



ZXSDR BS8908

Product Description



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Version	Date	Author	Approved By	Remarks

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1 Overview

With the developing of mobile communication, high quality networks have to be built up to meet growing requirements. Hot spot, indoor and rural area coverage should be taken into consideration. At the same time, telecom operators are facing challenges in equipment room, engineering and noise pollution. ZXSDR BS8908 (hereafter referred to "BS8908") compact BTS is hence designed to meet these requirements.

Integrated design and MCPA make it small volume, high density, high capacity and low power consumption. It can be used for both indoor and outdoor applications with IP65 protection. The unit can be mounted on walls, poles or masts.

Single unit supports up to 6 TRXs by adopting MCPA technology. It can also be expanded to S4/4/4 by cascading. BS8908 is shown in Figure 1.

Figure 1 ZXSDR BS8908



2 Highlight Features

- Compact Design, Light Weight, Easy Installation

BS8908 is only less than 13 kg, easy to transport and install. It can be mounted on the pole, against the wall, on the tower top, etc. No dedicated equipment space is required, easy for site acquisition, fast network deployment.

- Easy Expansion and High Coverage

By MCPA, it can be conveniently expanded from S1 to S6 by software. It supports expansion to S4/4/4 by adding units. 40W TOC and close to antenna installation improve coverage. Compared with traditional indoor BTS, hot spot and rural coverage solutions, it provides higher capacity and wider coverage.

- Green BTS

BS8908 supports Doherty, DPD and MCPA technologies in power amplifier module which provides high PA efficiency. High efficiency MCPA, natural cooling and high density design reduce the power consumption. Zero noise pollution makes it easy for indoor installation and site acquisition.

- IP RAN and Rich Interfaces

Abis interface is based on FE/GE or IP over E1. It provides E1/T1 and FE/GE interfaces for Abis connection and supports various transmissions networking such as SDH, IP, microwaves and satellite transmission.

3 Functionality

3.1 Basic Function

BS8908 accomplishes the following basic functions with Um, Abis and O&M interfaces.

- With Um interface, BS8908 accomplishes MS access and radio link transmission, including RF processing, channel coding and decoding, channel multiplexing and de-multiplexing, measuring and reporting, power control, transmitting diversity, receiving diversity, calibration and synchronization.
- With Abis interface, BS8908 connects with BSC and accomplishes the following functions, including cell management, reporting BTS measurement information, broadcasting system Information, implementing access control from BSC, mobility management, radio resource management and controlling and FP processing management.
- With operating and maintenance interface, BS8908 provides system management functions, including configuration management, alarm management, status checking and system monitoring.

Besides, BS8908 also provides some other functions as follows:

- Supporting GSM Phase I/GSM Phase II/GSM Phase II plus standards
- Supporting CS1~CS4 of GPRS, MCS1~MCS9 of EDGE. Supporting dynamically changing channel coding according to monitoring and measurement results
- The receiving part adopts Viterbi algorithm for coding. Channel decoding capability and system receiving sensitivity is improved.
- Supporting frequency hopping
- Supporting DTX sending and decreasing transmitting power, lowering the total interference in the air
- Supporting TA (Time Advance) calculation

3.2 Service Functions

BS8908 supports the following services currently:

- GSM/EDGE:

- FR: Full Rate voice service
- EFR: Enhanced Full Rate voice service
- HR: Half Rate voice service
- AMR: Adaptive Multi Rate voice service
- F9.6: 9.6 Kbit/s CS domain data service
- GPRS/EDGE
- R99 service:
 - CS domain service: 8 Kinds of AMR voice service, CS 64 Kbps
 - PS domain service: UL/DL 64 Kbps, UL/DL 128 Kbps, UL/DL 384 Kbps
 - Concurrent service: CS domain (AMR 12.2 Kbps, CS 64 Kbps) + PS domain (64 Kbps, 128 Kbps, 384 Kbps)

