



ZXMBW E9200

Indoor PICO Base Station

User Manual

Version 3.20.01.00

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About this Manual

Purpose

This Manual provides procedures and guidelines that support the operation of the ZXMBW E9200 Indoor Pico Base Station.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

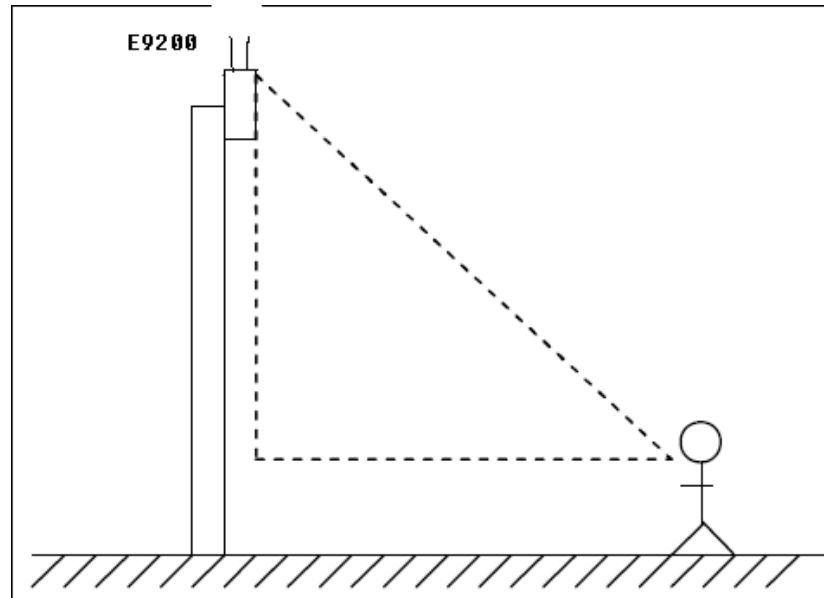
Notice

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under part 73 of this chapter, land mobile operation under part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

The installation methods of E9200 with two Braid-like antennas are wall-mount installation and pole-mount installation, about 2~3 meters height.

The safe distance between subscriber and E9200 is at least 20cm.



Intended Audience

This document is intended for engineers and technicians who perform operation activities on the ZXMBW E9200 Indoor Pico Base Station.

Prerequisite Skill and Knowledge

To use this document effectively, users should have a general understanding of wireless telecommunications technology. Familiarity with the following is helpful:

- the ZXMBW E9200 system and its various components
- user interfaces on the ZXMBW E9200 Indoor Pico Base Station.
- local operating procedures

What is in This Manual

This Manual contains the following chapters:

TABLE 1 CHAPTER SUMMARY




Chapter	Summary
Chapter 1 System Overview	Introduces the ZXMBW E9200's position, Functions, Principles, External and Internal interfaces, Applications and technical indices.
Chapter 2 Hardware Description	Describes Cabinet structure, Hardware modules, Main antenna feeder system and External cables.
Chapter 3 Hardware Installation	Describes detailed installation procedures of ZXMBW E9200's cabinet, cables, main antenna feeder system, GPS antenna feeder system, and Hardware installation checking, Power-on and Power-off procedures.

Conventions

Typographical Conventions

ZTE documents employ the following typographical conventions.

TABLE 2 TYPOGRAPHICAL CONVENTIONS

Typeface	Meaning
<i>Italics</i>	References to other Manuals and documents.
"Quotes"	Links on screens.
Bold	Menus, menu options, function names, input fields, radio button names, check boxes, drop-down lists, dialog box names, window names.
CAPS	Keys on the keyboard and buttons on screens and company name.
Constant width	Text that you type, program code, files and directory names, and function names.
[]	Optional parameters.
{ }	Mandatory parameters.
	Select one of the parameters that are delimited by it.
	Note: Provides additional information about a certain topic.
	Checkpoint: Indicates that a particular step needs to be checked before proceeding further.
	Tip: Indicates a suggestion or hint to make things easier or more productive for the reader.

**Mouse
Operation
Conventions****TABLE 3 MOUSE OPERATION CONVENTIONS**

Typeface	Meaning
Click	Refers to clicking the primary mouse button (usually the left mouse button) once.
Double-click	Refers to quickly clicking the primary mouse button (usually the left mouse button) twice.
Right-click	Refers to clicking the secondary mouse button (usually the right mouse button) once.
Drag	Refers to pressing and holding a mouse button and moving the mouse.

How to Get in Touch

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Chapter 1

System Overview

This chapter describes:

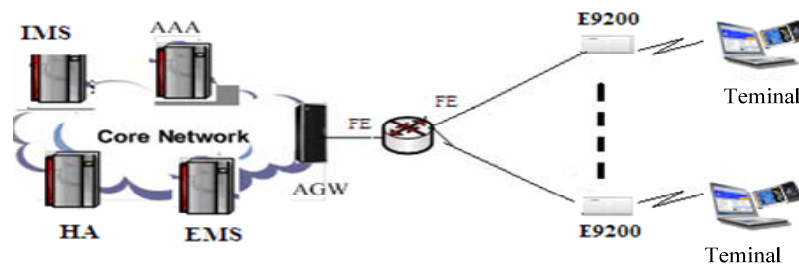
- ZXMBW E9200 position in WiMAX network
- ZXMBW E9200 functions
- ZXMBW E9200 appearance
- Fundamental principle
- ZXMBW E9200 application and networking scenario
- Technical indices
- Standards
- Interface description

ZXMBW E9200 Position in WiMAX Network

Overview The ZXMBW E9200 is located at the radio access layer of the WiMAX network, delivering broadband radio access services for terminal users. The ZXMBW E9200, as a supplement for blind points and hotspots of macro coverage, is mainly applied for middle-scale and small-scale indoor coverage, such as airport, shopping mall and conference center and so on.

Position in WiMAX Network Figure 1 illustrates the position of the ZXMBW E9200 in the WiMAX network.

FIGURE 1 ZXMBW E9200 IN WiMAX NETWORK



ZXMBW E9200 Functions

Forward Signal Processing

- The ZXMBW E9200 receives IP packets from the core network, decrypts these packets and then sends them to the baseband module to encode and modulate.
- The modulated signals are sent to the TX link for up conversion afterwards, power amplifier (PA) amplifies the signal, and then transmitted by the antenna.
- The ZXMBW E9200 supports forward auto-scale and manual scale.

Reverse Signal Processing

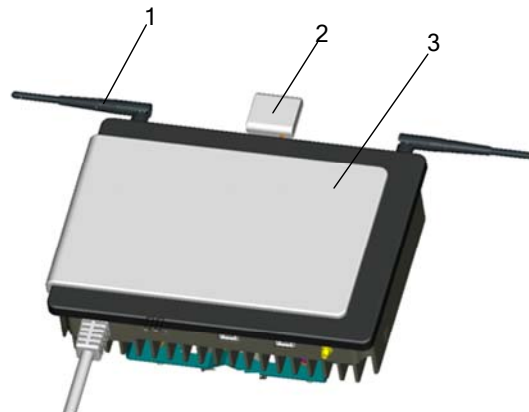
- The ZXMBW E9200 receives signals from terminals, sends them to the RX link for down conversion and then transmits them to the baseband module for channel demodulation.
- The baseband module demodulates the encrypted signals, and converts as IP packets, and then the IP packets are transmitted to the core network through the R6 interface.
- Reverse RSSI function.
- Reverse automatic gain control function.

- Other Functions**
- The ZXMBW E9200 generates PP1S synchronization signals.
 - The ZXMBW E9200 generates TDD sequential control signals.
 - The ZXMBW E9200 supports power supply and temperature monitoring.
 - The ZXMBW E9200 delivers version monitoring and version management functions.

ZXMBW E9200 Appearance

- Dimensions** The ZXMBW E9200 contains only one cabinet. The external dimension of the cabinet is (W x H x D):260mm (10 4/16 in) x 200mm (7 14/16 in) x 65mm (2 9/16 in). The internal dimension of the cabinet is (W x H x D): 246mm (9 11/16 in) x 184mm (7 4/16 in) x 23.5mm (1/16 in).
- Components** The ZXMBW E9200 comprises two braid-like antennas, one GPS receiver (GPS receiver does not need to be configured when ToP clock reference is adopted) and one cabinet. Figure 2 shows the appearance of the ZXMBW E9200.

