ZA-5000-WS500 High Performance Wireless Access Controller Product Specification

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Revision History

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Content

Chapter I Product Overview

1.1 ZA-5000-WS500 System Overview

ZDC ZA-5000-WS500, a high performance wireless access controller exclusively researched and developed by Nanjing Z-Com Wireless Co., Ltd., is capable of centralized management over thin APs and wireless clients, thus making WLAN a manageable and maintainable network.

ZA-5000-WS500 is a standard product based on the open architecture of ATCA. It is characterized by high level of integration, reliability, flexibility and safety as well as compact structure. Starting from the overall solution, ZA-5000-WS500 not only complies with ATCA hardware standards, but also adopts modular design concept. To achieve its best performance and provide ideal wireless access controller for telecom carriers and system integrators, configuration of a single system board can be adjusted in accordance with certain requirements.

ZA-5000-WS500 is also featured in the functions of user control management, intelligent RF management, automatic fault recovery ability, fast roaming and load balance, etc. It can achieve seamless and secure deployment of wireless networks on any existing L2/L3 network without interrupting the operation of the current network. ZA-5000-WS500 can also be integrated into existing networks without changing its structure, which greatly simplifies network deployment and management, saves user's investment.

Figure 1 ZA-5000-WS500 Side View

Figure 2 ZA-5000-WS500 Rear View

1.2 ZA-5000-WS500 Market Positioning

ZA-5000-WS500's platform is composed by ATCA chassis, single main service board. A main service board is the standard layout of ZA-5000-WS500. Each main service board, acting as an independent wireless access controller, can manage 4096 APs and 128,000 wireless clients at default. Therefore, ZA-5000-WS500 can provide powerful WLAN access for such applications as hotspot, campus, large enterprise parks, and metropolitans.

1.3 ZA-5000-WS500 Working Principle

When there is only a piece of business board, set it works as master mode, can be used as a independent wireless controller.

When multiple service boards in the chassis, Setting in which a service board to Master mode (acting as the main control board), other services board as Slave mode, at this time make them work with the main control board(service board as the Master mode) together through the wisdom of Z-com ACIP boards' protocol, all of the device only takes up a set of network resources. AC management and the AC, AP configuration is done through the main control board, main control board and the business users can be shared equally by the load balancing approach to all service boards to deal with.

Chapter II Product Feature and Specification

2.1 Chassis ZA-5000-WS500-1

2.1.1 Appearance

ZA-5000-WS500-1's appearance is as follow:：

Figure 3 ZA-5000-WS500-1 Side View

Figure 4 ZA-5000-WS500-1 Rear View

2.1.2 Hardware

- ATCA solid and high-density chassis complying with 3U standards;
- up to 2 veneer slots(Dual-Star);
- 2 hot plug fan boxes are enough to cool the whole chassis;
- AC & DC versions, Hot swappable PEM;
- Push –Pull duct design: horizontal duct with its direction from right to left;
- To meet the cooling demand of a 300W board in a single slot;
- Intelligent fan control system and message interface with I2C protocol

2.1.3 Chassis Specification

Table 1 ZA-5000-WS500-1 Chassis Specification

Item	Specification
Size	482.6mm×132.3mm×385.5mm
Color	Black
Power Line Outlet	Rear
Data Line Outlet	Front or Rear
Weight	Net: 13kg
Power Supply	dual DC-48V power redundancy (optional to choose) dual AC220V power redundancy (optional to choose)
Power Consumption	1000W
Voltage	-37V~-72V
Over-current Protection	30 A Fuses on PEM(AC) 35 A Breaker on PEM(DC)
Fan(number)	10
Operation Temperature	0°C~50°C
Operation Humidity (no-condensing)	5%~95%, no condensing
Storage Temperature	-20～80℃

2.2 NCP-6330-B: Single Service Board

2.2.1 NCP-6330-B Appearance

The appearance of single service board NCP-6330-B is as follow:

