Operator Logo

ZXUR 9000 Product Description

(UR14)

ZXUR 9000 Product Description

Version	Date	Author	Reviewer	Notes
V1.0	2014/12	Macy Jin		Not open to the third party

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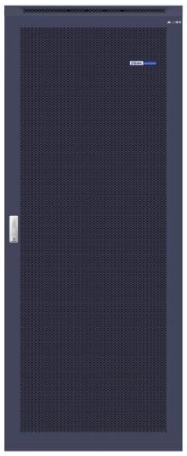
1 Product Overview

1.1 Introduction

Being as a new generation radio network controller, ZXUR 9000 uses all IP hardware structure, modularized design and distributed idea, providing network control functionality under GSM, UMTS or GU dual mode. It has extremely large processing capability, with high integration and intelligent design, which effectively improve the utilization rate of transmission and radio resources, simplify the whole network maintenance, cut down CAPEX and make the maintenance more convenient.

Figure 1-1 ZXUR 9000 Appearance



1.2 Benefits

Non Blocking Capability with IP Architecture

With all IP switching platform, data transmission is highly efficient and flexible. The high performance packet data management platform ensures the system non-blocking data transaction capability.

High Integration and Intelligent Design

Based on the same hardware platform, GSM, UMTS or GU dual mode can be supported. The board software package can be smoothly upgraded and switched between GSM/UMTS or adjusted to GU dual mode.

G/U Resource Sharing

When configuring GU dual mode, ZXUR 9000 uses unified RRM. Load information of GSM and UMTS are considered synthetically during traffic setup or handover so as to make balance between two systems. Furthermore, common transmission resource management and IP co-transmission are provided through unified transmission scheduling between GSM and UMTS.

High Reliability Design

All boards in ZXUR 9000 have backup design to ensure reliability of huge capacity controller.

- Control plane boards use 1+1 backup and load sharing mechanism.
- User plane boards use load sharing mechanism.
- Interface boards can be configured as 1+1 backup or load sharing according to requirements.
- Switch boards can be configured as load sharing.

2 Product Architecture

2.1 Physical Structure

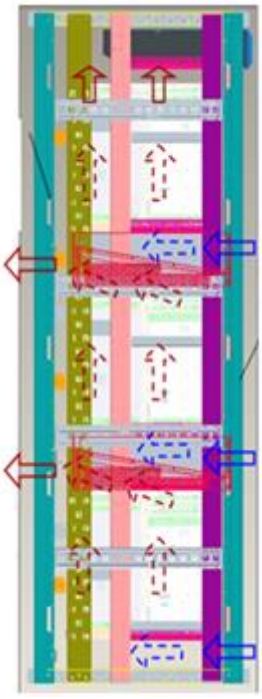
ZXUR 9000 follows the industry technology trend designed by modularization. It also has strong capability to support data services and new functions because of its high integration. In long term view, ZXUR 9000 can meet with the requirements of evolution and development of RAN network in the future.

ZXUR 9000 uses a standard 19 inches rack, and the dimension is 2200mm * 600mm * 800mm (H*W*D). The rack of ZXUR 9000 is shown as the following figures.

Figure 2-1 ZXUR 9000 Physical Structure

ZXUR 9000 uses independent air flue design. Air is induced in the front and exhausted in the rear for the shelves in the middle and the bottom, and the air is induced in the front and exhausted in the top for the top shelf. The figure below shows detail:

Figure 2-2 ZXUR 9000 Ventilation Structure



Note: the blue arrow shows air outlet, and the red arrow shows air intake. The dotted blue arrow and dotted red arrow stand for the air flow direction.

2.2 Hardware Architecture

The rack of ZXUR 9000 consists of 3 shelves, which is named as Enhanced Resource Shelf (ERS). Each ERS has a backplane with 28 board slots (14 in front and 14 in rear).

With different combination of boards, the ERS has two logic types of shelves: master shelf and slave shelf.

The difference between master shelf and slave shelf is that the master shelf has the master clock distribution function and works as the switch center among shelves. Other functions of master shelf and slave shelf are the same such as access, process and peripheral monitoring units.

Master shelf is mandatory, and there is only be one master shelf in each rack.

Slave shelf is optional, and the amount of shelf could be 0~2.