FIGURE 2 ZXMBW E9200 APPEARANCE



1. Braid-like antenna 2. GPS receiver (optional) 3. Cabinet.

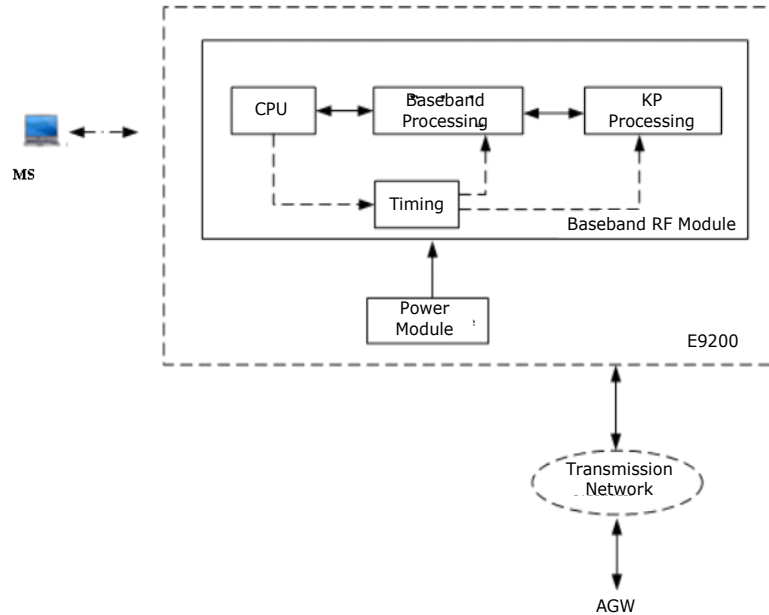
Fundamental Principle

The ZXMBW E9200 is located at the radio access layer of the WIMAX network, as a radio network base station lying between terminal users and AGW. Functionally E9200 is composed of baseband processing unit, radio frequency (RF) processing unit, CPU control center and clock processing unit.

Functional Components

Figure 3 illustrates the functional components of ZXMBW E9200

FIGURE 3 ZXMBW E9200 FUNCTIONAL COMPONENTS



Functional Process

The ZXMBW E9200 processes the following basic traffics:

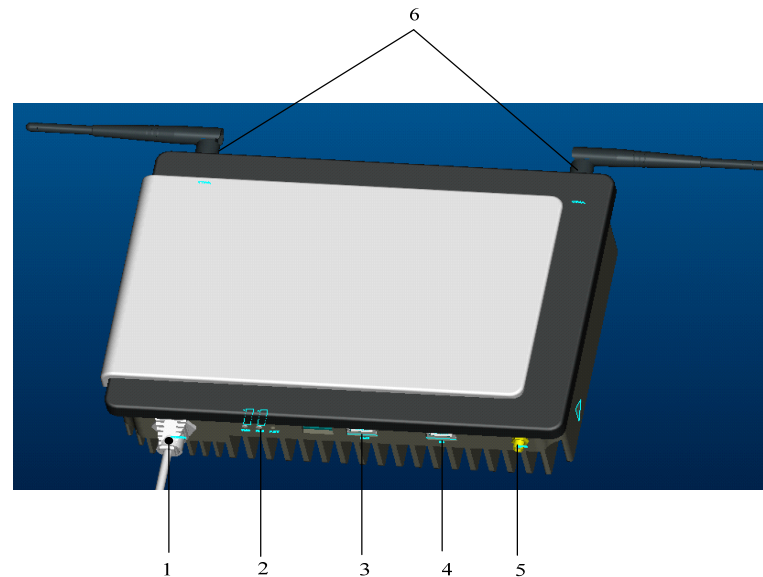
Forward traffic: The forward traffic from the core network sends IP packets to the ZXMBW E9200. After decrypting and unpacking these IP packets, the ZXMBW E9200 CPU control unit transmits them to the baseband processing unit for encoding and modulation. The modulated signals are sent to the RF processing unit for up conversion. After being processed for power amplification, these signals are transmitted through the antenna to user terminals.

Reverse traffic: the antenna of the ZXMBW E9200 receives the signals from user terminals. The RF processing unit performs down conversion for these signals and then sends them to the baseband processing unit for channel demodulation. Afterwards, the CPU control unit converts these signals into IP packets and encrypts them, and then sends them to the core network through the transmission network.

ZXMBW E9200 External Interfaces

Figure 4 shows the external interfaces of ZXMBW E9200.

FIGURE 4 ZXMBW E9200 EXTERNAL INTERFACES



1. Power interface 2. Indicators and Reset 3. NM interface
4. R6 interface 5. GPS interface 6. RF interfaces

Interfaces Description Table 4 lists the ZXMBW E9200 external interfaces and their descriptions.

TABLE 4 EXTERNAL INTERFACES AND DESCRIPTIONS

Interface	Description
Power interface	110V/220V AC power input interface
Indicators	The power indicator indicates whether the system is powered on normally.
	The system operation indicator indicates whether the system runs normally.
Reset	Resets the cabinet
NM interface	It is an Ethernet interface, serving to connect the local network management LMT.
R6 interface	It is an Ethernet interface, serving to connect an

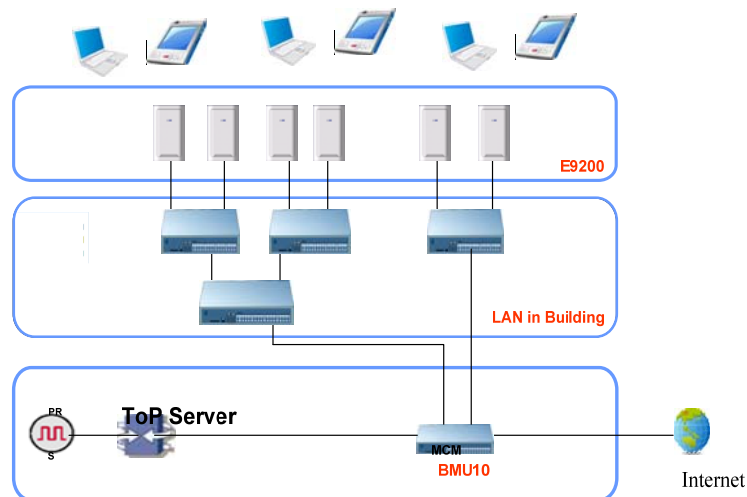
Interface	Description
	AGW or a BMU10.
GPS interface	It is an SMA interface, serving to connect a GPS receiver.
RF interfaces	They are SMA interfaces, serving to connect the two braid-like antennas that the ZXMBW E9200 is equipped or external antennas.

ZXMBW E9200 Application and Networking Scenario

As an indoor product, the ZXMBW E9200 is often used in two scenarios.

1. ZXMBW E9200 is applied for indoor or hot spot coverage, for example, airport and conference center. This scenario requires large capacity and extensive coverage. More than one ZXMBW E9200s are required. Figure 5 shows the networking structure.

FIGURE 5 ZXMBW E9200 EXTERNAL INTERFACES



The networking features are as follows:

- Only the BMU10 is configured with the GPS receiver that is provided for the E9200 in the ToP (Timing Over Packet) mode.
- Generally the BMU10 and E9200 are in the same building or same campus.
- The number of cascading levels between BMU10 and E9200 must be 5 at most.

- Switchover between E9200s is supported.

Note: The Building Manage Unit (BMU10) is the central access point of the indoor coverage system, delivering the functions including access, charging, QoS and security management of WiMAX AGW. BMU10 centralize the management of traffic convergence and NM, and provides synchronization clock.

- ZXMBW E9200 is applied for small indoor coverage, for example, café. The networking features are as follows:
 - Only one E9200 is needed and no BMU10 is required.
 - The E9200 is configured with a GPS receiver that provides the reference clock.

Technical Indices

ZXMBW E9200 technical indices cover engineering index, performance index and clock index.

Engineering Index

Table 5 lists the ZXMBW E9200 engineering index and their description.

TABLE 5 ZXMBW E9200 ENGINEERING INDEX

Index	Description
Working environment	Indoor: -5 ⁰ C ~50 ⁰ C (23 ⁰ F ~122 ⁰ F) Relative humidity: 5%-95%
External dimension (W × H × D)	260 mm (10 4/16 in) × 200 mm (7 14/16 in) × 65 mm (2 9/16 in)
Weight	< 3.6kg , <7.9 lb
Power supply	110V/220V AC input. Input range: 85~260VAC, 50/60Hz
Overall power consumption	< 45W
Protection level	Indoor: IP31
Shell material	The shell of the E9200 is made of plastics, featuring lightweight and handsome appearance.