Figure 5 NCP-6330-B Board Appearance

System logic diagram：

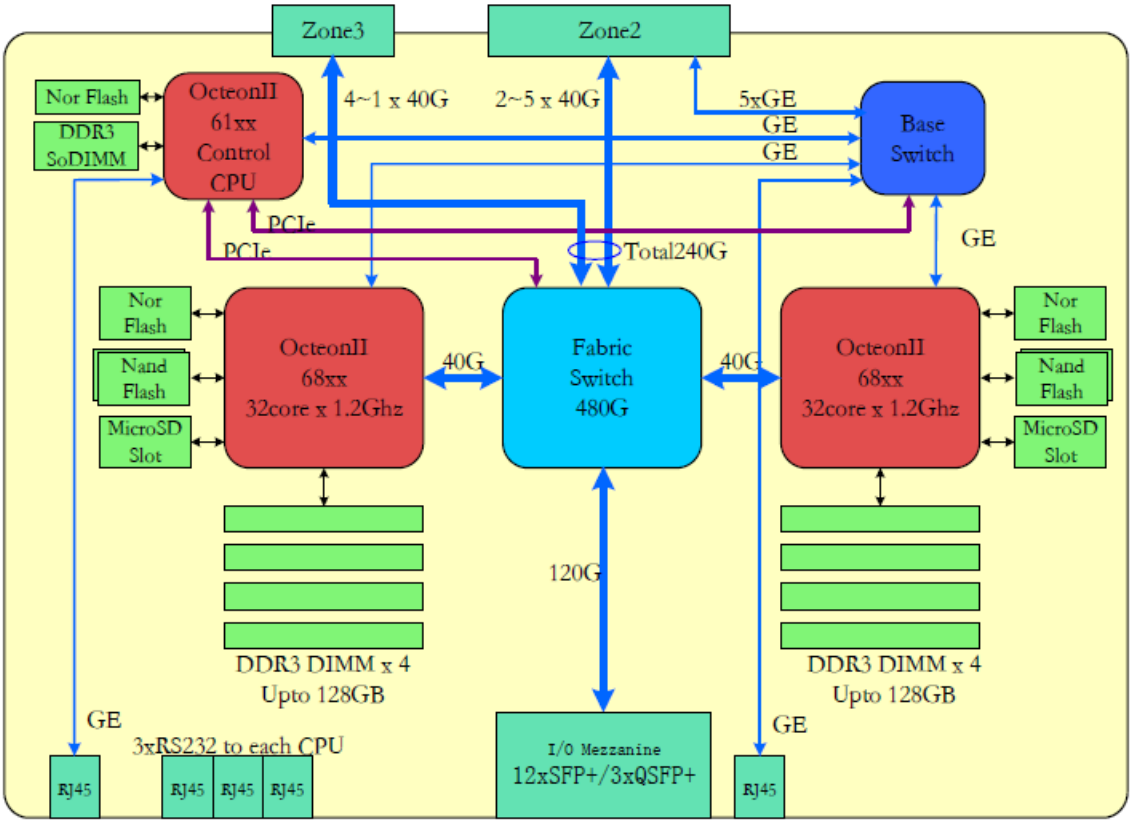

Figure 6 NCP-6330-B System Logic Diagram

2.2.2 Hardware

- ATCA Node board, support PICMG3.1 Option3, Option 9;
- OCTEON CN68XX processing system;
- 480Gbps switching capacity;
- 128MB Flash, 4GB MicroSD card each blade;
- One 1000M Base-T management port, three serial RS232 to RJ45 ports in front panel;
- ZONE2 supply two 1000M Base-T tunnels;
- ZONE3 supply four 40GE ports;
- The maximum power consumption of each board is controlled within 300W;
- Accelerate: encryption engine, TCP accelerate, Compression / decompression, RegEx;
- IPMC standard.

2.2.3 Specification

Table 2 NCP-6330-B specification

Item	Specification
Size	280mm×322.5mm×30.48mm
Power Consumption	＜300W
Weight	≤3.6 Kg
Operation Temperature	0℃~45℃
Operation Humidity	5%~90%(, No-condensing)
Storage Temperature	-40℃~70℃
Safe	UL/EN/IEC 60950-1,　CSA 22.2
Certificate	CE Emission, FCC Class A, RoHS, RoHS6
Host Performance	
CPU	OCTEON CN68XX, 800-1200MHz, 16-32 core
DDR Type	DDR3 SDRAM 4×4GB, , upto 4×32GB
Nor Flash	128MB Flash,
NAND Flash	2GB SLC Nand Flash, upto 64GB
Network	1×RJ45(10/100/1000), it is Eth0 which manage the port to the master CPU; 2×RJ45(10/100/1000), they are Eth1 which manage the port to the base switch 5×40 GbE link to the Zone2 2×XAUI, 2×RXAUI link to CN6880 0 2×XAUI, 2×RXAUI link to CN6880 1 16×10GbE link to RTM Zone3 12×10GbE link to front panel
Power Feature	
Input Voltage	48V redundancy circuit
Input Range	36~75VDC
Compatible Operation System	
OS	Linux, , VxWorks BSP/Driver

