

# OpenArchitect® ZX7000

## ATCA 14/16 Slot PICMG 3.1 Option 2 Ethernet Switch



### Product Description

The ZX7000 is a 48-port AdvancedTCA® Hub board / PTMC Carrier, providing switched Gigabit Ethernet service for up to 14 node boards via the PICMG 3.0 Base Interface and PICMG 3.1 Fabric Interface. The ZX7000 provides a tightly integrated modular switching platform that enables high-density solutions with the addition of onboard PMC/PTMC sites.

Linux-based OpenArchitect® 3 runs on the embedded Freescale MPC8270VR, providing a comprehensive package for the management of Layer 2 and Layer 3 packet switching. VLAN management and Layer 2-7 packet classification are also included with a user-friendly interface. OpenArchitect may be used with a variety of IP routing protocols.

Up to 12 switch egress ports are provided, depending on chassis/switch configuration, and one port is dedicated to the switch-to-switch connection in redundant configurations. For additional management connections, a USB, RS-232 serial, and three out-of-band 10/100 Ethernet ports are available for local configuration.

### PTMC Carrier

Two standards-based PMC/PTMC slots allow for significant expansion of possible applications. Each slot may host additional memory, I/O, processing or packet-processing capability.

### Fault Tolerant Backplane

By providing completely separate switches and control processors for the Two ZX7000 AdvancedTCA® switches can be used in a standard ATCA chassis to implement a fully redundant dual star network architecture over the base and fabric interface. Each payload slot has two Base Interface connections, one to each switch. With the OpenArchitect High Availability (HA) software suite, the chassis can respond and automatically correct any single point of failure.

### Ordering Information

Part Number	Description
ZX7000	48-port GigE PICMG 3.0/3.1 Hub Board, PTMC Carrier, L2 – L7 Operation
ZX6000-RTM	ATCA RTM w/ 4 1G (RJ-45) + 2) + OOB RS-232 port + OOB Ethernet
ZX6000-PE4	PTMC Egress Card provides 2 in-band GigE ports, OOB RS-232 console port, and OOB Ethernet port
ZX6000-PE2	PTMC Egress Card provides 2 in-band GigE ports

### ATCA Base Ethernet

#### • 48-port Non-Blocking Gigabit Ethernet Switch

- Supports 14 or 16 slot ATCA Chassis
- Up to 14 PICMG 3.0 Base Interface Ports
- Up to 14 PICMG 3.1 Option 1 Fabric Ports
- Up to 12 PICMG 3.1 Option 2 (2.0Gb/s) Fabric Ports
- Up to 12 GigE RJ-45 Egress Ports
- Inter-Switch Link
- One or Two Shelf Manager (ShMC) Links

#### • Two PMC/PTMC, Option 5 GigE Sites (2.0Gb/s)

#### • Optional RTM

- Two RS-232 Management Ports
- Two 10/100 Ethernet Management Ports
- Up to Four In-band Gigabit Ethernet Ports

#### • Base Switch Control Processor

- OpenArchitect® 3 Linux Switch Control Software
- Freescale 8270VR PowerPC Processor
- 256MB SDRAM
- 64MB Flash ROM for redundant system image
- CompactFlash socket for additional storage
- Recessed front-panel reset button
- RS-232 Console RJ45 to front panel & RTM
- 10/100 Ethernet RJ45 OOB to front panel & RTM

### Auxiliary Features

#### • RTM

- Four Base in-band ports (RJ45)
- OOB port for both Base and Fabric
- Mirrored RS-232 console ports

### Networking Features

#### • Layer 2 / Layer 3 Networking Features

- Wire-speed L2/L3 Switching
- Wire-speed L2 - L7 Packet Classification
- IEEE802.1Q 4096 VLANs
- IEEE802.3ad Link Aggregation (static)
- IEEE802.1D Spanning Tree (STP)
- IEEE802.1D-2004 Rapid Spanning Tree (RSTP)
- Virtual Router Redundancy Protocol (VRRP)
- Common Open Policy Service (COPS)
- Differentiated Services (DiffServ)
- Sophisticated Load Balancing
- Port Mirroring in Hardware

#### • Management

- Linux shell interface (Bash, et.al.)
- SNMP management (v1, v2, v3)
- Secure Shell daemon (SSH v2)
- DHCP server / client / relay
- Network Time Protocol (NTP) client
- Web server (HTTPD) for browser access

## OpenArchitect®

The core software technology of the ZX7000 goes far beyond simple Ethernet switch management. The field proven OpenArchitect® embedded operating system provides Linux-enabled flexibility in management protocols, configuration, packet vectoring, and high-availability features. Only ZNYX OpenArchitect® uses familiar, industry-standard Linux interfaces, enabling simple system configuration and true transparency for network integration.

