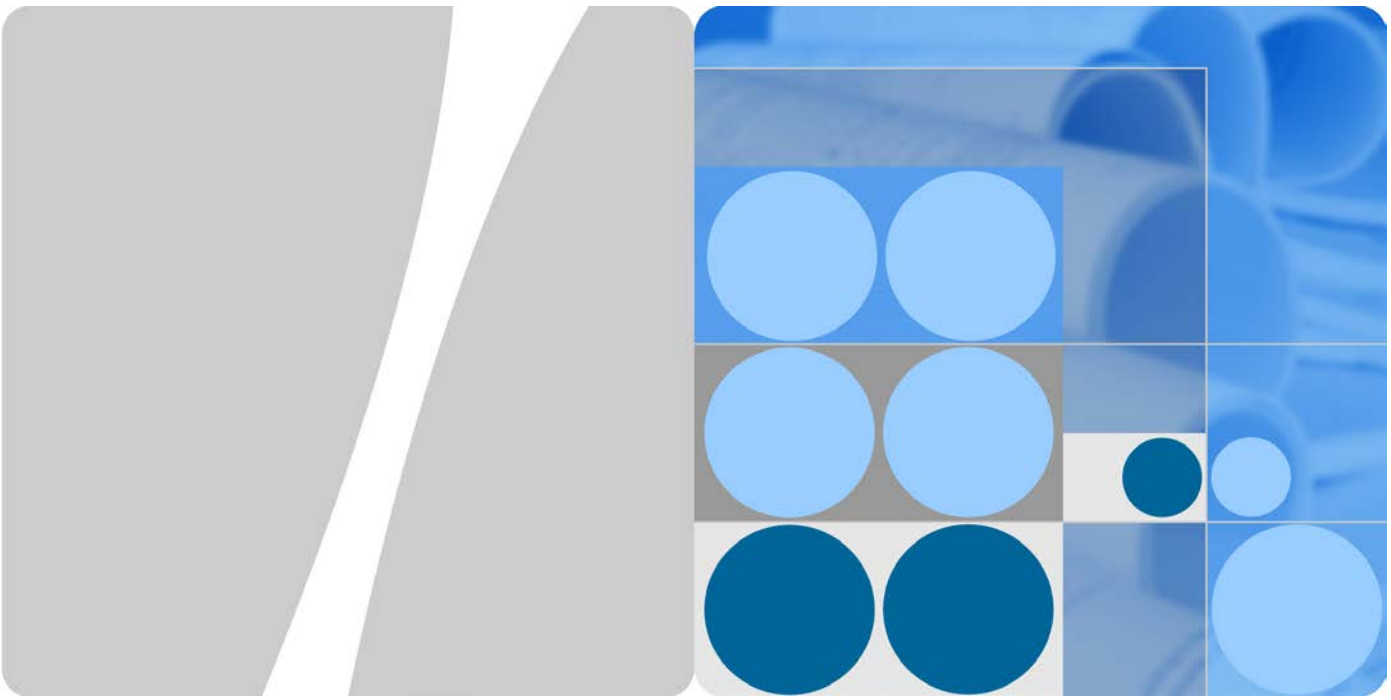

LTE TDD

3900 Series Base Station Product Description

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Contents

1 DBS3900 LTE TDD Overview

Long Term Evolution (LTE) is an evolved telecom standard. It provides various technical benefits to evolved universal terrestrial radio access network (E-UTRAN), including:

- Reduced service delay
- Higher user data rates
- Increased spectral efficiency
- Optimized support for packet services
- Improved system capacity and coverage

LTE has flexible bandwidths, enhanced modulation schemes, and effective scheduling. In addition, LTE allows operators to use both original and new spectral resources to provide data and voice services.

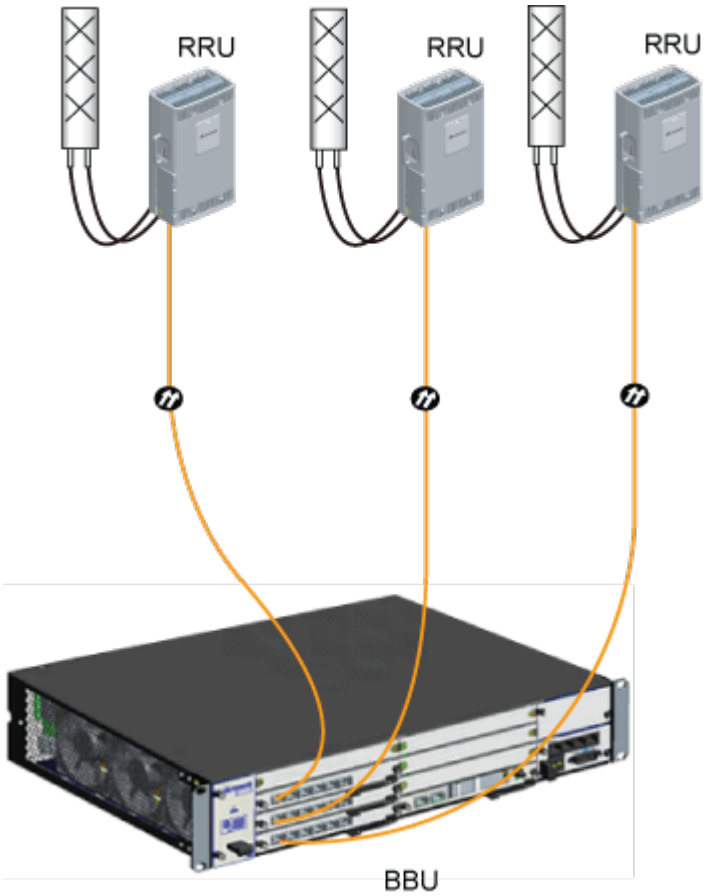
1.1 Positioning

With a focus on customer-oriented innovation, Huawei launches a series of products in its SingleRAN product portfolio, including the distributed E-UTRAN NodeB (eNodeB) DBS3900 LTE time division duplex (TDD). E-UTRAN is short for evolved universal terrestrial radio access network. The DBS3900 LTE TDD (referred to as DBS3900 in this document) fully utilizes Huawei platform resources and a variety of technologies to meet the challenges of mobile network development.

The eNodeB is used for radio access in the LTE system. The eNodeB mainly performs radio resource management (RRM) functions such as air interface management, access control, mobility control, and user equipment (UE) resource allocation.

The DBS3900 has two types of basic modules: baseband unit (BBU3900 or BBU3910 or BBU3910A) and radio frequency module which includes remote radio unit (RRU), and active antenna unit (AAU). Featuring a small size and low weight, a basic module can be flexibly and fast installed to accommodate varied site environment. It also supports flexible software configuration to meet different capacity requirements. Figure 1-1 shows a usage scenario of the DBS3900.

Figure 1-1 DBS3900



1.2 Benefits

Various RRU Types

The DBS3900 supports main LTE TDD frequency bands. RRUs configured in the eNodeB are characterized by their support for various bandwidths, high transmit (TX) power, and high power amplification efficiency. To meet network deployment requirements of different operators, two types of RRUs are available:

- RRU with eight TX channels and eight RX channels (8T8R)
- RRU with four TX channels and four RX channels (4T4R)
- RRU with two TX channels and two RX channels (2T2R)

RX is short for receive.

You can configure the software of a 4T4R RRU to divide the channels into two groups. In this way, the RRU can function as two 2T2R RRUs.

You can configure the software of a RRU3278 to divide the channels into two groups. In this way, the RRU can function as two 4T4R RRUs.

Energy Saving and Environment Friendly

Due to their small size and modular design, power amplifiers (PAs) do not take up much space in the equipment room, and resources are saved with the new energy-saving technique. The following measures also help save energy:

- Radio frequency (RF) channels are blocked and power amplifier (PA) voltage is adjusted if the downlink load reaches a preset threshold.
- The power supply unit (PSU) shuts down if the DBS3900 is provided with sufficient power. The temperature control function controls board temperature. Outdoor cabinets work in direct ventilation mode, and RRUs work in natural heat dissipation mode.

Flexible Installation

Flexible installation of the DBS3900 simplifies site acquisition and achieves fast network deployment with a low total cost of ownership (TCO). To reduce the installation investment, the BBU3900 or BBU3910 can be installed on an indoor wall or in a standard cabinet. The RRU can be mounted on a pole, tower, or concrete wall, or close to the antenna system to reduce the cost of feeders and power consumption.

High Transmission Reliability and Board Performance

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

- Support for the Huawei SingleRAN 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 the backup of important boards and power modules

2 Architecture

2.1 Overview

The DBS3900 features a distributed architecture. In addition to the two types of basic modules BBU3900(or BBU3910) and RRU\AAU, the DBS3900 has following auxiliary devices:

- Advanced power module with heat-exchanger (APM30H)
- Transmission cabinet with heat-exchanger (TMC11H)
- Integrated Battery Backup System with direct cooler (IBBS200D) or Integrated Battery Backup System with thermoelectric cooling unit (IBBS200T)
- Indoor Mini Box (IMB03)
- Outdoor Mini Box (OMB)

Flexible combinations of the basic modules and auxiliary devices can provide diverse site solutions.

2.2 Basic Modules

Featuring a modular design, the DBS3900 consists of the baseband unit and the remote radio unit, which are connected using optical fibers through common public radio interface (CPRI) ports to transmit CPRI signals.

2.2.1 Baseband Unit

The baseband unit, BBU3900, BBU3910 and BBU3910A1/BBU3910A3, performs the following functions:

- Provides ports for establishing an S1 interface between the eNodeB and the mobility management entity (MME)/S-GW and establishing an X2 interface with another eNodeB.

- Provides CPRI ports for communication with RRUs and processes uplink and downlink baseband signals.
- Manages the base station by means of operation and maintenance (OM) and signaling message processing.
- Provides an OM channel to the local maintenance terminal (LMT) or iManager U2000 (U2000). The U2000 is an integrated OM system designed by Huawei.
- Provides clock ports for clock synchronization, alarm monitoring ports for environment monitoring, and a Universal Serial Bus (USB) port for commissioning using a USB flash drive. The security of the USB port is ensured by encryption.