Performance Index

Table 6 lists the ZXMBW E9200 performance index and their description.

TABLE 6 ZXMBW E9200 PERFORMANCE INDEX

Index	Description
Overall noise	It satisfies the ETS 300 753 standard.
Clock synchronization	It supports GPS clock and ToP clock synchronization.

Index		Description
RF	Frequency band range	It supports the band range from 2496MHz to 2690MHz.
	Carrier bandwidth	10MHz (configurable)
	RF grid	250KHz
	Noise coefficient	< 6
Duplex mode	FDD/TDD	It supports TDD.
System indexes	Carrier sector	1CS
	MIMO	It supports 2 x 2 MIMO.
	Output power of antenna port	2×500mW
Modulation mode		QPSK,16QAM,64QAM
Demand for antenna		omni-directional or directional
R6 interface		It supports 10M /100M Ethernet electrical interfaces.
Maintenance		It supports remote upgrading.
		It supports local OMC and Debug interfaces.
Environmental protection		It meets the <i>Restriction of Injurious Materials in Electric and Electronic Devices</i> of European Union ROHS and WEEE regulations.
Air cooling		Self-cooling and no fan available.
Followed standards		IEEE 802.16-2005; WiMAX Forum™ Mobile Radio Conformance Tests
Lightning protection		It supports level D internal lightning protection power.
Installation mode		Indoor: wall-mounted and pole-held
Authentication		It meets the FCC and UL authentications.
		It meets the CE authentication.

Clock Index

- GPS clock

The precision of the system output clock PP1S is not less than 1E-10 when the GPS is locked. It is not less than 5E-10 during free oscillation.

- ToP clock

The ToP over Ethernet clock allows master/slave configuration. The duration when the slave clock is locked to

the master clock is shorter than 10min. The phase difference between the master and slave PP1Ss is less than $\pm 5\mu\text{s}$ and jittering is less than 20ns.

Standards

The ZXMBW-E9200 complies with the following standards:

- IEEE Standard 802.16-2005, Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems.
- WiMAX Forum™ Mobile Radio Conformance Tests (MRCT).
- WiMAX Forum™ Mobile Protocol Implementation Conformance Statement (PICS).
- WiMAX Forum™ Mobile System Profile
- IEEE1588 Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems.

In addition, the ZXMBW-E9200 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- The ZXMBW-E9200 may not cause harmful interference.
- The ZXMBW-E9200 must accept any interference received, including interference that may cause undesired operation.

Interface Description

The ZXMBW E9200 supports R1 interface, R6 interface and R8 interface. Hereafter gives the detailed description of these interfaces.

ASN Network Reference Model

Figure 6 illustrates the ASN network reference model developed by the WiMAX (Worldwide Interoperability for Microwave Access) NWG (NetWork Group).

FIGURE 6 ASN NETWORK REFERENCE MODEL

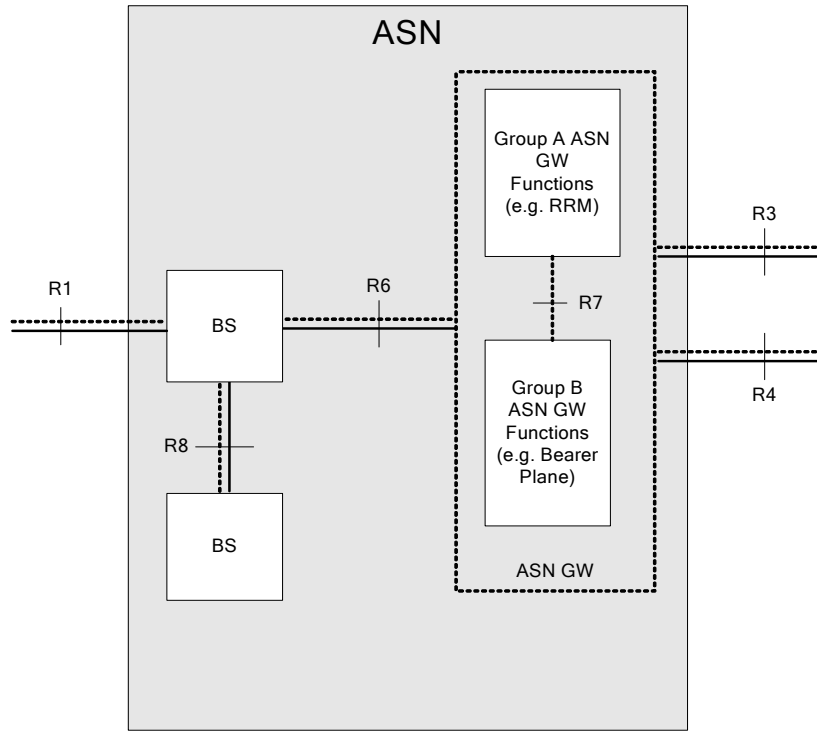


Table 7 lists the ASN interfaces and their description.

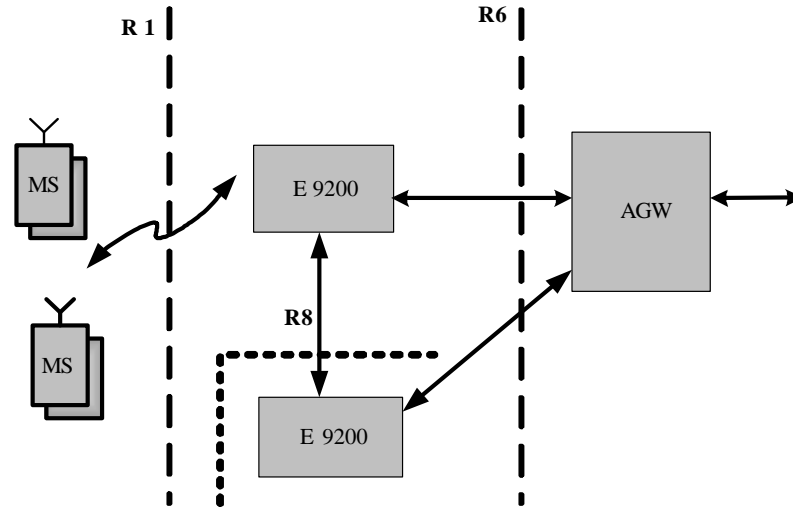
TABLE 7 ASN INTERFACES

Interface	Description
R1	Air interface between the user terminal and the RRU.
R3	Interface between the AGW (ASN-GW, Access Service Network Gate Way) and the CN.
R4	Interface between ASNs, i.e. the interface between AGWs. It implements some switching-related signaling and established data channel to maintain data integrity during switching.
R6	Interface between the AGW and the BS.
R7	Internal interface of the AGW. It is optional. It divides the AGW into strategy judgment function and implementing function.
R8	Interface between BSs.

ZXMBW E9200 Interfaces

Overview The ZXMBW E9200 reference network is illustrated in Figure 7.

FIGURE 7 ZXMBW E9200 NETWORK REFERENCE MODEL



Interfaces and description

- R1 interface

R1 interface is the air interface between the BS and the MS, including MAC layer, physical layer and relevant management plane. It complies with the 802.16e protocol.
- R6 interface

R6 interface is between the BS and the AGW. It includes:

 - ▶ Data plane

Data plane is the IP tunnel between the AGW and the BS, used to differentiate traffic flows required by different Quality of Service (QoS).
 - ▶ Control plane

Control plane delivers tunnel management, Authentication, Authorization, Accounting (AAA) and Radio Resource Management (RRM).
- R8 interface

R8 interface is between BSs to deliver quick and seamless switch-over.

R1 Interface Description

The following describes the R1 interface, including R1 message format, protocol stack and physical layer.

R1 Message Format Table 8 describes the MAC management message format of the R1 interface.

TABLE 8 R1 MESSAGE FORMAT

Content	Description
Message Type	The first field of every management message is Message Type. To know the value of this field, see the content of MAC management message in the protocol.
Non-TLV field	This field is sequenced strictly according to the definition of message format. The corresponding values of various fields are sorted strictly according to the sequence defined by the message format.
TLV field	This field is a triple field, i.e. type-length-value. The message sorts the triple of such field according to the actual situation.

