aTCA-80606PD

6U 6-Slot DC-Powered AdvancedTCA® Shelf

User's Manual



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Leading EDGE COMPUTING

Preface

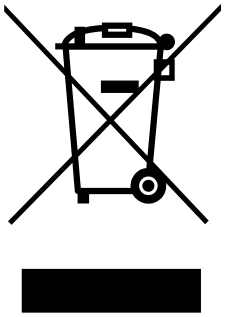
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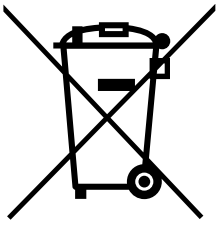
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1 Safety

The intended audience of this User's Manual is system integrators and hardware/software engineers.

1.1 Safety Symbols used in this document

	**Hazardous voltage!** *This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.*

	**Caution!** *This is the user caution symbol. It indicates a condition where damage of the equipment or injury of the service personnel could occur. To reduce the risk of damage or injury, follow all steps or procedures as instructed.*

	**Risk of electrostatic discharge!** *The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.*

1.2 General Safety Precautions

	**Warning!** *Voltages over 60 VDC can be present in this equipment. As defined in the PICMG 3.0 Specification, this equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.*

- Service personnel must know the necessary electrical safety, wiring and connection practices for installing this equipment.
- Install this equipment only in compliance with local and national electrical codes.
- For additional information about this equipment, see the PICMG 3.0 Specification (www.picmg.org).

1.3 Reference and Architecture Specifications

These documents contain information and specifications related to the requirements listed in this document.

- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference (www.pigeonpoint.com)
- Pigeon Point Systems Shelf Manager User Guide (www.pigeonpoint.com)
- PICMG 3.0 Revision 3.0 AdvancedTCA Base Specification (www.picmg.org)

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1.4 Product Definition

The aTCA-80606PD is a 6U / 6-Slot AdvancedTCA Shelf for fault-tolerant / high-availability applications.

- Dual Star Backplane, bussed IPMB. It is designed to work with two redundant Shelf Managers. Fans controlled by the Shelf Manager or through autonomous fan controller. DC Power Entry Modular.

1.5 Terms and Acronyms

Table 1: Terms and Acronyms

Term	Definition
ATCA	Advanced Telecom Computing Architecture
Backplane	Passive circuit board providing the connectors for the front boards. Power distribution, management and auxiliary signal connections are supported.
CDM	Chassis Data Module
Chassis	Enclosure containing subrack, backplane, boards, cooling devices, PEMs, same as Shelf
ECN	Engineering Change Notice
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FRU	Field Replaceable Unit
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
PCB	Printed Circuit Board
PEM	Power Entry Module
RTC	Real Time Clock
RTM	Rear Transition Module
Shelf	See Chassis
SMM	Shelf Manager Module
VRTN	Voltage Return

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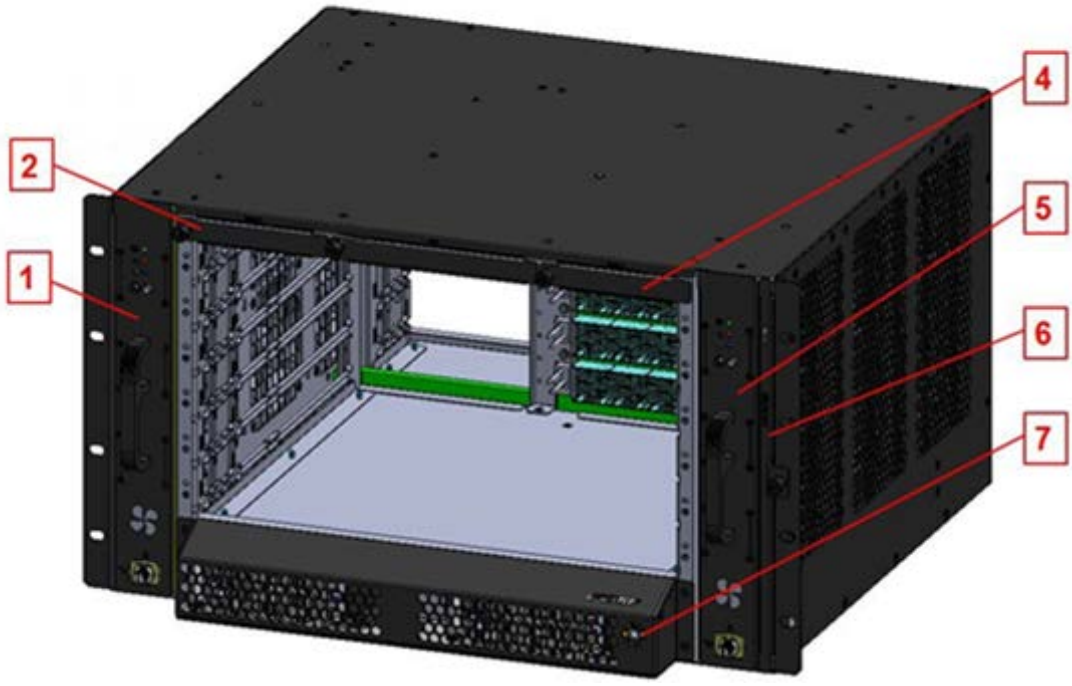
2 Hardware Platform

6U/19'' chassis with front card cage for ATCA boards and rear card cage for ATCA RTM board. The chassis is designed for easy access of any Field-Replaceable Units (FRU).