Figure 2-1 shows the exterior of the BBU3900 or BBU3910.

Figure 2-1 BBU3900 or BBU3910

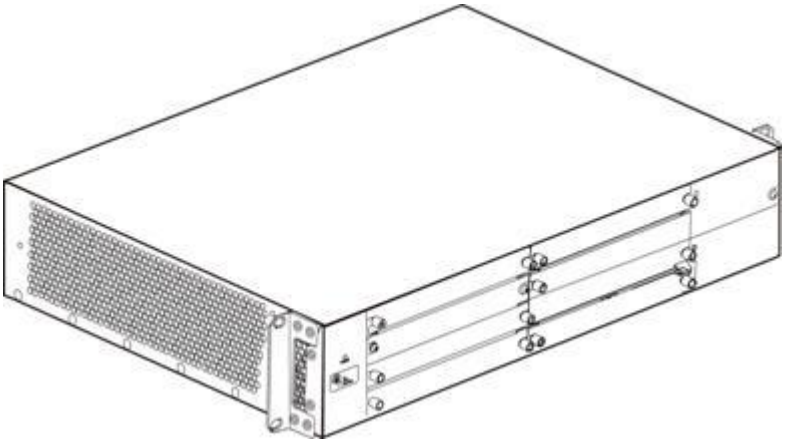
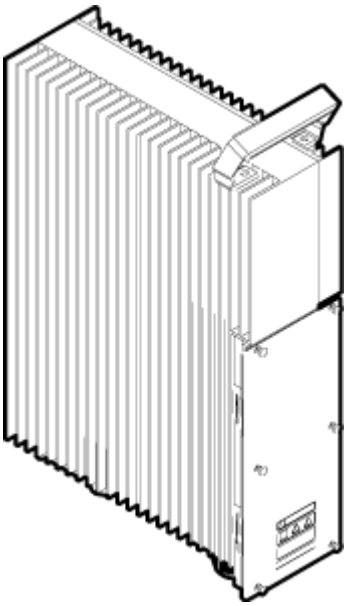


Figure 2-2 shows the exterior of the BBU3910A1/BBU3910A3.

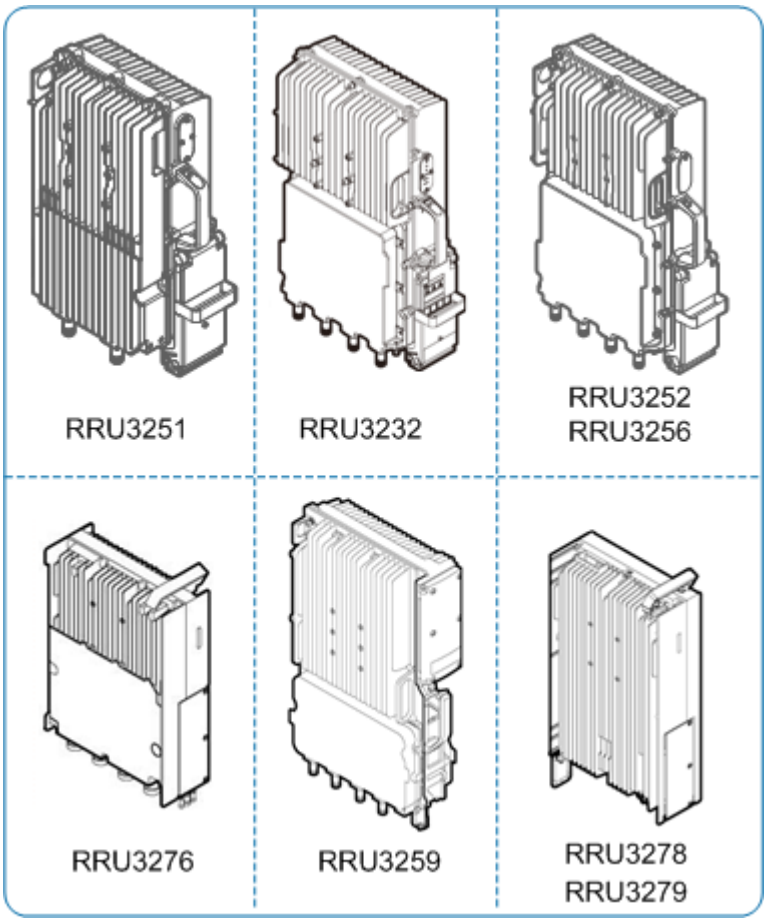
Figure 2-2 BBU3910A1/BBU3910A3



2.2.2 RRU

An RRU is a remote radio unit. One or more RRUs constitute the radio frequency (RF) part of a distributed eNodeB. RRUs can be installed on a pole, wall, or stand. They also can be installed close to antennas to shorten the feeder length, reduce feeder loss, and improve the base station coverage. The RRUs modulate and demodulate baseband and RF signals, process data, amplify power, and detect standing waves. Figure 2-3 shows the exteriors of two RRUs.

Figure 2-3 RRUs



2.2.3 AAU

The AAU is a new type of RF module. An AAU module connects to baseband signal processing boards using CPRI ports and incorporates the functions of RF modules and conventional antennas, which simplifies site deployment.

Figure 2-4 shows the AAU5271 exterior.

Figure 2-4 AAU5271 exterior

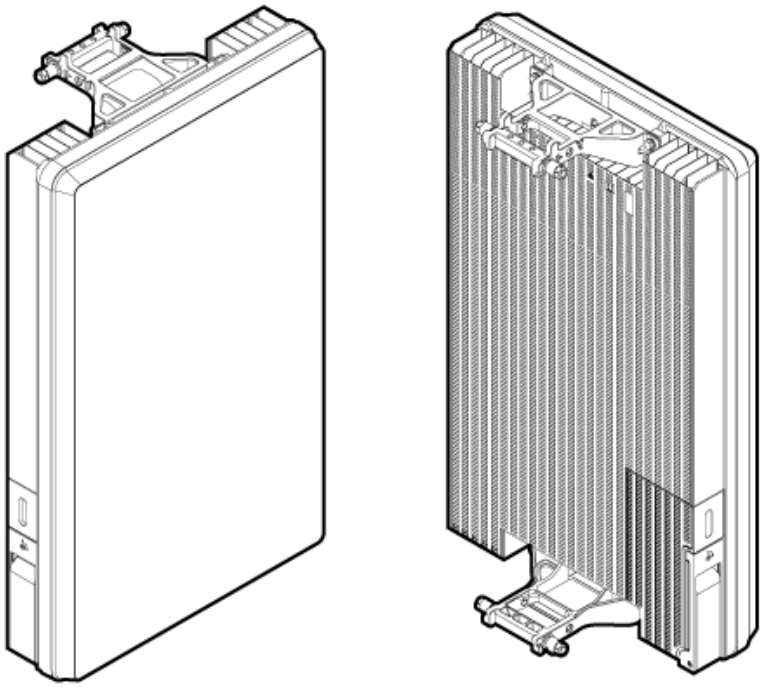
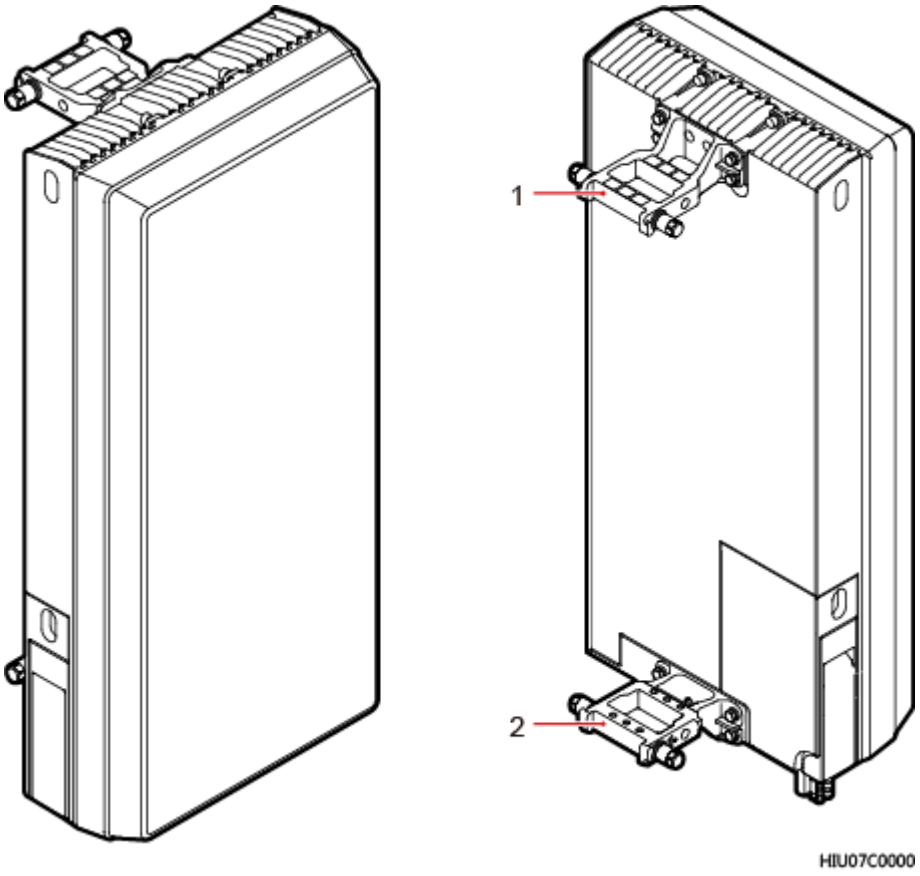


Figure 2-5 shows the AAU5281 exterior.

Figure 2-5 AAU5281 exterior



2.3 DBS3900

The DBS3900 fully addresses operators' concern over site acquisition, facilitates network planning and optimization, and shortens network deployment time. It enables operators to efficiently deploy an LTE network with a low TCO by minimizing the investment in electricity, space, and manpower.

