BTS3205E LT1ATOMBTS04
Product Description

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Contents

1 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:

- Flat network architecture
- Reduced delay
- Increased user data rates
- Improved spectral efficiency
- Optimized support for packet data services
- Improved system capacity and coverage

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

1.1 Positioning

As mobile communication technology develops rapidly, operators set increasingly high requirements for communication networks. In addition to the improvements in network coverage, more technologies are required to expand network capacity to meet the rapidly increasing data volume of the mobile broadband era.

User experience may be affected in coverage holes and hot spots with limited network capacity. Therefore, operators require a low-cost, easy-to-deploy solution to solve problems in these areas.

Focusing on customer-oriented innovation, Huawei launches the integrated LTE Time Division Duplex (TDD) micro base station BTS3205E for the SingleBTS solution. The BTS3205E is a future-oriented TDD eNodeB integrating multiple functional modules and technologies from Huawei's product portfolio. It is characterized by its compact size, light weight, plug and play, and automatic configuration. No shelter or equipment room is required for the BTS3205E. The BTS3205E also allows easy site selection, contributing to fast network deployment for operators.

The BTS3205E supports two antennas.

1.2 Benefits

Large Capacity and High Throughput with Flexible TX Power Configuration

- The BTS3205E provides large capacity. A single BTS3205E supports a maximum of 100/cell scheduled UEs and 400/cell UEs in RRC_CONNECTED mode.
- The BTS3205E provides a maximum throughput of 110Mbps/cell (in the case of SA2 configuration) in the downlink and 28Mbps/cell (in the case of SA1 configuration) in the uplink.
- The BTS3205E supports a maximum transmit (TX) power of 2 x 5 W. The TX power of the BTS3205E can be configured flexibly to meet different coverage requirements.

Enhanced SON Function

- Self-configuration

  The BTS3205E can automatically obtain its IP address, download software and configuration data, test its status, and upload radio parameters. This reduces the workload of data preparation and site deployment and operators' maintenance costs.

- Automatic neighbor relation (ANR)

  The BTS3205E can automatically maintain the integrity and validity of the neighboring cell list (NCL) by automatically detecting missing neighboring cells and evaluating neighbor relationships. This increases handover success rates and reduces the cost on network planning and optimization.

  Self-planning

  With the GU sniffer function and support by a self-organizing network (SON) receiver, the BTS3205E can automatically detect the physical cell identifier (PCI), eNodeB ID, and tracking area (TA), and automatically plan initial neighboring cells. This reduces manual operations during site deployment and reduces operators' O&M costs.

- Mobility load balancing (MLB)

  The BTS3205E supports MLB, improving user experience.

- Self-optimization

  The BTS3205E supports automatic network optimization, reducing operators' O&M costs.

Comprehensive and Low-Cost Transmission Modes

- The BTS3205E supports all-IP transmission. It also supports star and chain topologies.
- The BTS3205E supports access to the public network using x digital subscriber line (xDSL), x passive optical network (xPON), and fast Ethernet (FE)/gigabit Ethernet (GE) transmission modes.
- The BTS3205E supports low-cost backhaul transmission through the eRelay system.

Compact Structure, Quick Network Construction, and Low CAPEX

- With a highly integrated structure, the BTS3205E features compact size, light weight, and easy installation and maintenance. This reduces capital expenditure (CAPEX).
- The BTS3205E can be mounted on a wall or pole. No equipment room is required. The small size of the BTS3205E allows easy site selection, which increases the flexibility in network deployment and reduces the site rental cost for operators.

- Antennas can be installed separately or built in the BTS3205E. This can speed up network construction.

Improved User Experience by Networking with Macro eNodeBs

- The BTS3205E supports networking with macro eNodeBs to cover hot spots and coverage holes and improve data rates at the edges of macro cells.
- UEs can camp on a BTS3205E cell or macro cell and can also be handed over between a BTS3205E cell and a macro cell. This ensures service continuity and improves user experience.
- The BTS3205E supports interoperation between a BTS3205E cell and a GSM/UMTS macro network. This also ensures service continuity and improves user experience.