- 6-slot ATCA backplane with dual star Fabric Interface, Dual Star Base Interface and bussed IPMB interface, supporting four 8U node board slots and two 8U hub board slots and providing 40Gb/s connectivity (4 lanes with 10Gb/s).
- Two Push-Pull Fan Tray arrangement provides optimized cooling for ATCA blades with fault-tolerant capability; front-pluggable, hot-swappable, with 6 high-speed fans per tray.
- Two dedicated Shelf Manager bays accepting Shelf Managers based on Pigeon Point ShMM-700.
- ESD Wrist Strap Terminals at the front and the rear.
- Removable air filter that meets the requirements of the Telcordia GR-78-CORE specification.
- Two rear-pluggable DC power entry modules, the same interface in the Subrack for DC PEM. 1+1 redundant configuration.

2.1 Shelf Front and Rear View

Figure 1: Front View



1. Fan Tray 1
2. ShMC 1 (optional)
4. ShMC 2 (optional)
5. Fan Tray 2
6. Air Filter
7. ESD Wrist Strap

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Figure 2: Rear View



12. DC PEM B *13. DC PEM A*

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3 ATCA Backplane

The 6-slot ATCA monolithic backplane provides:

- Four ATCA Node Slots
- Two ATCA Hub slots
- Two dedicated Shelf Manager slots
- Two PEM slots
- Two fan Tray slots

Within the Shelf, there is one fixed board-backplane. This board is completely passive and is not Field-Replaceable Units. The 6-slot ATCA monolithic backplane provides 40Gb/s connectivity (4 lanes with 10Gb/s).

3.1 Logical to Physical Slot Mapping

The physical and logical slots are sequentially numbered from the lower to the upper side of the Shelf.

Table 2: 6-Slot ATCA Backplane physical to logical slot mapping

	Physical Slot	Logical Slot	HW-Address (Hex)	IPMB-Address (Hex)	Update Channel Routing
Node	6	6	46	8C	
Node	5	5	45	8A	
Node	4	4	44	88	
Node	3	3	43	86	
Hub Slot	2	2	42	84	
Hub Slot	1	1	41	82	

3.2 Base Interface

Logical slots 1 and 2 are the hub slots for the Dual Star Base Interface. Base Interface Channel 1 (ShMC) of logical slot 1 and 2 is cross connected to both dedicated Shelf Manager slots on the ATCA Backplane (as per PICMG 3.0 R2.0:ECN 3.0-2.0-001).

3.3 Fabric Interface

The Fabric Interface in the ATCA Backplane is routed as dual star. See PICMG® 3.0 AdvancedTCA Base Specification for details. Triple replicated full Mesh interconnecting each ATCA slot is requested.

3.4 Synchronization Clocks

Six differential pairs of synchronization clocks are bused between all 6 ATCA slots and terminated at both ends with 80.6 Ohms between each differential pair.

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3.5 Update Channel Interface

The Update Channels are wired between two redundant ATCA Backplane slots as 10 differential pairs with 100 Ohms impedance (see Table 2).

The Update Channel is intended to pass information between two redundant ATCA Blades.

Table 3: Backplane topology for Dual Star

Connector		Channel	Logic slot #					
			1	2	3	4	5	6
P20	1	Sync Clk	Sync Clk	Sync Clk	Sync Clk	Sync Clk	Sync Clk	Sync Clk
	2	Update Channel						
	3							
	4							
	5	Fabric Ch 15						
	6							
	7	Fabric Ch 14						
	8							
	9	Fabric Ch 13						
	10							
P21	1	Fabric Ch 12						
	2							
	3	Fabric Ch 11						
	4							
	5	Fabric Ch 10						
	6							
	7	Fabric Ch 9						
	8							
	9	Fabric Ch 8						
	10							
P22	1	Fabric Ch 7						
	2							
	3	Fabric Ch 6						
	4							
	5	Fabric Ch 5	6-1	6-2				
	6							
	7	Fabric Ch 4	5-1	5-2				
	8							
	9	Fabric Ch 3	4-1	4-2				
	10							
P23	1	Fabric Ch 2	3-1	3-2	2-2	2-3	2-4	2-5
	2							
	3	Fabric Ch 1	2-1	1-1	1-2	1-3	1-4	1-5
	4							
	5	Base Ch1	ShMC	ShMC	1-3	1-4	1-5	1-6
	6	Base Ch2	2-2	1-2	2-3	2-4	2-5	2-6
	7	Base Ch3	3-1	3-2				
	8	Base Ch4	4-1	4-2				
	9	Base Ch5	5-1	5-2				
	10	Base Ch6	6-1	6-2				

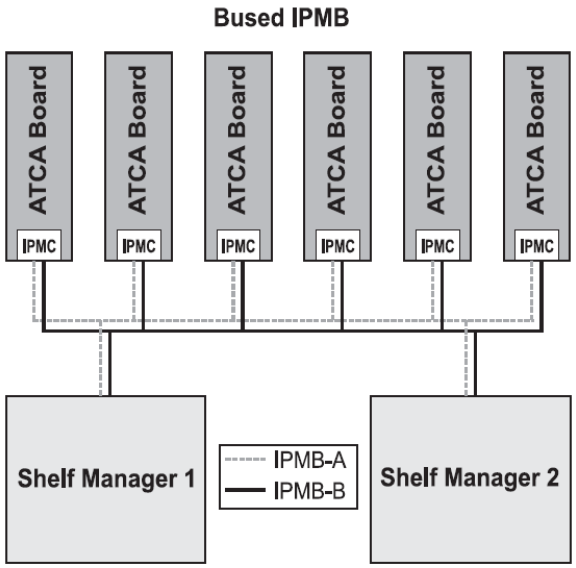
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3.6 Intelligent Platform Management Bus (IPMB)

The Shelf uses an Intelligent Platform Management Bus (IPMB) for management communications among all ATCA Boards and the Shelf Managers. The reliability of the IPMB is improved by the addition of a second IPMB, with the two IPMBs referenced as IPMB-A and IPMB-B.

