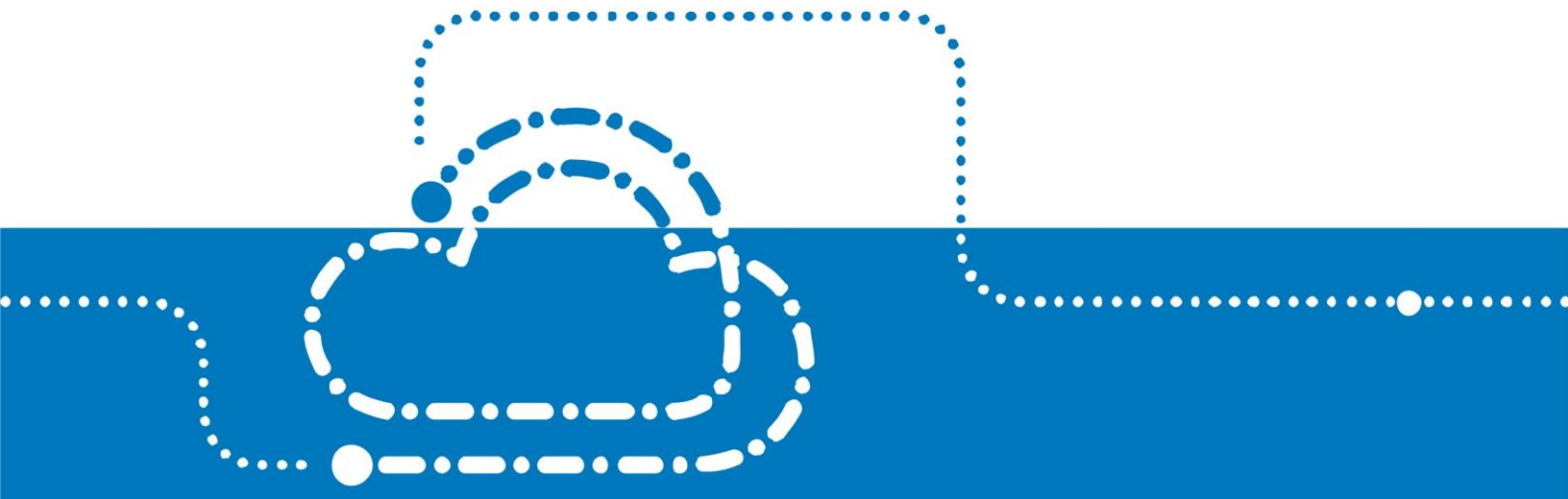
ZXSDR B8200 Product Description



ZXSDR B8200 Product Description

Version	Date	Author	Reviewer	Notes
V1.0	2015-07-15	ZTE		Not to open to the third party

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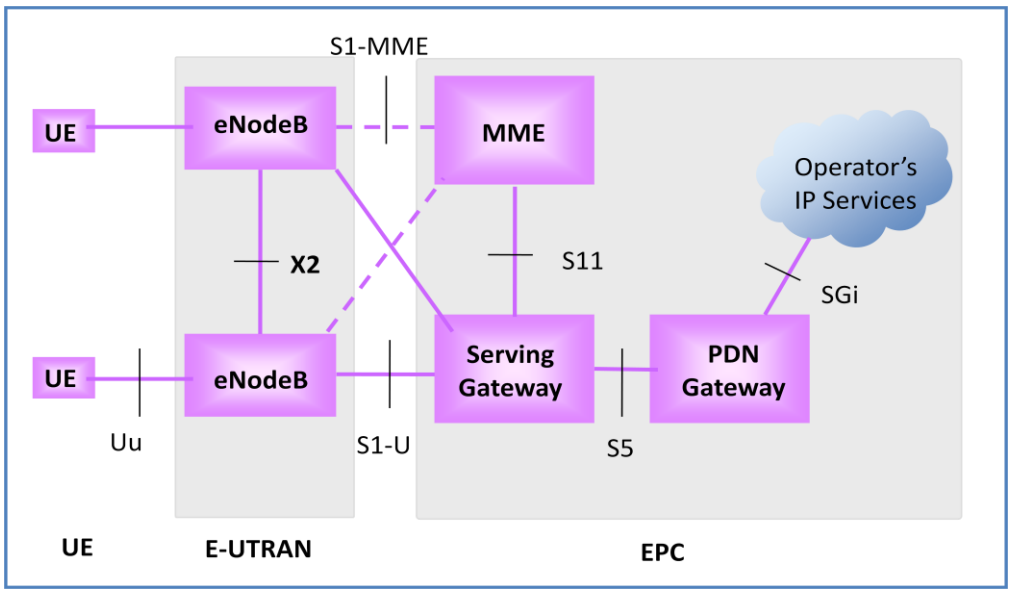
1 Overview