## OpenArchitect® Features

OpenArchitect® uses open-source, industry compatible APIs for networking. This allows any Linux-compatible protocol stack to work, giving ISVs flexibility in the choice of protocol stacks.

Features	Benefit
bash shell	Familiar command-line interface with scripting capability
ssh	Secure remote sessions
BusyBox toolkit	All the familiar UNIX/Linux/POSIX tools
vi editor	Widely used text editor for maintaining configuration files
tftp/ftp	Standard file transfer mechanisms
telnet	Remote session access
thttpd daemon	Web-based file service
net-SNMP	The latest in SNMP v1, v2, and v3 protocol support
STP/RSTP/MSTP	IEEE 802.1D automatic network configuration
iptables	Filter/Forward packets based on arbitrary rules for security
dhcpd	DHCP server for auto-configuration of payload and other nodes
port-based DHCP	IP Address assignment based on chassis slot number
zconfig	Complete control over VLAN configuration

## OpenArchitect®/High Availability (OA/HA)

Continuous (“five nines” or better) operation is a hard requirement in most networks, making hardware redundancy a must. Software facilities are equally critical to enable automatic, rapid re-convergence of the network around failed components. OpenArchitect/HA fills this need with the fastest fail-over performance possible in packet-switched networks. Instead of convergence in seconds or minutes as is typical for STP/RSTP failover schemes, OpenArchitect/HA can fail-over in milliseconds, often faster than the dual-SONET standard of 50 milliseconds.

## Flexibility

A key feature that enables the true application flexibility of the ZX7000 are the four PMC/PTMC sites. These allow industry-standard third-party function boards to be hosted on the ZX7000. In some cases this eliminates the need to use an ATCA payload slot for the same purpose, improving the density of the system chassis while gaining a cost advantage. Functions can include a variety of I/O boards, supplemental processors, memory devices, and packet processors.

The flexibility and power of the Linux-based OpenArchitect software allows fast implementation of features such as:

- System Logging
- Chassis Firewall
- NAT
- System Boot Servers and File Servers
- T1/E1 or T3 Egress gateway
- ATM interface
- IPv6 migration
- Supplemental Out-of-Band ports
- Packet Processing

## Features

### ATCA 3.0 Features

- **AdvancedTCA® form factor**
  - Supports both 14 and 16 slot Chassis
  - Complies with ATCA cooling environment
  - Single-PCB Design
  - Standard ATCA LED suite
  - Positive-latch ejector handles
- **IPMI Management Module (IPMC)**
  - Thermal & Fuse-Failure sensors for switch
  - Voltage Sensors for each power rail
  - I2C FRU ROM
  - ATCA 3.0 compliant E-Key function
- **Multiple-mode LED status Display**
  - Link/Activity/Speed Status for Base and Fabric Interface by port number
  - Operational Status of each link
  - Front panel mode-select button

### Additional Features

- **OpenArchitect® LED Status Display**
  - CLK indicates CPU health
  - OK indicates software ready
  - EXT Fault indicates external cable/link problem
  - INT Fault indicates internal hardware fault
- **Telco Compliance Engineering Standards**
  - NEBS / ETSI

## Standards and Specifications

Standard	Revision	Description	Status
ATCA 3.0	2.0	AdvancedTCA® Base Specification	Designed for compliance
ATCA 3.1	1.0	AdvancedTCA® for Ethernet	Fully Adopted
IEEE 802.3-2005	9 Dec. 2005	IEEE 802.3 Ethernet Specifications	Fully adopted.
IPMI	1.5	Intelligent Platform Management Interface	Fully adopted.
GR-1089-CORE, GR-63-CORE		Network Equipment Building System	Designed for Compliance
PICMG 2.15		PCI Telecom Mezzanine Card	Fully adopted.

## Front Panel



## Emissions

Standard	Class	Agency/Report Format	Description
CFR 47, Part 15, Subpart B 1998 (ANSIC63.4 1992)	A	FCC	United States
CE Conformity	A	EN55022 (2006) Class A EN55024 (1998), A1 – 2001, A2 – 2003 EN60950-1: (2001) A11 – 2004 EN61000-4-2: ESD EN61000-4-3: RF EM Field, AM EN61000-4-4: EFT, Signal Ports EN61000-4-6: RF, conducted continuous	European Union
VCCI (ANSI C63.4-1992 / CISPR 22-1997)	A	VCCI	Japan / International
ICES-003, Issue 3	A	ICES 003	Canada
KN22, KN24	A	MIC	South Korea

## Environment

Specification	Unit Measure	Lower Limit	Upper Limit
Temperature, Operating - Normal	Celcius	+5C	+40C
Temperature, Operating – Short Term	Celcius	-5C	+55C*
Ambient Temperature, Storage	Celcius	-40C	+70C
Operating Voltage Range	Volts	-39V	-72V
Ambient Humidity (Non-Condensing) Operating/Storage	Percent	5%	90%

\* It is not recommended that the ZX7000 be operated at the upper limit of the Ambient Operating Temperature for extended periods of time. When operating at the upper limit, it is recommended that 500 lfm airflow is used.