IPMB-A and IPMB-B are routed to the ATCA Slots in a bused configuration.

Figure 2: Bused IPMB



3.7 Shelf SEEPROM

The SEEPROMs are located at the rear side of the backplane. The Shelf SEEPROM is a repository of the shelf-specific information, capabilities of the system and other user configurable options.

The SEEPROM contains as example:

- A list of which slots are connected together
- How the update channels are routed
- How many slots are in the system
- What the maximum power is to each slot
- The serial number of the Shelf
- The backplane topology etc.

The Shelf Managers use this information to provide functions such as electronic keying, controlling the power state of the system, etc.

The Shelf Managers cache the information that is stored in the SEEPROMs so that the SEEPROM is only needed when the Shelf Managers are first inserted or when the Shelf is first turned on.

The redundant SEEPROMs ensure that if one is corrupt or non-functional, the second can provide the necessary information. The Shelf Manager selects what set of information is correct and then synchronizes the two SEEPROMs from the internally cached of the SEEPROM information.

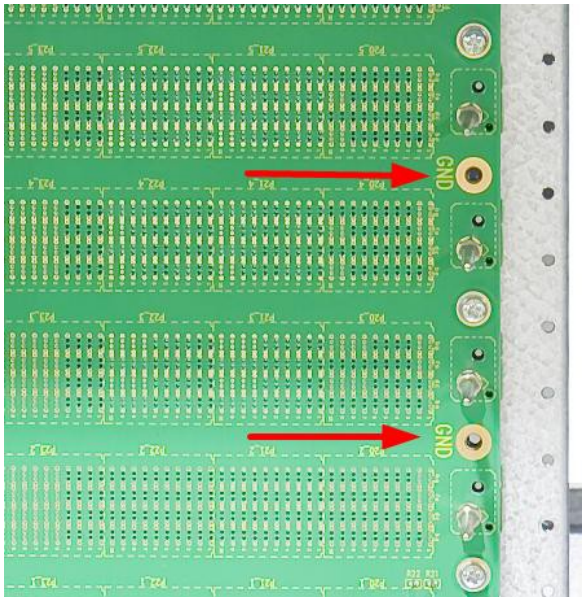
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3.8 Logic Ground

The ATCA Backplane provides a mechanism to connect Logic Ground and Shelf Ground.

To connect Logic Ground and Shelf Ground, the mounting screws at the positions marked by arrow must be fixed.

Figure 4: Logic Ground



By default, Logic Ground and Shelf Ground are isolated, the chassis is shipped without the mounting screws at the marked positions.

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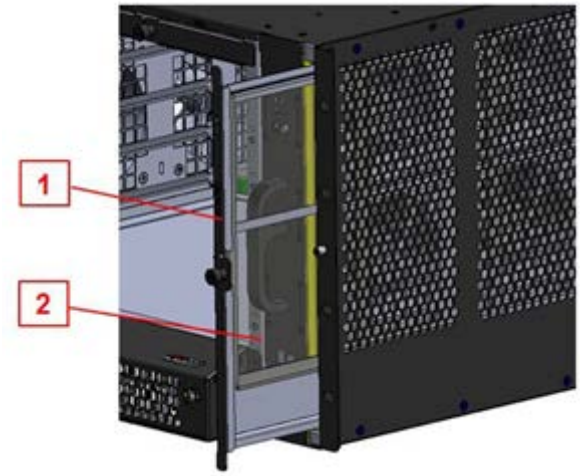
4 Air Filter

4.1 Introduction

The ATCA Shelf provides a front-replaceable air filter. The filter element is an open cell polyurethane foam special coating to provide improved fire retardation and fungi resistance.

The filter meets the requirements of the Telcordia Technologies Generic Requirements GR-78- CORE specification.

Figure 3: Air Filter



1. Air Filter Tray 2. Filter Element

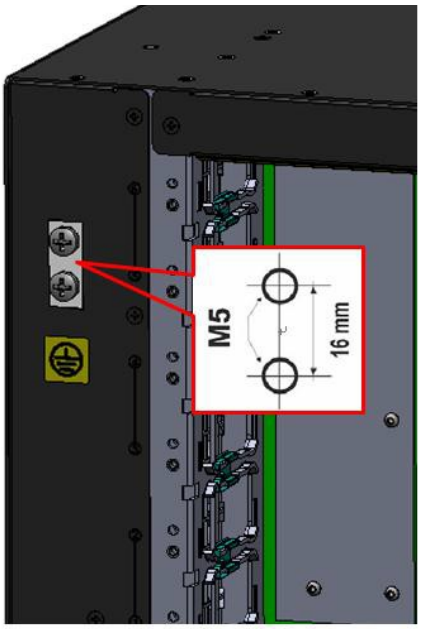
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5 Shelf Ground Connection

	Hazardous voltage! *Before powering-up the Shelf, make sure that the Shelf Ground terminals are connected to Protective Earth (PE) of the building.*

The ATCA Shelf provides a Shelf ground terminal at the upper rear side. The Shelf ground terminal provides two threads (M5) with a 16.0mm spacing between thread centers to connect a two hole lug Shelf ground terminal cable.

Figure 4: Shelf Ground Terminal



Please note that in a typical telecom environment, the VRTN path of the -48V supply is grounded to Protective Earth (PE) of the building.