Protocol Stack The R1 interface contains MAC layer and physical layer.

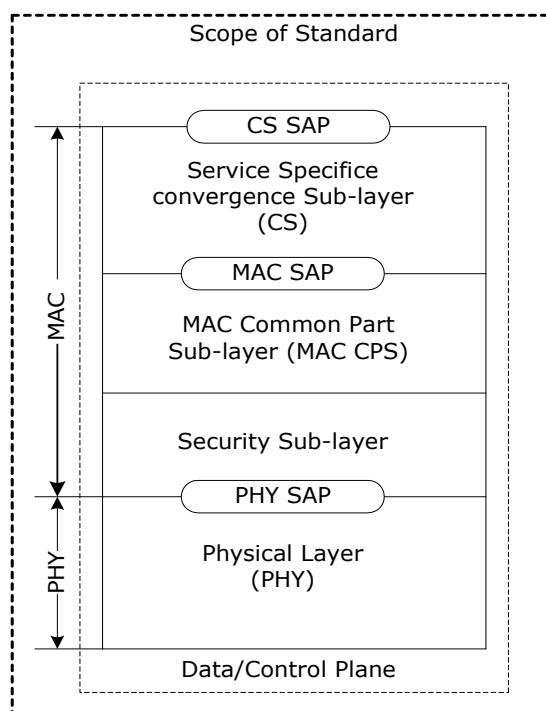
The MAC layer includes three sub-layers, that is, service-specific Convergence Sub-layer (CS), MAC Common Part Sub-layer (MAC CPS) and security sub-layer in the top-down sequence.

- The CS sub-layer converts/maps the external data received by CS-SAP into MAC SDU and transmits the data to MAC CPS through MAC SAP. The sub-layer classifies external Service Data Units (SDUs) and associates them with proper SFIDs and CIDs. It supports the payload head compression function and provides various service-specific convergence sub-layer specifications for different external protocol interfaces.
- The MAC CPS sub-layer does not resolve the payload at the CS sub-layer. The MAC CPS sub-layer delivers the core functions of the MAC layer, including bandwidth request, connection setup and maintenance. It receives data of various CS sub-layers through the MAC SAP and classifies these data by different MAC connections. Its QoS is applied to transmission and schedule above the physical layer.
- The MAC layer contains an independent security sub-layer that serves for authentication, safe key exchange and encryption.

The physical layer is defined by multiple specifications, each of which corresponds to a specific frequency range and application.

Figure 8 illustrates the R1 interface protocol stack.

FIGURE 8 R1 INTERFACE PROTOCOL STACK



Physical Layer The R1 interface physical layer adopts Orthogonal Frequency Division Multiplexing (OFDM) mode.

R6 Interface Description

This following describes the R6 interface including signaling transmission mode and message format of the control plane.

Signaling Transmission Mode The signaling between the BS and the ASN-GW is transmitted through the R6 tunnel in the format of User Datagram Protocol (UDP) plus the signaling format defined by NWG stage 3. The media plane data is over the encapsulation tunnel protocol, in which the UDP bears R6 signaling. Generic Routing Encapsulation (GRE), Multiple Protocol Label Switching (MPLS) and Virtual Local Area Network (VLAN) can be the bearer of R6 data.

The ASN-GW terminates the R6 tunnel from the BS. Various encapsulation technologies such as GRE, MPLS and VLAN can be adopted to implement the R6 tunnel. Different tunnel granularities are allowable. The R6 data path supports encapsulation protocol and tunnel granularity negotiation.

Control Plane Message Format Figure 9 illustrates control plane message format of R6 interface.

Field	Description
TLVs	A triplet following the message head.

Figure 10 illustrates the detailed format of the flag field.

FIGURE 10 FLAG FIELDS FORMAT

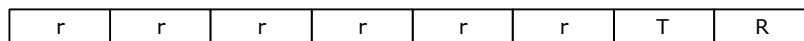


Table 10 Flag Fields and Description lists the flag fields and their description.

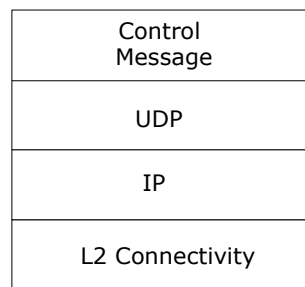
TABLE 10 FLAG FIELDS AND DESCRIPTION

Bit	Description
r	Reserved bit that must be set to 0. The receiver should ignore the reserved bit.
T	If this bit is configured, the message should contain Source Identifier TLV and Destination Identifier TLV.
R	Used to reset the next expected Transaction ID.

Control Plane Protocol Stack

Figure 11 illustrates the structure control plane protocol stack.

FIGURE 11 CONTROL PLANE PROTOCOL STACK



A logical connectivity between L2 of two control plane protocol stack enables communications between the two functional entities. The encapsulation of IP packets between the two functional entities relies on the connectivity type, e.g. GRE tunnel. The seal of the encapsulated packet contains address information, which ensures that the packet can be sent to the correct physical entity.

Physical Layer

The physical layer of the R6 interface supports packet access and Time Division Multiplexing (TDM) access.

- Packet access: 100MBps FE electrical port
- TDM access: E1/T1, E3/T3 electrical port, OC-3 optical port.

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Chapter 2

Hardware Description

This chapter describes:

- ZXMBW E9200 cabinet structure
- ZXMBW E9200 hardware modules
- Main antenna feeder system
- External cables

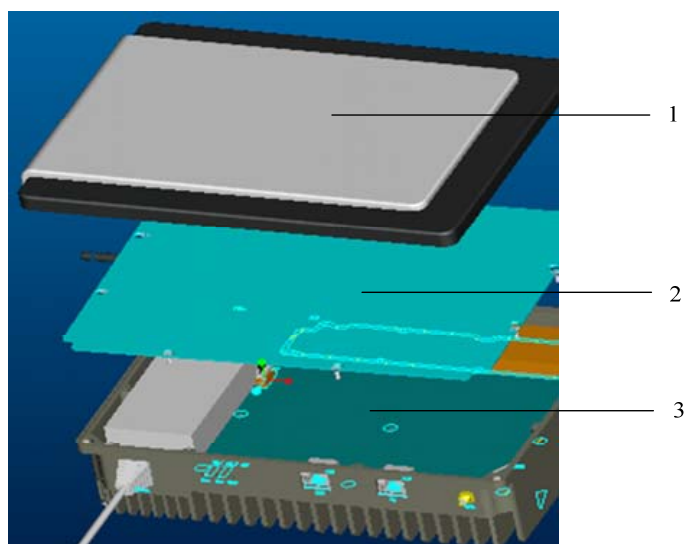
ZXMBW E9200 Cabinet Structure

The ZXMBW E9200 is composed of one cabinet, two braid-like antennas and one GPS receiver (optional) is shown in Figure 2.

The ZXMBW E9200 cabinet comprises a top, a shield cover plate and a bottom shell.

Figure 12 shows the structure of ZXMBW E9200 cabinet.

FIGURE 12 ZXMBW E9200 CABINET STRUCTURE



1. Top
2. Shield cover plate
3. Bottom shell

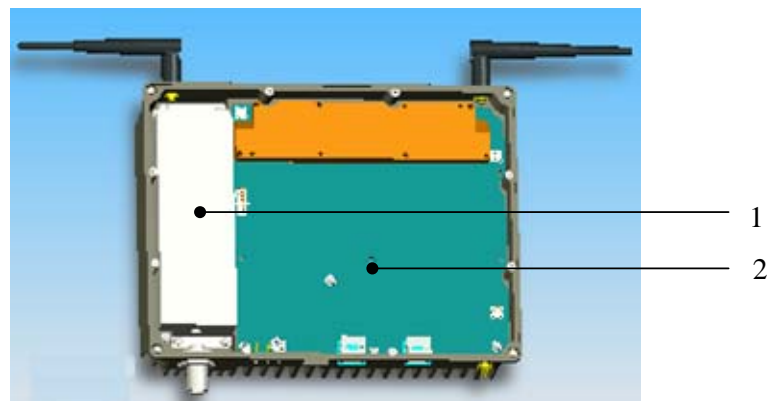
Caution: Do not open the ZXMBW E9200 cabinet. Contact ZTE engineers to open it for maintenance.