2.3 ZA-5000-WS500 Software System

2.3.1 Software System Summary

The software system of ZA-5000-WS500 can be applied into various hardware platforms developed by Nanjing Z-Com. Its function of centralized management not only simplifies AP configuration, but also solves the problems caused by traditional fat AP. ZA-5000-WS500 has the following advantages: powerful AP management ability, data forwarding, access control, various security mechanisms and authentication methods.

Corresponding to its design concept of carrier-grade product, ZA-5000-WS500's software system is

organically integrated with the management of AP, RF, wireless clients, various services and so on. Various functions of ZA-5000-WS500 are centralized into a stable and extensible process platform. By using ZA-5000-WS500, ISP can quickly deploy WLAN and provide network services in complicated network environment. Network maintainers are also relieved from such annoyances as time-consuming and laborious management of independent APs. Administrators can easily achieve the application of new security standards and wireless services on ZA-5000-WS500, and promote them into the whole service system. At the same time, ZA-5000-WS500 can well balance the cost and feasibility considered by ISP.

ZA-5000-WS500 has the functions of access control, intelligent RF management, automatic fault recovery ability, fast roaming and load balance. It can achieve seamless and secure deployment of wireless networks on existing L2/L3 network without interrupting the operation of current network. ZA-5000-WS500 can also integrate with existing networks without changing its structure, which greatly simplifies network deployment and management, and saves user's investment.

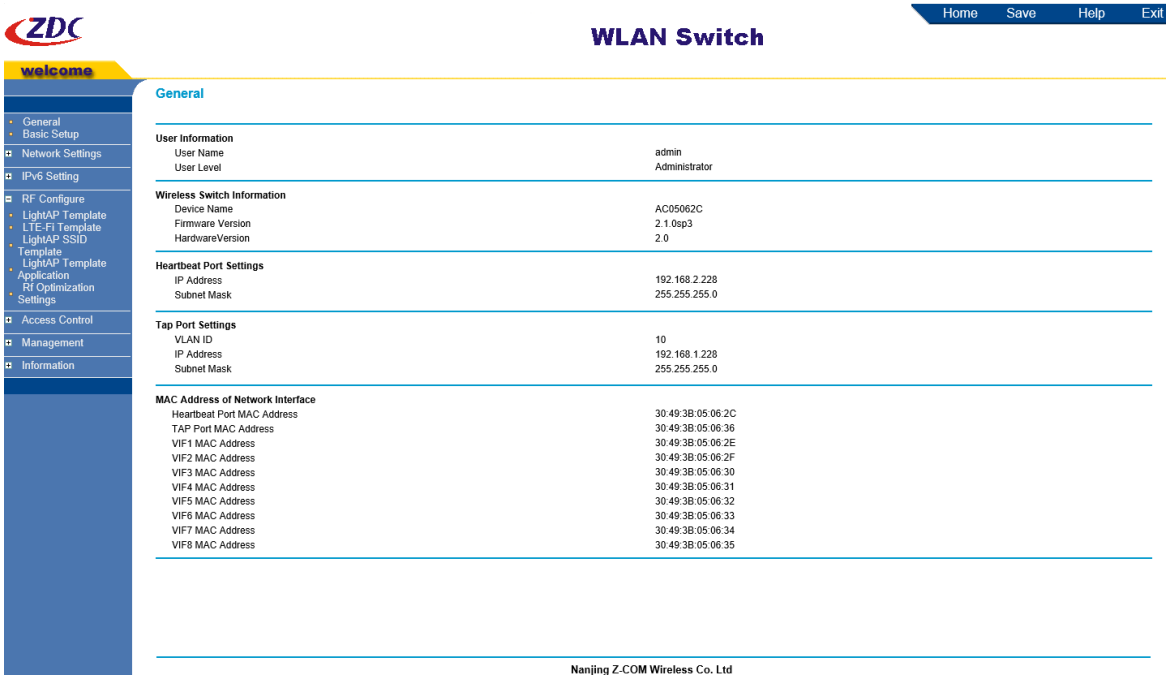

Figure 7 Interface of Software System

2.3.2 Technical Features of Software System

- Convenient AP installation and maintenance process. AP can be plugged and played on AC. With its zero configurations, AP can detect AC on L2/L3 networks and automatically connect to AC. It also accepts unified management by AC.
- Serial products of ZA-5000-WS can be applied in various complicated networks, and deployed