ZTE aims to provide competitive telecommunication equipment and solutions for customers, builds and launches the distributed Software Defined Radio (SDR) solution for Base Band Unit (BBU) & Remote Radio Unit (RRU). ZXSDR B8200 and RRU make up the complete eNodeB to achieve wireless transmission and control of wireless channels.

The ZXSDR B8200 is a multi-mode BBU, which is based on the ZTE SDR platform. It can support GSM/UMTS/TD-SCDMA/TD-LTE/LTE FDD single-mode or multi-mode by software upgrade, which adapts to operators' cost-effective strategy of Long Term Evolution (LTE).

The following figure shows the network architecture of TD-LTE.

Figure 1-1 TD-LTE Network Architecture



- UE: Standard-compliant User Equipment (UE) provides wireless access for users.
- E-UTRAN: The Radio Access Network (RAN) provides wireless access for users.
- EPC: The Evolved Packet Core (EPC) provides connection services.

The related interfaces are described as follows:

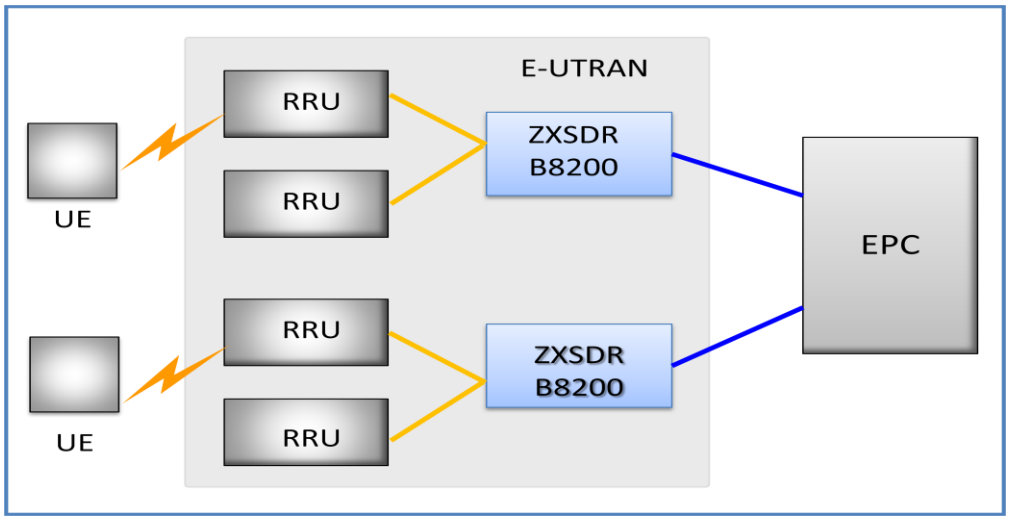
- Uu: used between the eNodeB and UE

- X2: used between the eNodeBs supplied by same or different vendors
- S1: used between the EPC and the E-UTRAN

The E-UTRAN architecture consists of a set of eNodeBs connected with each other through the X2 interface and connected to the EPC through the S1 interface.

The following figure shows the position of ZXSDR B8200 in TD-LTE network.

Figure 1-2 ZXSDR B8200 Position in TD-LTE Network



2 Highlights

2.1 Large Capacity

ZXSDR B8200 supports at most 4 (-10°C - 40°C) or 3 (-10°C - 55°C) baseband boards. The TD-LTE baseband board BPL1 supports 6 x 2-antenna@20MHz, 3 x 4-antenna@20MHz or 3 x 8-antena@20MHz, and the new baseband board BPN2 supports 12 x 2-antenna@20MHz, 6 x 4-antenna@20MHz or 6 x 8-antena@20MHz, such industry leading large capacity can completely meet the requirements of TD-LTE system.