2 Architecture

2.1 Overview

The BTS3205E adopts a structure with the service functional components separated from the power and transmission components. The service functional components comprise a BTS module, and the power and transmission components comprise a dock module. Figure 2-1 shows this architecture.

Figure 2-1 Logical architecture of the BTS3205E
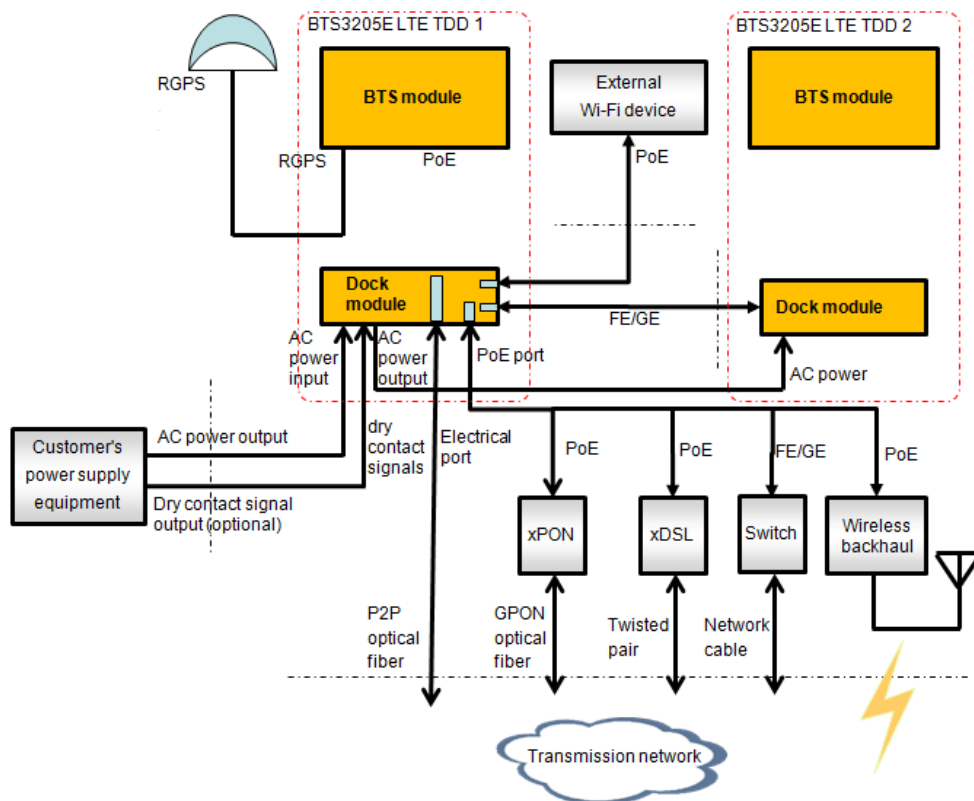
The BTS module consists of a transmission & interface unit, main control processing unit, baseband processing unit, radio frequency (RF) unit, and an RF antenna. Figure 2-2 shows the architecture of the BTS module.
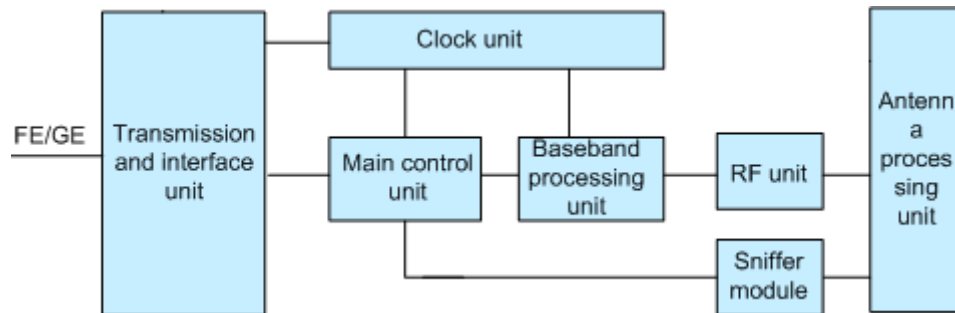
Figure 2-2 BTS module architecture

The BTS module performs the following functions:

- The transmission & interface unit provides ports for communication between the BTS3205E and the Evolved Packet Core (EPC), and provides an O&M channel to the Operation & Maintenance System (OMS).