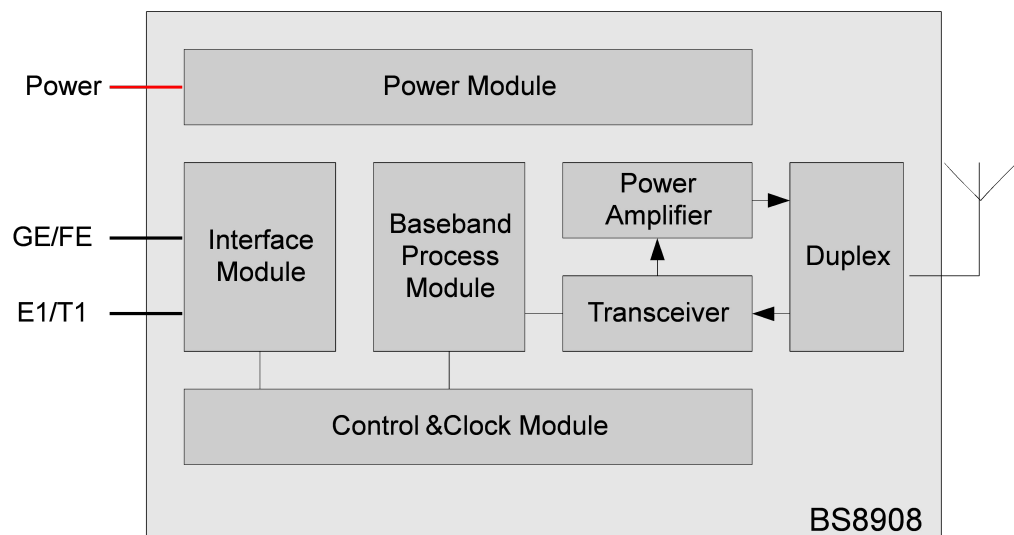
4 System Architecture

By integrated design, BS8908 single unit integrates control and clock module, baseband processing, radio unit, power management and so on. Both AC (220V/110V) and DC (-48V) power supply are supported.

4.1 Hardware Architecture

BS8908 consists of Interface Module, Control & Clock Module, Baseband Process Module, Transceiver, Power Amplifier, Duplex and Power Module.

Figure 2 BS8908 Hardware Structure



4.1.1 Interface Module

The interface module provides the interfaces of the system and the interface protection.

- Providing 4 pairs of E1 or T1 Abis interfaces with interface protection
- Providing automatic bridge in BTS chain networking
- Providing 1 GE/FE Abis interface
- Providing 2 cascading high speed fiber interfaces
- Providing GPS antenna external connection interface
- Providing 4 dry contact alarm inputs, and a RS485 port for monitoring

- Providing AISG interface
- Providing 1 Ethernet interface for debugging or local maintenance

4.1.2 Control and Clock Module

The control and clock module is used for control and management, and provides system clock. Its functions are as follows:

- Ethernet switching function, implementing data switching for service and control flow within the system
- Abis interface protocol processing
- Monitoring, controlling and maintaining of the base station system, providing LMT interface
- Managing software versions and supporting local and remote software upgrade
- Synchronizing with various external reference clocks, including the Abis interface recovery clock and the GPS clock
- Generating and delivering the clock signal demanded by each part
- Providing GPS receiver interface and managing the GPS receiver
- Providing a real-time clock for system operation and maintenance; the real-time clock can be calibrated.

4.1.3 Baseband Process Module

It processes the physical layer protocol and frame protocol specified by 3GPP. Its main functions are listed as follows:

- Achieving rate adaptation, channel coding, interleaving, encryption, generate TDMA shock burst, GMSK/8PSK modulation and IQ baseband digital signals output.
- Achieving uplink IQ data receiving, receiver diversity combiner, digital demodulation (GMSK&8PSK, equilibrium), decryption, de-interleaving, demodulator and rate adaptation
- Radio link synchronization and transmission frame processing
- Measuring parameters required in power control and handover
- Diversified receiving.

4.1.4 Transceiver

Transceiver is the radio transmitting and receiving module. Its main functions are listed as follows:

- Processing 2 paths receiving and 1 path transmitting signal
- Uplink & downlink transition for radio link signal
- Downlink IQ signal multiplexing, uplink IQ signal de-multiplexing
- Signal amplifying, filter, and digit/analog converting
- RTWP and TSSI measurement report;
- Standing wave ratio (SWR) measurement report
- Hardware failure self-test and alarm;

4.1.5 Power Amplifier

- Amplifying RF output signal power
- Providing digital pre-distortion feedback signal for Transceiver
- Providing power amplification output control
- Feedback forward power coupling signal to Transceiver, and Transceiver do forward power inspection
- Feedback backward power coupling signal to Transceiver, and Transceiver do backward power (SWR) inspection

4.1.6 Duplex

- Combination and separation of receiving and transmitting signal
- Filter function of receiving & transmitting signal
- Low-noise amplification function