2.3.1 Typical Installation Scenarios

As mentioned, the DBS3900 consists of a BBU3900 (or BBU3910 or BBU3910A1 or BBU3910A3) and RRUs\AAUs. In a distributed installation scenario, RRUs can be installed close to the antenna system to reduce feeder loss and improve base station performance.

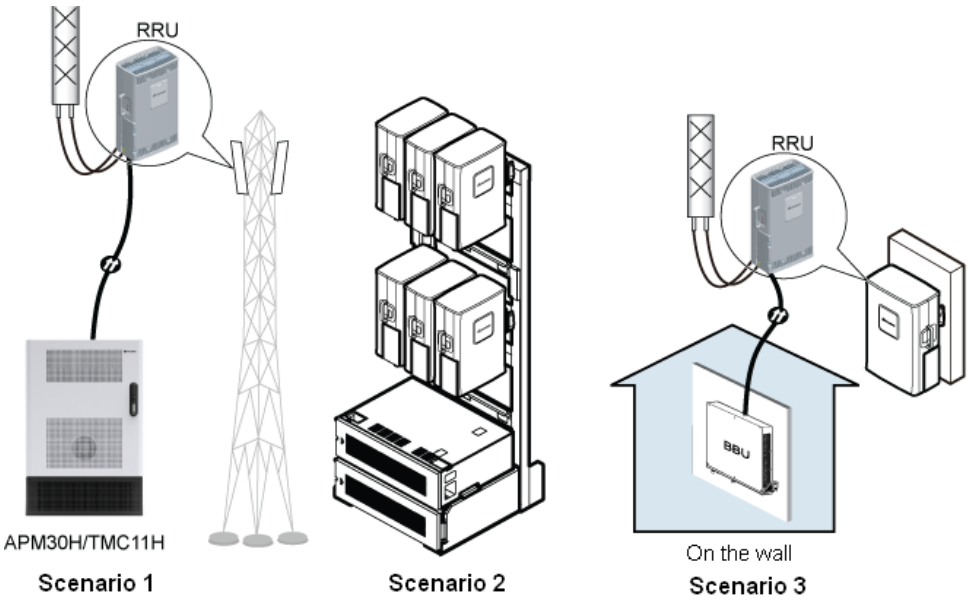
Table 2-1 shows the typical installation scenarios for the DBS3900.

Table 2-1 Typical installation scenarios for the DBS3900

Usage Scenario		Installation Scenario
Outdoor	Input power is 110 V AC or 220 V AC.	The BBU3900 or BBU3910 is installed in an APM30H (Ver.B) or APM30H (Ver.C) or APM30H (Ver.D) or APM30H (Ver.E) cabinet,

Usage Scenario		Installation Scenario
		and RRUs are remotely installed. The APM30H (Ver.B) or APM30H (Ver.C) or APM30H (Ver.D) or APM30H (Ver.E) cabinet feeds power to the BBU and RRUs, as shown in **Scenario 1** of Figure 2-6.
	Input power is -48 V DC.	The BBU3900 or BBU3910 is installed in a TMC11H (Ver.B) or TMC11H (Ver.C) or TMC11H (Ver.D) or TMC11H (Ver.E) cabinet, and RRUs are remotely installed. The TMC11H (Ver.B) or TMC11H (Ver.C) or TMC11H (Ver.D) or TMC11H (Ver.E) cabinet feeds power to the BBU and RRUs, as shown in **Scenario 1** of Figure 2-6.
Indoor	Input power is -48 V DC.	The BBU3900 or BBU3910 is installed in the IMB03, RRUs are centrally installed. RRUs and the IMB03 are installed in the IFS06, as show in **Scenario 2** of Figure 2-6.
		The BBU3900 or BBU3910 is mounted on a wall and RRUs are remotely installed outdoors, as shown in **Scenario 3** of Figure 2-6.

Figure 2-6 Typical installation scenarios for the DBS3900



2.3.2 Typical Configurations

Table 2-2 describes the typical configurations of the BBU3900.

Table 2-2 Typical configurations of the BBU3900

Baseband Processing Board Type	Cell Configurations	Maximum Number of Served Cells
LBBPc	20MHz 4T4R	1
	20MHz 2T2R	3
	10MHz 4T4R	3
	10MHz 2T2R	3
	5MHz 2T2R	3
LBBPd2 or UBBPd4	20MHz 4T4R	3
	20MHz 2T2R	3
	15MHz 4T4R	3
	15MHz 2T2R	3
	10MHz 4T4R	3
	10MHz 2T2R	3
	5MHz 4T4R	3
	5MHz 2T2R	3
UBBPd6	20MHz 8T8R	3
	15MHz 8T8R	3
	10MHz 8T8R	3
	20MHz 4T4R	6
	20MHz 2T2R	6
	15MHz 4T4R	6
	15MHz 2T2R	6
	10MHz 4T4R	6
	10MHz 2T2R	6
	5MHz 4T4R	6
	5MHz 2T2R	6
LBBPd4 or UBBPd9	20MHz 8T8R	3
	15MHz 8T8R	3
	10MHz 8T8R	3
UBBPe4	20MHz 2T2R	6
	15MHz 2T2R	6

Baseband Processing Board Type	Cell Configurations	Maximum Number of Served Cells
	10MHz 2T2R	6
	5MHz 2T2R	6
	20MHz 4T4R	6
	15MHz 4T4R	6
	10MHz 4T4R	6
	5MHz 4T4R	6
	20MHz 8T8R	3
	15MHz 8T8R	3
	10MHz 8T8R	3
UBBPe6	20MHz 2T2R	12
	15MHz 2T2R	12
	10MHz 2T2R	12
	5MHz 2T2R	12
	20MHz 4T4R	12
	15MHz 4T4R	12
	10MHz 4T4R	12
	5MHz 4T4R	12
	20MHz 8T8R	6
	15MHz 8T8R	6
	10MHz 8T8R	6

Table 2-3 describes the typical configurations of the BBU3910.

Table 2-3 Typical configurations of the BBU3910

Baseband Processing Board Type	Cell Configurations	Maximum Number of Served Cells
UBBPd4	20MHz 4T4R	3
	20MHz 2T2R	3
	15MHz 4T4R	3
	15MHz 2T2R	3
	10MHz 4T4R	3

Baseband Processing Board Type	Cell Configurations	Maximum Number of Served Cells
	10MHz 2T2R	3
	5MHz 4T4R	3
	5MHz 2T2R	3
UBBPd6	20MHz 8T8R	3
	15MHz 8T8R	3
	10MHz 8T8R	3
	20MHz 4T4R	6
	20MHz 2T2R	6
	15MHz 4T4R	6
	15MHz 2T2R	6
	10MHz 4T4R	6
	10MHz 2T2R	6
	5MHz 4T4R	6
	5MHz 2T2R	6
LBBPd4 or UBBPd9	20MHz 8T8R	3
	15MHz 8T8R	3
	10MHz 8T8R	3
UBBPe4	20MHz 2T2R	6
	15MHz 2T2R	6
	10MHz 2T2R	6
	5MHz 2T2R	6
	20MHz 4T4R	6
	15MHz 4T4R	6
	10MHz 4T4R	6
	5MHz 4T4R	6
	20MHz 8T8R	3
	15MHz 8T8R	3
	10MHz 8T8R	3
UBBPe6	20MHz 2T2R	12
	15MHz 2T2R	12

Baseband Processing Board Type	Cell Configurations	Maximum Number of Served Cells
	10MHz 2T2R	12
	5MHz 2T2R	12
	20MHz 4T4R	12
	15MHz 4T4R	12
	10MHz 4T4R	12
	5MHz 4T4R	12
	20MHz 8T8R	6
	15MHz 8T8R	6
	10MHz 8T8R	6
UBBPem	10MHz 64T64R	2
	15MHz 64T64R **NOTE** UBBPem supports 15MHz from V100R013C00 and later versions.	2
	20MHz 64T64R	2
UBBPf1	10MHz 64T64R	3
	15MHz 64T64R	3
	20MHz 64T64R	3

Table 2-4 describes the typical configurations of the BBU3910A1.

Table 2-4 Typical configurations of the BBU3910A1

Cell Configurations	Maximum Number of Served Cells
20MHz 4T4R	3
15MHz 4T4R	3
10MHz 4T4R	3
5MHz 4T4R	3
20MHz 2T2R	3
15MHz 2T2R	3
10MHz 2T2R	3
5MHz 2T2R	3

Table 2-5 describes the typical configurations of the BBU3910A3.

Table 2-5 Typical configurations of the BBU3910A3

Cell Configurations	Maximum Number of Served Cells
20MHz 4T4R	6
15MHz 4T4R	6
10MHz 4T4R	6
5MHz 4T4R	6
20MHz 2T2R	6
15MHz 2T2R	6
10MHz 2T2R	6
5MHz 2T2R	6

2.3.3 APM30H

The APM30H is a power system for outdoor applications. It provides distributed eNodeBs with power supply and backup batteries in outdoor scenarios. It also provides space for the BBU3900(or BBU3910) and customer equipment. The APM30H is compact and lightweight, and can be installed on the pole or ground.

Four types of APM30Hs are APM30H Ver.B, APM30H Ver.C, APM30H Ver.D and APM30H Ver.E.

Figure 2-7 shows the appearance of an APM30H cabinet.