ZXMBW E9200 Hardware Modules

The ZXMBW E9200 is composed of one cabinet, two braid-like antennas and one GPS receiver (optional) is shown in Figure 2.

The ZXMBW E9200 bottom shell contains two functional modules, power module and PICO RF Baseband Module (PRBMO), as shown in Figure 13.

FIGURE 13 ZXMBW E9200 FUNCTIONAL MODULES

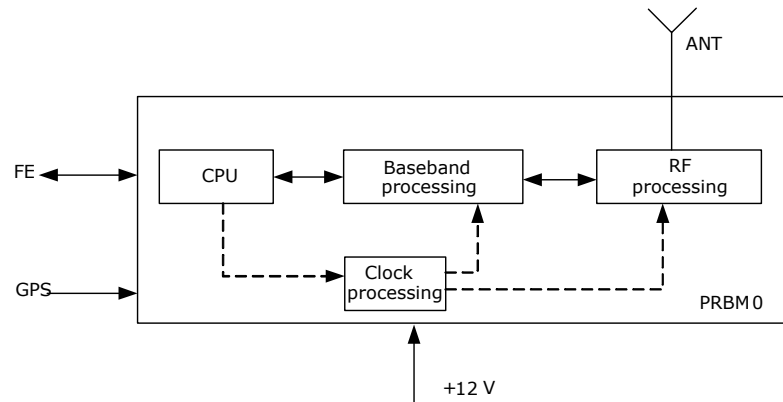


1. Power module 2. PRBMO Module

PRBMO Module

Overview The PRBMO module integrates RF processing, baseband processing, CPU control and clock (GPS clock and ToP clock) processing functions. Figure 14 illustrates the principle of the PRBMO module.

FIGURE 14 PRBMO MODULE PRINCIPLE



- CPU Unit**
- Controls the system, generates and encrypts IP packets.
 - Interfaces with the baseband process unit.
 - Provides a service network interface.
 - Provides an Ethernet interface for the local operation and maintenance LMT.

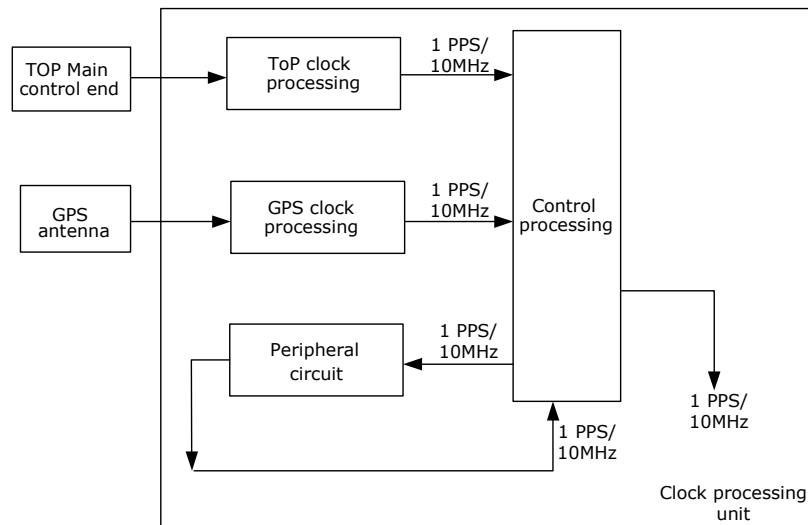
- Baseband Processing Unit**
- Processes the WiMAX PHY layer and MAC layer.
 - Encrypts and decrypts signals.

- RF Processing Unit**
- Performs transmission signal processing includes digital baseband signal processing, D/A conversion, analog baseband/intermediate frequency signal processing, and modulation from analog baseband/intermediate frequency signals to RF/RF signals.
 - Performs received signal processing includes RF signal processing, modulation from RF signals to analog baseband/intermediate frequency signals, analog baseband/intermediate frequency signal processing, analog baseband/intermediate frequency A/D conversion and digital baseband/intermediate frequency signal processing.
 - Generates and monitors local oscillator.
 - Processes RF antenna and power supply.

Clock Processing Unit The clock process unit is a timing & frequency subsystem, provides PP1S and 10MHz timing reference and frequency reference signals for the baseband and RF subsystem.

The ZXMBW E9200 clock process unit consists GPS clock process subunit, ToP clock process subunit, control process subunit and peripheral circuit process subunit, as shown in Figure 15.

FIGURE 15 CLOCK PROCESSING UNIT



- GPS clock processing procedure

The control subunit and the peripheral circuit subunit performs locking, phase discrimination and voltage control for PP1S signals that are received from the GPS receiver, and outputs PP1S and 10MHz reference signals.
- ToP clock processing procedure

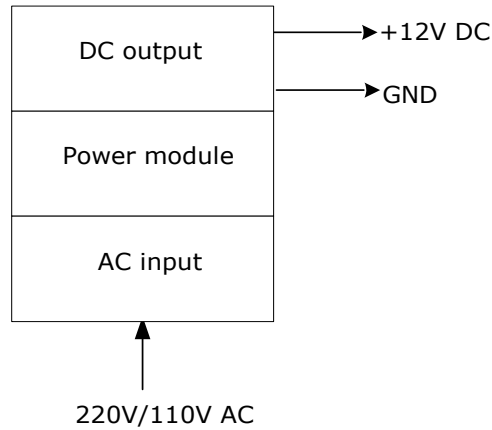
The ZXMBW E9200 receives PTP time packets from ToP Master that is synchronized to GPS PP1S, through the Ethernet cable. The ZXMBW E9200 generates local clock that is synchronous with ToP Master.

The control subunit and the peripheral circuit subunit performs locking, phase discrimination and voltage control for signals input by the ToP clock process subunit and outputs PP1S and 10MHz reference signals.

Power Module

Overview The ZXMBW E9200 power supply module performs AC-DC conversion. Figure 16 illustrates the composition of the ZXMBW E9200 power supply module.

FIGURE 16 POWER SUPPLY MODULE



Specifications Input: 110V/220V AC (range: 85V~265V, 45~65Hz)

Output: single-circuit output +12V

Protection functions: over/under voltage protection of output current, over voltage, over current, short circuit and over temperature protection of input current.

Protective self-recovery function (except for over voltage of output current).

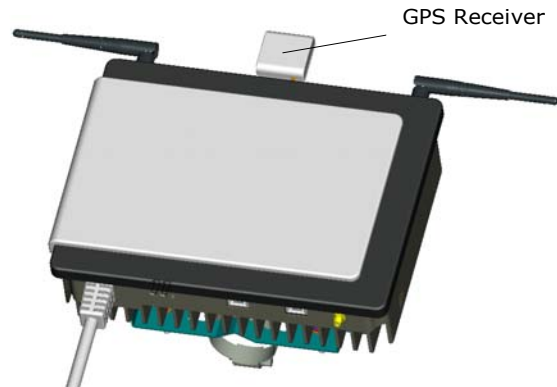
GPS Antenna

ZXMBW E9200 is equipped with the GPS receiver antenna. ZXMBW E9200 can also be installed with the outdoor GPS antenna.

The GPS antenna shipped with the ZXMBW E9200 is installed on the top of the cabinet, as shown in

Figure 17.

FIGURE 17 GPS ANTENNA INSTALLATION POSITION

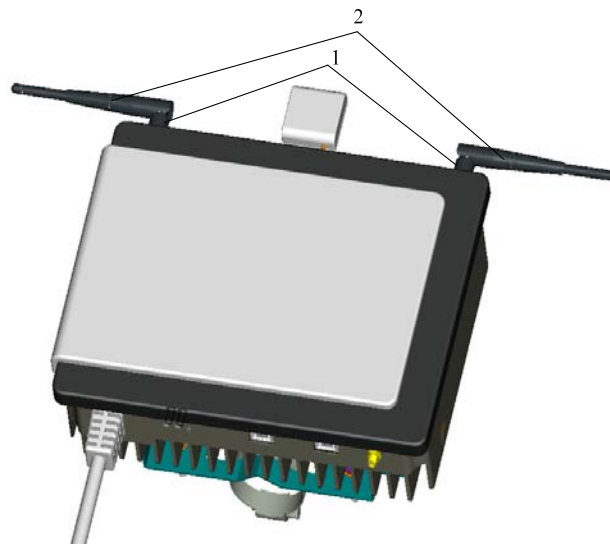


Note: User can change the direction of GPS antenna receiver.

