 • FCC PART15	
	The NodeB meets the EMC requirements and complies with the following standards: • CISPR 22 (1997) • EN 55022 (1998) • EN 301 489-23 V1.2.1 (2002-11) • CISPR 24 (1998) • IEC 61000-4-2 • IEC 61000-4-3 • IEC 61000-4-4 • IEC 61000-4-5 • IEC 61000-4-6 • IEC 61000-4-29 • GB 9254-1998 • ETSI 301 489-1 V1.3.1 (2001-09) • FCC Part 15 The NodeB has been certified by European standards.	

Item	Specification
	The eNodeB meets the EMC requirements and complies with the following standards: • R&TTE Directive 1999/5/EC • R&TTE Directive 89/336/EEC • 3GPP TS 36.113 • ETSI EN 301489-1/23 • ETSI EN 301908-1 V2.2.1 (2003-10) • ITU-R SM.329-10 The eNodeB has been certified by European standards.

5 Acronyms and Abbreviations

3GPP	3rd Generation Partnership Project
AC	Alternating current
APM	Advanced power module
BBU	Baseband unit
CAPEX	Capital expenditure
CME	Configuration Management Express
CMUA	Central monitoring unit type A
CMUE	Central monitoring unit type E
Co-OAM	Co-Operation and Maintenance
Co-RNP&RNO	Co-Radio Network Planning & Radio Network Optimization
Co-RRM	Co-Radio Resource Management
Co-TRM	Co-Transmission Management
CPRI	Common public radio interface
DC	Direct current
DCDU	Direct current distribution unit
EMC	Electromagnetic compatibility
EMUA	Environment monitoring unit type A
EPS	Embedded power system
EPU	Enhanced Packet forward Unit
ETSI	European Telecommunications Standards Institute
GSM	Global System for Mobile Communications
GUI	Graphical user interface
HAU	Heater assembly unit

HPMI	Hert Power Monitoring Interface unit
IBBS	Integrated Backup Battery System
LMT	Local maintenance terminal
LTE	Long Term Evolution
MIMO	Multiple-input multiple-output
O&M	Operation and maintenance
OMC	Operation and maintenance center
PA	Power amplifier
PMU	Power monitoring unit
PSU	Power supply unit
RF	Radio frequency
RFC	Radio frequency cabinet
RFU	Radio frequency unit
RRU	Remote radio unit
SDR	Software-defined radio
SLPU	Signal Lightning Protection Unit
TCO	Total cost of ownership
TEC	Thermoelectric cooling unit
TMC	Transport Management Cabinet
UMTS	Universal Mobile Telecommunications System