- The main control processing unit manages the entire BTS3205E in terms of O&M and signaling processing and provides the system clock.

- The baseband processing unit processes the user-plane protocol stack over the Uu interface, including scheduling and data processing in both the uplink and downlink.

- The RF unit performs modulation, demodulation, data processing, combining, and dividing for baseband and RF signals.

- The RF antenna receives uplink signals from UEs and transmits downlink signals to UEs. The BTS3205E supports built-in and external antennas.

- Clock unit: provides clock synchronization. The clock synchronization modes supported by the BTS3205E are Remote Global Positioning System (RGPS), and IEEE 1588v2.

- Sniffer module: scans neighboring GSM&UMTS cells and implements SON.

2.2 Exterior of the BTS3205E

Figure 2-3 shows the exterior of the BTS3205E.

Figure 2-3 Exterior of the BTS3205E

Figure 2-4 and Figure 2-5 show the exterior of the BTS module.

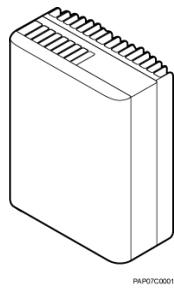**Figure 2-4** Exterior of the BTS module with a built-in antenna

Figure 2-5 Exterior of the BTS module without a built-in antenna
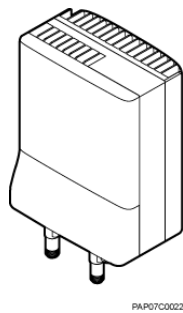

Figure 2-6 shows the exterior of the dock module.

Figure 2-6 Exterior of the dock module
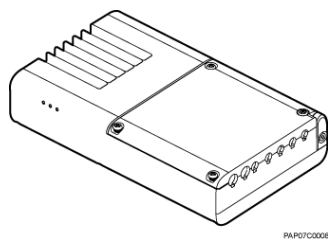
2.3 Physical Ports on the BTS3205E

The BTS3205E has a modular structure with its physical ports at the module bottom and on the cabling cavity. Figure 2-6、Figure 2-7 and Figure 2-7 respectively show the physical ports and indicators on the BTS and dock module. For the functions of the physical ports and indicators, see Table 2-3.

Figure 2-7 Physical ports and indicators on the BTS3205E
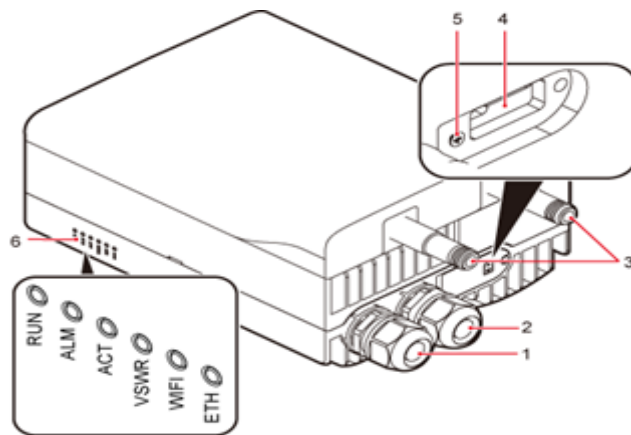
Table 2-1 Physical ports and indicators on the BTS3205E

No.	Type	Name	Description
1	Port	RGPS port	Used for RGPS signal receiving and clock synchronization.
2		P&E port	Used for power supply and data transmission.
3(opt)		ANTA_TX/RX	Port A for receiving and transmitting RF signals, using a Type N connector Configured when an external antenna is used
		ANTB_TX/RX	Port B for receiving and transmitting RF signals, using a Type N connector Configured when an external antenna is used
4		TF port	Used for site deployment.
5		Mini USB port	Used for commissioning and clock output.
5	Indicator	RUN	Indicates the running status of the BTS3205E.
		ALM	Indicates whether an alarm is reported.
		ACT	Indicates the activation status of the BTS3205E.

No.	Type	Name	Description
		VSWR	Indicates whether a voltage standing wave ratio (VSWR) alarm is reported over the transmit port.
		ETH	Indicates the connection status of the BTS3205E.