Figure 2-3 ZXUR 9000 Shelf (Front/Rear/Side face)

2.2.1 Switch Board

Switch board provides large capacity and non-blocking switch function for system control management, communication between service processing boards and traffic connection among multiple access units.

Switch board includes:

- EGBS (Enhanced GE Base Switch board, GSM/UMTS):

EGBS is the switch board of control plane, and provides intra-shelf and inter-shelf control plane switch channel.

EGBS in master shelf is in charge of the control plane channel between two slave shelves and one master shelf.

- EGFS (Enhanced GE Fabric Switch board, GSM/UMTS):

EGFS is the switch board of user plane, and provides intra-shelf and inter-shelf user plane switch channel.

EGFS in master shelf is in charge of the user plane channel between two slave shelves and one master shelf.

EGFS in master shelf also works as a clock board, which is responsible for the clock supply and external synchronization.

2.2.2 Processing Board

Processing board processes control plane signaling and user plane information, including voice, data, stream and transcoding.

Processing board includes:

- UMP (Universal Management Process board, GSM/UMTS):

UMP realizes operation and maintenance function, and provides global management processing.

- USP (Universal Service Process board, GSM/UMTS):

USP realizes service processing function, including the GSM/UMTS control plane and user plane protocol stack processing.

From the viewpoint of logic functionality, USP board is divided into three parts: CU (Common Unit), DUc (Dedicate Unit control plane) and DUm (Dedicate Unit media plane).

Both CU and DUc are responsible for control plane processing. CU is used for common signaling processing among cells while DUc is dedicated for user signaling processing irrelative with cells.

DUm is used for user plane processing.

- ETCB (Enhanced Trans Coder Board, GSM):

ETCB realizes transcoding and adaptation functionality.

2.2.3 Interface Board

Interface board provides access implementation for A, Abis, Ater, Gb, Iu, Iub, Iur interfaces. Different interface boards are configured so as to achieve customized transmission solution.

Interface board includes:

- EDTA (Enhanced Digital Trunk board ATM version, UMTS):

EDTA realizes ATM over E1/T1 access function.

- ESDTA (Enhanced SDH Digital Trunk board ATM version, UMTS):

ESDTA realizes ATM over CSTM-1 access function.

- EDTI (Enhanced Digital Trunk board IP version, GSM/UMTS):

EDTI realizes IP over E1/T1 access function.

- ESDTI (Enhanced SDH Digital Trunk board IP version, GSM/UMTS):

ESDTI realizes IP over CSTM-1 access function.

- EDTT (Enhanced Digital Trunk board TDM version, GSM):

EDTT realizes TDM over E1/T1 access function.

- ESDTT (Enhanced SDH Digital Trunk board TDM version, GSM):

ESDTT realizes TDM over CSTM-1 access function, which can be used in A interface only.

- EGPB (Enhanced GE Process Board, GSM/UMTS):

EGPB realizes GE/FE access function.

- EAPB (Enhanced ATM Process Board, UMTS):

EAPB realizes ATM over STM-1 access function.

- ESDTG (Enhanced SDH Digital Trunk board GSM version, GSM)

ESDTG realizes TDM over CSTM-1 access function.

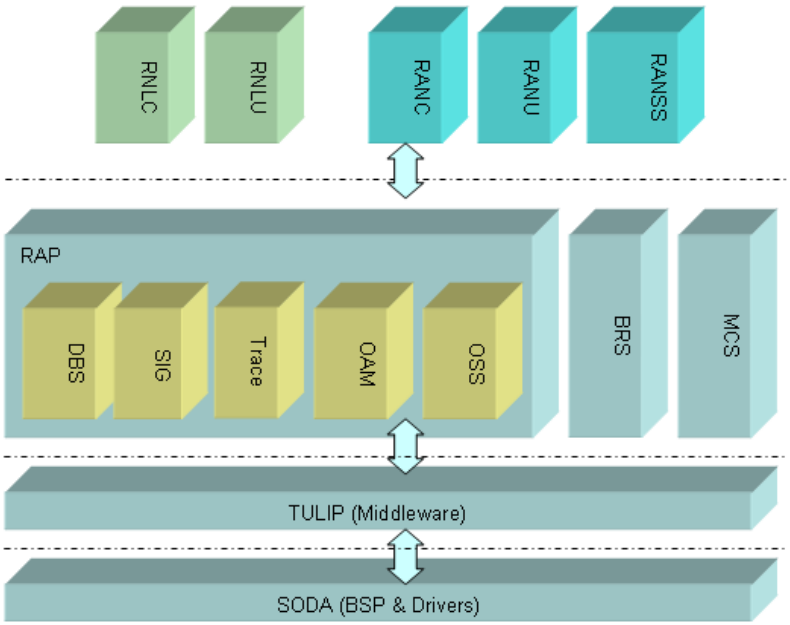
- EXGB1b (Enhanced XGE Process Board 1b, GSM/UMTS)