5.1 Specification of the Shelf Ground Connection Cable

Required wire size: AWG8

Required terminals: Use only two hole lug terminals. (Terminal used: *PANDUIT part no.* ***LCD8-14A-L***)

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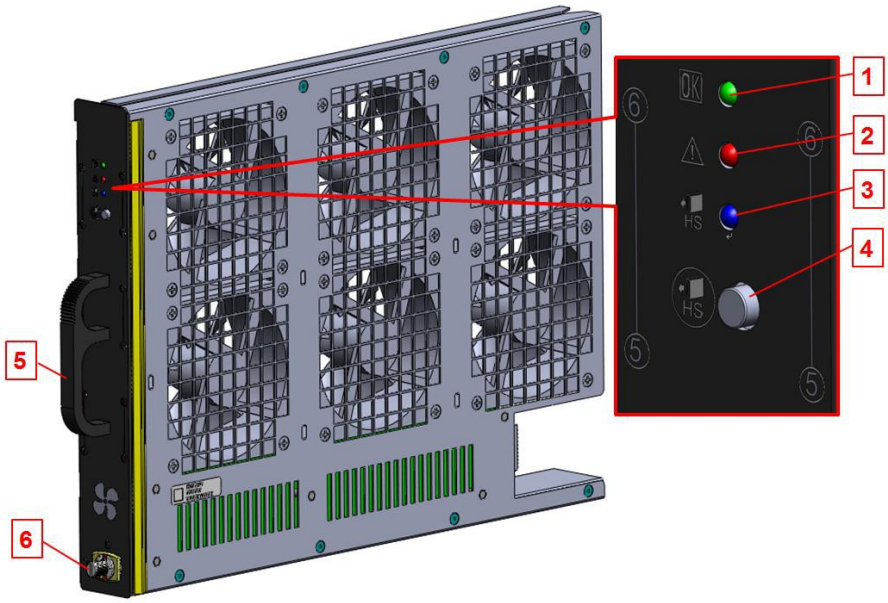
6 Fan Trays

6.1 Introduction

The 6 Slot ATCA Shelf contains two hot-swappable Fan Trays arranged in a side to side configuration for maximum air flow. The Fan Trays are locked into the Shelf by a mini compression latch with indicator. A hot-swap push button is used to provide hot-swap functionality. The Fan Trays are intelligent FRUs and plugged in at the left and right front of the Shelf.

Each Fan Tray contains six 92mm fans (245m^3/h (146CFM) each). The Fan Tray is controlled via an on-board IPM controller.

Figure 5: Fan Tray



1. Fan Tray OK LED (green)

2. Fan Tray Fault LED (red)

3. Hot Swap LED (blue)

4. Hot Swap Push Button

5. Handle

6. Mini Compression Latch

6.2 Fan Control Model

The onboard IPM controller is located on the Fan Tray and has 2 operation modes:

6.2.1 Shelf Manager Mode

As soon as a Shelf Manager is plugged-in and becomes active, the IPM controller switches automatically into the Shelf Manager mode. The Shelf Manager performs management of the Fan Tray through the two independent bussed IPMB connections.

When the Fan Tray is first inserted into the system, the fans start at full speed and then decrease to the specified speed by Shelf Manager. The circuitry on-board the Fan Tray uses a PWM signal to control the speed of all the fans. Lower speeds reduce acoustic noise and power consumption and increase the lifetime of the fans.

The speed of each individual fan is monitored. If any of the fan speeds drops below the desired fan speed, a System Event Log (SEL) entry is logged by the Shelf Manager. The Shelf Manager then generates alerts and sets alarm conditions as necessary.

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The system is designed to run indefinitely with any single fan failure. When one fan fails, all other fans are increased to full speed. The Fan Tray has sufficient cooling capacity to keep the Shelf cooled with a single fan failure.

6.2.2 Autonomous Mode

When no Shelf Manager is present, the Fans are controlled by the IPM controller. The fan speed depends on the setting of DIP switch on board. With a Micro DIP switch you can select either the exhaust temperature from the left Fan Tray or the fixed fan speed as reference to control the fan speed.

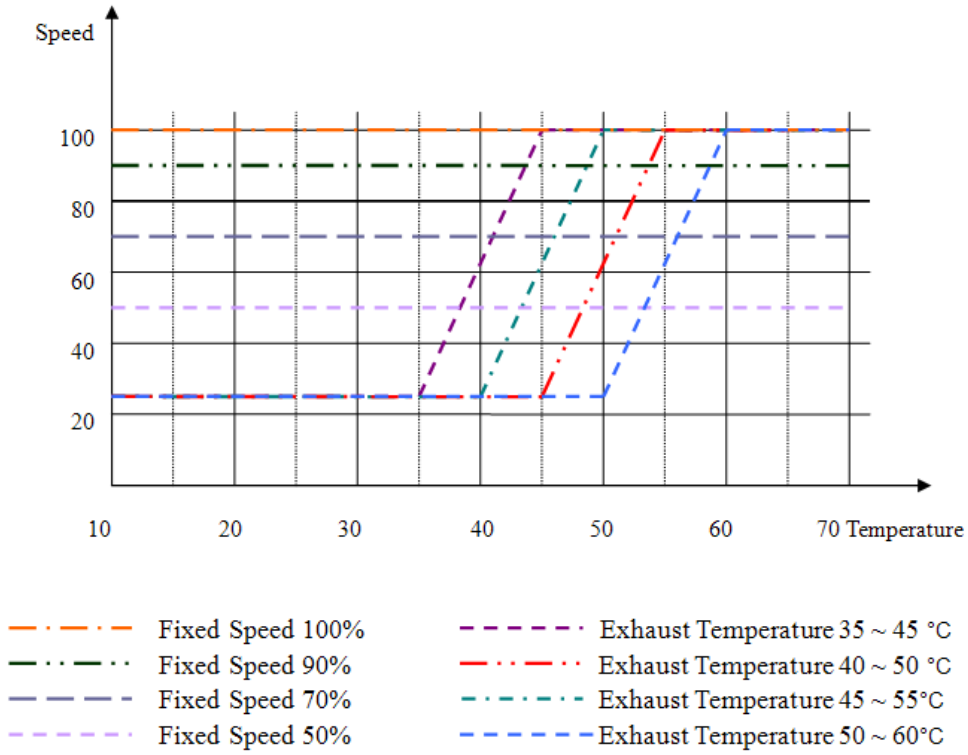
By default the fixed speed of 50% full speed is used to determine the fan speed. When setting up the DIP switch, "1" stands for on and "0" stands for off.