cross L2/L3 networks without changing any exiting wired networks. With standard CAPWAP protocol or WLTP (WLAN Switch & Light AP Protocol)exclusively developed by Nanjing Z-Com, ZA-5000-WS500 can cross L3 network to detect AP and establish wireless networks.

- ZA-5000-WS500's software system can separate wired and wireless networks with tunnels and achieve seamless and secure deployment of wireless networks on any existing L2/L3 network without interrupting the operation of the current network. The software system supports not only concentrated forwarding for thin AP, but also local forwarding. Users can choose either data forwarding mode in accordance with actual network deployment, thus to enhance AC's operation control ability. Therefore, networks can be smoothly upgraded, which takes front-end investment into account.
- Thanks to the convenient AP installation and maintenance process, ISP can realize centralized management over APs connecting to AC. Based on the concept of advanced and intelligent management, ZA-5000-WS500's software system provides the services of automatic FW upgrade, automatic download of configuration, SNMP management to APs connecting to it, which greatly decreases the cost and difficulty degree of device deployment and network maintenance. In addition, ZA-5000-WS500's software system supports user-friendly WEB configuration interface with the languages of Chinese and English. Thus, network administrators can complete device configuration and maintenance with most efficiency.
- The system provides more comprehensive wireless services: automatic channel selection, automatic adjustment of AP output power, load balance, fast roaming and so on. In addition, users can configure different QoS strategies in accordance with different applications so as to ensure network's optimal operation.
- ZA-5000-WS500's software system supports various wireless encryption methods and access control. With its flexible configuration ability, the software system can guarantee the security of user data transmitted with WAPI, WEP, 802.1x and other encryption methods. The internal WIDS function can detect and restrain the potential threats posed by illegal AP and AD Hoc host in the network. ZA-5000-WS500 provides strict strategies of access control, such as WEB authentication, PPPOE authentication, bandwidth control, ACL and so on.
- ZA-5000-WS500's software system supports various fault recovery functions, such as 1+1 and N+1 backup, so as to guarantee the network stability.

2.3.3 Technical Specification of Software System

Table 3 ZA-5000-WS500 Technical Specification

Item	Technical Specification
Support Protocol	IEEE802.3/u 10/100Base-Tx RJ-45 IEEE 802.3z 1000BaseX gigabit Ethernet protocol, 802.1d, 802.1p, , 802.1q, , 802.1x, , 802.11h, 802.11i, 802.11e 802.11, , 802.11b, , 802.11a, , 802.11g, 802.11n, 802.11ac , , , , CAPWAP
IP Application	DHCP Server((supports several ranges of DHCP IP address))
	DHCP Client
	DHCP Relay
	DNS Cient
	NTP((Server and Client))
IP Routing	Static Routing
Multicast	IGMP Snooping
IPv6	TCPv6, UDPv6, ICMPv6
	Pingv6 , TraceRTv6
	Telnetv6
	DNSv6
	IPv6 ND
	IPv6 PMTU
	IPv6 ACL
	IPv6 Static Routing
AP Detects AC	Static IP Detection
	DHCP Detection
	DNS Detection
Roaming	Support roaming within AC
	Support roaming cross AC
Forwarding Method	Centralized Forwarding
	Local Forwarding
RF Management	Enable/ Disable Radio
	Wireless Mode (802.11a/b/g/n/ac)
	Manual or Automatic Channel Selection
	Manual or Automatic Output Power Adjustment
	Automatic Data Rate Selection((1～54Mbps))
	Support WMM
	STA Mandatory Roaming
	Support Multi BSSID

Security Features	WEP(WEP64/WEP128/WEP152)
	WPA-PSK, WPA2-PSK
	WPA, WPA2
	WAPI
	802.1X Authentication(Support Internal RADIUS Server)
	Web Authentication(Support Internal Portal)
	PPPoE Authentication(Support Internal PPPoE Server)
	Prevent DoS Attack(flood attack)
	ACL(Support access control which is based on MAC address and IP address)
	Wireless Isolation on L2
Backup Function	Support the swap of primary and secondary control boards within AC
	Several AC Backup strategy(1+1, N+1)
Device Management	Web Management
	SNMP(v1/v2c/v3 MIB II, Private MIB)
	Telnet
	SSH
	SYSLOG
	FTP
	Console