EXGB1b realizes 10GE access function.

2.3 Software Architecture

ZXUR 9000 software includes SODA (BSP&DRIVERS), TULIP (middleware), BRS, MCS, DBS, OAM, OSS, Trace/Log, SIG, RANC, RANU, RANSS, RNLC and RNLU.

Figure 2-4 Software Structure of ZXUR 9000



SODA (BSP & Drivers): BSP sub-system. It is responsible for offering driver for hardware, screen hardware function and mapping of logical functions to upper software.

TULIP: TULIP middleware. It is responsible for providing unified virtual OS service between hardware and high level applications, with support of various mainstream operation system, e.g. Linux.

MCS: Micro-Code Sub-system. Its main function is to quickly deal with user plane's data and to realize separation between user plane and control plane.

BRS: Bearer Sub-system. It offers ATM, IP, TDM bearer services for service sub-system, signaling sub-system and O&M sub-system. The function of BRS can be divided into link layer function, network transmission function, dynamic router function, ATM function, and flux-controlling function.

DBS: Database Sub-system. It is responsible for management of network element and information of services, signaling, and protocol.

SIG: Signaling Sub-system. It is responsible for providing signaling control functionality in transport layer, supporting various transport protocol, e.g. NO.7 signaling and SIGTRAN.

Trace/Log: Trace/Log Sub-system. It is responsible for providing trace and logging service to various application software modules.

OAM: Operation and Maintenance Sub-system. It manages network elements including RNC, BSC and BTS.

OSS: Operation & Support Sub-System. It is responsible for monitoring the whole system, controlling application processes, downloading software and upgrading system.

RANC: GSM RAN Control Sub-system. It is responsible for managing the control panel protocol of Um, Abis, A, Gb, Lb, including wireless resource management, dynamic channel adjustment, load control, handover processing and signaling connection management.

RANU: GSM RAN User plane Sub-system. It is responsible for transferring data through wireless interface and Gb interface, in PS domain or Iu mode; it is also responsible for providing signal's TC functionality in CS domain.

RANSS: GSM RAN Support Sub-system. It is responsible for supporting control panel and user panel to signal whole BSC functions including load control, access control, etc.

RNLC: UMTS RAN Control Sub-system. It is responsible for managing UTRAN control plane protocol of Uu, Iub, Iur, Iu, Iur-g, including RRM algorithm implementation, admission control and handover processing, etc.

RNLU: UMTS RAN User plane Sub-System. It is responsible for managing UTRAN user plane protocols and transferring user data.

2.4 Functionalities

2.4.1 Basic Functions

ZXUR 9000 works in 3 modes: ZXUR 9000 GSM single mode, ZXUR 9000 UMTS single mode and ZXUR 9000 G/U dual mode.

ZXUR 9000 provides Abis/A/Gb/Ater interface in GSM and Iub/Iu-CS/Iu-PS/Iur in UMTS.

The main functionalities of ZXUR 9000 include:

- System information broadcast and UE access control
- Mobility management such as handover, etc.
- Radio resource management such as power control, cell resource allocation, etc.
- Access bearer service of CS and PS domain
- Encryption and decryption for signaling and data

2.4.2 Service Functions

Moreover, main service functions of ZXUR 9000 are listed as follows:

- GSM voice service (FR/EFR/HR/AMR/AMR-WB), GPRS, EDGE, EGPRS2-A of E-EDGE
- Support VAMOS, Soft Synchronization, IFTA functionalities which can improve spectrum efficiency, and increase network capacity
- UMTS R99 service, HSPA (DL 14.4Mbps/UL 5.76Mbps), HSDPA DB-DC, DB-DC+MIMO and 4C+64QAM+MIMO (DL 168Mbps/UL 23Mbps)
- Supports 3GPP MOCN
- Supports RNC Pool for resource sharing
- Supports interworking between G/U and LTE network