2.2 Mature and Stable Performance

ZXSDR B8200 adopts ZTE's unified Software Defined Ratio (SDR) platform, which was released in October 2008. The SDR platform has been applied in several large scale commercial projects of CDMA, GSM, UMTS, TD-SCDMA and LTE. Excellent performance has proved its maturity and stability. ZXSDR B8200 can fully satisfy the multi-standard, multi-frequency and low-TCO requirements of operators.

On September 30, 2008, ZTE SDR 8000 series products won InfoVision Award at the Broadband World Forum (BBWF) Europe for its product innovation.

2.3 Multi-Standard and Smooth Evolution

ZXSDR B8200 supports various systems including GSM, UMTS, CDMA, TD-SCDMA, and LTE, and streamlines the operators' management. It enables the operators to select the network evolution path more flexibly.

2.4 Abundant Interfaces Enabling Flexible Networking

The Common Public Radio Interface (CPRI) supports 6.144G/9.830G optical transmission. The number of CPRI interfaces reaches 12 per BBU by BPL1, and reaches 24 per BBU by BPN2.

The S1 interface supports GE optical interfaces and GE electrical interfaces at full rates and supports IEEE1588v2 synchronization mode to achieve flexible network deployment.

2.5 All-IP Architecture Enabling Flexible Networking

Based on the All-IP architecture, the ZXSDR B8200 provides GE/FE interfaces and supports star, chain or hybrid networking with Remote Radio Units (RRUs) to achieve cross-area networking and expansion, so as to greatly save engineering cost. ZXSDR B8200 meets various network construction requirements in different conditions and meets various transmission scenarios.

2.6 Compact Design Enabling Easy Deployment

The ZXSDR B8200 adopts standard Micro TCA platform with only 2U high, 19 inches wide and 197mm deep, such compact design facilitates requirements on small space and easy deployment.

The ZXSDR B8200 can be easily installed into a standard 19-inch rack. It can also be mounted on a wall with a minimal space requirement to improve the possibility of co-site with 2G and 3G equipments.

All the interfaces including power supply, GPS, S1/X2, LMT, CPRI are placed on the front panel of boards, enabling simple operation and fewer footprints, and supporting installation against wall as well.

3 Functionality

As a multi-mode compact BBU, the ZXSDR B8200 provides S1 and X2 interfaces, clock synchronization, baseband processing and RRU interface functions to achieve internal communication and data exchange. The digital baseband signal is transmitted on fiber between BBU and RRU. The main features of the ZXSDR B8200 are listed below:

- RRU control and data processing through standard CPRI interface between BBU and RRU
- IP header compression and encryption
- Radio resource management:
  - Radio bearer control
  - Radio access control
  - Mobility management
  - Dynamic resource management
- MME selection when the UE attach procedure is initiated
- Routing user plane data to Service GW (SGW)
- Paging message scheduling and transmission
- Measurement and measurement report in mobility and scheduling processing
- PDCP\RLC\MAC\ULPHY\DLPHY data processing
- Operation and maintenance function by the background network management (OMCB/LMT):
  - Configuration management
  - Alarm management
  - Performance management

  - Version management
  - Communication management between foreground and background
  - Diagnosis management

- Centralized and unified environment monitoring and transparent tunnel transmission
- Hot plugging of all boards and modules
- Remote maintenance, detection, recovery and software download

4 System Architecture

4.1 Physical Structure

The following figures show the appearance of ZXSDR B8200. The dimensions of ZXSDR B82000 are 88.4mm x 482.6mm x 197mm (H x W x D) (19 inches wide and 2U in high).