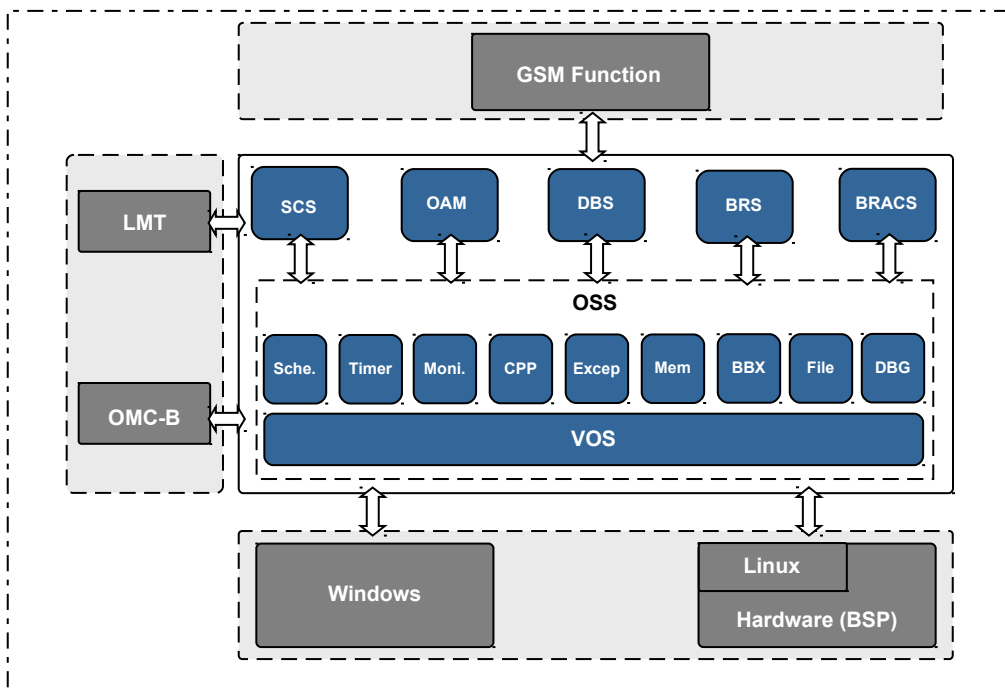
4.1.7 Power Module

The power module can be configured to support -48 V DC or 110/220 V AC respectively. It supports lightning protection, filtering, AC-to-DC conversion, allocation and grounding for working power. It also provides measurement and protection of input over-voltage/under-voltage functions.

4.2 Software Architecture

The software system of BS8908 consists of operating support layer and application layer.

Figure 3 BS8908 Software Structure



The operating support layer provides the functions of OSS, OAM, DBS, BRS, BRACS, and SCS to serve different BTS modes.

- OAM (Operating and Maintenance) provides the configuration, alarm and performance measurement function.
- DBS (Data Base Sub-system) provides the database function.
- BRS (Bearer Sub-system) provides protocol stack processing function.
- BRACS (Bearer Access Control Sub-system) provides the function of access control on bear layer.
- SCS (System Control Sub-system) provides functions of power control/supply and active/standby switching.

OSS (Operation Support Sub-system) is the support layer in this framework, which is a hardware independent platform for running software and providing basic functions like scheduling, timer, memory management, communication, sequencing control, monitoring, alarming and logging.

BSP (Board Support Package) supports the information routing to the GSM and public parts in the application layer.

4.3 External Interface

Table 1 Description of ZXSDR BS8908 External Interfaces

Interface	Item	Index	Interface Type	Standard
Abis	E1/T1	4 pairs	DB26	ITU G.703/G.704
	Ethernet	1 (10M/100M/1000M electrical) Auto-Negotiation Auto-MDI/MDIX	RJ45	10/100/1000BASE-T IEEE 802.3 compatible
		1 (1000M optical) or 1 (100M optical)	SFP (LC)	1000BASE-LX IEEE 802.3 compatible 100BASE-FX IEEE 802.3 compatible
Antenna Feeder	ANT	2	N	-
Cascade Interface	SFP	2	SFP(LC)	-
Clock	GPS	1	SMA	GPS Antenna Interface NMEA 0183 V3.0
Monitor & Alarm	Dry Contact	4	DB15	-
	RS485	1	DB15	-
Electrical Antenna	AISG	1	DB9	AISG 2.0
Configuration interface	USB	1	USB	-