Chapter III Product Performance Index

Table 4 ZA-5000-WS500 Performance Index

Item	Specification
Manageable AP (Number)	4096 for each service board
Maximum Wireless Client	128K for each service board
ACL List Capacity	128K for each service board
DHCP Address Capacity	128K clients+4096 TAP for each service board
MAC Address Capacity	128K for each service board
VLAN Number	4K

Chapter IV ZA-5000-WS500 Leading Design Technology

4.1 Summary of Carrier-grade Service Process Platform

Items defined by carrier-grade service process platform are structure of machine frame, power, heat dissipation, interconnection, system management, electric interface and physical size of single service board, and so on. These items must have such features as high availability, manageability, extensibility and high security.

ATCA is a set of frame standards on the basis of high performance backplane blade. ATCA standard (also known as PICMG 3.0 standard) defines the standards to server's power source and power supply, backplane exchange network and backplane interface, as well as cooling system and system heat dissipation. PICMG 3.1~PICMG 3.5 standards, based on ATCA standard and defining five different exchange backplanes, is currently still under improvement.

4.2 PICMG 3.0 Standard

In September, 2001, PICMG (PCI Industrial Computer Manufacturing Group) sets up a committee to draft the platform standard of next generation of computer which is feature by high performance and high reliability. 105 companies, including industrial and telecom device manufactures as well as end users, constitute the committee. It is aimed at establishing and revising the new standard, scheduled to be released by the end of 2002. After 12 months' hard work, the committee released PICMG3.0 standard, an advanced telecom computing architecture (ATCA), as scheduled. In the whole process, each team in the organization is in charge of a different aspect and dedicates to their efforts to a practical solution expected. Among the teams, the core team is responsible for monitoring the whole process, detecting and solving potential incompatibility and obstacles during the whole process. Release of this standard is undoubtedly a very good example of fast and effective cooperation in engineering field. PICMG 3.0 is a 460-page standard. It takes a member of the committee five years of meeting and telephoning time to formulate this standard.

4.2.1 PICMG 3.0 Objective

It is required by ISO of PICMG that formulation of any new standard should be started with SOW (Statement of Work). Guidance provided by SOW is to make sure the standard does derivate from original objective. The SOW of PICMG 3.0: “PICMG 3.0 standard is structure-based, compatible and extensible hardware architecture with high performance price ratio and formulated for the new generation of networks merged with telecommunication and data. At the same time, technologies and applications supported in the form of module by PICMG 3.0 standard meet the requirement of modern transmission. Machine structure, heat dissipation management, power-supply distribution and system management are all defined in the core standard. PICMG3.0 standard is concentrated on carrier-grade application which is characterized by reliability, availability and serviceability (RAS). The affiliated objective is to accelerate the adoption of this technology by high availability Data Center (HA Data Center). The standard is distinctively aimed at these applications, the demand of which cannot be met by existing CompactPCI standard or exclusive architectures. PICMG 3.0 and its supplementary regulations will bring a great solution to the above-mentioned application.” As a matter of fact, most members of PICMG 3.0 committee are dedicating themselves to CompactPCI and exploring new platform for the application of new generation of telecommunication and documents. All members tried to revise 2X standard to meet the demand of telecom market, but only achieved a limited effect. At last, the members have to admit that previous CompactPCI standard cannot meet the telecom demand of space, power consumption, bandwidth and system management of a single board. Thus, the new standard is emerged.