Table 4: Micro DIP switch settings

Bit1	Bit2	Bit3	Description
0	0	0	Fixed Speed, 50% of Full Speed
0	0	1	Fixed Speed, 70% of Full Speed
0	1	0	Fixed Speed, 90% of Full Speed
0	1	1	Fixed Speed, 100% of Full Speed
1	0	0	Exhaust Temperature 35 ~ 45 °C
1	0	1	Exhaust Temperature 40 ~ 50 °C
1	1	0	Exhaust Temperature 45 ~ 55 °C
1	1	1	Exhaust Temperature 50 ~ 60 °C

Figure 6: Fan Curves



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6.3 Fan Tray Signals

The Fan Tray provides signals for:

- Fuse monitoring
- Status of the Hot Swap Controller
- Fan Speed
- Temperature

These signals are controlled by the IPM Controller devices on the Fan Tray PCB. The Shelf Manager has access to these signals via IPMB.

6.4 Fan Tray Indicators

The front panel includes a green Fan Tray OK LED, a red Fan Tray Fault LED, and a blue Hot Swap LED.

The Hot-Swap push button indicates to the Shelf Managers that the Fan Tray is about to be removed. Its use is optional, but it is provided so that service personnel can be trained to look for a blue LED to be illuminated on any active component before removing it from the system. Once the operator pushes the Hot Swap button, the Shelf Manager is informed of the pending extraction. When the Shelf Manager feels it is “safe“ to remove the Fan Tray, the blue Hot Swap LED illuminates solid.

Table 5: LEDs on Fan Tray front panel

Color	Description	Status	Condition
Green	Fan Tray OK LED	Off	No Power to the Fan Tray
		Solid green	Normal Operation
Red	Fan Tray Fault LED	Solid red	Attention Status (error condition)
Blue	Hot Swap LED	Off	No Power to the Fan Tray, or not OK to extract the Fan Tray
		Short blink	Preparing for extraction
		Solid blue	Ready to remove

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6.5 Fan Tray Connector Pin Assignment

Table 6: Fan Tray Connector Pin Assignment

Pin#	Signal	Description	Pin#	Signal	Description
A1	-48V_B	-48VDC Feed B	E1	-48V_A	-48VDC Feed A
A2	-48V_B	-48VDC Feed B	E2	-48V_A	-48VDC Feed A
A3	-48V_B	-48VDC Feed B	E3		
A4			E4		
A5	SCL_A	IPMB A Clock	E5	I2C_SCL_B	I2C B Clock
A6	SDA_A	IPMB A Data	E6	I2C_SDA_B	I2C B Data
A7	SCL_B	IPMB B Clock	E7	GND	Fan Tray Presence, connected to GND
A8			E8		
A9	VRTN_B	RTN Feed B	E9		
A10	VRTN_B	RTN Feed B	E10	VRTN_A	RTN Feed A
A11	VRTN_B	RTN Feed B	E11	VRTN_A	RTN Feed A
B1	-48V_B	-48VDC Feed B	F1	-48V_A	-48VDC Feed A
B2	-48V_B	-48VDC Feed B	F2	-48V_A	-48VDC Feed A
B3	-48V_B	-48VDC Feed B	F3		
B4			F4		
B5	I2C_B CONTROL	I2C B Line Busy Signal	F5	GND	Logic Ground
B6	SDA_B	IPMB B Data	F6	INT_I2C_A	Interrupt Signal of I2C A Line
B7	INT_I2C_B	Interrupt Signal of I2C B Line	F7	GND	Logic Ground
B8			F8	INT_ERROR	Check Error Signal
B9	VRTN_B	RTN Feed B	F9		
B10	VRTN_B	RTN Feed B	F10	VRTN_A	RTN Feed A
B11	VRTN_B	RTN Feed B	F11	VRTN_A	RTN Feed A
C1	-48V_B	-48VDC Feed B	G1	-48V_A	-48VDC Feed A
C2	-48V_B	-48VDC Feed B	G2	-48V_A	-48VDC Feed A
C3			G3		
C4			G4	SAP_PRESENT	Presence Signal of SAP
C5	PEM_PRESNET_L	Presence Signal of Left PEM	G5	I2C_SCL_A	I2C A Clock
C6	H2		G6	I2C_SDA_A	I2C A Data
C7	ERROR	Error Signal	G7	SHELF_PRESENT	Presence Signal of Shelf Manager
C8			G8	Monitor	Monitor Signal
C9			G9		
C10	VRTN_B	RTN Feed B	G10	VRTN_A	RTN Feed A
C11	VRTN_B	RTN Feed B	G11	VRTN_A	RTN Feed A
D1			H1	-48V_A	-48VDC Feed A
D2			H2	-48V_A	-48VDC Feed A
D3			H3		
D4			H4	INT_PCA9555_R	Interrupt Signal of Right PEM PCA9555
D5	INT_PCA9555_L	Interrupt Signal of Left PEM PCA9555	H5	+3.6V	
D6	PEM_PRESNET_R	Presence Signal of Right PEM	H6	I2C_A CONTROL	I2C A Line Busy Signal
D7	FAN_PRESENT	Presence Signal of Fan Tray	H7	INT_Monitor	Check Monitor Signal
D8			H8	FILTER_PRESENT	Presence Signal of Filter
D9			H9		
D10			H10	VRTN_A	RTN Feed A
D11			H11	VRTN_A	RTN Feed A