5 Technical Specifications

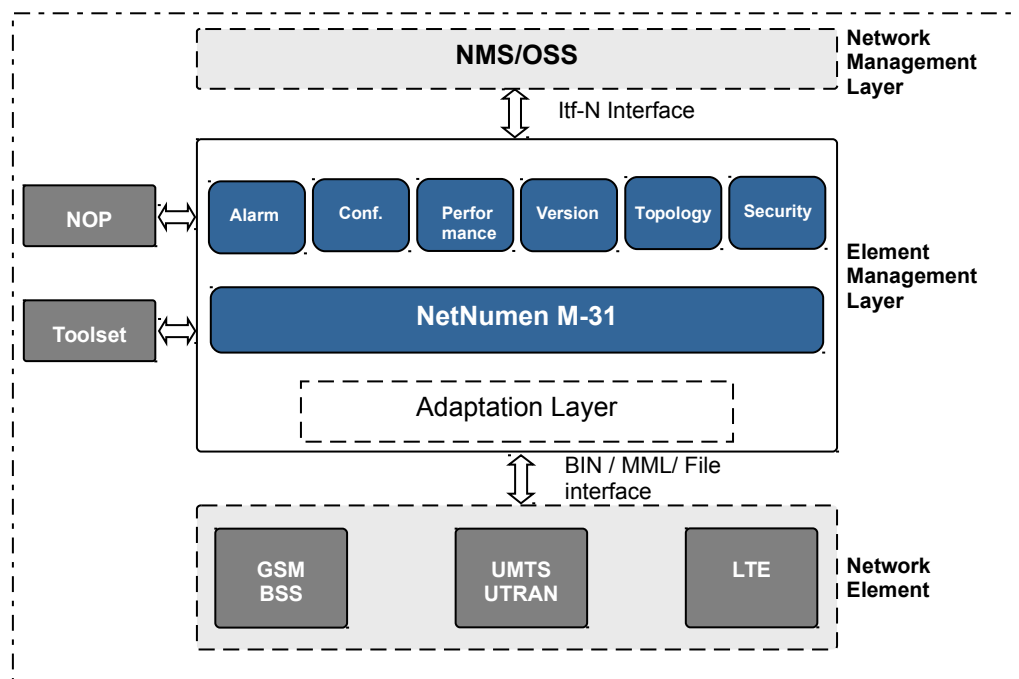
Table 2 ZXSDR BS8908 Technical Indices

Type	Item	Indices
Performance Indices	Working Frequency	EGSM 900 MHz DL:925~960 MHz, UL:880~915 MHz DCS 1800 MHz DL:1805~1880 MHz, UL:1710~1785 MHz
	Working Bandwidth	20 MHz
	Capacity	Single Unit: 6 TRXs (S6)
		3 Units Cascading: 12 TRXs (S444)
	Output Power (TOC)	40W (GMSK) / 25W (8PSK)
Static Receiving Sensitivity	-112.5 dBm @ Single Antenna	
Physical Indices	Dimension	420 mm*315 mm*100 mm (H * W * D)
	Weight	<13 Kg
Power Indices	Power supply, voltage range of variation	-48V DC (-37 V DC ~ -60V DC) 110 V AC /220 V AC (90 V AC ~ 290 V AC)
Power Consumption Indices	Power Consumption	187W (TOC 40W) 900M 190W (TOC 40W) 1800M
Environment Indices	Temperature	-40°C~+55°C
	Relative Humidity	5%~100%
	Waterproof /Dustproof	IP65
	Heat Dissipation	Natural Cooling
	Ground	≤5 Ω Earth resistance can be less 10 Ω in thunder less area where thunderstorm days should be less than 20 per year.
EMC Indices	National/ International Standard	YD/T 1595.2-2007 ETSI EN 301 489-01, ETSI EN 301 489-23 ETSI EN 300 386-V1.3.2 (CISPR22) Class B Directive 1999/5/EC (R&TTE)
Reliability Indices	MTBF	≥236,000 hours
	MTTR	1 hours
	Availability	≥99.999576%
	Down Duration	<2.227 min/year

6 Operation And Maintenance

The operation and management of BS8908 is performed by the ZTE unified network management system, NetNumen M31, which adopts client/server architecture. The server runs Solaris OS + Oracle database. The client adopts Windows system, enabling human-machine management for the network element.

Figure 4 NetNumen M31 Management System



The BSS provides a transparent channel to implement operation and maintenance information interaction between NetNumen M31 and the radio network. Management of the BSC/RNC and the BTS/Node B/eNode B adopts unified client interface for security management and operation log. NetNumen M31 also supports CORBA/SNMP Itf-N interface towards third-party NMS.

BS8908 operation and maintenance system supports the following functions:

- Version Management

With this function, administrator can view versions of the all software and hardware running at the foreground. The hardware version includes the BOOT version number and its generation time. The software version includes the software version number, download time and its current running state.

The background provides a software downloading system for software download/upgrade at the foreground. Before download/upgrade, warehousing processing is required. The warehousing process copies the version files to the server and registers to the server.