Figure 2-7 Appearance of an APM30H cabinet

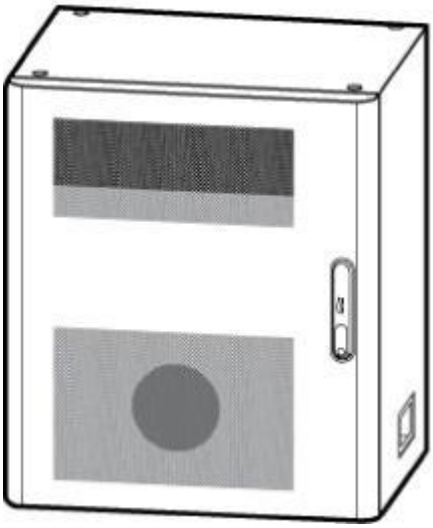
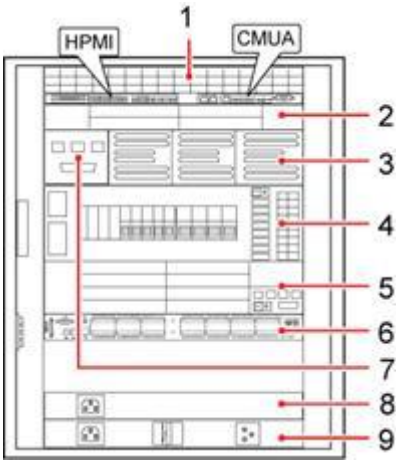


Figure 2-8 shows the internal structure of an APM30H (Ver.B) cabinet.

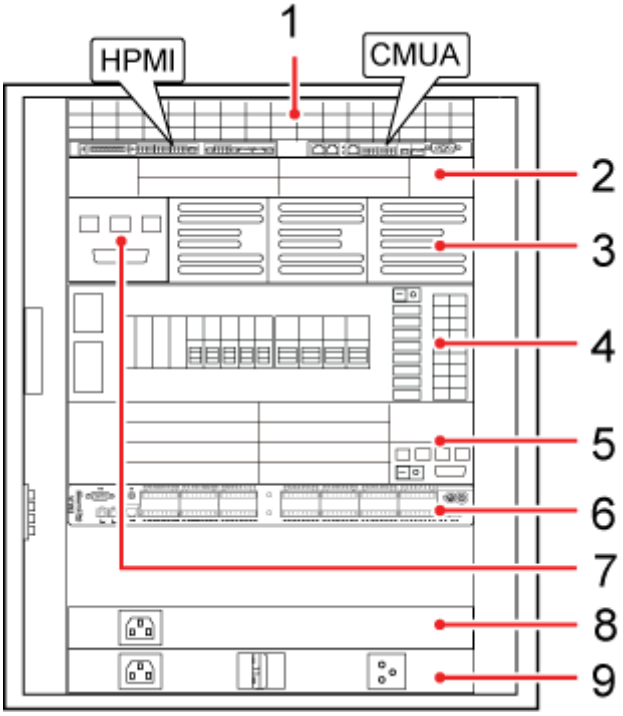
Figure 2-8 Internal structure of an APM30H (Ver.B) cabinet



(1) Fan box	(2) SLPU	(3) PSU (AC/DC)
(4) EPS subrack	(5) BBU3900 or BBU3910	(6) EMUA
(7) PMU	(8) HAU	(9) SOU

Figure 2-9 shows the internal structure of an APM30H (Ver.C) cabinet.

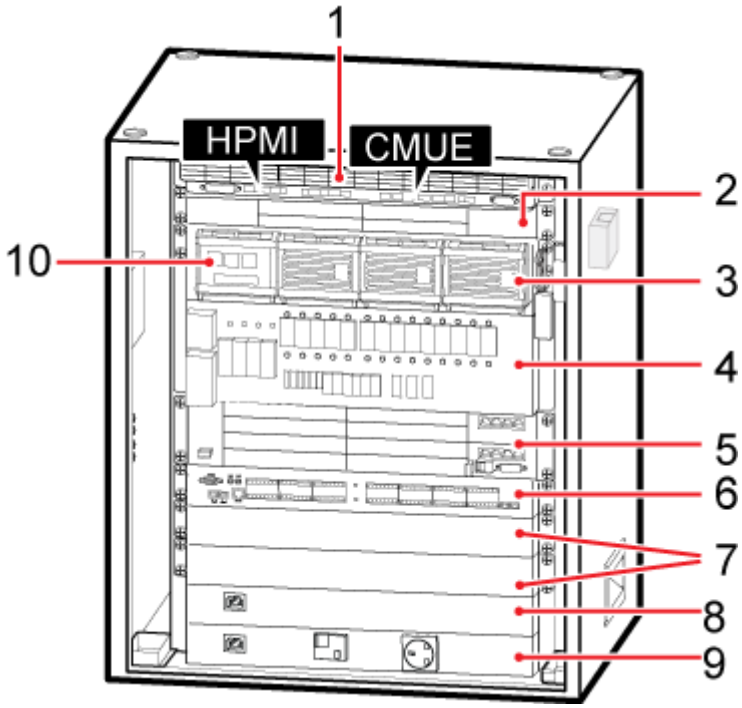
Figure 2-9 Internal structure of an APM30H (Ver.C) cabinet



(1) Fan box	(2) SLPU	(3) PSU
(4) EPU subrack	(5) BBU3900 or BBU3910	(6) EMUA
(7) Filler module	(8) AC HAU	(9) SOU
(10) PMU	-	-

Figure 2-10 shows the internal structure of an APM30H (Ver.D) cabinet.

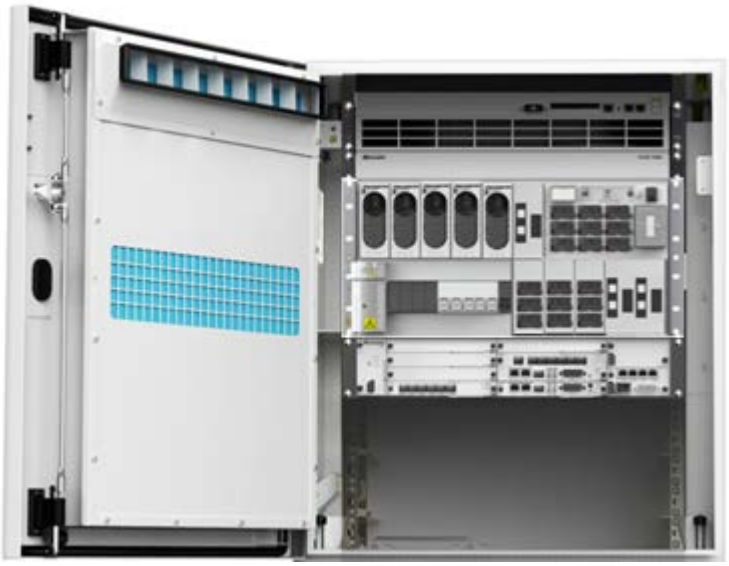
Figure 2-10 Internal structure of an APM30H (Ver.D) cabinet



(1) Outer air circulation device	(2) Junction box	(3) Fan box
(4) SLPU	(5) Door status sensor	(6) Electronic label unit (ELU)
(7) Embedded power subrack unit (EPU) subrack	(8) BBU3900 or BBU3910	(9) EMUA
(10) Filler module	(11) AC heater	(12) Maintenance socket

Figure 2-11 shows the internal structure of an APM30H (Ver.E) cabinet.

Figure 2-11 Internal structure of an APM30H (Ver.E) cabinet



2.3.4 TMC11H

When the site provides –48 V DC power input or more space is required for transmission equipment, the TMC11H Ver.B, TMC11H Ver.C or TMC11H Ver.D can be added. Both the three TMC11Hs are compact, lightweight, and easy to transport.

Figure 2-12 shows the external structure of a TMC11H cabinet.

Figure 2-12 External structure of a TMC11H cabinet

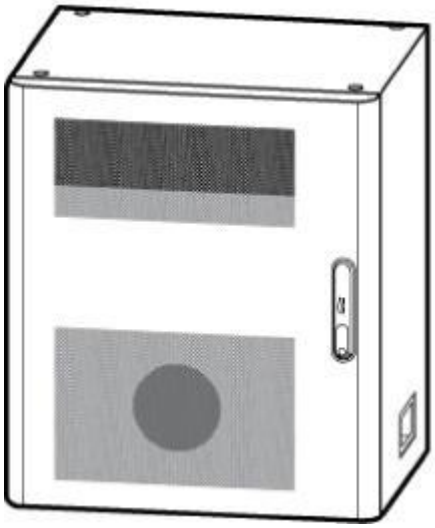
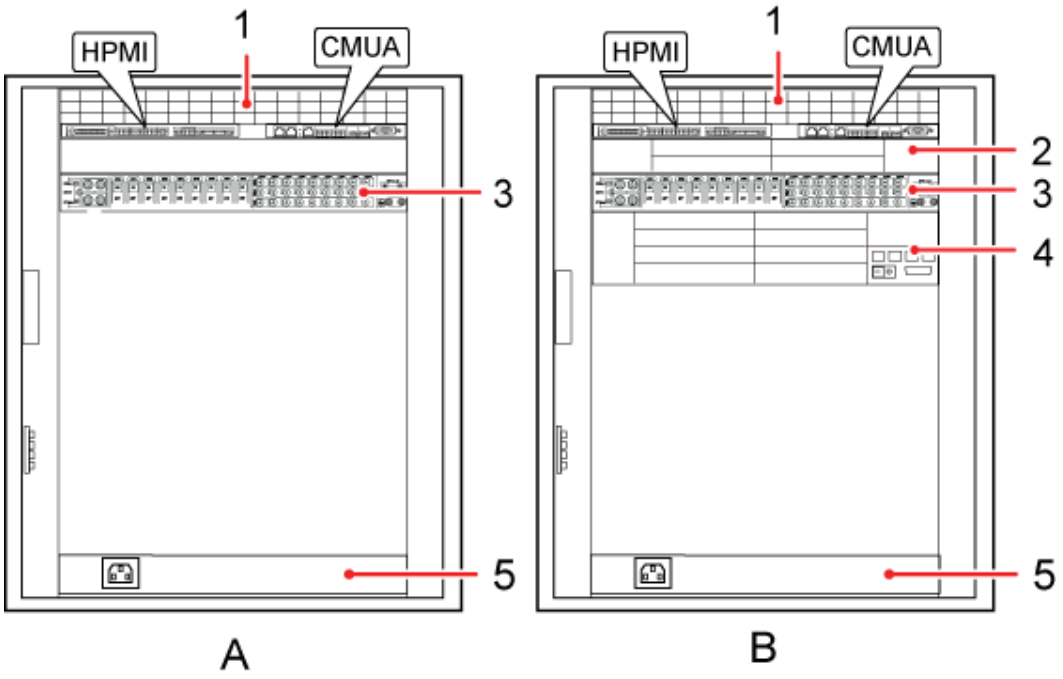


Figure 2-13 shows the internal structure of a TMC11H (Ver.B) cabinet.