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6.6 Fan Tray IPMB Addresses

Geographic address pins H2 at the Fan Tray Backplane connector determine the hardware addresses of the devices.

Table 7: Fan Tray IPMB address

	HW-Addr.	IPMB-Addr.
Fan Tray Right	0x2D	0x5A
Fan Tray Left	0x2E	0x5C

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7 Power

	**Hazardous voltage!** *Before working ensure that the power is removed from the power connection cables.*

The Shelf supports Power Entry Modules (PEMs) with DC voltage power input.

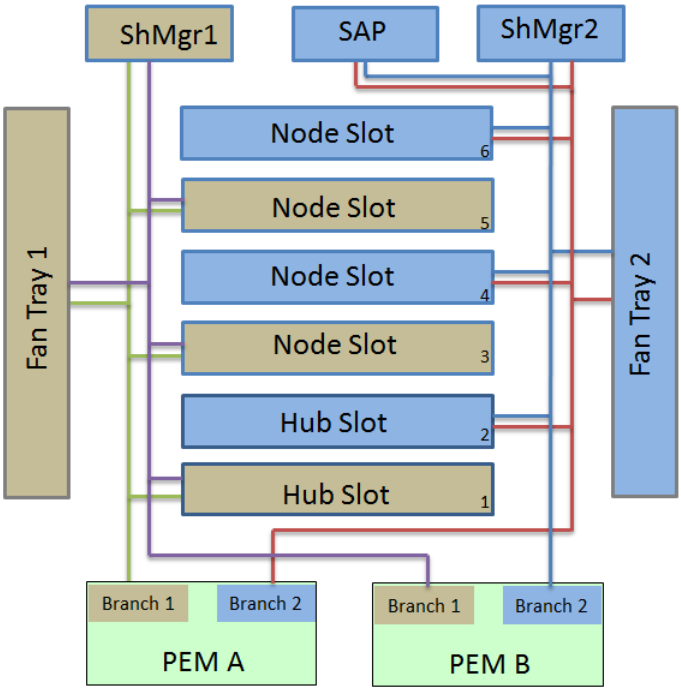
The Shelf can be powered using a regular telecommunication power supply of -48/-60 VDC with a VDC return. The specified voltage range is from -40.5 VDC to -72 VDC. The Shelf supports redundant power supplies but the two supplies should be independently powered.

7.1 Introduction

Two pluggable DC power modules are located at the rear bottom side of the Shelf. The power supply modules are plugged-in from the rear side and are hot-swappable. To provide a redundancy they are arranged in a 1+1 configuration.

7.2 Power Distribution

Figure 7: Power Distribution



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7.3 DC Power Entry Modular

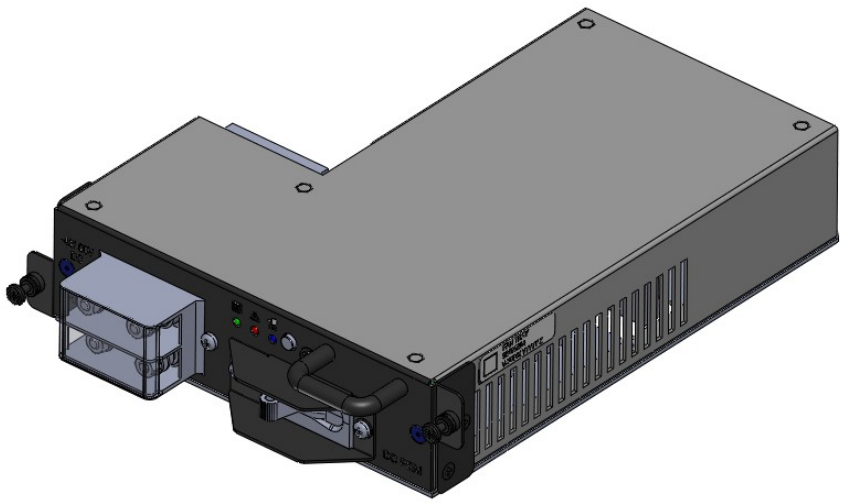
Two pluggable redundant DC Power Entry Modules (PEM) are located at the rear bottom side of the Shelf. Each PEM provides power terminals for 75A power feed. Each power feed consists of a –48 VDC cable and its corresponding return cable. The feed is protected by a 60 A fused switches. The power is divided in 2 output branches towards the backplane. Overcurrent protection is provided by 40 A fuses in output each branch.

The power filtering consists of filtered power terminals and a discrete line-filter for each power branch. The input voltage range for the Shelf is from -40VDC to -72VDC.In each power feed, voltage measurement is implemented, by means of a dedicated voltage monitor device.

The PEM (together with all shelf related FRUs) are protected against wrong polarity up to +57 V DC, but it does not block wrong polarity voltage being applied to shelf-related FRUs and to Zone 1 power wiring of payload slots.

