



# ZXSDR R8872A

## Macro Remote Radio Unit

### Product Description

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Hardware Version: HV1.0

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## **Revision History**

Revision No.	Revision Date	Revision Reason
R1.4	2016-12-05	Updated "4.3 Performance"
R1.3	2016-09-30	Updated "4.3 Performance"
R1.2	2016-02-23	V4.14.10.30.P30 Those topics have been modified: <ul style="list-style-type: none"><li>● Functions</li><li>● Operating Environment</li><li>● Performance</li><li>● Reliability</li></ul>
R1.1	2015-05-13	<ul style="list-style-type: none"><li>● Updated "1.1 Functions" and "1.2 Features"</li><li>● Added lightning protect unit in "2.1 Hardware Architecture"</li><li>● Updated specifications in "Chapter 4 Technical Specifications", involving "4.1 Technical Specification", "4.3 Power Supply", "4.4 Performance" and "4.5 Reliability"</li></ul>
R1.0	2014-10-21	First edition

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# About This Manual

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## Purpose

This manual provides information about the ZXSDR R8872A, including functions, features, system architecture, operation and maintenance, and technical specifications.

## Intended Audience

This manual is intended for:

- Network planning and optimization engineers
- Field designing engineers

## What Is in This Manual

This manual contains the following chapters.

Chapter 1, Overview	Describes the external view, functions, and features of the ZXSDR R8872A.
Chapter 2, System Architecture	Describes the hardware architecture and software architecture of the ZXSDR R8872A.
Chapter 3, Networking and Maintenance	Describes the baseband-RF networking modes and operation and maintenance of the ZXSDR R8872A.
Chapter 4, Technical Specifications	Describes the technical specifications of the ZXSDR R8872A.


## Related Documentation

The following documentation is related to this manual:

*ZXSDR R8872A Macro Remote Radio Unit Hardware Description*

## Conventions

This manual uses the following conventions.

	Note: provides additional information about a topic.
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# Chapter 1

# Overview

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The ZXSDR R8872A is an outdoor [RRU](#). It works with the [BBU](#) to form a distributed base station, implementing radio transmission and radio channel control in the coverage areas.

[Figure 1-1](#) shows an external view of the ZXSDR R8872A.

**Figure 1-1 External View**



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## 1.1 Functions

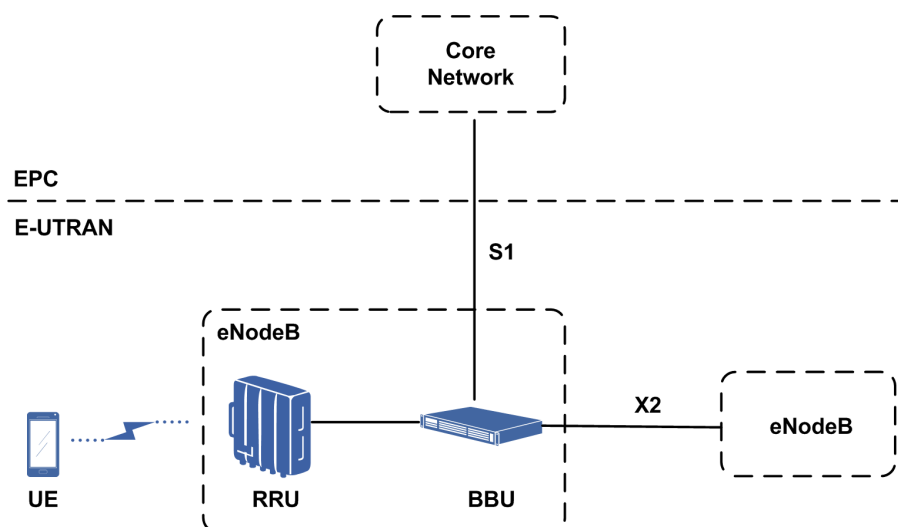
The ZXSDR R8872A provides the following functions:

- Various bandwidth configurations of 1.4/3/5/10/15/20 MHz
- Frequency band: 850/900/1800/1900 MHz
- Support 2T4R in one box which can optimize spectrum efficiency greatly and improve network uplink performance

- Uplink/downlink 64QAM modulation
- Transmission power reporting function for each carrier
- PA overload protection function
- Transmission channel switch function
- Software failure will not affect the running of connected BBU and other cascaded RRUs.