Main Antenna Feeder System

The ZXMBW E9200 is equipped with two braid-like antennas. Figure 18 shows the antenna interfaces and positions of the two antennas.

FIGURE 18 MAIN ANTENNA POSITION



1. Antenna interfaces (SMA interfaces) 2. Braid-like antennas

The ZXMBW E9200 antenna is close to the cabinet because the ZXMBW E9200 is low power equipment. Generally, the two braid-like antennas can meet the requirement. They are removable. The ZXMBW E9200 provides two SMA antenna interfaces to connect the external antenna.

In the case that the external antenna feeder system is adopted, the feeder must be made on site according to the actual situation, and the common indoor ceiling antenna or wall-mounted antenna is often used as the external antenna. For details of the external antenna feeder system, refer to the relevant information of other base stations.

External Cables

The external cables of the ZXMBW E9200 are:

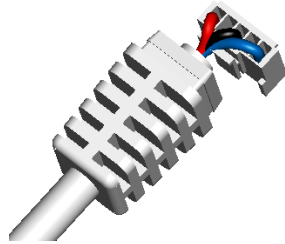
- Power cable
- Grounding cable
- Ethernet cable
- GPS RF cable.

Power Cable

The ZXMBW E9200 adopts 220 V/110 V AC power.

The wall-through 3-core power cable serves as the ZXMBW E9200 AC power cable. Figure 19 shows the appearance of the power cable.

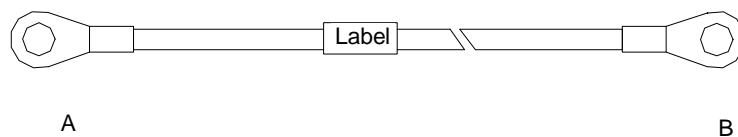
FIGURE 19 AC POWER CABLE APPEARANCE



Grounding Cable

Figure 20 illustrates the structure of the grounding cable.

FIGURE 20 GROUNDING CABLE STRUCTURE

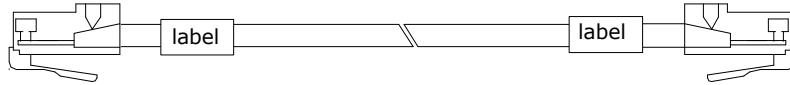


The grounding cable is made of 16mm² (6 AWG) olivine copper cable, with two bare round metal terminals (also called lug) crimped at both ends of the cable.

Ethernet Cable

The ZXMBW E9200 is connected with the AGW and the LMT by Ethernet cables. Figure 21 illustrates the structure of Ethernet cable.

FIGURE 21 ETHERNET CABLE STRUCTURE

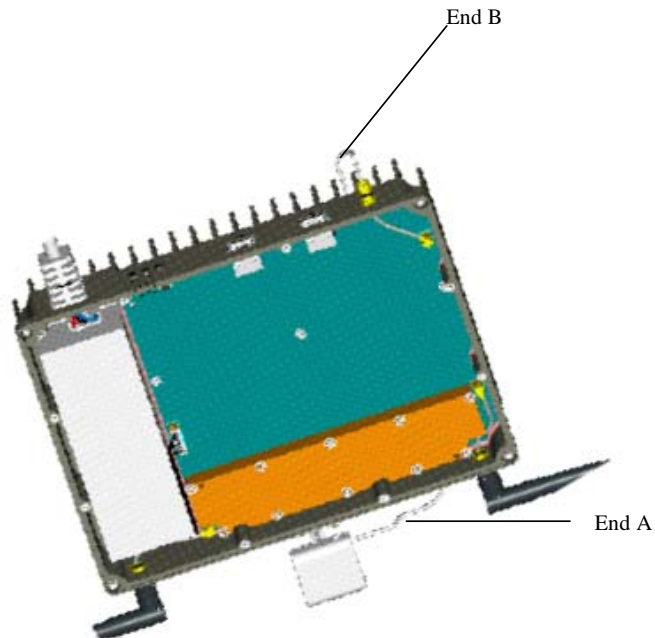


GPS RF Cable

The ZXMBW E9200 GPS receiver is shipped with a GPS RF cable. Figure 22 shows the connection points of GPS RF cable.

End A of the cable connects the GPS receiver while end B connects the GPS interface on the ZXMBW E9200 cabinet. End B is an SMA interface.

FIGURE 22 GPS RF CABLE



Chapter 3

Hardware Installation

This chapter describes:

- Installation components
- Installation flow
- Installation precautions
- Installation preparation
- Cabinet installation
- External cables installation
- GPS antenna feeder system installation
- Main antenna feeder system installation
- Hardware installation check
- Power-on and Power-off test

Installation Components

- The ZXMBW E9200 cabinet includes fixing clips and enclosure.

Note: The internal cables and functional modules are installed before delivery.

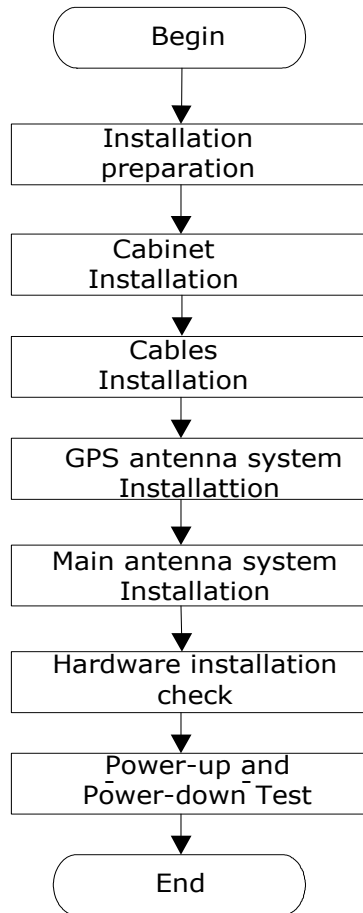
- Cables: power cable, grounding cable, Ethernet cable and GPS RF cable
- GPS antenna feeder system: optional. The system needs to be installed when GPS is used to provide time reference. GPS antenna need not be installed when ToP clock reference is used.
- Main antenna feeder system includes antenna and main feeder.

Installation Flow

Figure 23 illustrates the general installation flow of ZXMBW E9200.

Note: The on-site installation flow may differ depending on the actual situation.

FIGURE 23 ZXMBW E9200 INSTALLATION FLOW



Installation Precautions

The installation engineer should check the working environment before starting the installation. The installation engineer must be familiar with the installation position, networking, data configuration and cables of ZXMBW E9200.

Besides, pay attention to the following:

- Operations on the ZXMBW E9200 are forbidden if the cabinet is powered on.
- Installing the outdoor antenna feeder system is forbidden during rainy and lightning situations.

Installation Preparation

Check the installation environment, installation position, temperature, humidity and power supply before installing the ZXMBW E9200.

Checking Installation Environment

Check the installation environment according to the requirements of *ZTE Environment Acceptance Report* before the installation.

Checking Installation Position

Check whether the installation position of ZXMBW E9200 meets the engineering requirements are as given below.

- The ZXMBW E9200 installation position must be clean, and away from the places of injurious gases or explosive articles.
- The ZXMBW E9200 must be away from the places with strong shocks or loud noise.
- The ZXMBW E9200 is away from transformer substations.
- The ZXMBW E9200 away from industrial boilers and heating boilers and contamination resources.
- The ZXMBW E9200 away from high power wireless interfering resources.

Checking Temperature and Humidity

Check whether the working temperature and humidity of ZXMBW E9200 meets the requirements as described in Table 11.

TABLE 11 ZXMBW E9200 WORKING TEMPERATURE AND HUMIDITY

Name	Working condition
Temperature	Indoor: -5 ⁰ C ~50 ⁰ C (23 ⁰ F ~122 ⁰ F)
Humidity	Relative humidity: 5%-95%

Checking Power Supply

Check whether the power supply of ZXMBW E9200 meets the requirement as described in Table 12.

TABLE 12 ZXMBW E9200 POWER SUPPLY REQUIREMENT

Type	Nominal value	Voltage range
AC	110 V /220V AC	85 V AC~265V AC, 50/60Hz

Checking Grounding Mode

The ZXMBW E9200 applies the joint grounding mode. The grounding resistance must be less than 5 Ω .

