

NEP / ATCA PROFILE

ATCA PROFILE

Version 1.0 March 30th 2006

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1. PURPOSE

The purpose of this document is to provide guidelines to standardization bodies and to the vendors' industry who want to migrate from proprietary solutions to PICMG's open standard based platform: AdvancedTCA™. The level of detail used in this living, changeable document is the starting point for further activities either initiated by the addressed audience or will be rendered more precisely during further investigations by SCOPE. The first release of the document will prioritize the interchangeability of boards within the control and service plane. This document will also help the adopters of AdvancedTCA™ specifications by identifying the features important for the telecom equipment providers. While overall time to market will be reduced, lower upfront development costs are required and cost savings due to economy of scale effects can be anticipated, it will also help customers to start on stable product basis and make long-term investment.

In essence, the main purpose of the document is to create a solid competitive environment for common building blocks and avoiding fragmented market initially in the Control and Service Plane.

In addition to NEPs, this document is targeted to telecommunication industry particularly hardware vendors; manufacturers of the blade level and shelf building blocks and base platform integrators; anybody building ATCA based components.

2. AUDIENCE

The target audiences of this document are:

- ✓ hardware vendors;
- ✓ manufacturers of the blade level and shelf building blocks and base platform integrators;
- ✓ telecom equipment manufacturers who are building or planning to build systems based on AdvancedTCA specifications;
- ✓ and standardization bodies and related trade associations, who are made aware of gaps in current standards definitions and who may find proposals or requirements for necessary amendments.

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3. REFERENCES

1. PICMG 3.0 R2.0 AdvancedTCA Base Specification – PCI Industrial Computer Manufacturers Group (coming in Q2 2006)
2. PICMG 3.1 R1.0 Ethernet/Fiber Channel for AdvancedTCA Systems – PCI Industrial Computer Manufacturers Group
3. PICMG® AdvancedMC.0 Advanced Mezzanine Card Specification, Revision 1.1, January 2005.
4. PICMG® AdvancedMC.1 - PCI Express and Advanced Switching, Revision 1.0
5. PICMG® AdvancedMC.2 – AMC Gigabit Ethernet/10 Gigabit XAUI Ethernet, Revision 1.0
6. PICMG® AdvancedMC.3 – AMC Storage, Revision 1.0
7. IPMI – Intelligent Platform Management Interface Specification v2.0; Defines message and system interface to platform management hardware. Intel Corporation, Hewlett-Packard Company, NEC Corporation, Dell Computer Corporation.
8. IPMI – Intelligent Platform Management Bus Specification V1.0 defines an internal management bus for platform management within chassis Intel Corporation, Hewlett-Packard Company, NEC Corporation, Dell Computer Corporation.

4. INTRODUCTION

The PCI Industrial Computer Manufacturers Group (PICMG) has defined an open standard platform for telecom equipment under AdvancedTCA™ specification, PICMG 3.0 specification, to address the above issue. The specification defines architecture for many modular components that can be quickly integrated to deploy high performance and carrier grade service solutions. In essence, the components from different vendors will inter-operate with each other and, thus, giving flexibility to combine components from different vendors.

The published AdvancedTCA™ specification covers many aspects of design and operation including mechanical and electrical characteristics, data transport, and more. While specifications of many features are comprehensive, some aspects are left ambiguous to allow customization and future extensions. As a result the specification has become unwieldy and demanding for vendors to formally claim compliance. Consequently, the vendors are uncertain of development effort in making a marketable platform product.

In this document, we identify a subset of features from AdvancedTCA™ specification that are sufficient to address most of service & control applications of the telecom market's needs. The equipment vendors can use this as reference to develop their products in phases and yet generate revenue with AdvancedTCA™ formally.

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This document is result of an effort to protect customer's long-term investments. It is consolidation of features that are required from a platform to support most of the current and future telecommunication applications.