- If the TMC11H (Ver.B) cabinet is only used to provide space for transmission equipment, the internal structure is shown in part A of Figure 2-13.

- If the TMC11H (Ver.B) cabinet is configured with the BBU3900(BBU3910) in a –48 V DC power supply scenario, the internal structure is shown in part B of Figure 2-13.

Figure 2-13 Internal structure of a TMC11H (Ver.B) cabinet

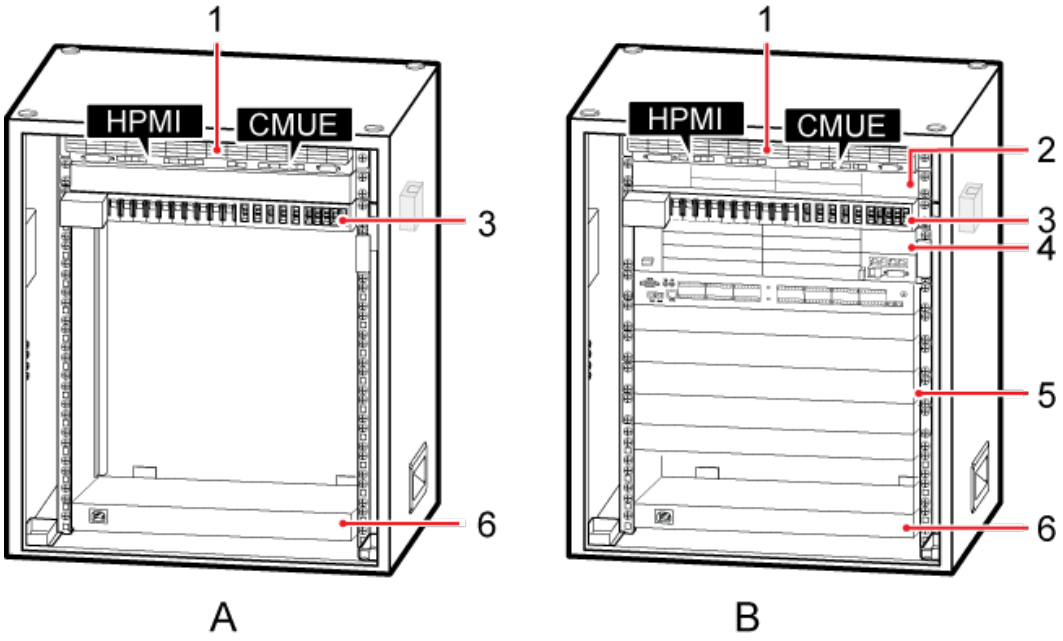


(1) Fan box	(2) SLPU	(3) DCDU-03
(4) BBU3900 or BBU3910	(5) HAU	-

Figure 2-14 shows the internal structure of a TMC11H (Ver.C) cabinet.

- If the TMC11H (Ver.C) cabinet is only used to provide space for transmission equipment, the internal structure is shown in part A of Figure 2-14.
- If the TMC11H (Ver.C) cabinet is configured with the BBU3900 or BBU3910 in a –48 V DC power supply scenario, the internal structure is shown in part B of Figure 2-14

Figure 2-14 Internal structure of a TMC11H (Ver.C) cabinet



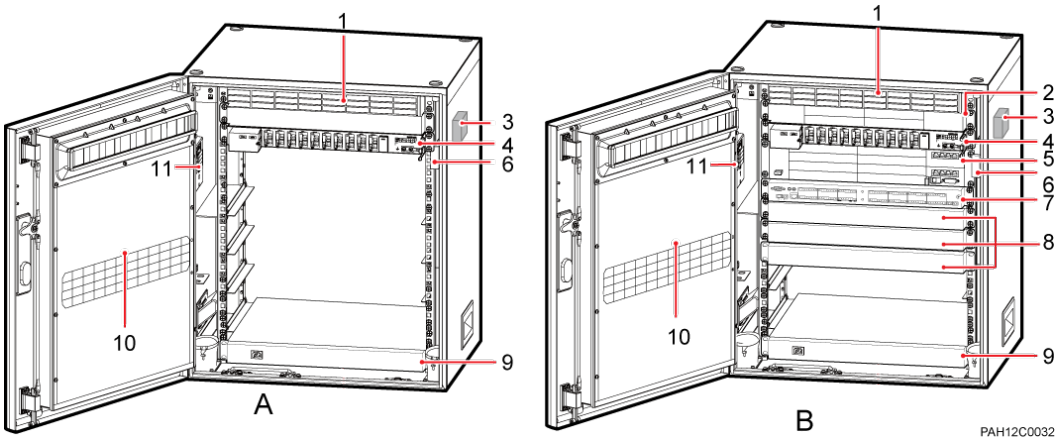
(1) Fan box (2) SLPU (3) DCDU-11C

(4) BBU3900 (5) Filler module (6) AC HAU

Figure 2-15 shows the internal structure of a TMC11H (Ver.D)/TMC11H (Ver.E) cabinet.

- If the TMC11H (Ver.D)/TMC11H (Ver.E) cabinet is only used to provide space for transmission equipment, the internal structure is shown in part A of Figure 2-15.
- If the TMC11H (Ver.D)/TMC11H (Ver.E) cabinet is configured with the BBU3900 or BBU3910 in a –48V DC power supply scenario, the internal structure is shown in part B of Figure 2-15.

Figure 2-15 Internal structure of a TMC11H (Ver.D)/TMC11H (Ver.E) cabinet



(1) Fan box	(2) SLPU	(3) ELU
(4) DCDU-12C	(5) BBU3900 or BBU3910	(6) Door status sensor
(7) EMUA	(8) Filler module	(9) AC heater
(10) Outer air circulation device	(11) Junction box	-

2.3.5 IBBS200D and IBBS200T

When power backup of long duration is required, the IBBS200D or IBBS200T can be added. With built-in storage battery packs, the maximum backup power that can be provided by an IBBS200D or IBBS200T is –48 V DC 184 Ah. When two IBBS200Ds or IBBS200Ts are stacked, the maximum backup power that can be provided is –48 V DC 368 Ah.

The IBBS200D and IBBS200T are applicable to outdoor scenarios, and are compact and easy to transport. The IBBS200D works in direct-ventilation mode for heat dissipation. The IBBS200T has a built-in air conditioner and is applicable to a high-temperature environment.

The IBBS200D and IBBS200T both have Ver.B, Ver.C and Ver.D.

Figure 2-16 shows the external structure of an IBBS200D cabinet.

Figure 2-16 External structure of an IBBS200D cabinet

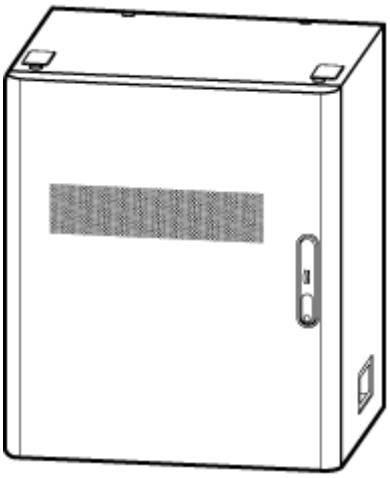
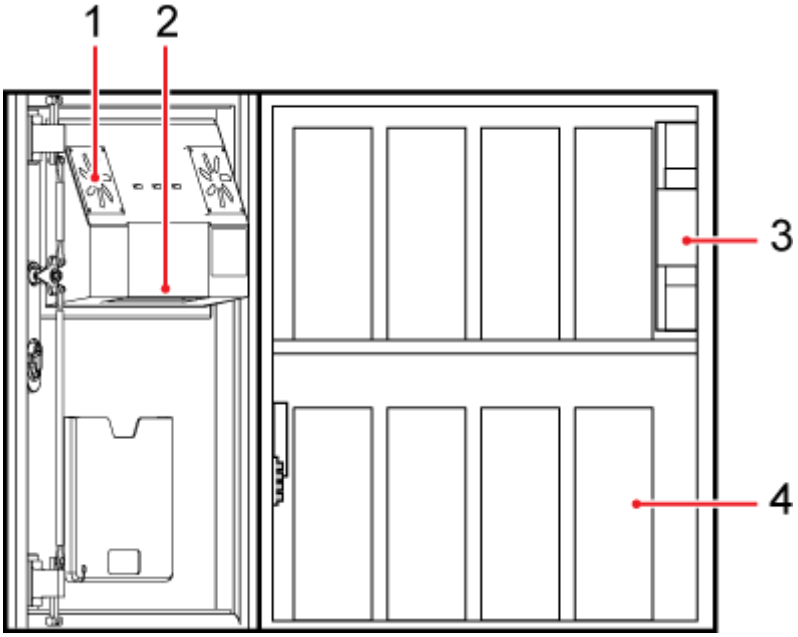


Figure 2-17 shows the internal structure of an IBBS200D (Ver.B)/IBBS200D (Ver.C) cabinet.