Figure 4-1 ZXSDR B8200 Front View

Figure 4-2 ZXSDR B8200 Side View

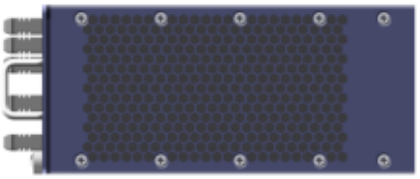
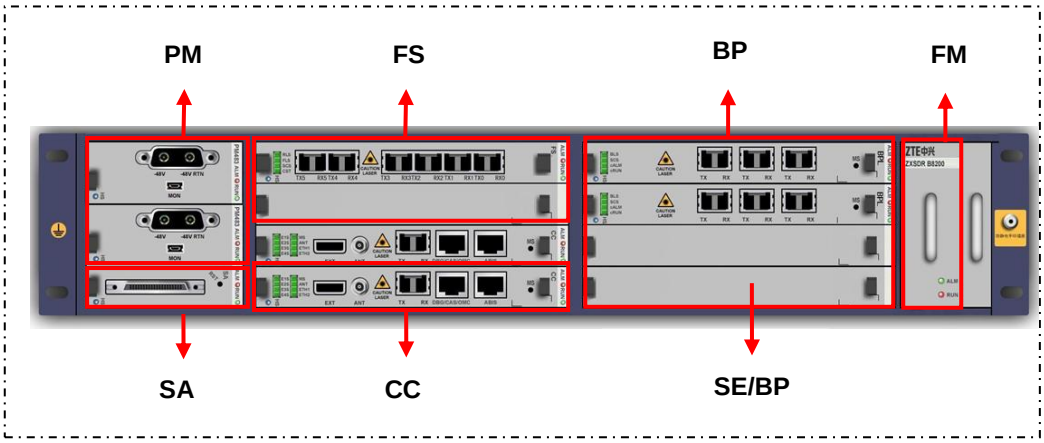


Figure 4-3 ZXSDR B8200 Top View

The following figure shows the physical structure of the ZXSDR B8200.

Figure 4-4 Physical Structure of ZXSDR B8200



The following table shows the board list of the ZXSDR B8200.

Table 4-1 Board List of the ZXSDR B8200

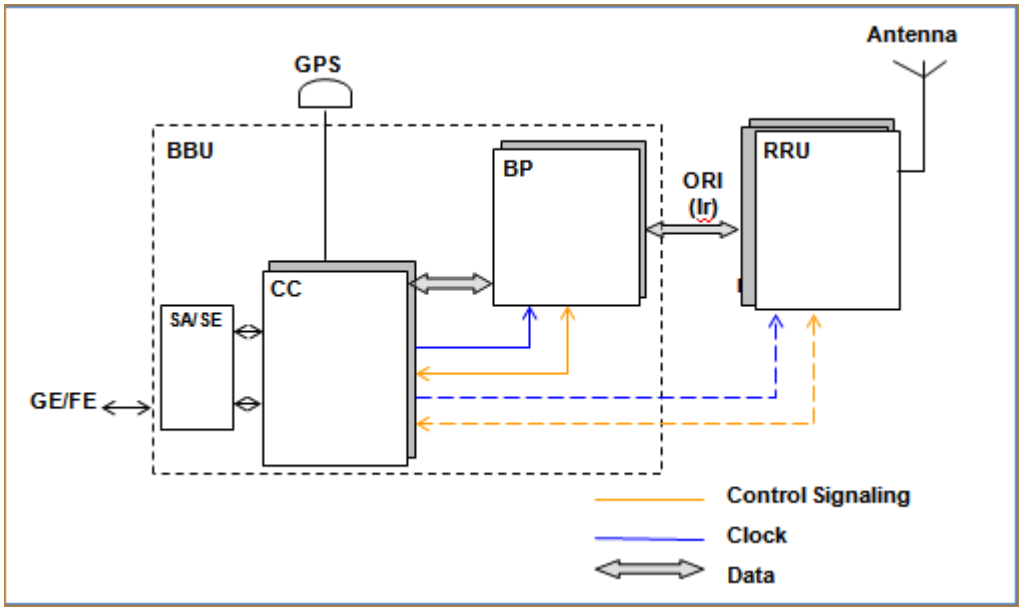
Board Category	Description
CC	Control & clock board, O&M interface
BP	Baseband processing for LTE
FS	Fabric switch board, IQ data switch
SA	Site alarm board
SE	Site alarm extension board
PM	Power module, dual backup, -48VDC
FM	Fan module

4.2 Hardware Architecture

The ZXSDR B8200 is designed on the basis of MicroTCA (also known as uTCA), a flexible common platform enabling easy extension.

The following figure shows the hardware architecture of the ZXSDR B8200.