Suppressor diodes are included in the feed chain that provide protection against a K.20 pulse of 500 V being applied to its input (K.20 surge pulse, "Basic level", Table 7, pulse type 7.3, 500 V applied to -48V and -48V RTN branches at the same time against shelf ground) so that the PEM itself and other shelf-related FRUs can sustain this level of pulse.

Figure 8: DC Power Entry Modular



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7.3.1 DC PEM Power Distribution

Power distribution within the Shelf originates from each DC PEM and powers all the blades, the Shelf Managers, and the Fan Trays. For maximum fault tolerance, the two DC PEMs should be independently powered by a separate Feed A and Feed B.

A single DC PEM is capable of supplying the 335 watts of power to each blade slot and the necessary power for the PEMs, Fan Trays, and Shelf Managers.

If two DC PEMs are in service, each DC PEM is hot-swappable after removing the power input cables from the DC PEM.

7.3.2 DC PEM Signals

The DC PEM provides signals for:

- Voltage monitoring
- Current monitoring
- Circuit Breaker Trigger Status
- Fuse Monitoring
- Status of the Hot Swap Controller
- Temperature

The I²C devices on the DC PEM board are connected to Master-Only I²C bus of the Fan controller board. The Shelf Manager has access to these signals via IPM Bus of Fan Tray.

7.3.3 DC PEM Indicators

The front panel includes the following indicators:

- In-Service LED (green)
- Out-of-Service LED (red)
- Hot Swap LED (blue)

Table 8: LEDs on DC PEM front panel

Color	Description	Status	Condition
Green	In-Service LED	Off	No Power to the PEM
		Solid green	Normal Operation
Red	Out-of-Service LED	Solid red	Attention Status (error condition)
Blue	Hot Swap LED	Off	No Power to the PEM, or not OK to extract the PEM
		Short blink	Preparing for extraction
		Solid blue	Ready to remove

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7.3.4 Specification for the power connection cables

Required wire size:

Diameter AWG6 when using two-hole lugs for screw M4

max. length 2.5 to 3.0 m

suitable for 60A at 50°C ambient temperature.

Required terminals:

Use two hole terminals.

7.4 DC PEM Pin Assignment

Table 9: DC PEM Pin Assignment

Pin#	Signal	Description	Pin#	Signal	Description
P1A1	-48V_2	-48VDC Feed 2	P3C1	VRTN_1	RTN Feed 1
P1A2	-48V_2	-48VDC Feed 2	P3C2	VRTN_1	RTN Feed 1
P1B1	-48V_2	-48VDC Feed 2	P3D1	VRTN_1	RTN Feed 1
P1B2	-48V_2	-48VDC Feed 2	P3D2	VRTN_1	RTN Feed 1
P1C1	-48V_2	-48VDC Feed 2	P4A1	-48V_1	-48VDC Feed 1
P1C2	-48V_2	-48VDC Feed 2	P4A2	-48V_1	-48VDC Feed 1
P1D1	-48V_2	-48VDC Feed 2	P4B1	-48V_1	-48VDC Feed 1
P1D2	-48V_2	-48VDC Feed 2	P4B2	-48V_1	-48VDC Feed 1
P2A1	VRTN_2	RTN Feed 2	P4C1	-48V_1	-48VDC Feed 1
P2A2	VRTN_2	RTN Feed 2	P4C2	-48V_1	-48VDC Feed 1
P2B1	VRTN_2	RTN Feed 2	P4D1	-48V_1	-48VDC Feed 1
P2B2	VRTN_2	RTN Feed 2	P4D2	-48V_1	-48VDC Feed 1
P2C1	VRTN_2	RTN Feed 2	A1	GND	Logic Ground
P2C2	VRTN_2	RTN Feed 2	A2	+3.3V	
P2D1	VRTN_2	RTN Feed 2	B1	GND	PEM Presence, connected to GND
P2D2	VRTN_2	RTN Feed 2	B2	SCL	I2C Clock
P3A1	VRTN_1	RTN Feed 1	C1	H1	
P3A2	VRTN_1	RTN Feed 1	C2	SDA	I2C Data
P3B1	VRTN_1	RTN Feed 1	D1	INT_PCA9555	Interrupt Signal of PCA9555
P3B2	VRTN_1	RTN Feed 1	D2		

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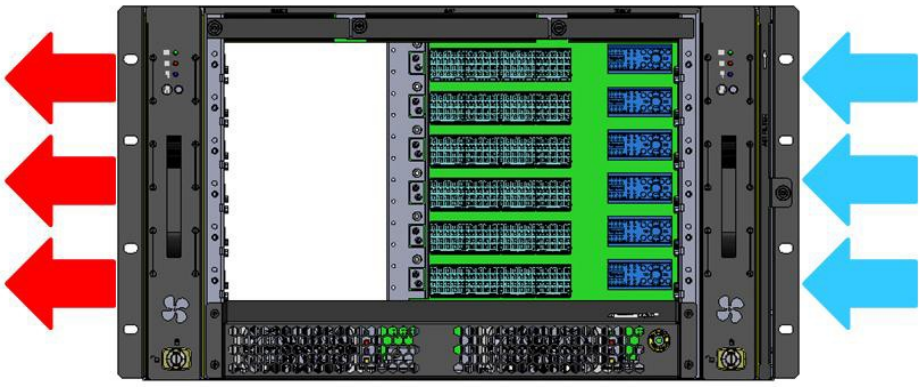
8 Thermal

8.1 System Airflow Path

The 6 slots ATCA Shelf provides an airflow using two Fan Trays at right and left sides of the Shelf.