4.2.2 Family-Based Serial Standards

The title of PICMG 3.0 standard is advanced telecom computing architecture, which is also referred to as ATCA. However, this causes confusion. ATCA is a set of standards and PICMG 3.0 is a standard among ATCA. As a matter of fact, PICMG 3.0 is different from other PICMG standards. It is composed by PICMG 3.0 and a serial of other complementary standards. The core standard of ATCA family defines the mechanism, power supply, heat dissipation, interconnection and system management in ATCA standards; the complementary standards define the transmission mode of interconnection in the core standards. As a matter of fact, the core standards define P2P connection during board-to-board communication, and the supplementary standards define the protocols and regulations for these P2P

connection. At present, four complementary protocols, 3.1 etheric and optical fiber transmission, 3.2 InfiniBand transmission, 3.3 star transmission and 3.4 PCI Express transmission, have been passed. Another complementary protocol, PICMG3.5--- interconnection of advanced architecture/ high-speed I/O serial transmission is under formulation. The flexibility of complementary protocols brings availability; integrated device manufacturer of ATCA product will pay more attention to the complementary protocols used in the board card of hot system platform. A board adopting 3.1 etheric and optical fiber transmission protocol cannot communicate with another board adopting 3.2 InfiniBand transmission protocol.

4.2.3 Introduction of Single Board

Requirement for PICMG 3.0 mechanism is mainly from the use and research of 600mm ETSI and 19" EIA standard cabinet space. PICMG3.0 committee takes the size of single board into consideration, for it hopes the next generation of components can meet the demand of physical size and heat dissipation and the chassis space and board can reach their utmost matching and exploration at the same time. The initial work is based on European standards and then upgraded to support low-cost frame of sheet metal (simple telecommunication encapsulation). Trace module meets the demand of I/O application. Before deciding the available board space, range of the front and rear panel's net depth are taken into considerations so as to make enough room for a large quantity of tied cables. After discussion on various boards with different sizes, PICMG3.0 organization fixes the board sizes as follows: front panel: 8U x 280mm, net depth: 1.2" pitch, net depth of optional rear panel: 8U x 70mm. The 1.2" pitch, 19" EIA frame can support 14 slots and the 600mm ETSI can support 16 slots. The side view of ACTA front and rear panel in 600mm ETSI frame is as follows:

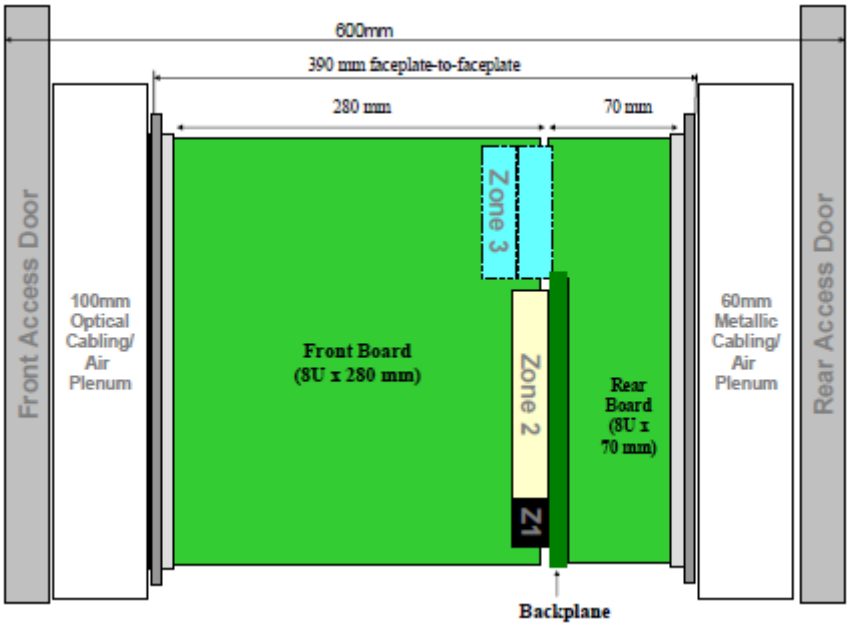

Figure 8 Side View of ATCA Front and Rear panel in ETSI Frame

4.2.4 Power Introduction

The maximum power consumption of a single PICMG 3.0 board is 200w. Although 200w is unremarkable with modern silicon technology, a frame with sixteen 200w boards will total 3200w. If there are three frames in one device, the total power consumption will be up to 10,000w. Once the power consumption of a board exceeds 200w, its width should be doubled and it will take the width of two slots for heat dissipation. It is impossible to draw power lower than 3.3V, 60A into each board. The standard telecom device is 48V and the output current of a 200w board is 4A. As 48VDC is used in most telecom applications, there is no need to provide power frame. To draw duplicated backup power into power supply can eliminate failure in a single point caused by power supply. The pin of power joint includes adjustment pin which is used to locate the correct plug-in position of a single PICMG3.0 board, and pins for power management.