Figure 4-5 Hardware Architecture of ZXSDR B8200



The ZXSDR B8200 consists of the following modules:

- CC (CC16/CCE1)
- BP (BPL1/BPN2)
- FS
- SA
- SE
- PM
- FM

4.2.1 Control & Clock Board

4.2.1.1 CC16

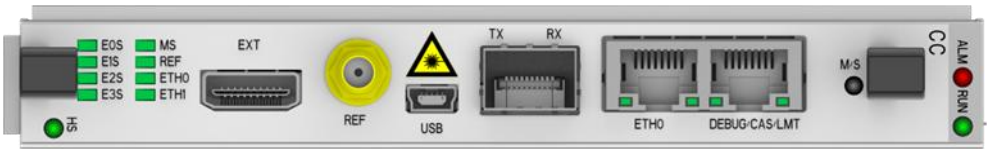
The CC16 provides the following functions:

- GE Ethernet switching for S1 interface via optical or electrical interfaces

- Rack management function
- GPS system clock and RF reference clock
- Clock extension interface (IEEE1588 V2)
- Debugging and local maintenance
- Communications extension interface (via local maintenance interface)

The following figure shows the CC16 panel.

Figure 4-6 CC16 Panel



The following table shows the panel interfaces & functionality of CC16.

Table 4-2 Panel Interface & Functionality of CC16

Interface	Description
ETH0	An Ethernet electrical interface of S1, 10M/100M/1000M adaptive, mutually exclusive with TX/RX.
DEBUG/CAS/LMT	An Ethernet electrical interface used for debugging or local maintenance, 10M/100M/1000M adaptive.
TX/RX	An Ethernet optical interface of S1, 100M/1000M adaptive, mutually exclusive with ETH0.
EXT	A standardized communication interface to connect the transmission equipment and supports input/output at different time. The interface is RS485.
REF	An external GPS antenna interface.

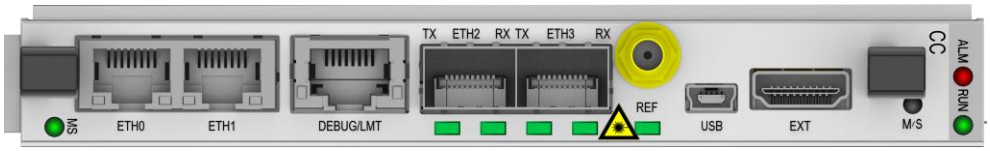
4.2.1.2 CCE1

The CCE1 provides the following functions:

- GE Ethernet switching for S1 interface via optical or electrical interface
- Rack management function
- GPS system clock and RF reference clock
- Clock extension interface (IEEE1588 V2)
- Debugging and local maintenance
- Communications extension interface (via local maintenance interface)

The following figure shows the CCE1 panel.

Figure 4-7 CCE1 Panel



The following table shows the panel interfaces & functionality of CCE1.

Table 4-3 Panel Interface & Functionality of the CCE1

Interface Name	Description
ETH0	An Ethernet electrical interface of S1, 10M/100M/1000M adaptive, mutually exclusive with ETH2/ETH3.
ETH1	An Ethernet electrical interface of S1, 10M/100M/1000M adaptive, mutually exclusive with ETH2/ETH3.
DEBUG /LMT	An Ethernet electrical interface used for cascading, debugging or local maintenance, 10M/100M/1000M adaptive.
ETH2	An Ethernet optical interface of S1, 1000M/10000M adaptive supports SFP+ standards, mutually exclusive with ETH0/ETH1.
ETH3	An Ethernet optical interface of S1, 1000M/10000M adaptive supports SFP+ standards, mutually exclusive with ETH0/ETH1.
USB	Management interface for BBU version upgrade.

EXT	It is an external communication interface to connect the external receiver. The interfaces are 1PPS +TOD (clock Reference). It supports RS485 standards.
REF	An external GPS antenna interface.

4.2.2 Baseband Processing Board

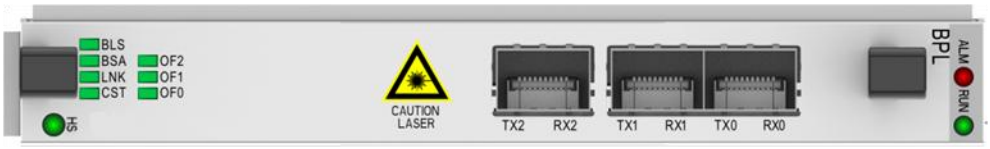
4.2.2.1 BPL1

BPL1 board has the following functions:

- 6.144G/9.8304G CPRI optical interface connecting with RRU
- User plane protocol processing , include PDCP, RLC, MAC
- Physical layer(PHY) protocol processing
- Providing the IPMI management interface

The following figure shows the BPL1 panel.

Figure 4-8 BPL1 Panel



The following table shows the panel interfaces & functionality of BPL1.