5. TERMS AND DEFINITIONS

AdvancedMC	Advanced Mezzanine Card
ATCA	Advanced Telecommunication Computing Architecture. Also known as AdvancedTCA™.
Backplane	A passive circuit blade providing connectivity of front blade Slots in the shelf. The connection includes high-speed differential pairs, power distribution, management, and auxiliary signal connections.
Data Transport Interface	Direct point-to-point fabric links between any pair of slots; dual star topology is subset of full mesh interconnection, i.e. a full mesh backplane can also support a dual star configuration.
Dual Star Topology	An interconnect fabric topology in which two switch resources provide redundant connections to all end points within the network. A pair of switch boards provides redundant interconnects between node blades.
Front Blade (ATCA)	A blade that conforms to PICMG® 3.0 mechanicals (8U x 280 mm), including a Printed Circuit Board and a Panel. Further, a blade connects with the Zone 1 and Zone 2 backplane connectors and, optionally, may connect with a Zone 3 midplane connector or directly to an RTM connector and is installed into the front portion of a shelf.
FRU	Field Replaceable Unit. Any entity that can be replaced by a user in the field
Full Meshed	An interconnect fabric topology in which a direct data path (i.e., Channel) to/from each Board in the system. In a system consisting of n Slots, there is n-1 Channel from each Slot to all other Slots.
IPMB	Intelligent Platform Management Bus
IPMC	The Intelligent Platform Management Controller is used to provide the IPMB interfaces
PICMG	PCI Industrial Computer Manufacturers Group
POST	The Power-on Self test is a diagnostic testing sequence run by the CPU's BIOS as the computer's power is initially turned on. After performing the POST the BIOS loads and starts the master boot from disk or another storage device.
RTM	Rear Transition Module. An 8U x 70 mm x 6 HP assembly installed into the rear portion of a Shelf and mated with a front blade through Zone 3 connectors to provide I/O connectivity.
Shelf	The Shelf consists of the Subrack Sub rack, Backplane, Front blades, cooling devices, RTMs, power supplies, etc. also histori-

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	cally known as a shelf.
ShMC	Shelf Management Controller. An IPMC that is also capable of supporting the functions required of the shelf manager.
TEM	Telecommunication Equipment Manufacturer

6. PROFILE TABLE

6.1 Specification Related Issues

The PICMG 3.0 specifications describe extensive set of features for claiming compliance. The following table (mandatory and optional requirements) consolidates telecommunication equipment manufacturing immediate requirements for migrating from proprietary hardware platforms to AdvancedTCA™.

Category	Feature Description	Comment
AdvancedMC interconnection	1 GE dual star (PICMG AdvancedMC.2, Type E2)	Mentioned here due to impact of the board design of ATCA blades
AdvancedMC fabric interface	Fabric interconnection is GE or PCI-Express (min. 4 times)	Mentioned here due to impact of the board design of ATCA blades
AdvancedMC front plate	Standard AdvancedMC with customer appearance adapted front plate	Mentioned here due to impact of the board design of ATCA blades
Blade thermal requirement	Minimal air flow over pressure drop curve requirement per blade to be specified by the suppliers. Hydraulic impedance must be specified by the board supplier. The board thermal design must be able for instance to support 4 AMCs with a budget of 200 W per slot: power dissipation, hydraulic	Hydraulic impedance must be defined for interoperability in PICMG 3.x (Gap of ATCA)

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	impedances	
Cable Management	Mandatory Front access, rear access when RTM is used	
Corporate appearance	<p>It should be possible to mount NEP specific front plate assemblies. As handles and handle switches are not fixed in the standard, it might be as well part of corporate appearance.</p> <p>At least the following PICMG3.0 defined LEDs shall be supported on each blade: Hot swap (blue LED), LED1 (Out Of Service) and LED2 (health).</p>	Company trademark should be put on sticker on the front board (real estate on the blade front plate needed).
EMC	EMC Class B -6dB compliance depending on use cases (Central Office or Data Centers)	
External connections or inter-shelf connectivity	For base interface, n x 1G m x 10 GigE for fabric interface	General trend is 10 G and in short term 1G could be sufficient
Fabric interface	Fabric is Ethernet technology 1/2/4 with aggregation technology or 10 Gbits per slot (PICMG 3.1. opt. 1, 2, 3, 9).	General trend is 10 G and in short term 1G could be sufficient
Fabric Interface topology	dual star	
IPMB	Redundant radial or bussed topology	
Mezzanine cards	AdvancedMC	
Noise	According to ETS 300 753 class 3.1 (Telecommunication equipment room attended) and NEBS GR-63-core (ind. equipment frame, forced cooled) for central office environment.	Implementation of world's relevant standards rel. standards