## Safety

Standard	Description
UL 60950 1 <sup>st</sup> Edition	United States
CAN/CSA 22.2 No 60950-1 1 <sup>st</sup> Edition	Canadian
IEC 60950-1 : 2001 First Edition	International
EN 60950 (1992) Amendments 1, 2, 3, 4, & 11	European Union

## Power Consumption

Maximum Power Consumption	<84 Watts
Power Consumption per Gigabit	~ 1.75W

## Reliability

MTBF	>160,000 hours
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## Hazardous Substances

JIG A / JIG B Compliant	Japan
RoHS Compliant (6 of 6)	European Union
WEEE Directive	European Union

## Configuration Guide

The ZX7000 has an assortment of build options to allow it to be used in a wide variety of applications. The table below shows how the switch ports are allocated for each option.

Product	ZX7000AA	ZX7000AB	ZX7000AC	ZX7000BA	ZX7000BB	ZX7000BC	ZX7000CA	ZX7000CB	ZX7000CC	ZX7000DA	ZX7000DB	ZX7000DC
<b>Build Options</b>												
Base Option	<b>A</b>	<b>A</b>	<b>A</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>C</b>	<b>C</b>	<b>C</b>	<b>D</b>	<b>D</b>	<b>D</b>
ZMC Option	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>A</b>	<b>B</b>	<b>C</b>
<b>Base Interface Channels</b>												
ShMC 1	22	22	22	22	22	22	22	22	22	22	22	22
ShMC 2							13	13	13	13	13	13
ISL (Channel 2)	23	23	23	23	23	23	23	23	23	23	23	23
Node 3	0	0	0	0	0	0	0	0	0	0	0	0
Node 4	1	1	1	1	1	1	1	1	1	1	1	1
Node 5	2	2	2	2	2	2	2	2	2	2	2	2
Node 6	3	3	3	3	3	3	3	3	3	3	3	3
Node 7	4	4	4	4	4	4	4	4	4	4	4	4
Node 8	5	5	5	5	5	5	5	5	5	5	5	5
Node 9	6	6	6	6	6	6	6	6	6	6	6	6
Node 10	7	7	7	7	7	7	7	7	7	7	7	7
Node 11	8	8	8	8	8	8	8	8	8	8	8	8
Node 12	9	9	9	9	9	9	9	9	9	9	9	9
Node 13	10	10	10	10	10	10	10	10	10	10	10	10
Node 14	11	11	11	11	11	11	11	11	11	11	11	11
Node 15	20	20	20	20	20	20	20	20	20	20	20	20
Node 16	21	21	21	21	21	21	21	21	21	21	21	21
<b>Front Egress</b>												
PTMC1 - 1	12	12	12	12	12	12	12	12	12	12	12	12
PTMC1 - 2	13	13	13	13	13	13						
PTMC1 - 3	O1	O1	O1	O1	O1	O1	O1	O1	O1	O1	O1	O1
PTMC1 - 4	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
PTMC2 - 1	44			44			44			44		
PTMC2 - 2	45			45			45			45		
PTMC2 - 3	46			46			46			46		
PTMC2 - 4	47			47			47			47		
PTMC3 - 1	14	14	14	14	14	14	14	14	14	14	14	14
PTMC3 - 2	15	15	15	15	15	15	15	15	15	15	15	15
PTMC3 - 3	16	16	16				16	16	16			
PTMC3 - 4	17	17	17				17	17	17			
PTMC4 - 1	18	18	18				18	18	18			
PTMC4 - 2	19	19	19				19	19	19			
<b>Rear Transition</b>												
RTM RS-232	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1	S1
RTM OOB	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2	O2
RTM 1				16	16	16				16	16	16
RTM 2				17	17	17				17	17	17
RTM 3				18	18	18				18	18	18
RTM 4				19	19	19				19	19	19
<b>Fabric Interface Channels</b>												
Node 2 (ISL)												
Node 3	24,25	24,25	24,25	24,25	24,25	24,25	24,25	24,25	24,25	24,25	24,25	24,25
Node 4	26,27	26,27	26,27	26,27	26,27	26,27	26,27	26,27	26,27	26,27	26,27	26,27
Node 5	28,29	28,29	28,29	28,29	28,29	28,29	28,29	28,29	28,29	28,29	28,29	28,29
Node 6	30,31	30,31	30,31	30,31	30,31	30,31	30,31	30,31	30,31	30,31	30,31	30,31
Node 7	32,33	32,33	32,33	32,33	32,33	32,33	32,33	32,33	32,33	32,33	32,33	32,33
Node 8	34,35	34,35	34,35	34,35	34,35	34,35	34,35	34,35	34,35	34,35	34,35	34,35
Node 9	36,37	36,37	36,37	36,37	36,37	36,37	36,37	36,37	36,37	36,37	36,37	36,37
Node 10	38,39	38,39	38,39	38,39	38,39	38,39	38,39	38,39	38,39	38,39	38,39	38,39
Node 11	40	40,44	40,44	40	40,44	40,44	40	40,44	40,44	40	40,44	40,44
Node 12	41	41,45	41,45	41	41,45	41,45	41	41,45	41,45	41	41,45	41,45
Node 13	42	42,46	42	42	42,46	42	42	42,46	42	42	42,46	42
Node 14	43	43,47	43	43	43,47	43	43	43,47	43	43	43,47	43
Node 15			46			46			46			46
Node 16			47			47			47			47