Table 4-4 Panel Interfaces & Functionality of BPL1

Interface	Description
TX0 RX0, TX1 RX1, TX2 RX2	1. Three 6.144G/9.8304G CPRI optical interfaces connecting with RRU. 2. Supporting SFP+ standards.
RST	Press the button to set the board in reset state.

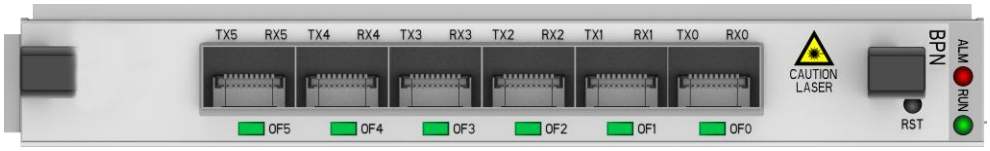
4.2.2.2 BPN2

BPN2 board has the following functions:

- 6.144G/9.8304G CPRI optical interfaces connecting with RRU
- User plane protocol processing , include PDCP, RLC, MAC
- Physical layer(PHY) protocol processing
- Providing IPMI management interface
- Obtaining 1PPS+TOD signal from RRU with GPS receiver embedded

The following figure shows the BPN2 panel.

Figure 4-9 BPN2 Panel



The following table shows the panel interfaces & functionality of BPN2.

Table 4-5 Panel Interfaces & Functionality of BPN2

Interface	Description
TX0 RX0 through TX5 RX5	1. Six 6.144G/9.8304G CPRI optical interfaces connecting with RRU. 2. Supporting SFP+ standards.
RST	Press the button to set the board in reset state.

4.2.3 Fabric Switch Board

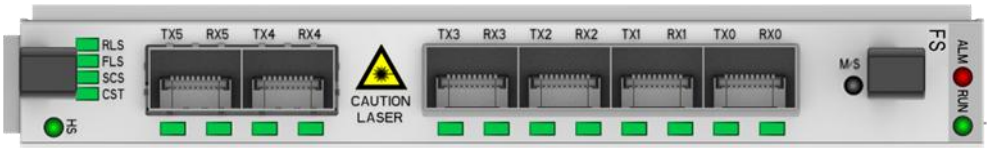
The FS implements IQ data switching between the baseband unit and the optical interface to achieve real sharing of BPL1 resource within BBU. In addition, the FS provides optical interfaces for cascade of RRUs to facilitate combination of baseband resource.

The FS has the following functions:

- Achieving IQ switching with BPL1 boards through software configuration.
- GE interface enabling communication with CC board.
- Providing six optical interfaces, output rates of which are compatible with 6.144 / 9.8304Gbps.

The following figure shows the FS panel.

Figure 4-10 FS Panel



The following table shows the panel interfaces & functionality of FS.

Table 4-6 Panel Interfaces & Functionality of FS

Interface Name	Description
TX0 RX0 through TX5 RX5	1. Six 6.144 / 9.8304Gbps optical interfaces. 2. Supporting SFP+ standards.

4.2.4 Site Alarm Board

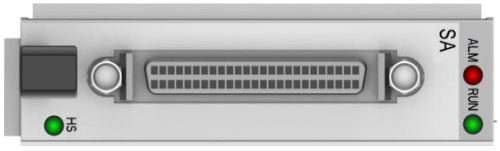
SA has the following functions:

- Providing fan monitoring (alarm, debugging, rotating speed report) function.
- Communicating with the CC board via UART.
- One RS485 and one RS232 full duplex interface for external monitoring equipment respectively
- 6+2 dry contact interfaces (6 input interfaces, 2 input/output interfaces)
- 1 temperature sensor interface

- IPMI management interface

The following figure shows the SA panel.

Figure 4-11 SA Panel



The following table shows the panel interfaces & functionality of SA.

Table 4-7 SA Panel Interfaces & Functionality

Interface Name	Description
Front Panel Interfaces	8 E1/T1 interfaces, RS485&RS232 interface, 6+2 dry contact interfaces (6 input and 2 two-way interfaces)

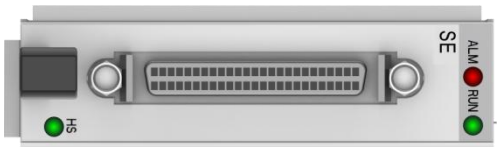
4.2.5 Site Alarm Extension Board

SE has the following functions:

- 6+2 dry contact interfaces (6 input interfaces and 2 two-way interfaces)

The following figure shows the SE panel.