- Support IPV6

3 Technical Specifications

3.1 Physical Indices

Table 3-1 ZXUR 9000 Physical Indices

Item	Indices
Dimension (Height * Width * Depth)	2200 * 600 * 800 (mm)
Weight	≤430 Kg/Rack
Color	Navy Blue

3.2 Capacity Indices

In the case of three shelves, all indices are shown as below. When G/U works simultaneously, the capacity can be configured flexibly according to actual requirements.

Table 3-2 ZXUR 9000 Capacity Indices

Working Mode	TRX	Cell	Site	BHCA (K)	Erl (K)	Maximum PS Thr. (Gbps)
GSM (IP A)	12,250	5,600	2,800	16,800	73.5	2.14
UMTS	-	8,400	5,600	32,500	244	43.5

3.3 Power Indices

Table 3-3 ZXUR 9000 Power Indices

Item	Indies
Power Input	-48V DC

Item	Indies
Allowable Fluctuation Range	-57 ~ -40V DC
Power Consumption	≤3,000W (1 Shelf) ≤6,000W (2 Shelves) ≤9,000W (3 Shelves)
Heat Consumption	≤3,000W (1 Shelf) ≤6,000W (2 Shelves) ≤9,000W (3 Shelves)
Grounding Resistance	<1 Ω

3.4 Interface Indices

Table 3-4 ZXUR 9000 Interface Indices

Transmission type	Standard	Interface Board	Port Interface	Remark
E1/T1	ITU-T G.703/G.704	EDTA	DB64	Provide 32*E1/T1 for ATM Iub
		EDTI	DB44	Provide 32*E1/T1 for IP Iub/Abis/Gb
		EDTT	DB44	Provide 32*E1/T1 for TDM A/Abis/Ater
Channelized STM-1/OC-3	ITU-T G.957 ITU-T I.432.1 ITU-T I.432.2	ESDTA	LC/PC	Provide 4*channelized STM-1/OC-3 optical ports for ATM Iub
		ESDTI	LC/PC	Provide 4*channelized STM-1/OC-3 optical ports for IP Iub/Abis and Gb
		ESDTT	LC/PC	Provide 4*channelized STM-1/OC-3 optical ports for TDM A
		ESDTG	LC/PC	Provide 4*channelized STM-1/OC-3 optical ports for TDM Abis and Ater

Transmission type	Standard	Interface Board	Port Interface	Remark
STM-1/OC-3c	ITU-T G.957 ITU-T I.432.1 ITU-T I.432.2	EAPB	LC/PC	Provide 4*STM-1/OC-3 optical ports for ATM Iub/Iu/Iur
GE/FE	IEEE 802.3	EGPB	RJ45	Provide 4*GE/FE electrical ports for IP Iub/Iu/Iur/Abis/Gb/A
			LC/PC	Provide 4*GE optical ports for IP Iub/Iu/Iur/Abis/Gb/A
10GE	IEEE 802.3	EXGB1b	LC/PC	Provide 2*10GE optical ports for IP Iub/Iu/Iur/Abis/Gb/A

3.5 Environment Indices

Table 3-5 ZXUR 9000 Environment Indices

Item	Indices	
Equipment Environment	Temperature	Long-term operation: 0°C~45°C Short-term operation: -5°C~50°C
	Humidity	Long-term operation: 5%~85% Short-term operation: 5%~90%
	Noise	When the system works in full load and the working temperature is 23°C ± 2°C, the noise power level is less than7.2 Bels
	Atmospheric pressure	70 kPa ~106 kPa
Storage Environment	It should be packed and stored indoors. Temperature: -40°C~+70°C. Relative humidity: 10%~90%; free of condensation.	
Transport Environment	Transport environment: 2K4P/2B2/2C3/2S3/2M3 Sustainable transport time: 30 days Intact package	

Item	Indices
Mechanical Adaptability	ETSI 300 019-1-3 Class 3.1 Part 1-3: Classification of environmental conditions Stationary use at weather protected locations