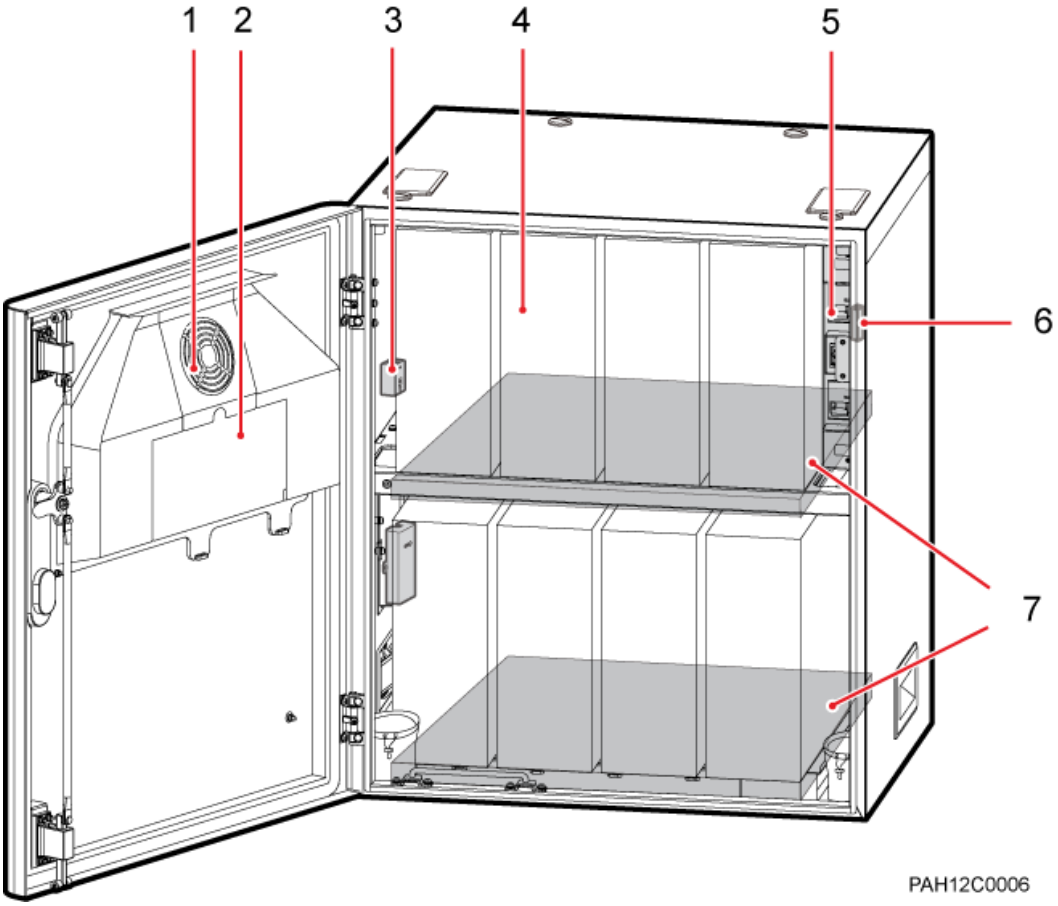
Figure 2-17 Internal structure of an IBBS200D (Ver.B)/IBBS200T (Ver.C) cabinet



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

Figure 2-18 shows the internal structure of an IBBS200D (Ver.D) cabinet.

Figure 2-18 Internal structure of an IBBS200D (Ver.D) cabinet



(1) Fan installation module	(2) CMUEA	(3) ELU
(4) Storage batteries	(5) Power distribution box	(6) Door status sensor
(7) Heating film	-	-

Figure 2-19 shows the external structure of an IBBS200T cabinet.

Figure 2-19 External structure of an IBBS200T cabinet

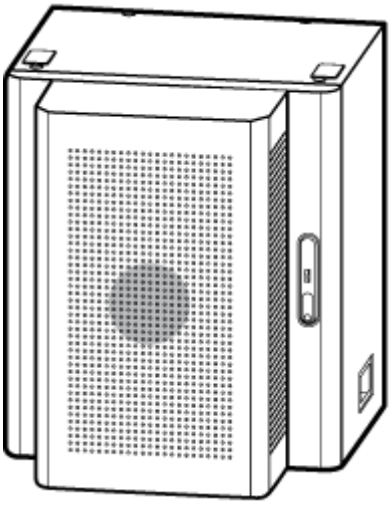
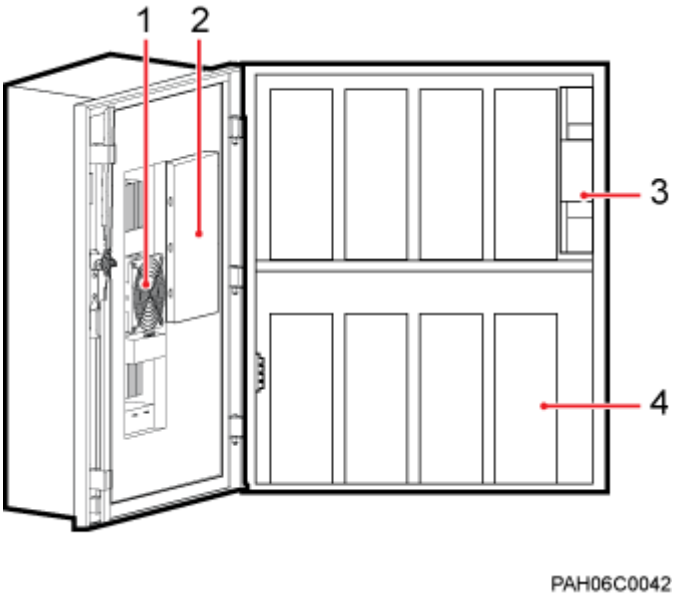


Figure 2-20 shows the internal structure of an IBBS200T (Ver.B)/IBBS200T (Ver.C) cabinet.

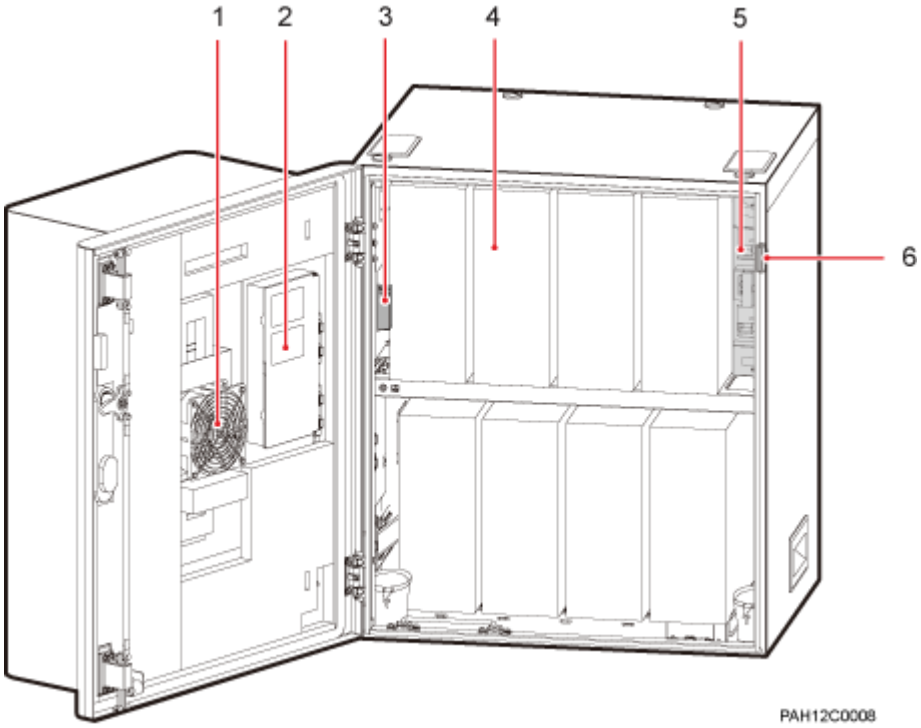
Figure 2-20 Internal structure of an IBBS200T (Ver.B)/IBBS200T (Ver.C) cabinet



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

Figure 2-21 shows the internal structure of an IBBS200T (Ver.D) cabinet.

Figure 2-21 Internal structure of an IBBS200T (Ver.D) cabinet



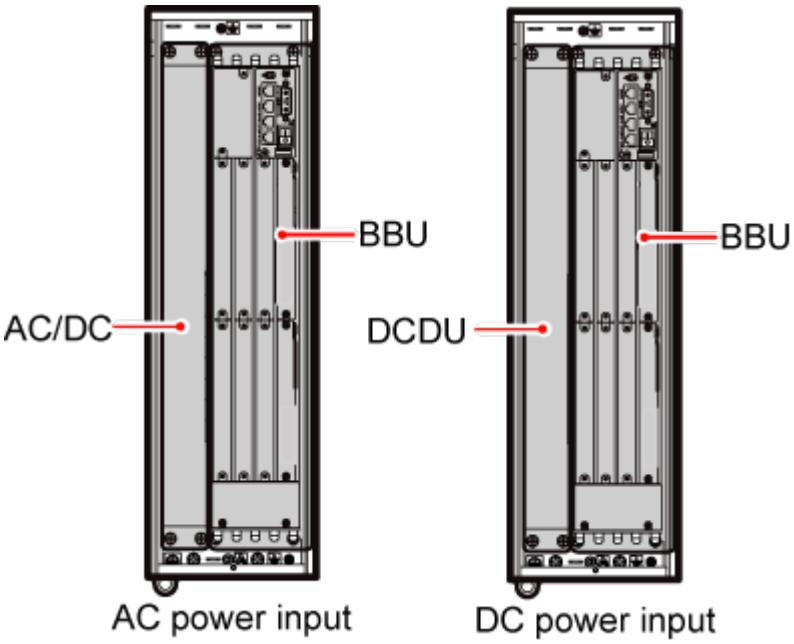
(1) Thermoelectric cooler (TEC)	(2) CMUEA	(3) ELU
(4) Storage battery	(5) Power distribution box	(6) Door status sensor

2.3.6 IMB03

The IMB03 is used at indoor sites and requires an AC or –48 V DC power supply. It provides a 3 U space for installing the BBU and power equipment such as the AC/DC power equipment, direct current distribution unit (DCDU), or other power systems.

The IMB03 is characterized by its flexible installation, satisfactory heat dissipation, and easy cabling. It can be supplied with DC or AC power. Figure 2-22

Figure 2-22 IMB03



2.3.7 OMB/OMB(Ver.C)

The OMB or OMB(Ver.C) functions as a BBU at outdoor sites and requires an AC or –48 V DC power supply. It provides a 3 U space for installing the BBU, transmission equipment, and power equipment, such as the AC/DC power equipment, DCDU, or other power systems.