Figure 4-12 SE Panel



The following table shows the panel interfaces & functionality of SE.

Table 4-8 Panel Interfaces & Functionality of SE

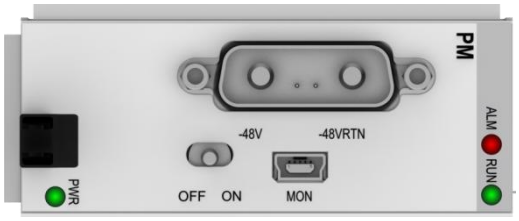
Interface Name	Description
Front Panel	RS485/232 interface, 6+2 dry contact interfaces (6 input and 2

Interfaces	two-way interfaces)

4.2.6 Power Module

The following figure shows the PM panel.

Figure 4-13 PM Panel



The following table shows the panel interfaces & functionality of PM.

Table 4-9 Panel Interfaces & Functionality of PM

Interface	Description
MON	Debugging interface, RS232 interface
-48V/-48VRTN	-48V input interface

4.2.7 Fan Module

FM has the following functions:

- Fan control function and interface
- A temperature sensor to detect temperature of air intake
- LED display of fan plug-in box

The following figure shows the FM panel.

Figure 4-14 FM Panel

Note: The product received is subject to the actual object.

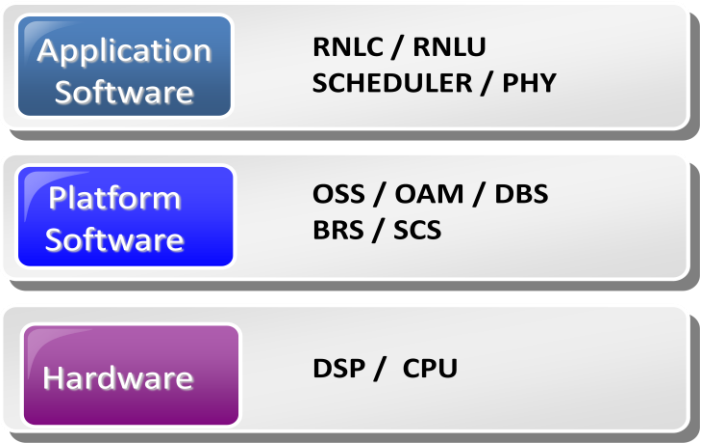
4.3 Software Architecture

The software architecture of ZXSDR B8200 can be divided into three layers:

- Application software layer
- Platform software layer
- Hardware layer

For more information, please refer to the following figure.

Figure 4-15 ZXSDR B8200 Software Architecture



The application software layer provides functions of:

- Radio Network Layer Control plane (RNLC)
- Radio Network Layer User plane (RNLU)
- SCHEDULER (scheduler sub-system)
- PHY (Physical layer)

The SDR platform software provides the functions of Operation Support Sub-system (OSS), Operating and Maintenance (OAM), Data Base Sub-system (DBS), Bearer Sub-system (BRS) and System Control Sub-system (SCS):

- OSS

A hardware independent platform for running software and provides basic functions like scheduling, timer, and memory management, communication, sequencing control, monitoring, alarming and logging

- OAM

Providing configuration, alarm and performance measurement functions for eNodeB

- DBS

The database system

- BRS

Providing IP communication function for inter-boards and inter-network elements

- SCS

Providing power control and system management functions

- Digital Signal Processor (DSP) and CPU are adopted at the hardware layer.

5 Technical Specifications

Table 5-1 ZXSDR B8200 Technical Indices

Item	Index
Dimensions (H × W × D)	88.4 x 482.6 x 197 (mm)
Weight	< 7 kg(4BP) < 6.5 kg(3BP) < 5.5 kg(1BP)
Power consumption (W)	120 @25°C (1BPL1) 260 @25°C (3BPL1)
	150 @25°C (1BPN2) 290 @25°C (3BPN2)
Power supply mode, allowed voltage fluctuation range	- 48V DC: -57V ~ -40V;
Normal operating temperature	-10°C ~ +55°C (long period) -10°C ~ +60°C (short period)
Normal operating humidity	5% ~ 95%RH
Installation mode	Inserted in a 19-inch rack or mounted on the wall
BPL1 capacity	6*2-antenna@20MHz 3*4-antenna@20MHz 3*8-antenna@20MHz
BPN2 capacity	12*2-antenna@20MHz 6*4-antenna@20MHz 6*8-antenna@20MHz
Max. No. of BPL1/BPN2	4 (-10°C - 40°C) 3 (-10°C - 55°C)
No. of GE interface	2
No. of dry contact	16
Synchronization	GPS, IEEE 1588 V2, 1PPS+TOD
MTBF	> 230000 hours
MTTR	< 0.5 hour