Other Checks

- Make sure that accessories or parts (e.g. antenna pole, grounding copper bus-bar) are in accordance with the ZXMBW E9200 engineering design.
- Make sure that interconnection devices such as AGW, and power supply are available.

Tools and Instruments Preparation

Prepare installation tools and test instruments according to the actual situation. Table 13 and Table 14 list the common tools and instruments.

TABLE 13 TOOLS LIST

Type	Tool
Special-purpose tools	Knife for cutting feeder ends Wire stripper for coaxial cables One crimping pliers for coaxial cables Multi-functional crimping pliers
Concrete drilling tools	Electric percussion drill Auxiliary bits Vacuum cleaner Power socket (two-phase and three-phase socket)

Type	Tool
General-purpose tools	Cross screwdrivers (4", 6" and 8" each) Flathead screwdrivers (4", 6" and 8" each) Monkey wrenches (6", 8", 10" and 12") Dual-purpose spanners (17" and 19" each) Socket wrench 5 kg (11 lb) nail hammer Electric iron, 300 W Electric iron, 40 W Solder wires Hot wind blower Tin sucker Tweezers Paint brush Electrical knife Paper knife Scissors
Measurement tools	50 m (164 ft) cloth tape 5 m (16.4 ft) copper tape 400 mm (15.6 in) horizontal ruler Angle instrument Plumb
Protection tools	Antistatic wrist strap Safety helmet Slip-proof glove
Pliers	Hacksaw (with several saw blades) Sharp-nose pliers (8") Diagonal pliers (8") Slip joint pliers (8") Vices (8") Needle file set (medium sized) Hydraulic crimper Crowbar
Auxiliary tools	Pulley block Rope Ladder

TABLE 14 INSTRUMENTS LIST

Instrument	Manufactory
Voltage Standing Wave Ratio (VSWR) tester	SITE MASTER
Fiber tester	—
Compass	—
Multi-meter	—

Instrument	Manufactory
Grounding resistance tester	—

Unpacking Inspection

Prerequisite The project supervisor and the representative of customer must be present on site during unpacking.

The following describes the procedure for unpacking inspection ZXMBW E9200 boxes.

- Steps** Perform the following steps to unpack ZXMBW E9200.
1. Count the number of packing boxes. Check whether the packing boxes are intact and whether the actual arrival place is the correct place. If yes, unpack the goods for inspection.
 2. Check whether the goods are consistent with the goods in the Equipment Acceptance List and archive the report.
 3. If any shortage of goods, wrong goods, superfluous goods or goods damage found, note it and inform ZTE office.
 4. The project supervisor should fill Unpacking for Inspection Feedback Table and send it back to ZTE office.

Caution

- When the equipment is moved from a colder and drier place to a hotter and damper place, wait for 30 minutes before unpacking the equipment. Otherwise, moisture may condense on the surface of the equipment and cause damage.
- Properly recycle the desiccant lest.

END OF STEPS.

Acceptance and Handover

- Acceptance**
- Check the goods one by one according to the name, type and amount on the shipping list.
 - There should be no dents, bulges, scratches, peels, blithers, blisters or smudges on the outer surface of the cabinets.
 - The surface paint on the cabinets should not fall off or be scratched.
 - The fastening screws should not be loosened, disconnected, or mistakenly placed.
 - The accessories and fittings needed for cabinet installation should be complete.
 - Arrange the checked goods by type.

Handover Upon completion of unpacking for acceptance, the representative of user and the project supervisor sign on the Unpacking Acceptance Report to acknowledge the acceptance. If goods are to be kept by the user after acceptance, both parties sign on the Unpacking Acceptance Report for confirmation, and then goods will be handed over to the user.

Note: Both parties must hold a copy of Unpacking Acceptance Report and the project supervisor should give feed back for the Acceptance Conclusion of this report to ZTE office for archiving within seven days.

Cabinet Installation

The following introduces ZXMBW E9220 cabinet installation, and installation modes such as wall-mount installation and pole-mount installation.

ZXMBW E9200 Cabinet Installation Introduction

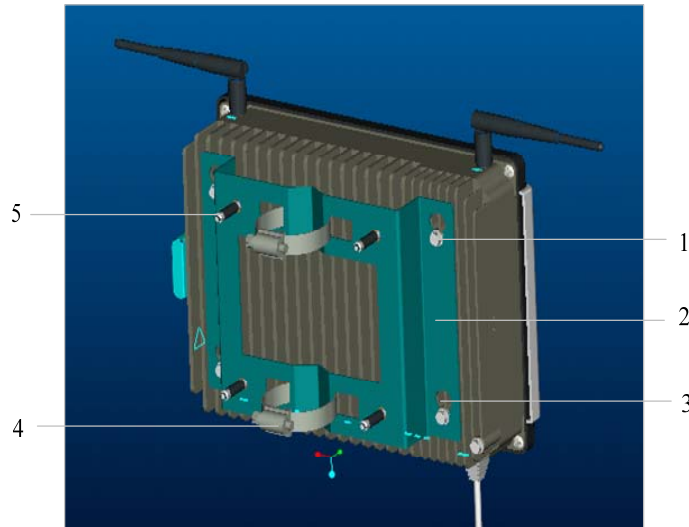
Installation Modes The ZXMBW E9200 cabinet can be installed in two modes depending on the installation environment.

The installation modes are:

- Wall-mount installation
- Pole-mount installation

Cabinet Installation Supporting Parts Figure 24 shows the installation supporting parts of ZXMBW E9200 cabinet.

FIGURE 24 ZXMBW E9200 CABINET INSTALLATION PARTS



- | | |
|--------------------|---|
| 1. Hex flange bolt | 2. Installation plate |
| 3. Cucurbit hole | 4. Hoop (used for pole-held installation) |
| 5. Expansion bolt | |

Wall-mount Installation

The following describes the wall-mount installation procedure of ZXMBW E9200 cabinet.

Installation Accessories

The following accessories are required for wall-mount installation.

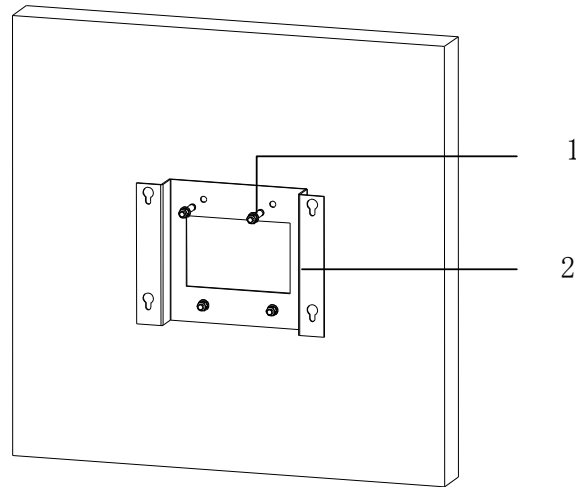
- One installation plate
- 4 expansion bolts and 4 hex flange bolts
- Fastening tools

Steps

Perform the following steps to install the cabinet as wall-mount mode.

1. Fix the installation plate on the wall using 4 expansion bolts, as shown in Figure 25.

FIGURE 25 ZXMBW E9200 CABINET INSTALLATION PARTS



1. Expansion bolt 2. Installation plate

2. Mount the cabinet on the installation plate, and insert the 4 hex flange bolts at the back of the cabinet through the larger parts of the cucurbit holes on the plate.
3. Move the inserted 4 hex flange bolts into the smaller parts of the cucurbit holes to fix the cabinet to the plate.
4. Tighten the 4 hex flange bolts

END OF STEPS.

Pole-mount Installation

The following describes the pole-mount installation procedure of ZXMBW E9200 cabinet.

Installation Accessories

The following accessories are required for pole-mount installation.

- One installation plate
- 4 expansion bolts and 4 hex flange bolts
- Hoops
- Fastening tools

Steps

Perform the following steps to install the cabinet as pole-mount mode.

1. Mount the Installation plate on the pole with using the hoops and fix it with four expansion bolts.

2. Mount the cabinet on the installation plate, and insert the 4 hex flange bolts at the back of the cabinet through the larger parts of the cucurbit holes on the plate.
3. Move the inserted 4 hex flange bolts into the smaller parts of the cucurbit holes to fix the cabinet to the plate.
4. Tighten the 4 hex flange bolts.

Note: The diameter of the pole should be within the range of 30 mm (1 3/16 in) to 60 mm (2 6/16 in).