3.6 Electromagnetic Compatibility Indices

Table 3-6 ZXUR 9000 EMC Indices

Item	Indices
Static Discharge Immunity	Contact Discharge: ±6000V Air Discharge: ±8000V
Surge Impact Immunity	DC Power port Line(Ground): ±1000V

3.7 Clock Indices

Table 3-7 ZXUR 9000 Clock Indices

Item	Indices
Synchronization Level	Level 2 class A
Clock Working Mode	Fast capture, tracking, handover and free-run

3.8 Reliability Indices

In ZXUR 9000, the algorithm of system reliability is based on the GJB/Z299B Electronic Equipment Reliability Estimation Manual and MIL-HDBK-217F Electronic Equipment Reliability Estimation.

Table 3-8 ZXUR 9000 Reliability Indices

Item	Indices
MTBF	≥650,000 hours
MTTR	0.5 hour

Item	Indices
Availability	99.99992%
Downtime	≤1 minute/year

4 Compliance with Standards

Table 4-1 Standards Compliance

Item	Standard
Transport and Storage	ISTA 1H NEBS GR-63-CORE GR-3108-CORE ETS 300 019-1 Series
EMC	EN 300 386 CISPR 22, class B (emission, international) The EMC directive, 89/336/EEC FCC part 15 GR 1089-CORE Issue 4
Earthquake	NEBS GR-63-CORE GR-3108-CORE ETS 300 019-1-3 ETS 300 019-1-4
Shock	NEBS GR-63-CORE GR-3108-CORE GR-487-CORE ETS 300 019-1 Series
Acoustic Noise	NEBS GR-63-CORE GR-3108-CORE GR-487-CORE ETS 300 753
Safety	IEC/EN 60 950-1 UL 60950-1 The Low Voltage Directive 2006/95/EC (Previous 73/23/EEC) UL60950-1 1st edition CSA 22.2 NO. 60950-1-03

5 Typical Configuration

ZXUR 9000 features in modularized design and distributed management system. Configuration of ZXUR 9000 is flexible and highly integrated with TC of 2G and control & user plane protocol processing.

Three typical types of ZXUR 9000 configuration are shown below. The actual capacities can be configured flexibly according to different requirements.

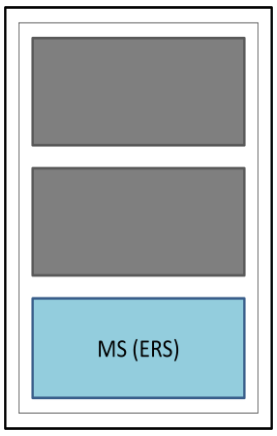
5.1 Typical Configuration of ZXUR 9000 GSM

5.1.1 Configuration 1: Typical Configuration for Medium Capacity

Table 5-1 Medium Capacity Configuration of ZXUR 9000 GSM

Working Mode	TRX	Cell	Site	BHCA (K)	Erl (K)	PS Thr. (Gbps)
GSM (IP A)	5,120	2,560	2,560	7,000	30.7	0.90

Figure 5-1 Medium Capacity Configuration within One Shelf of ZXUR 9000 GSM

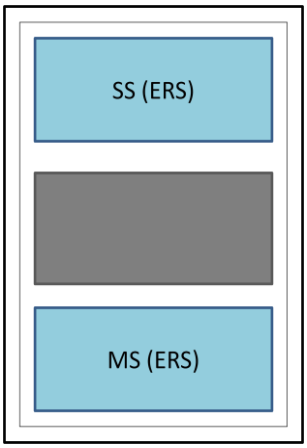


5.1.2 Configuration 2: Typical Configuration for Large Capacity

Table 5-2 Large Capacity Configuration of ZXUR 9000 GSM

Working Mode	TRX	Cell	Site	BHCA (K)	Erl (K)	PS Thr. (Gbps)
GSM (IP A)	8,192	4,096	2,800	11,200	49.1	1.43