## ZNYX Networks

ZNYX specializes in the development of blade-based Switching Platforms for proprietary and open-standards based systems including PICMG 2.16 and AdvancedTCA®.

ZNYX's OpenArchitect® Switch Management Software and HA Suite provide a highly integrated solution based on a hardened Linux environment. Developers and Integrators can leverage the Linux environment to customize and re-use application code across multiple switching/routing platforms. ZNYX products service the following markets:

- Mobile
- Communications
- Telephony
- Military
- Homeland Security
- Aerospace
- Medical
- Automation
- Storage
- Enterprise

## Product Specifications

### PICMG 3.0 Interfaces

- (14) 10/100/1000Base-T to payload slots
- (1) GigE Inter-Switch Link (ISL)
- Up to 2 10/100Base-T to Shelf Manager (ECN.001)

### PICMG 3.1 Interfaces

- (14) 10/100/1000Base-T to payload slots (Option 1)
- (12) 10/100/1000Base-T to payload slots (Option 2)

### Base CPU

- Freescale 8270VR
- 256MB ECC SDRAM (100MHz SDRAM bus)
- 64MB Flash ROM
- CompactFlash Site

### Front / Rear Panel Interfaces

- Up to 12 10/100/1000Base-T Base Egress (RJ45)
- Up to 2 10/100Base-T Base Out-of-Band (RJ45)
- Up to 2 RS-232 Base Console (RJ45)

### Layer 2 / 3 Switch/Routing Features

- IEEE 802.1Q VLANs with double tagging
- IEEE 802.1D Spanning Tree Protocol (STP)
- IEEE 802.1D-2004 Rapid Spanning Tree (RSTP)
- IEEE 802.3ad Link Aggregation (static)
- IEEE 802.3x Full Duplex Flow Control
- Jumbo Frames Support (9kB, L2, non-host)
- On-Chip MAC table (16k addresses)
- Port Mirroring in hardware
- Per-port traffic shaping, policies, broadcast control
- Line-Rate Layer 3 Forwarding (8k IP addresses)

### Management Features

- Command Line Interface (CLI)
- IPMI v1.5 client
- SNMP v1, v2, v3 with extensive MIB support
- RMON counters

### Status Indicators

- Network status, per channel Link, Activity LEDs
- PICMG 3.0 status indicators (Out-of-Service, Health, System, HotSwap)
- OpenArchitect® status indicators (Ext Fault, Int Fault, Clock, OK)

### AdvancedTCA® Features

- PICMG 3.0 compliant HotSwap Power Management Controller
- PICMG 3.0 Extended Mode Support
- PICMG 3.0 Status Indicators
- PICMG 3.0 FRUID support
- PICMG 3.0 compliant IPMI controller (IPMC)
- Compliant with PICMG 3.0 ECN.001 for shelf manager cross-connect
- Power plane sensors
- Temperature sensor

### Network Services

- FTP / TFTP servers for remote file transfer
- HTTP server for web-based access
- DHCP server / client / relay
- NFS client for remote filesystems
- NTP client for network-based time service
- SSH / Telnet server for remote session access

### QoS and Priority Queues

- IEEE 802.1p Class of Service (CoS) with 8 priority queues per VLAN
- Supports IETF DiffServ DSCP marking
- Supports IETF Type-of-Service (TOS)
- Supports IETF Common Open Policy Services (COPS) architecture

### High Availability Features

- Power-On Diagnostics
- Switch-to-Switch Failover (policy-based)
- VLAN-to-VLAN Failover (policy-based)
- Port-to-Port Failover (policy-based)
- Automatic Reconfiguration after HotSwap
- Redundant OpenArchitect® runtime image in flash
- Full PICMG 3.0 HotSwap support
- Bonding driver for transparent failovers on client
- Scriptable, policy-based link failure correction



### Specifications Subject to Change

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