Figure 1-2 shows the position of the ZXSDR R8872A in a radio network.

**Figure 1-2 ZXSDR R8872A Position in a Radio Network**



## 1.2 Features

The ZXSDR R8872A has the following features:

- High performance

It provides a 75 MHz instantaneous bandwidth, which enables it to utilize more frequency spectrum resources. Design of 2T4R channels improves the spectrum efficiency. It provides a 2×80 W transmission power, and can be applied in urban areas with dense population.

- Convenient network construction

It supports GSM/CDMA/LTE or mixed technologies, which ensure the smooth evolution from GSM/CDMA to LTE.

- Low TCO

Advanced technologies including Doherty PA, DPD, and MCPA are applied to the power amplifiers. It also supports dynamic adaptive PA power supply based on output power, which reduces power consumption.

- Build-in lightning protect unit

It has integrated lightning protect unit whose protection level is 20 kA.



# Chapter 2

## System Architecture

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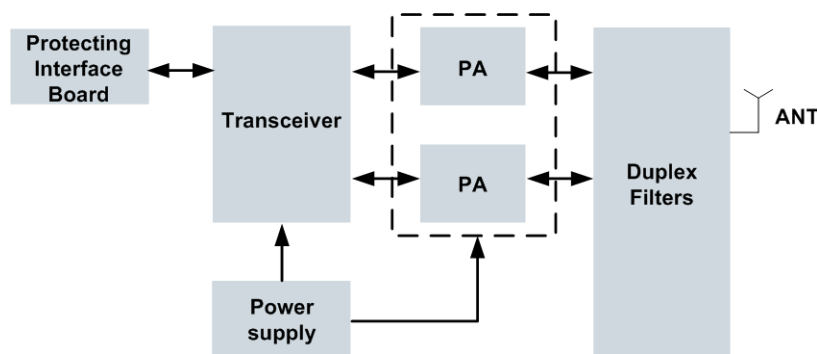
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## 2.1 Hardware Architecture

The ZXSDR R8872A contains five hardware modules, see [Figure 2-1](#).

**Figure 2-1 Hardware Architecture**

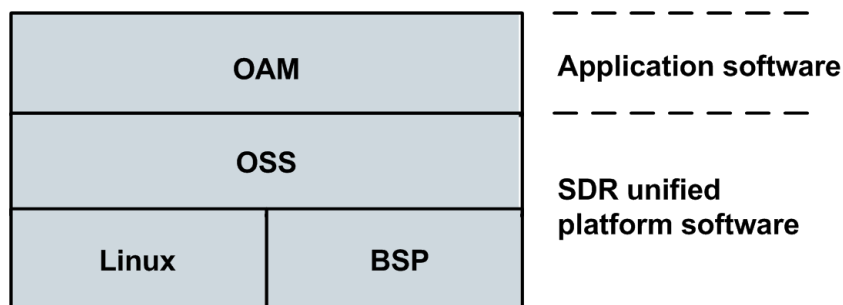


- **Transceiver**  
It implements the transmitter and receiver functions, and provides interfaces and control.
- **Duplex filters**  
It provides the functions of RF signal combination and splitting and filtering.
- **PA**  
It transmits and amplifies two channels of RF signals. This module consists of two PAs.
- **Power supply**  
It provides the system power supply.
- **Protecting interface board**  
Integrated lightning protect unit for the AISG, RS485 and dry contacts.

## 2.2 Software Architecture

The ZXSDR R8872A software architecture is divided into two layers: SDR unified platform software and application software, see [Figure 2-2](#).

**Figure 2-2 Software Architecture**



- SDR unified platform software
  - **BSP**: It provides basic functions including hardware drivers, initialization, alarms, and monitoring. It also provides interfaces for devices to access the Linux operating system.
  - **Linux**: It is the operating system platform.
  - **OSS**: It is the support layer in the entire software architecture. It provides a hardware-independent platform for system software operation, and provides some basic software functions, including scheduling, timer, memory management, inter-module communication, sequence control, monitoring, alarms, and logs.
- Application software
  - OAM**: It provides functions including configuration, alarms, and performance measurement.