Software versions existing in the base stations can be activated with or without software tests.

- Alarm Management

The alarm management system monitors running states of the base stations, dynamically displays the rack structure of the foreground module and collects abnormal information of the boards, links, database and server in real time. These functions make it convenient to analyze, address the problems, and execute maintenance and repair.

Information collected by the alarm management system includes notification, alarm and alarm recovery.

The alarm management system synchronizes alarms, reports historical and current alarms, and sets and queries alarm shielding.

- Configuration Management

Configuration management implements functions of equipment configuration and radio configuration.

- Log Management

NetNumen M31 system provides the log management function. Any operation performed by operator will be recorded automatically. Thus, the operation maintenance administrator can query historical operation records. Log records are saved in the NM database server.

- Security Management

Security management is implemented through user management and user group management. The user management includes the management for user name, password and user groups which the user belongs to. The user group management

includes the management of user group name and authority information (indicating authorities the user group has).

- Performance Management

Performance management is to measure, report and provide performances statistic of base stations.

- Diagnosis and Test

Diagnosis and test are important components of EMS. The network administrator can check whether system hardware is working properly by diagnosis and test. They are also able to trace and recover the faults on time to secure the safe operation of the system.

Base station diagnosis and test cover the following functions:

- Information reporting
- Board link testing
- Receiving field strength testing
- Environment information monitoring
- Other Supplementary Functions

The operation and maintenance system also provides other supplementary functions to facilitate base station maintenance, which include but not limited signaling tracing, channel viewing, abnormal record reporting and viewing.

7 Installation

BS8908 is easy for deployment with fewer requirements to the equipment room compared with traditional BTS:

- It is portable to transport and flexible install on the pole, tower and walls.
- Only the E1/FE/GE and power cable to be connected.
- Suitable for any weather with tight but light water resist and dust proof case.
- Natural cooling, zero noise.

The feeder loss can be saved when the BS8908 is installed close to the antenna, which extends the coverage.

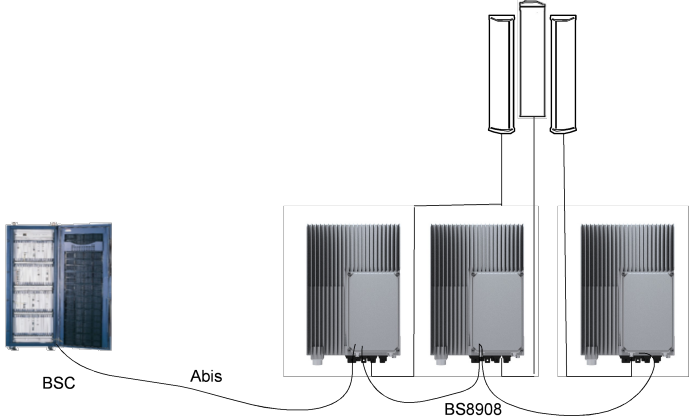
8 Configuration Mode

Single unit supports 1 TRX to 6 TRXs by software configuration. It is convenient to expand by cascading. Star and chain connection are supported for flexible networking topology.

Table 3 Configuration of BS8908

Site Type	Number of BS8908	Number of X-polar Antenna
O1-O6	1	1
S11-S66	2	2
S111-S444	3	3

Figure 5 S444 Configuration



9 Acronyms and Abbreviations

Abbreviations	Full Name
3GPP	3rd Generation Partnership Project
AMR	Adaptive Multi Rate
BRACS	Barrier Access Control Sub-system
BRS	Barrier Sub-system
BSC	Base Station Controller
BSP	Board Support Package
BTS	Base Transceiver Station
CORBA	Common Object Request Broker Architecture
DBS	Data Base Sub-system
DL	Down Link
DTX	Discontinuous transmission
EDGE	Enhanced Data rates for GSM Evolution
GE	Gigabit Ethernet
GERAN	GSM Edge Radio Access Network
GPS	Global Positioning System
GSM	Global System for Mobile communications
HR	Half Rate
LMT	Local Maintenance Terminal
MS/UE	Mobile Station/User Equipment
MTBF	Mean Time Between Failures
MTTR	Mean Time To Recovery
NM	NetNumen
NMS	Network Management System
OAM	Operating And Maintenance
OSS	Operation Support Sub-system
PA	Power Amplifier
RF	Radio Frequency

RTT	Round Trip Time
SCS	System Control Sub-system
SDH	Synchronous Digital Hierarchy
SDR	Software Defined Radio
SNMP	Simple Network Management Protocol