Figure 2-8 Physical ports on the dock module
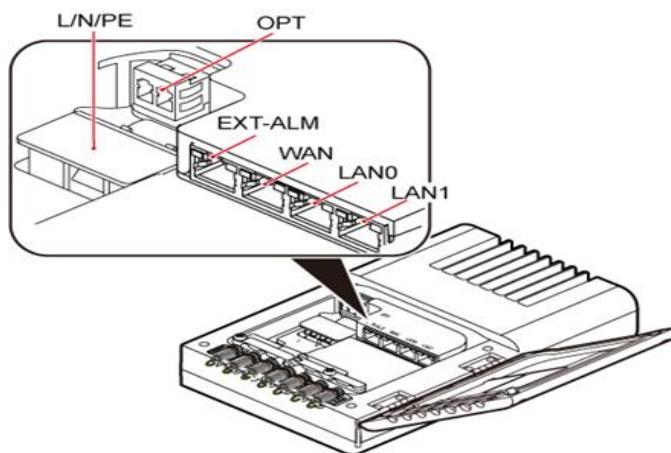
Figure 2-9 Indicators on the dock module
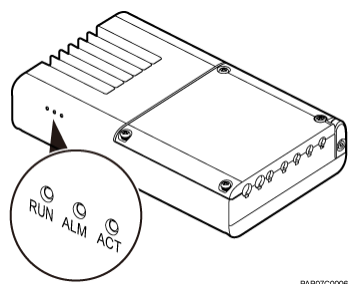
Table 2-2 Ports on the dock module

Silkscreen	Port Type	Description
L/N/PE	Cord end terminal	AC input port
WAN	RJ45	P&E port used for transmission, power supply, and connection to an external transmission device
LAN0	RJ45	P&E port used for transmission, power supply, and connection to a BTS3205E
LAN1	RJ45	P&E port used for transmission, power supply, and connection to the commissioning device, radio backhaul device or cascaded device

Silkscreen	Port Type	Description
EXM-ALX	RJ45	Four-line dry contact used for monitoring external devices
OPT	SFP	FE/GE optical port

2.4 Auxiliary Devices of the BTS3205E

Table 2-3 lists the auxiliary devices of the BTS3205E.

Table 2-3 Auxiliary devices of the BTS3205E

Device	Configuration Principle	Description
External antenna	Optional	–
RGPS device	Mandatory	Configured when the RGPS clock source is used

3 Application Scenarios

The BTS3205E, an integrated eNodeB, is used to cover outdoor hot spots and coverage holes, indoor areas, and rural areas.

The BTS3205E can work with auxiliary devices to meet operators' network deployment requirements indoors and outdoors.

The BTS3205E can be installed on a wall or pole, as shown in Figure 3-1 through Figure 3-4.

Figure 3-1 Installation of the BTS3205E with a built-in antenna on a pole
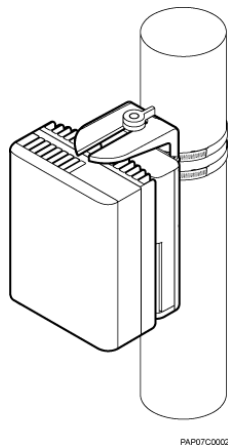
Figure 3-2 Installation of the BTS3205E without a built-in antenna on a pole
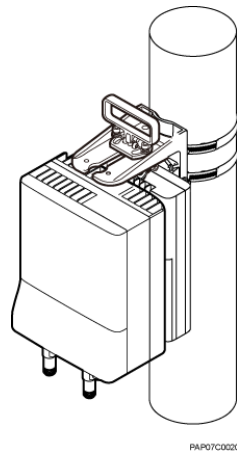
Figure 3-3 Installation of the BTS3205E with a built-in antenna on a wall
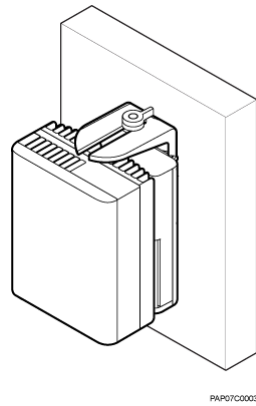
Figure 3-4 Installation of the BTS3205E without a built-in antenna on a wall
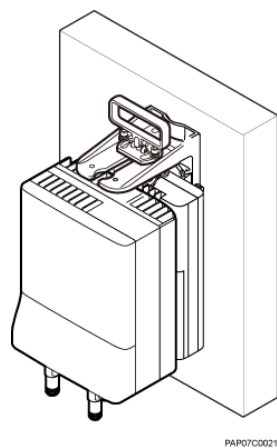
4 Operation and Maintenance