END OF STEPS.

External Cables Installation

The external cable installation includes:

- Grounding cable installation
- Ethernet cable installation
- Power cable installation
- GPS RF cable installation

Grounding Cable Installation

The following describes prerequisites and procedure of grounding cable installation.

Prerequisites The connection point for the indoor grounding copper bus-bar is available.

Prepare a length-proper grounding cable according to the actual situation. Use a 16mm² (6 AWG) olivine copper cable to make the grounding cable.

Crimp a bare round metal terminal (also called lug) at both ends of the cable respectively.

Steps Perform the following steps to install the grounding cable.

1. Connect one bare terminal of the grounding cable to the protective grounding terminal that is located at the M5 bolt of the power cable interface on the ZXMBW E9200 cabinet.
2. Connect the other end of the grounding cable to the specified indoor grounding copper bus-bar.

Note: To ensure reliable connection, press the lugs of grounding cable to make the cable in good contact with the other parts.

END OF STEPS.

Ethernet Cable Installation

The following describes prerequisite and procedure of Ethernet cable installation.

Prerequisite Prepare a length-proper Ethernet cable and make RJ45 connectors at the both ends of the cable before the installation.

Steps Perform the following steps to install the Ethernet cable.

1. Connect one end of the Ethernet cable to the Ethernet interface on the ZXMBW E9200 plane.
2. Connect the other end to the Ethernet interface of the network equipment.

END OF STEPS.

Power Cable Installation

The following describes installation procedure of power cable.

Note: The wall-through connector of the power cable is connected to the ZXMBW E9200 cabinet before delivery.

Insert the other end to the GPS interface on the ZXMBW E9200 cabinet.

GPS RF Cable Installation

The following describes installation procedure of GPS RF cable.

Note: One end of the GPS RF cable is fixed on the shell of the GPS receiver before ZXMBW E9200 delivery.

Insert the other end to the GPS interface on the ZXMBW E9200 cabinet.

GPS Antenna Feeder System Installation

The GPS antenna feeder system includes GPS receiver and GPS RF cable.

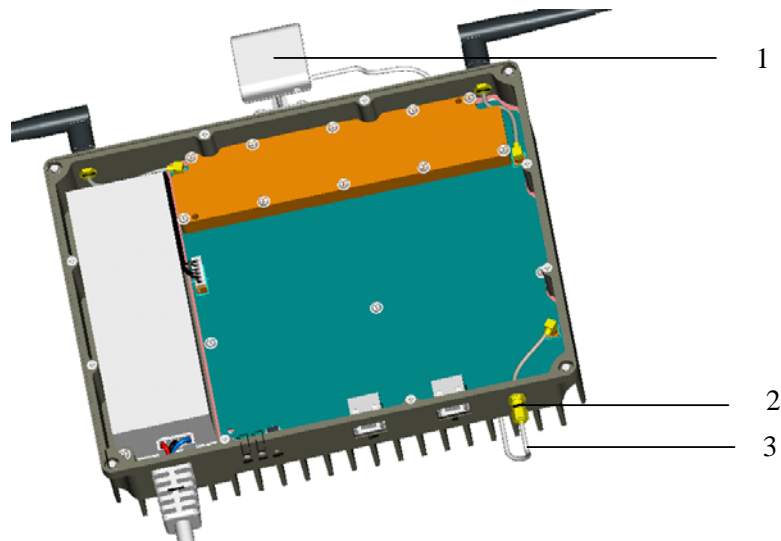
The following describes the installation procedure of GPS antenna feeder system.

Steps Perform the following steps to install GPS antenna feeder system.

1. Fix the GPS receiver on the top of the cabinet.
2. Connect the GPS RF cable to the SMA connector of the GPS interface.

Figure 26 shows the installed GPS antenna feeder system.

FIGURE 26 GPS ANTENNA FEEDER SYSTEM INSTALLATION



1. GPS receiver 2. GPS interface 3. GPS RF cable

END OF STEPS.

Main Antenna Feeder System Installation

The ZXMBW E9200 provides external SMA antenna interfaces. Generally two braid-like antennas are to be installed before ZXMBW E9200 delivery.

To install an external antenna feeder system, perform the following steps.

- Steps**
1. Remove the two braid-like antenna from cabinet.
 2. Install the external antenna jumper or antenna feeder.

END OF STEP.

For details, refer to the relevant information of other base stations.

Hardware Installation Check

This section describes the over all check on the installed cabinet, cables and running environment.

Cabinet Installation Check

The following describes the checking procedure of installed cabinet.

- Steps**
- Perform the following steps to check the installed cabinet.
1. Check whether the cabinet is installed in the right position that is complies with the design drawing.
 2. Check whether the cabinet is fixedly installed and able to resist level 7 earthquakes.
 3. Confirm the horizontal and vertical deviations of the cabinet are less than 3 mm (2/16 in).
 4. Check whether the overall equipment is clean and painted well. The parts on the cabinets are intact and well installed. The labels on the cabinet are correct, clear and complete.
 5. Make sure all screws are tightened with flat washers and spring washers placed correctly.

END OF STEPS.

Cable Installation Check

The following describes the checking procedure of installed cables includes Ethernet cable and GPS RF cable.

- Steps** Perform the following steps to check the installed cabinet.
1. Check whether the cables are laid flat and straight without any apparent fluctuation, crossing or jump-wire in air.
 2. Check whether the bends of the cable are smooth.
 3. Check whether both ends of each cable are clearly labeled and marked with its usage. The labels on both ends of a cable should have the same contents.
 4. Check the joint parts are firmly and correctly connected and in good contact without breaking or bending.

END OF STEPS.

Power and Grounding Cable Installation Check

The following describes the checking procedure of installed cables includes power cable and grounding cable.

- Steps** Perform the following steps to check the installed cabinet.
1. Check whether the power cable and the grounding cable are laid away from other cables. They must be horizontally 200 mm (7 14/16 in) away from the signal cable upon parallel laying.
 2. Check whether the power cable and the grounding cable are whole material without connector is in middle.
 3. Confirm that each grounding point on the grounding copper bus-bar only connected with one device.
 4. Confirm the power cable and grounding cable redundant in length is cut and there is no winding.
 5. Make sure that the copper lugs on both ends of the power cable and the grounding cable are soldered or pressed firmly.
 6. Make sure that the grounding path is short as possible.
 7. Check whether the bare wires at the connecting terminals and lug handle are tightly wrapped with the insulating tape or the heat-shrink tube instead of being exposed

END OF STEPS.

Running Environment Check

Engineering wastes must be cleaned. After the installation is finished, the work site should be recovered to what it was, without any cable strap, stub, waste paper box, waste cable or waste plastic bag. The whole site must be clean and tidy.

Other Environment Check

During the installation, record the relevant information according to the base station information table in the installation acceptance report.

Power-on and Power-off Test

This section describes the Power-on and Power-off procedures at first time.

Power-On Procedure

The following describes prerequisites and procedure of power-on ZXMBW E9200 equipment.

- Prerequisites**
- The voltage of the power supply meets the requirement of the ZXMBW E9200
 - The cabinet power and the grounding cable are correctly connected.
 - The cabinet power plug is disconnected from the power socket.
- Steps**
1. The ZXMBW E9200 cabinet has no power switch. Enable the external power switch to power on the cabinet.
 2. If any exception occurs during the power-on, disconnect the switch or remove the power plug. Find out the cause.

END OF STEPS.

Power-Off Procedure

Disconnect the external power switch.

Abbreviations

Abbreviation	Full name
AGW	Access Service Network GateWay
AAA	Authentication, Authorization, Accounting
BMU	Building Manager Unit
E9200	Pico Base Station(indoor)
EMS	Element Management System
FDD	Frequency Division Duplex
HA	Home Agent
IMS	IP Multimedia Subsystem
MAC	Media Access Control
MIMO	Multiple-Input multiple-Out-put
OFDM	Orthogonal Frequency Division Multiplexing.
QoS	Quality of Service
QPSK	Quadrature Phase-Shift Keying
QAM	Quadrature Amplitude Modulation
RSSI	Receive Signal Strength Indicator
RRM	Radio Resource Management
TDD	Time Division Duplex
ToP	Timing Over Packet
WIMAX	Worldwide Interoperability for Microwave Access
WiFi	Wireless Fidelity 802.11
ZXMBW	ZTE Mobile Broadband Wireless

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