# Chapter 3

## Networking and Maintenance

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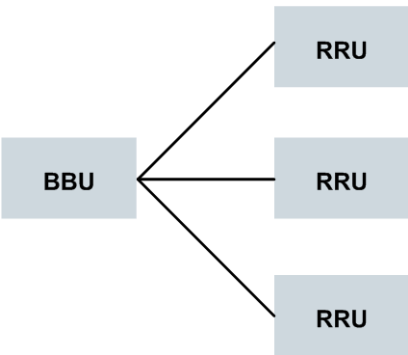
### 3.1 Baseband-RF Networking

The ZXSDR R8872A supports star and line networks with the BBU. The ZXSDR R8872A and the BBU are connected with optical fibers.

- Star network

Each RRU has a point-to-point connection with the BBU, see Figure 3-1. This network topology is reliable but occupies more transmission resources. It is applicable to densely-populated areas.

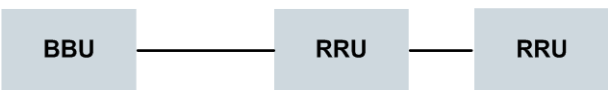
Figure 3-1 Star Network



- Line network

Multiple RRUs are connected to form a link, and then the link is connected to the BBU, see Figure 3-2. This network topology occupies less transmission resources but is less reliable than the star network topology. It is applicable to sparsely-populated areas.

Figure 3-2 Line Network

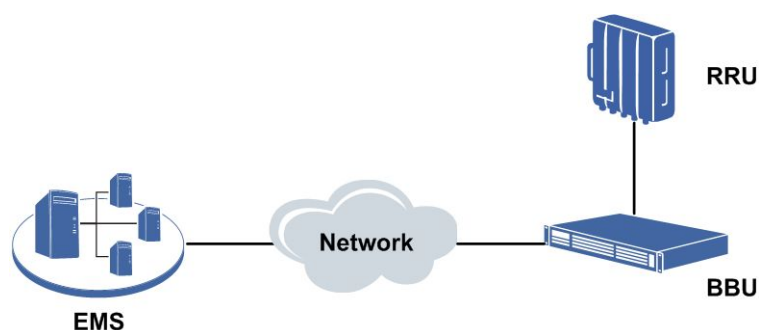


## 3.2 Operation and Maintenance

### Remote Maintenance

Remote maintenance is implemented through the EMS, which is connected to the BBU through the TCP/IP protocol, and the BBU is connected to the ZXSDR R8872A through the CPRI interface, see Figure 3-3. Multiple base stations can be maintained through one EMS.

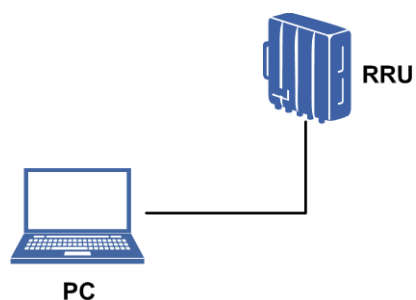
Figure 3-3 Remote Maintenance Mode



### Local Maintenance

Local maintenance is implemented through the LMT, which is installed on a PC directly connected to the ZXSDR R8872A with an Ethernet cable, see Figure 3-4. The LMT is used to maintain a single base station.

Figure 3-4 Local Maintenance Mode



# Chapter 4

## Technical Specifications

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## 4.1 Physical Specifications

For a description of the physical specifications of the ZXSDR R8872A, refer to [Table 4-1](#).

**Table 4-1 Physical Specifications**

Item	Specification
Dimensions (H × W × D)	415 mm × 352 mm × 137 mm
Weight	23 kg
Color	Silver gray

## 4.2 Operating Environment

For the operating environment requirements for the ZXSDR R8872A, refer to [Table 4-2](#).

**Table 4-2 Operating Environment Requirements**

Item	Specification
Temperature	−40 °C to +55 °C
Relative humidity	5% to 100%
Waterproof and dustproof level	IP65
Grounding	≤ 5 Ω In areas where the number of thunderstorm days per year is less than 20, the grounding resistance can be less than 10 Ω.

## 4.3 Power Supply

For the power supply requirements of the ZXSDR R8872A, refer to [Table 4-3](#).