Operation and maintenance (O&M) covers management, monitoring, and maintenance of the BTS3205E software, hardware, and configuration. In addition, diversified OM modes meet various requirements.

4.1 O&M Modes

The BTS3205E supports the following O&M modes:

- Local maintenance: A single BTS3205E can be maintained using the LMT.
- Remote maintenance: Multiple BTS3205Es can be maintained simultaneously using the M2000 or LMT.

Figure 4-1 shows the O&M system of the BTS3205E.

Figure 4-1 O&M system of the BTS3205E
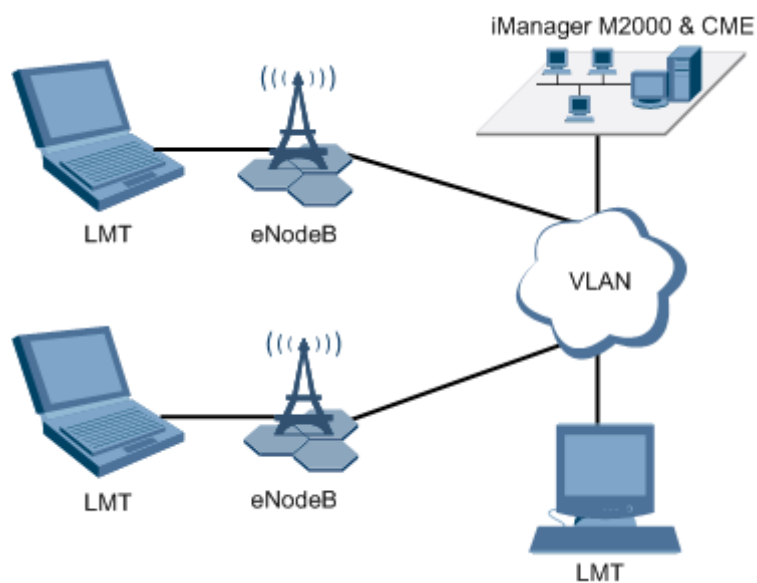
The BTS3205E O&M system consists of the following:

- LMT: used to maintain a single BTS3205E locally or remotely
- iManager M2000: also called M2000, used to remotely maintain BTS3205Es in batches
- Configuration management express (CME): used to configure and manage BTS3205E data
- eNodeB: BTS3205E, which is maintained

4.2 O&M Functions

The BTS3205E O&M functions include configuration management, fault management, performance management, security management, software management, deployment management, device management, and inventory management.

Configuration Management

Configuration management includes data configuration, query, export, backup and restore, and data synchronization with the M2000.

Data is configured based on managed objects (MOs), which are specific to devices, services, and transmission. The configurations of these types of data are independent from each other. Generally, service configurations are independent from the device configurations. Modifying either type of configurations does not require a modification of the other type.

Fault Management

Fault management involves fault detection, fault isolation and self-healing, alarm reporting, and alarm correlation. Faults might be related to hardware, environment, software, transmission, cells, and different types of services in cells.

- Fault isolation and self-healing bring the following benefits:
    - Prevents a faulty component from affecting other components in a BTS3205E.
    - Reestablishes a cell of lower specifications to minimize the impact of faults on services.
- Alarm correlation enables the BTS3205E to report only the alarm indicating the root fault and the ultimate impact on services, though there may be series of problems caused by the root fault.

Performance Management

Performance management involves periodic performance measurement on a BTS3205E and collection, storage, and reporting of performance measurement results.

The BTS3205E supports performance measurement with a period of 15, 30, or 60 minutes. Performance measurement covers performance of eNodeBs, cells (including neighboring cells), transmission, standard interfaces, and device usage.