Figure 5-2 Large Capacity Configuration within Two Shelves of ZXUR 9000 GSM

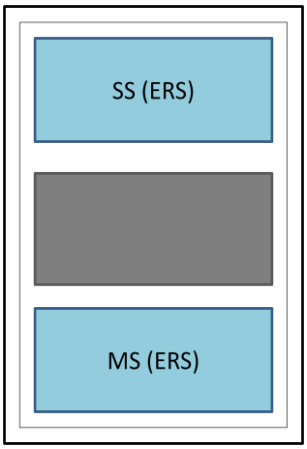


5.1.3 Configuration 3: Maximum Capacity Configuration

Table 5-3 Maximum Capacity Configuration of ZXUR 9000 GSM

Working Mode	TRX	Cell	Site	BHCA (K)	Erl (K)	PS Thr. (Gbps)
GSM (IP A)	12,250	5,600	2,800	16,800	73.5	2.14

Figure 5-3 Maximum Capacity Configuration of ZXUR 9000 GSM



The maximum capacity configuration can be reached within two shelves, and the rest shelf is reserved for low rate interface boards.

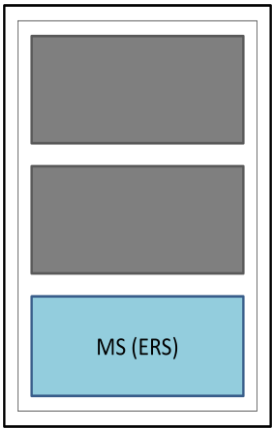
5.2 Typical Configuration of ZXUR 9000 UMTS

5.2.1 Configuration 1: Typical Configuration for Medium Capacity.

Table 5-4 Medium Capacity Configuration of ZXUR 9000 UMTS

Working Mode	Site	Cell	BHCA (K)	Erl (K)	PS Thr. (Gbps)
UMTS	3,000	3,000	8,500	64	11.5

Figure 5-4 Medium Capacity Configuration within One Shelf of ZXUR 9000 UMTS

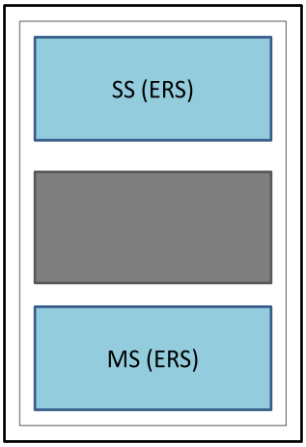


5.2.2 Configuration 2: Typical Configuration for Large Capacity

Table 5-5 Large Capacity Configuration of ZXUR 9000 UMTS

Working Mode	Site	Cell	BHCA (K)	Erl (K)	PS Thr. (Gbps)
UMTS	5,600	7,200	20,500	154	27.5

Figure 5-5 Large Capacity Configuration within Two Shelves of ZXUR 9000 UMTS

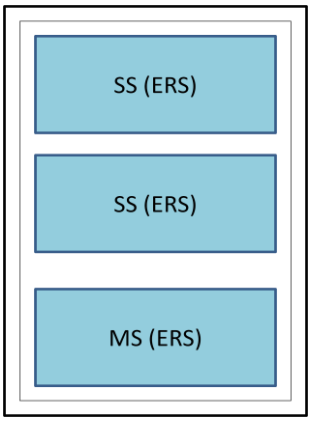


5.2.3 Configuration 3: Maximum Capacity Configuration

Table 5-6 Maximum Capacity Configuration of ZXUR 9000 UMTS

Working Mode	Site	Cell	BHCA (K)	Erl (K)	PS Thr. (Gbps)
UMTS	5,600	8,400	32,500	244	43.5

Figure 5-6 Maximum Capacity Configuration of ZXUR 9000 UMTS



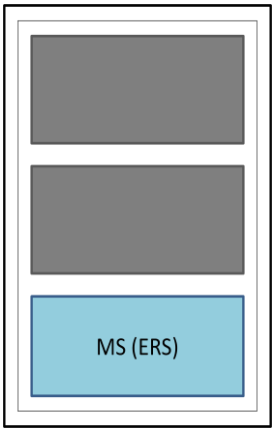
5.3 Typical Configuration of ZXUR 9000 GU

5.3.1 Configuration 1: Typical Configuration for Medium Capacity

Table 5-7 Medium Capacity Configuration of ZXUR 9000 GU

Working Mode		TRX	Cell	Site	BHCA (K)	Erl (K)	PS Thr. (Gbps)
Dual Mode	GSM (IP A)	2,048	1,024	1,024	2,800	12.2	0.36
	UMTS	-	1,800	1,800	5,000	38	6.9