**Table 4-3 Power Supply Requirements**

Item	Specification	
Power supply	DC: -48 V DC (-37 V DC to -60 V DC)	
Power consumption	S1800	GSM S8 x 20 W: Typical power consumption: 275 W Peak power consumption: 555 W
		GSM S2 x 2 x 20 W+LTE 2 x 40 W: Typical power consumption: 310 W Peak power consumption: 555 W
	S9000	GSM S8 x 20 W: Typical power consumption: 295 W Peak power consumption: 575 W
		LTE S2, 2 x 40 W/LTE cell: Typical power consumption: 315 W Peak power consumption: 575 W
		GSM S2 x 2 x 20 W+LTE 2 x 40 W: Typical power consumption: 365 W Peak power consumption: 575 W
	S8500(LTE 2 x 80 W)	Typical power consumption: 315 W Peak power consumption: 575 W
Lightening protection	S1900(LTE 2 x 80 W)	Typical power consumption: 290 W Peak power consumption: 560 W
	20 kA	

## 4.4 Performance

The ZXSDR R8872A supports four frequency band models:

- ZXSDR R8872A S8500: supports CDMA, LTE, GSM, and UMTS.
- ZXSDR R8872A S9000: supports GSM and LTE.
- ZXSDR R8872A S1800: supports GSM and LTE.
- ZXSDR R8872A S1900: supports GSM, UMTS, and LTE.

For the performance requirements of the ZXSDR R8872A, refer to [Table 4-4](#), [Table 4-5](#), [Table 4-6](#), and [Table 4-7](#).

**Table 4-4 ZXSDR R8872A S8500 Performance Requirements**

Item	Specification	
Operating frequency band	850 MHz ● Tx: 869–894 MHz ● Rx: 824–849 MHz	
TOC output power	2 x 80 W	
Bandwidth	LTE: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, and 20 MHz	
Receiver Sensitivity	GSM	Single antenna: –113.5 dBm Dual antennas: –115.5 dBm Four antennas: N/A
	UMTS	Single antenna: –125.8 dBm Dual antennas: –128.5 dBm Four antennas: N/A
	LTE	Single antenna: –106.4 dBm Dual antennas: –109.2 dBm Four antennas: N/A
Capacity	GSM single-mode	2 x 4 TRXs
	UMTS single-mode	2 x 2 CSs
	UMTS/LTE multi-mode	UMTS 2 x 2 CSs and LTE 1 x 10 M 2T2R Cell
	GSM/LTE multi-mode	GSM 2 x 4 TRXs and LTE 1 x 10 M 2T2R Cell
	GSM/UMTS multi-mode	GSM 2 x 4 TRXs and UMTS 2 x 2 CSs
	GSM/UMTS/LTE multi-mode	GSM 2 x 2 TRXs , UMTS 2 x 1 CSs , and LTE 1x10 MIMO 2T2R Cell
Transmission	CPRI interface, 2 x 6.144 Gbps	

**Table 4-5 ZXSDR R8872A S9000 Performance Requirements**

Item	Specification	
Operating frequency band	900 MHz ● Tx: 934–960 MHz ● Rx: 889–915 MHz	
TOC output power	2 x 80 W	
Bandwidth	LTE: 1.4 MHz, 3 MHz, 5 MHz, and 10 MHz	

Item	Specification	
Receiving sensitivity	GSM	Single antenna: –113.5 dBm Dual antennas: –115.5 dBm Four antennas: N/A
	LTE	Single antenna: –106.4 dBm Dual antennas: –109.2 dBm Four antennas: –112 dBm
Capacity	GSM single-mode	2 x 6 TRXs
	LTE single-mode	2 x 10 MHz 2T2R/2T4R Cells
	GSM/LTE multi-mode	<ul style="list-style-type: none"> <li>● GSM 2 x 4TRXs+LTE 1 x 10 MHz 2T2R/2T4R Cell</li> <li>● GSM 2 x 2TRXs+LTE 2 x 10 MHz 2T2R/2T4R Cells</li> </ul>
Transmis- sion	CPRI interface, 2 x 6.144 Gbps	