The OMB or OMB(Ver.C) has the following benefits:

- Easy cabling
- Protection against water, dust, and sunlight
- Proper grounding
- Easy installation and maintenance
- The OMB or OMB(Ver.C) can be supplied with DC or AC power.

Figure 2-23 shows the interior of an OMB/OMB(Ver.C).

Figure 2-23 OMB

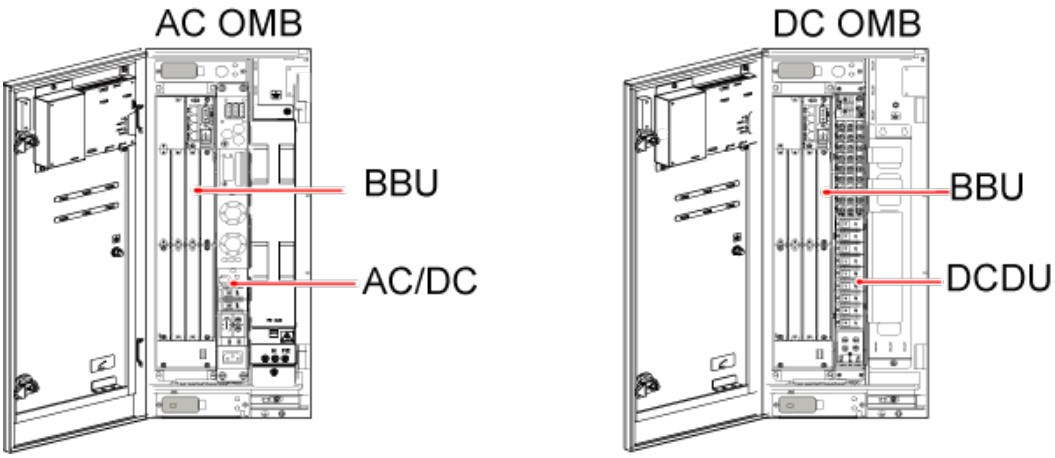
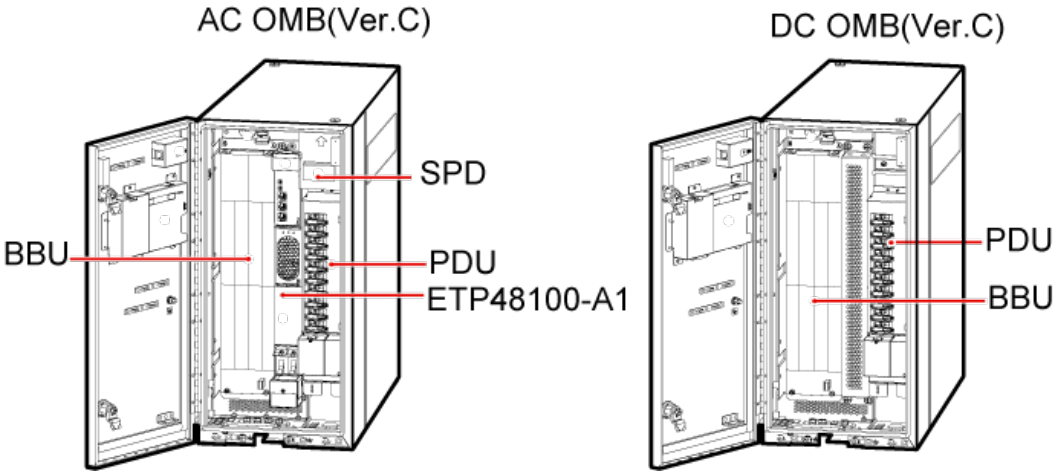


Figure 2-24 shows the interior of an OMB(Ver.C).

Figure 2-24 OMB(Ver.C)



(1) SPD: Surge protective device

(2) PDU: Power distribution unit

(3) ETP48100-A1: embedded telecommunication power A1

2.3.8 OPM50M

An Outdoor Power Module 50M (OPM50M) is an outdoor power module. It converts external input power into -48 V DC power and supplies the power to the DC RRU, BBU3910A1 or BBU3910A3, and transmission module.

Figure 2-25 shows the exterior of an OPM50M.

Figure 2-25 OPM50M exterior

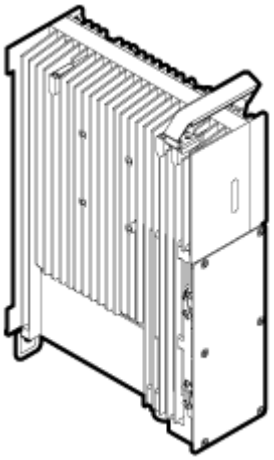
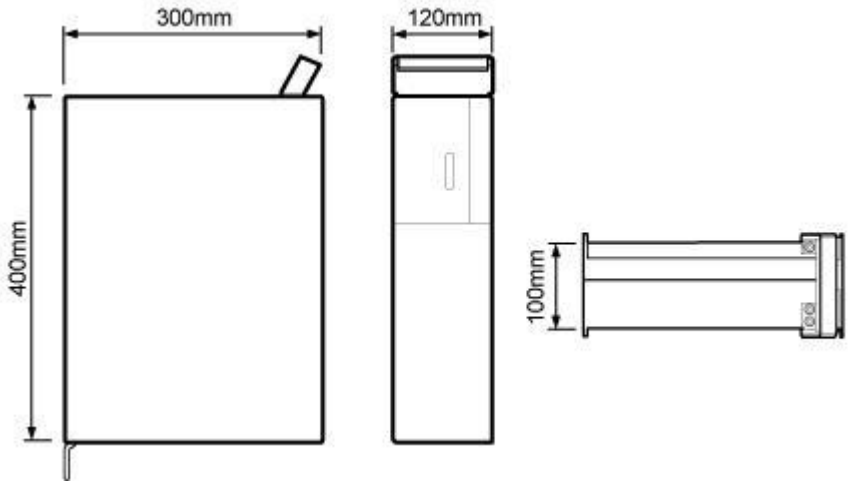


Figure 2-26 shows the dimensions of an OPM50M.

Figure 2-26 OPM50M dimensions



3 Operation and Maintenance

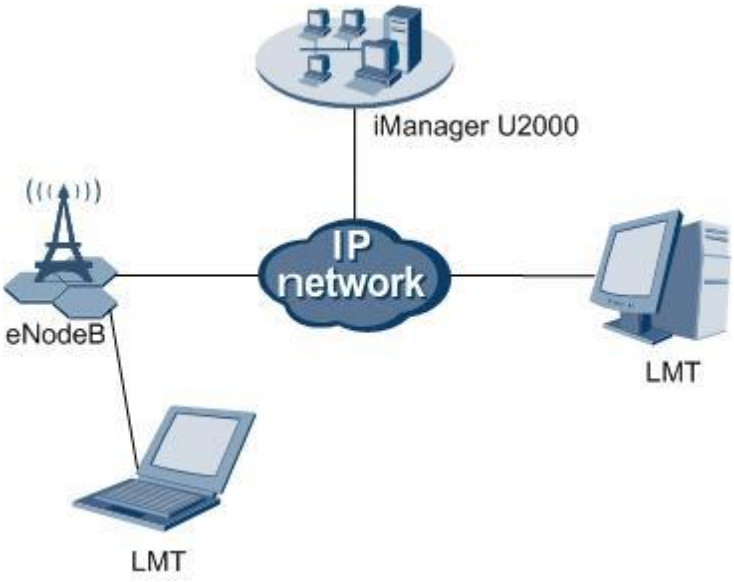
3.1 Overview

The DBS3900 performs all OM functions of eNodeBs. The eNodeB supports the OM system that is based on both the man-machine language (MML) and the graphical user interface (GUI). The OM system provides a hardware-independent mechanism and provides powerful functions to meet various OM requirements.

3.2 OM system

Figure 3-1 shows the OM system of the eNodeB.

Figure 3-1 OM system



The OM system consists of the LMT and the U2000.

The LMT is used to maintain a single eNodeB.

- To maintain the eNodeB locally, connect the LMT to the eNodeB by using an Ethernet cable.
- To maintain the eNodeB remotely, connect the LMT to the eNodeB through the Internet Protocol (IP) network.

The U2000, a mobile element management system provided by Huawei, is used to remotely maintain multiple eNodeBs of different types or software versions.

The OM system provides the following functions:

- The LMT performs functions such as data configuration, alarm monitoring, commissioning, and software upgrade.
- The U2000 performs functions such as data configuration, alarm monitoring, performance monitoring, and software upgrade.

Both the LMT and the U2000 support MML and GUI modes.

3.3 Benefits

3.3.1 Configuration Management

The eNodeB configuration management features easy accessibility, high reliability, and excellent scalability.

- Easy accessibility
  - The OM system supports a user-friendly GUI mode.
  - The eNodeB provides configuration templates for the common configuration scenarios, such as eNodeB startup, capacity expansion, and eNodeB replacement. In

addition, the eNodeB offers scenario-specific configuration wizards in GUI mode. This scenario-oriented design helps to minimize the requirement for users to enter the configuration information, and speeds up the site deployment.

- Huawei also provides the networking planning tool iPlan, which is used to import data to the template for initial configuration, reducing the effort required from network planners and network optimization engineers.

- High reliability
  - The eNodeB provides data configuration, query, export, backup, and restoration functions. In addition, it synchronizes data with the U2000.
  - The eNodeB updates all received configuration commands and checks the configuration restrictions to prevent misoperations.
  - The Configuration Management Express (CME) supports configuration rollback in batches. Therefore, when the configured eNodeB works abnormally or the eNodeB performance deteriorates, users can run a rollback command to restore data.
- Excellent scalability
  - Configuration management by using the northbound network management system (NMS) is supported.
  - Users can run MML commands to add, remove, or modify eNodeB configurations.
  - Users can use MML commands and the integration script star (iSStar) of the U2000 to customize functions of the U2000, for example, to customize troubleshooting procedures.