Figure 5-7 Medium Capacity Configuration within One Shelf of ZXUR 9000 GU

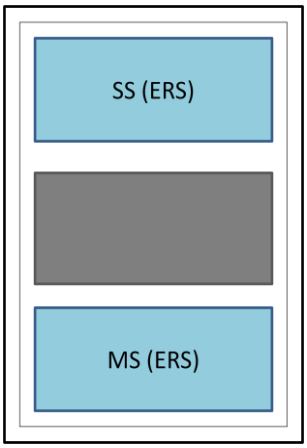


5.3.2 Configuration 2: Typical configuration for Large Capacity

Table 5-8 Large Capacity Configuration of ZXUR 9000 GU

Working Mode		TRX	Cell	Site	BHCA (K)	Erl (K)	PS Thr. (Gbps)
Dual Mode	GSM (IP A)	5,120	2,560	2,560	7,000	30.7	0.90
	UMTS	-	3,000	3,000	8,500	64	11.5

Figure 5-8 Large Capacity Configuration within Two Shelves of ZXUR 9000 GU

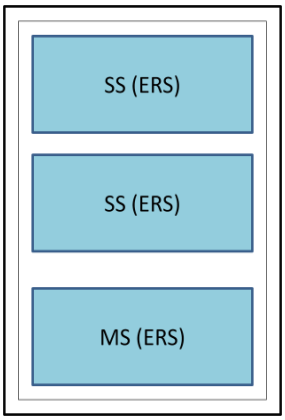


5.3.3 Configuration 3: Full Configuration

Table 5-9 Full Configuration of ZXUR 9000 GU

Working Mode		TRX	Cell	Site	BHCA (K)	Erl (K)	PS Thr. (Gbps)
Dual Mode	GSM (IP A)	5,120	2,560	2,560	7,000	30.7	0.90
	UMTS	-	7,200	5,600	20,500	154	27.5

Figure 5-9 Full Configuration of ZXUR 9000 GU



6 Abbreviations

Table 6-1 Abbreviations

Abbreviations	Full Characteristics
ATM	Asynchronous Transfer Mode
BHCA	Busy-Hour Call Attempts
BRS	Barer Sub-system
BSC	Base Station Controller
BTS	Base Transceiver Station
CN	Core Network
CU	Common Unit
DBS	Database Sub-system
DUc	Dedicate Unit control plane
DUm	Dedicate Unit media plane
EAPB	Enhanced ATM Process Board
EDTA	Enhanced Digital Trunk board ATM version
EDTI	Enhanced Digital Trunk board IP version
EDTT	Enhanced Digital Trunk board TDM version
EGBS	Enhanced GE Base Switch board
EGFS	Enhanced GE Fabric Switch board
EGPB	Enhanced GE Process Board
EMC	Electro-Magnetic Compatibility
ERS	Enhanced Resource Shelf
ESDTA	Enhanced SDH Digital Trunk board ATM version
ESDTG	Enhanced SDH Digital Trunk board GSM version
ESDTI	Enhanced SDH Digital Trunk board IP version
ESDTT	Enhanced SDH Digital Trunk board TDM version
ETCB	Enhanced Trans Coder Board
EXGB1b	Enhanced XGE Process Board 1b
GE	Gigabit Ethernet
GSM	Global System for Mobile communications

Abbreviations	Full Characteristics
MCS	Microcode Subsystem
MS	Main Shelf
MS/UE	Mobile Station/User Equipment
MTBF	Mean Time Between Failures
MTTR	Mean Time to Repair
OAM	Operating And Maintenance subsystem
OMM	Operation and Maintenance Module
OSS	Operating & Support Subsystem
QoS	Quality of Service
RANC	RAN Control
RANSS	RAN Support Sub-system
RANU	RAN User
RNC	Radio Network Controller
RNLC	Radio Network Layer Control plane subsystem
RNLU	Radio Network Layer User plane subsystem
RRM	Radio Resource Management
SDH	Synchronous Digital Hierarchy
SIG	Signaling subsystem
SS	Slave Shelf
TC	Trans Coder
UMP	Universal Management Process board
UMTS	Universal Mobile Telecommunications System
UTRAN	UMTS Terrestrial Radio Access Network
USP	Universal Service Process board