Figure 9 Power Joint

4.2.5 Transmission Introduction

PICMG3.0 includes several transmission modes, which are shown as below. The transmission modes from top to bottom provide connections for system management layer, control layer and data layer in sequence. System management is based on an I2C dual-serial signal line connected to every slot. System management information, based on IPMI regulation, is used in PICMG3.0 standards. System management bus also has a redundancy to ensure the transmission of management data once a bus fails. The control layer beside data layer is called Base interface, which is a dual star topology with redundant interchange blades and Ethernet BASE-T signal. Base interface supports IP transmission in PICMG3.0. This is similar to PICMG 2.16 in architecture definition. The data of a single PICMG 3.0 board transmitted in a very high speed through Fabric Interface, which is based on 3.125Gbps SERDES signal and can support a transmission rate of 10Gb in star and whole network topology. As above mentioned, PICMG3.0 core regulation defines the signal and interconnection of Fabric interface and supplementary regulations define protocols used in transmission. The whole network Fabric interface and dual star Base interface supported on the rear side of PICMG 3.0 board as well as redundant management system are as follows:

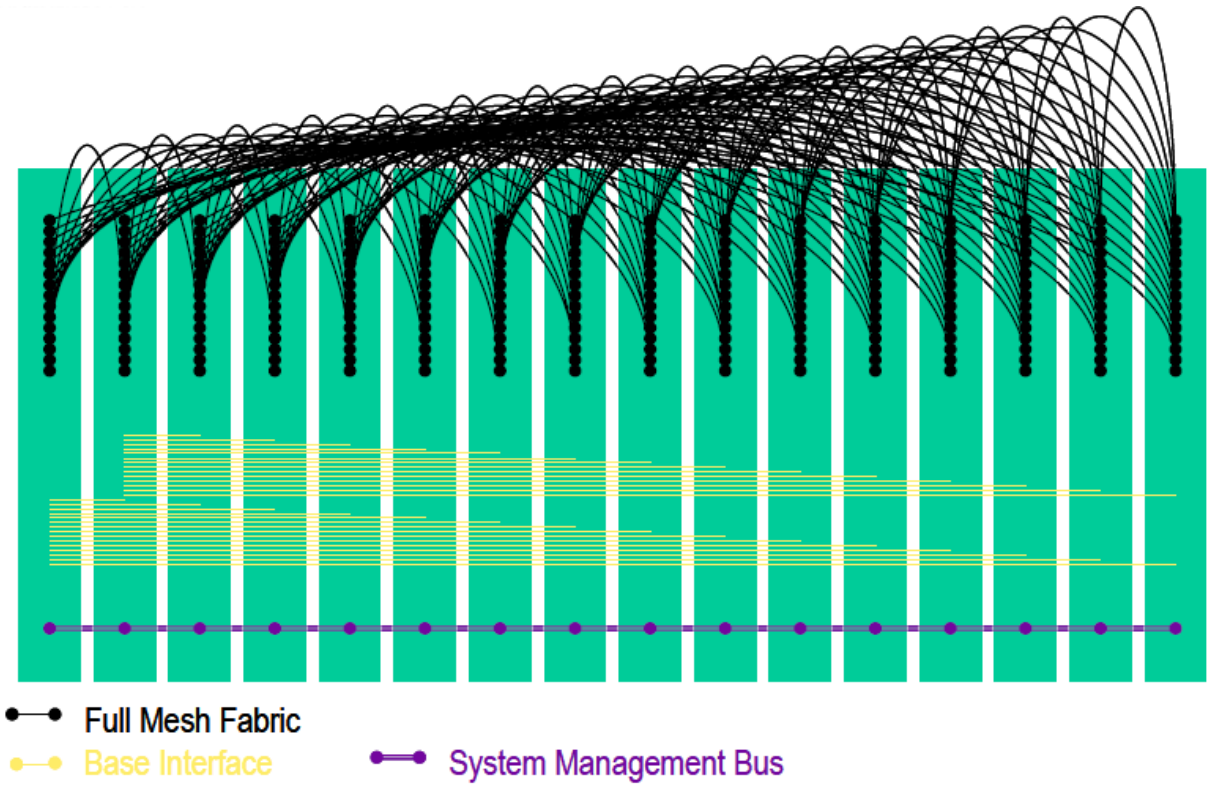

Figure 10 Design Drawing of Rear Panel Transmission