3.3.2 Fault Management

The eNodeB fault management provides easy fault localization, high reliability, and various tracing and monitoring methods.

- Easy fault localization
  - Handling suggestions are offered for each alarm, which helps users to easily locate and rectify the fault. In addition, the maintenance function and tools related to alarm handling also help users to locate faults.
  - or key performance indicator (KPI) level service failures, the eNodeB offers methods to rectify faults, which helps users to locate and rectify faults quickly and accurately.
  - The eNodeB supports alarm correlation. For all faults that result from one root cause, the eNodeB reports only one root alarm and the alarms affecting services. Users can easily locate the root cause of the alarm, and then rectify the faults.
- High reliability
  - The eNodeB comprehensively and accurately detects the faults in hardware, software, antenna system, transmission, cells, and environment.
  - Fault detection for the environment monitors equipment in terms of door status control, infrared, smoke, water damage, and temperature. In addition, external alarms can be customized.
  - Fault isolation and self-healing of the eNodeB ensure that a local failure does not affect the other parts of the base station. In addition, the eNodeB can set up the cell again with degraded specifications to minimize the impact of the failure on services.
- Various tracing and monitoring methods
  - The eNodeB supports various tracing functions to check interface compatibility. The standard signaling of one UE can be traced in the entire network, in a cell, or

on standard interfaces. Users can trace operations of the eNodeB on the LMT/U2000 in real time, or browse and analyze tracing results later.

- The eNodeB supports real-time performance monitoring in GUI mode to help users to locate performance failures speedily. Users can monitor the transmission quality of user-level or cell-level air interface, air interface performance and interference, and quality of transmission links in real time.
- The eNodeB supports one-click collection and upload of system logs. When users fail to locate or rectify a fault, this function helps them to collect the detailed fault information for the site. Then, users can provide the fault information to Huawei Customer Service Center for troubleshooting.

3.3.3 Performance Management

Performance management offers multiple monitoring and reporting periods and appropriate measurement point allocation to meets requirements in a variety of scenarios.

- Multiple monitoring and reporting periods
  - The eNodeB can collect performance counters every 15 or 60 minutes. The default period is 60 minutes.
  - The eNodeB supports real-time monitoring of KPIs for a duration of 1 minute.
- Appropriate measurement point allocation
  - The eNodeB supports performance measurement at the system-level or cell-level, of neighboring cells, on interfaces, and of device usage, to helps users to locate faults.

3.3.4 Security management

Security management provides network-level and user-level security services. The eNodeB supports the following services to ensure the security, integrity, and availability of the base station:

- Encryption of key information of users
- User account management and authentication
- Control over access rights of users
- Support of security protocols such as File Transfer Protocol over SSL (FTPS), Secure Socket Layer (SSL), and IP security (IPSec)
- Automatic recording of account usage information
- Security certificate

3.3.5 Software Management

The eNodeB software management features easy accessibility, high efficiency, and small impact on services during software upgrade.

- Easy accessibility
  - Users can perform a health check on the eNodeB before and after an upgrade, and back up, download, and activate the software step by step using the upgrade wizard of the U2000. Users can also query the upgrade status and result.
  - The eNodeB automatically updates the configuration data during the upgrade. Users do not need to prepare the configuration data.
- High efficiency
  - The eNodeB supports remote upgrade and batch upgrades.

  - The eNodeB supports upgrade strategy management. After the upgrade strategy is set, the eNodeB can perform software upgrades automatically.
- Small impact on services during software upgrades

  The eNodeB supports fast rollback. Users can perform version rollback by running one command, reducing the impact of upgrade failures on the base station.

  The eNodeB supports the management of patch packages. Users can install hot patches to repair software defects without interrupting the base station operation.

3.3.6 Deployment Management

The eNodeB deployment solutions consist of automatic identification of the eNodeB and initial configuration by using a USB flash drive. In addition, local commissioning is not required. These functions contribute to the ease of the deployment work and shortening the time required. Field engineers need to install only the hardware during site deployment. No notebook computer is required.

- The eNodeB supports automatic eNodeB identification of Global Positioning System (GPS) binding and unique ID binding.
- Users can download the software and eNodeB data to an eNodeB by using a USB flash drive, which reduces the download time, especially when the transmission bandwidth to the network element (NE) and the NMS is limited. The security of the USB port is ensured by encryption.
- Software commissioning is performed in the network management center instead of on site. After commissioning, users can check and accept the site deployment in the network management center.

3.3.7 Equipment Management

The eNodeB offers multiple user-friendly equipment management functions such as fault detection, data configuration, status management, and inventory reporting for the main equipment, mechanical and electric equipment, GPS, and remote electrical tilt (RET) antenna. In addition, the eNodeB reports the inventory to the U2000 automatically.

3.3.8 Inventory Management

The inventory management function offers various, accurate, and real-time management services:

- Provides the eNodeB inventory information, such as hardware, physical ports, transmission resources, system configuration, and software version.
- Collects the inventory information periodically and synchronizes the information on a daily basis.

4 Technical Specifications

4.1 Input Power

Table 4-1 lists the input power specifications of the DBS3900.

Table 4-1 Input power specifications

Item	Specifications
DBS3900	• BBU3900, BBU3910 or BBU3910A1 or BBU3910A3: -48 V DC (voltage range: -38.4 V DC to -57 V DC) • RRU3232: -48 V DC (voltage range: -36 V DC to -60 V DC) • RRU3251: -48 V DC (voltage range: -34 V DC to -60 V DC) • RRU3252(AC): voltage range: 90 V AC to 290 V AC) • RRU3252(DC): -48 V DC (voltage range: -32 V DC to -60 V DC) • RRU3253: -48 V DC (voltage range: -32 V DC to -60 V DC) • RRU3256: -48 V DC (voltage range: -32 V DC to -60 V DC)

Item	Specifications
	• RRU3259: -48 V DC (voltage range: -32 V DC to -60 V DC) • RRU3276： -48 V DC (voltage range: -36 V DC to -57 V DC) • RRU3278： -48 V DC (voltage range: -36 V DC to -57 V DC) • RRU3278u： -48 V DC (voltage range: -36 V DC to -57 V DC) • RRU3279: -48 V DC (voltage range: -36 V DC to -57 V DC) • RRU3236E： 2.3G, voltage range: 140V AC to 300V AC 3.5G, voltage range: 90V AC to 290V AC

4.2 Clock Synchronization

The DBS3900 uses the GPS, IEEE 1588 V2, or Time of Day (TOD)+1 Pulses Per Second (PPS) signals for clock synchronization.

4.3 Equipment Specifications

For details about the equipment specifications of the DBS3900, see the *LTE TDD BBU3900&BBU3910 Description*, *LTE TDD BBU3910A Description* and descriptions of each type of RRU.

4.4 Environmental Specifications

For details about the environmental specifications of the DBS3900, see the *LTE TDD BBU3900&BBU3910 Description* , *LTE TDD BBU3910A Description* and descriptions of each type of RRU\AAU.

4.5 Reliability

Table 4-2 lists the reliability specifications of the DBS3900.

Table 4-2 Reliability specifications

Item	Specifications

Item	Specifications
System availability	≥ 99.999%
Mean time between failures (MTBF)	≥ 155,000 hours
Mean time to repair (MTTR)	≤ 1 hour
System soft-reset time	< 200 seconds

4.6 Compliance Standards

Table 4-3 lists the compliance standards for the DBS3900.

Table 4-3 Compliance standards

Item	Specifications
Storage	ETSI EN 300019-1-1 V2.1.4 (2003-04) class1.2 "Weather protected, not temperature-controlled storage locations"
Transportation	ETSI EN300019-1-2 V2.1.4 (2003-04) class 2.3 "Public transportation"
Anti-seismic protection	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)
Earthquake	ETSI EN 300019-1-4: "Earthquake"
EMC	The eNodeB meets the Electromagnetic Compatibility (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 • ETSI EN 301489-4 • ETSI EN 301489-23 • ETSI EN 301908-1 V2.2.1 (2003-10) • ITU-R SM.329-10 The eNodeB is Conformite Europeenne (CE) certified.
Radio	• EN 301 908-1 V5.2.1 • EN 301 908-14 V4.2.1 • EN 301 908-20 V5.1.1 • EN 302 544-1 V1.1.2

5 Acronyms and Abbreviations

A	
APM	advanced power module
AAU	Active Antenna Unit
B	
BBU	baseband unit
C	
CDMA	Code Division Multiple Access
CME	Configuration Management Express
CPRI	common public radio interface
D	
DBS	distribution base station
DCDU	direct current distribution unit
E	
eNodeB	E-UTRAN NodeB
E-UTRAN	evolved universal terrestrial radio access network
F	
FTPS	File Transfer Protocol over SSL
G	
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GUI	graphical user interface
I	
IBBS	Integrated Battery Backup System

IP	Internet Protocol
IPSec	IP Security
K	
KPI	key performance indicator
L	
LBBP	LTE **baseband processing unit**
LMT	local maintenance terminal
LTE	Long Term Evolution
M	
MIMO	multiple-input multiple-output
MME	mobility management entity
MML	man-machine language
MTBF	mean time between failures
MTTR	mean time to repair
N	
NMS	network management system
O	
OM	operation and maintenance
OMB	outdoor mini box
P	
PMU	power monitoring unit
PPS	pulse per second
PSU	power supply unit
Q	
QoS	quality of service
R	
RAN	radio access network
RF	radio frequency
RET	remote electrical tilt
RRM	radio resource management
RRU	remote radio unit

S	
S-GW	serving gateway
SSL	Secure Socket Layer
T	
TCO	total cost of ownership
TDD	time division duplex
TEC	thermoelectric cooling unit
TMC	transmission cabinet
TOD	time of day
U	
UE	user equipment
USB	Universal Serial Bus
UTRAN	universal terrestrial radio access network