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Power Budget	Maximum power dissipation per front blade shall be 200 W. At the same time, it must be able to fully populate a shelf with blades consuming 200W. RTM power dissipation up to additional 20W, with RTM in each slot.	
Power Supply	Shelf to require redundant power feed of – 48V DC	–60V DC as option
Regulatory	NEBS level 3; ETSI standards relevant for central office applications, as listed in chapter 7, ‘Regulatory guidelines’ of PICMG 3.0 Rel. 2.0 ‘Advanced TCA base specification’. European Directive 2002/95/EC; 2002/96/EC amm.2003/108/EC : EU requirements regarding restriction of the use of harmful substances in electronic equipment (RoHS, WEEE), and also fulfill the requirements for lead free products in terms of the EU-Directive.	Implementation of world’s relevant standards
RTM thermal requirement	Minimal air flow over pressure drop curve requirement per blade to be specified by the suppliers.	Must be defined for interoperability in PICMG 3.x (Gap of ATCA)
Serviceability	Hot swap of blades and other FRUs, including AdvancedMC cards, in-service replacement of Fans and filters, front access and other FRUs.	
Shelf	14 or 16 slots	
Shelf cooling	Air flow over pressure drop curve (speed steps, failure cases) for shelf (front blade slots and RTM slots) to be specified by the suppliers.	Must be defined for interoperability in PICMG (Gap of ATCA)
Shelf Manager	Redundant shelf manager either integrated or separate from the switch. ShMC is considered as integral part of the shelf for low level hardware management.	
Shelf Manager	Modular modifiable software. ShMc itself has no standard. HPI is the only way to get	Remote load-able software

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Software	standardized access to it.	aspects must be defined for interoperability in SAF-HPI (Gap of SAF)
Switches' Positions	Centered or edged position is preferred	
Update Interface	Interface between logical paired slots using 10 differential pairs between two slots.	

6.2 Beyond ATCA Specifications

The following table includes the telecommunication equipment manufacturing requirements for migrating from proprietary hardware platforms to AdvancedTCA™ not described in the ATCA specification.

Category	Feature Description	Comment
Cabinet	Three shelves (\leq 600mm in a cabinet)	
Diagnostic/Test	<p>What: localize faults on any device down to the FRU. This rule should cover at least 80% of fault case (based on component reliability analysis). Devices include IPMI capable devices and CPU, memory, storage, switch ports, ...</p> <p>When:</p> <ul style="list-style-type: none"> Automatically after any failure detection on any device (including machine reboot after panic...). Manually upon administration/ HMI request (HPI?). <p>How: Launched by ShMC</p>	Gap in ATCA
Storage	<p>iSCSI over IP over Ethernet for plug-in storage units.</p> <p>CPU blade with hard drive on-blade need to be possible.</p> <p>External storage should be supported via</p>	<p>iSCSI is not the priority (cost).</p> <p>Local storage hard drive on some CPU blade (SAS).</p>



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	<p>either iSCSI or Fiber Channel.</p> <p>Disk life expectancy should be at least 5 years.</p>	
Upgrade	<p>Remote firmware upgrade to enable automatic procedure for firmware upgrade without service interruption with fall-back feature.</p>	<p>Through base Ethernet for payload / IPMB for IPMC...</p> <p>Not specified but it should be</p>