Table 4-6 ZXSDR R8872A S1800 Performance Requirements

Item	Specification	
Operating frequency band	1800 MHz <ul style="list-style-type: none"> <li>● Tx: 1805–1880 MHz</li> <li>● Rx: 1710–1785 MHz</li> </ul>	
TOC output power	2 x 80 W	
Bandwidth	LTE: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, and 20 MHz	
Receiving sensitivity	GSM	Single antenna: –113.5 dBm Dual antennas: –115.5 dBm Four antennas: N/A
	LTE	Single antenna: –106.4 dBm Dual antennas: –109.2 dBm Four antennas: –112 dBm
Capacity	GSM single-mode	2 x 6 TRXs
	LTE single-mode	2 x 20 MHz 2T2R/2T4R Cells
	GSM/LTE multi-mode	<ul style="list-style-type: none"> <li>● GSM 2 x 4 TRXs+LTE 1 x 20 MHz 2T2R/2T4R Cell</li> <li>● GSM 2 x 2 TRXs+LTE 2 x 20 MHz 2T2R/2T4R Cells</li> </ul>
Transmis- sion	CPRI interface, 2 x 6.144 Gbps	



**Table 4-7 ZXSDR R8872A S1900 Performance Requirements**

Item	Specification	
Operating frequency band	1900 MHz ● Tx: 1930—1990 MHz ● Rx: 1850–1910 MHz	
TOC output power	2 x 80 W	
Bandwidth	LTE: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, and 20 MHz	
Receiving sensitivity	GSM	Single antenna: –113.5 dBm Dual antennas: –115.5 dBm Four antennas: N/A
	UMTS	Single antenna: –125.8 dBm Dual antennas: –128.5 dBm Four antennas: N/A
	LTE	Single antenna: –106.4 dBm Dual antennas: –109.2 dBm Four antennas: N/A
Capacity	GSM single-mode	2 x 4 TRXs
	UMTS single-mode	2 x 2 CSs
	UMTS/LTE multi-mode	UMTS 2 x 2 CSs and LTE 1 x 10 MIMO 2T2R Cell
	GSM/LTE multi-mode	GSM 2 x 4 TRXs and LTE 1 x 10 MIMO 2T2R Cell
	GSM/UMTS multi-mode	GSM 2 x 4 TRXs and UMTS 2 x 2 CSs
	GSM/UMTS/LTE multi-mode	GSM 2 x 2 TRXs , UMTS 2 x 1 CSs , and LTE 1 x 10 MIMO 2T2R Cell
Transmission	CPRI interface, 2 x 6.144 Gbps	

## 4.5 Reliability

For the reliability requirements of the ZXSDR R8872A, refer to [Table 4-8](#).

**Table 4-8 Reliability Requirements**

Item	Specification
MTBF	DC: $\geq 438,000$ hours
MTTR	1 hour
Availability	DC: $\geq 99.999772\%$
Down time	DC: $\leq 1.200$ minutes/year

# 4.6 Electromagnetic Compatibility

For the electromagnetic compatibility requirements of the ZXSDR R8872A, refer to [Table 4-9](#).

**Table 4-9 Electromagnetic Compatibility Requirements**

Item	Specification
ESD immunity	Contact discharge: $\pm 6000$ V Air discharge: $\pm 8000$ V
Surge immunity	DC power interface cable (grounding): $\pm 2000$ V

# Glossary

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**64QAM**

- 64 Quadrature Amplitude Modulation

**BBU**

- Base Band Unit

**BSP**

- Board Support Package

**CDMA**

- Code Division Multiple Access

**CPRI**

- Common Public Radio Interface

**DPD**

- Digital Pre-Distortion

**EMS**

- Element Management System

**GSM**

- Global System for Mobile Communications

**IP**

- Internet Protocol

**LMT**

- Local Maintenance Terminal

**LTE**

- Long Term Evolution

**MCPA**

- Multi-Carrier Power Amplifier

**MTBF**

- Mean Time Between Failures

**MTTR**

- Mean Time To Recovery

**OAM**

- Operating and Maintenance

**OSS**

- Operation Support Subsystem

**PA**

- Power Amplifier

**PC**

- Personal Computer

**RRU**

- Remote Radio Unit

**TCO**

- Total Cost of Ownership

**TCP**

- Transmission Control Protocol