6 Installation

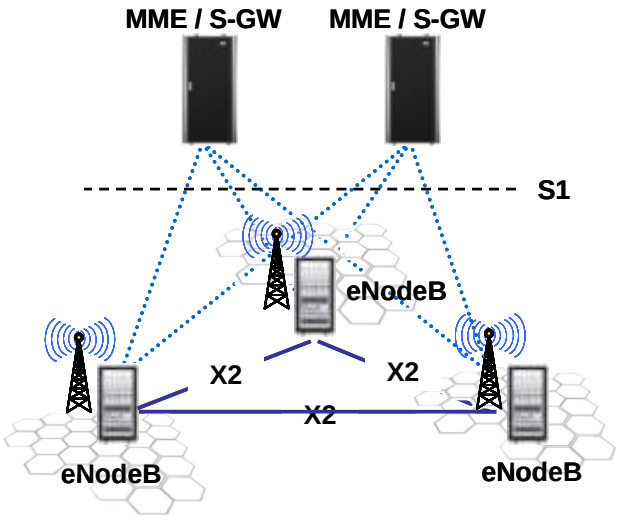
The ZXSDR B8200 adopts Micro TCA industry standard with 2U high and 19 inches wide, and supports hot plug-in. It is easy to be installed in a standard 19-inch rack, or mounted on a wall or placed on the ground.

7 Networking

The ZXSDR B8200 provides S1 interface to connect the EPC, X2 interface to connect eNodeB and CPRI interface to connect RRU. For the S1/X2 interface, ZXSDR B8200 provides GE transmission and supports all-IP transmission. For the CPRI interface, ZXSDR B8200 provides optical interface with the rate of 6.144Gbps / 9.8304Gbps.

The B8200 and RRUs can form star network, chain network, circle network and hybrid network.

Figure 7-1 LTE Network Structure



8 Glossary

1PPS	1 Pulse per Second
3GPP	3rd Generation Partnership Project
BBU	Base Band Unit
BBWF	Broadband World Forum
BP	Baseband Processing
BPL1	Baseband Processing board for LTE type1
BPN2	Baseband Processing board N type 2
BRS	Bearer Sub-system
CAPEX	Capital Expenditure
CC	Control and Clock
CPRI	Common Public Radio Interface
DBS	Data Base Sub-system
DSP	Digital Signal Processor
EPC	Evolved Packet Core
E-UTRAN	Evolved UTRAN
FDD-LTE	Frequency Division Duplex – Long Term Evolution
FE	Fast Ethernet
FM	Fan Module
FS	Fabric Switch
GE	Gigabit Ethernet
GPS	Global Positioning System
GSM	Global System for Mobile communications
IPMI	Intelligent Platform Management Interface
LMT	Local Maintenance Terminal
LTE	Long Term Evolution
MicroTCA	Micro Telecommunications Computing Architecture
MIMO	Multi Input Multi Output
MTBF	Mean Time Between Failures
MTTR	Mean Time To Recovery
MME	Mobility Management Entity
OAM	Operating And Maintenance

OPEX	Operational Expenditure
OSS	Operation Support Sub-system
PHY	Physical layer
PM	Power Module
RAN	Radio Access Network
RNLC	Radio Network Layer Control plane
RNLU	Radio Network Layer User plane
RRU	Remote Radio Unit
SA	Site Alarm module
SCS	System Control Sub-system
SDR	Software Defined Radio
SE	Site alarm Extension
SGW	Service GW
TCO	Total Cost of Ownership
TD-LTE	Time Division Duplex – Long Term Evolution
TOD	Time of Day
UART	Universal Asynchronous Receiver/Transmitter
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
uTCA/MicroTCA	Micro Telecom Computing Architecture
UTRAN	Universal Terrestrial Radio Access Network