Tracing Management

Tracing management facilitates routine maintenance, commissioning, and fault diagnosis by tracing internal messages or by tracing all messages over an interface, over a signaling link, or related to a UE.

Security Management

Security management involves user account management, rights management, login management, identity authentication, and operation authentication for BTS3205E authentication and access control.

Security management also involves Secure Sockets Layer (SSL)-based security control on the channels between the BTS3205E and the M2000.

Security management provides network- and user-specific security services. It provides the following functions:

- Encryption: for key information about users
- Authentication: management of user accounts and authentication of users
- Access control: control for user operations
- Security protocol: support for SSL

Software Management

Software management involves the following functions:

- Software version management: Software versions can be queried, backed up, and restored.
- Software version upgrade: BTS3205Es can be remotely upgraded in batches. With the one-click remote upgrade wizard provided by the M2000, you can:
  - Perform health checks before and after upgrades.
  - Back up, download, and activate software versions.
  - Check the upgrade status and results.

  The BTS3205E can automatically update configurations during upgrades. You only need to follow the instructions on the upgrade wizard to complete an upgrade. It also supports rapid version rollback by running a single command, reducing the impact of upgrade failures on the system.
- Patch management: It involves patch query, download, loading, activation, deactivation, rollback, confirmation, and removal.

Deployment Management

The BTS3205E deployment solution covers the functions such as BTS3205E self-discovery, deployment by using a TF card, remote deployment, and radio parameter self-planning. These functions reduce the workload of network deployment and increase the deployment efficiency. No personal computer (PC) is required, and you only need to install the hardware for BTS3205E deployment.

- BTS3205E self-discovery: You do not need to configure the IP addresses of the BTS3205E and M2000 during deployment.
- The software and eNodeB data can be automatically downloaded to a BTS3205E using a TF card. This function reduces the download time and is helpful especially when the transmission bandwidth between the BTS3205E and the M2000 is limited.
- Remote deployment: During remote deployment, software commissioning is performed at the network management center (NMC) rather than on sites. You can perform acceptance tests at the NMC.

- Radio parameter self-planning: This function allows automatic generation of radio parameters for a BTS3205E in online mode. This function reduces the workload of parameter planning and configuration.

Equipment Management

Equipment management involves data configuration, device status management, fault detection, and troubleshooting for all the components in the BTS3205E. On the device panel, you can view device status and perform simple operations such as device reset.

Inventory Management

Inventory management involves collection and reporting of the inventory information about the BTS3205E. With inventory management, you can manage the BTS3205E assets at the NMC.

5 Specifications

The technical specifications of the BTS3205E include the specifications of the frequency band, capacity, output power, power consumption, ports, input power, equipment, environment, reliability, and standard compliance.

5.1 Frequency Band

Table 5-1 Frequency band specifications

Frequency Band	RX Frequency Band (MHz)	TX Frequency Band (MHz)	Supported Bandwidth (MHz)
2600MHz	2575~2635MHz	2575~2635MHz	10/20

5.2 Capacity

Table 5-2 Capacity specifications

Item	Specifications
Maximum number of cells	2
Maximum throughput	Downlink: 110Mbps/cell (in the case of SA2 configuration) Uplink: 28Mbps/cell (in the case of SA1 configuration)
Maximum number of UEs in RRC_CONNECTED mode per eNodeB	800
Maximum number of active UEs (scheduled by the eNodeB) per eNodeB	200
Number of data radio bearers (DRBs)	8 DRBs per UE

5.3 Built-in Antenna

Table 5-3 Specifications of the built-in antenna

Item	Specifications
Antenna type	Directional antenna
Frequency band	2.6 /2.3GHz
Gain	10 dBi
Half-power beamwidth (HPBW)	65 ° for the horizontal plane and 30 ° for the vertical plane

5.4 Output Power

Table 5-4 Output power specifications

Frequency Band (MHz)	Maximum Output Power (W)
2600	2 x 5 (2 channels, 5 W per channel)

5.5 Power Consumption

Table 5-5 Power consumption specifications

Frequency Band (MHz)	Maximum Power Consumption (W)
2600	130

5.6 Port

Table 5-6 Interface specifications

Item	Specifications
Transmission port	Two FE/GE electrical port and one FE/GE optical port
Monitoring port	Four dry contact signals
Antenna port	Connected to an external antenna Using a Type N connector

5.7 Input Power

Table 5-7 Input power specifications

Item	Specifications
Input power	AC power: +90V to +290V DC power: -42~-57V PoE power supply

5.8 Equipment

Table 5-8 Equipment specifications

Item	Specifications
Dimensions (H x W x D)	BTS module: 200 mm x 250 mm x 115 mm Dock module: 250 mm x 160 mm x 52 mm
Weight	BTS module: ≤ 6.5 kg Dock module: ≤ 2.5 kg

5.9 Environment

Table 5-9 Environment specifications

Item	Specifications
Temperature	–40 ℃ to +55 ℃ (without solar radiation)
Relative humidity	2% RH to 100% RH
Ingress Protection rating	IP65

5.10 Reliability

Table 5-10 Reliability specifications

Item	Specifications
System availability	≥ 99.999%
Mean time between failures (MTBF)	Dock module: 1,265,800 hours BTS module: 465,100 hours

Item	Specifications
Mean time to repair (MTTR)	≤ 1 hour

5.11 Standard Compliance

Table 5-11 Standards that the BTS3205E complies with

Item	Standards
EMC	- CISPR 22 - CISPR 24 - EN 301 489-17 - EN 301 489-23 - EN 55022 - ETSI 301 489-1 - GB 9254 - GB 9254-2008 - IEC 61000-4-2 - IEC 61000-4-3 - IEC 61000-4-4 - IEC 61000-4-5 - IEC 61000-4-6 - IEC 61000-4-29 - VCCI V-3
Protocols	3GPP R99, R4, R5, R6, R7, R8, R9, and R10
Environment protection	RoHS
Surge protection	- IEC61000-4-5 - IEC 61312-1 - YD 5098
General protection	- IEC 61000-4-5 - YD 5068-98 - YD 5098

Item	Standards
Safety	• AS/NZS60950-22 • AS/NZS60950-1 • EN60950-1 • EN60950-22 • IEC60950-1 • IEC60950-22 • UL60950-1 • UL60950-22
Device environment	• IEC 68-2-1 • IEC 68-2-2 • IEC60068-2-2 • ETSI EN300019-1-1 • ETSI EN300019-1-2 • ETSI EN300019-1-4

6 Acronyms and Abbreviations

Acronym or Abbreviation	Full Name
ANR	automatic neighbor relation
BS	base station
CAPEX	capital expenditure
CDMA	Code Division Multiple Access
DRB	data radio bearer
EMC	electromagnetic compatibility
eNodeB	E-UTRAN NodeB
EPC	evolved packet core
ETSI	European Telecommunications Standards Institute
E-UTRAN	evolved universal terrestrial radio access network
FE	fast Ethernet
FTPS	File Transfer Protocol over SSL
GE	gigabit Ethernet
GSM	Global System for Mobile Communications
GUI	graphical user interface
HPBW	half-power beamwidth
IP	Internet Protocol
IPSec	IP Security
iSStar	integration script star
ITU-R	International Telecommunication Union -Radio communication Sector

Acronym or Abbreviation	Full Name
ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
KPI	key performance indicator
LMT	local maintenance terminal
LTE	Long Term Evolution
MLB	mobility load balancing
MML	man-machine language
MTBF	mean time between failures
MTTR	mean time to repair
NCL	neighboring cell list
NMC	network management center
NMS	network management system
OMS	Operation & Maintenance System
PCI	physical cell identifier
PoE	power over Ethernet
RF	radio frequency
RGPS	Remote Global Positioning System
RRC	radio resource control
RX	receive
SON	self-organizing network
SSL	Secure Sockets Layer
TA	tracking area
TDD	time division duplex
TF	trans flash
TX	transmit
UE	user equipment
UMTS	Universal Mobile Telecommunications System
UTRA	Universal Terrestrial Radio Access
VLAN	virtual local area network
VSWR	voltage standing wave ratio

Acronym or Abbreviation	Full Name
WAN	wide area network
xDSL	x digital subscriber line
xPON	x passive optical network