Each Fan Tray has 6 fans moving air from the right side to the left side of the Shelf in a push-pull arrangement. This arrangement provides excellent airflow as well as fault tolerance in the unlikely event of a fan failure.

Figure 9: General airflow path for the 6U 6 slot ATCA Shelf



8.2 Cooling Capacity

The maximum system airflow (all fans at full speed) is 387.3 CFM.

The maximum air distribution is measured with front and RTM test boards.

(Front board impedance

= 37Pa pressure drop at 50 m^3/h (30 CFM), RTM board impedance = 24.9 Pa at 8.4 m^3/h (5 CFM))

The maximum average per slot cooling capacity is:

- Front slot: 340 W with ΔT = 12 K
- Rear slot:35 W with ΔT = 12 K

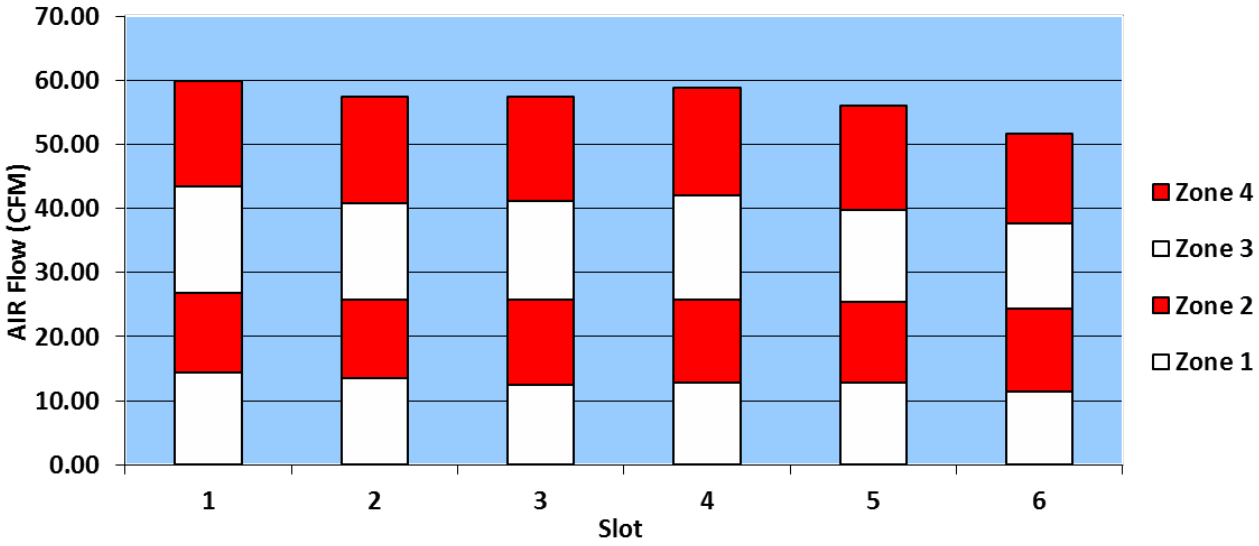
8.2.1 Front Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0 specification.

- Front board pressure drop: 37 Pa at 0.85 m^3/min

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Chart 1: Front Boards - Slot Volumetric Flow

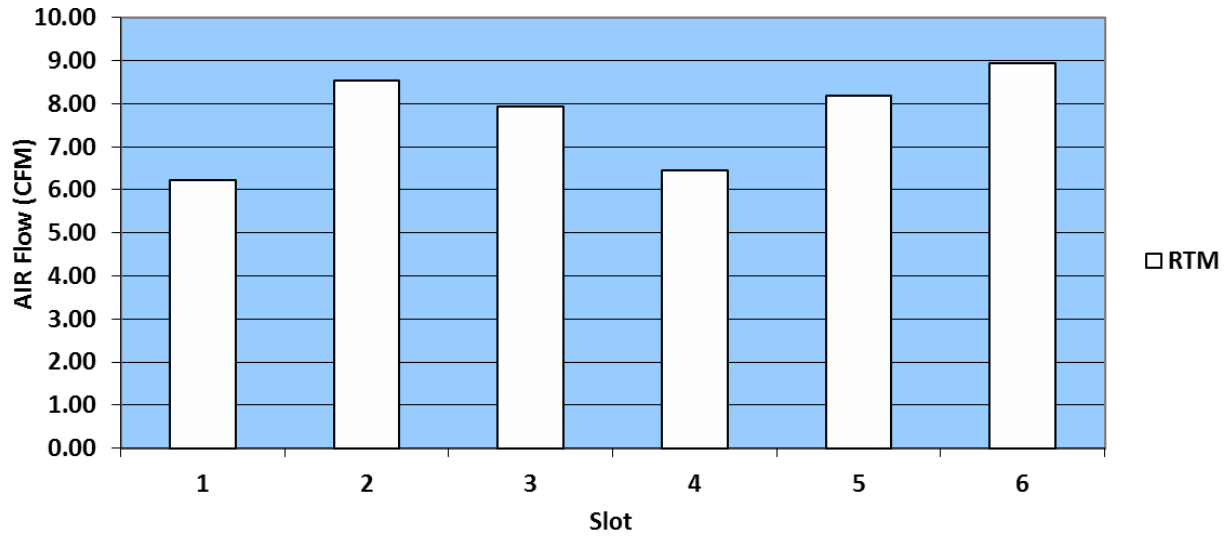


8.2.2 Rear Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0 specification.

- Rear board pressure drop: 24 Pa at 0.14 m³/min

Chart 2: RTM's - Slot Volumetric Flow



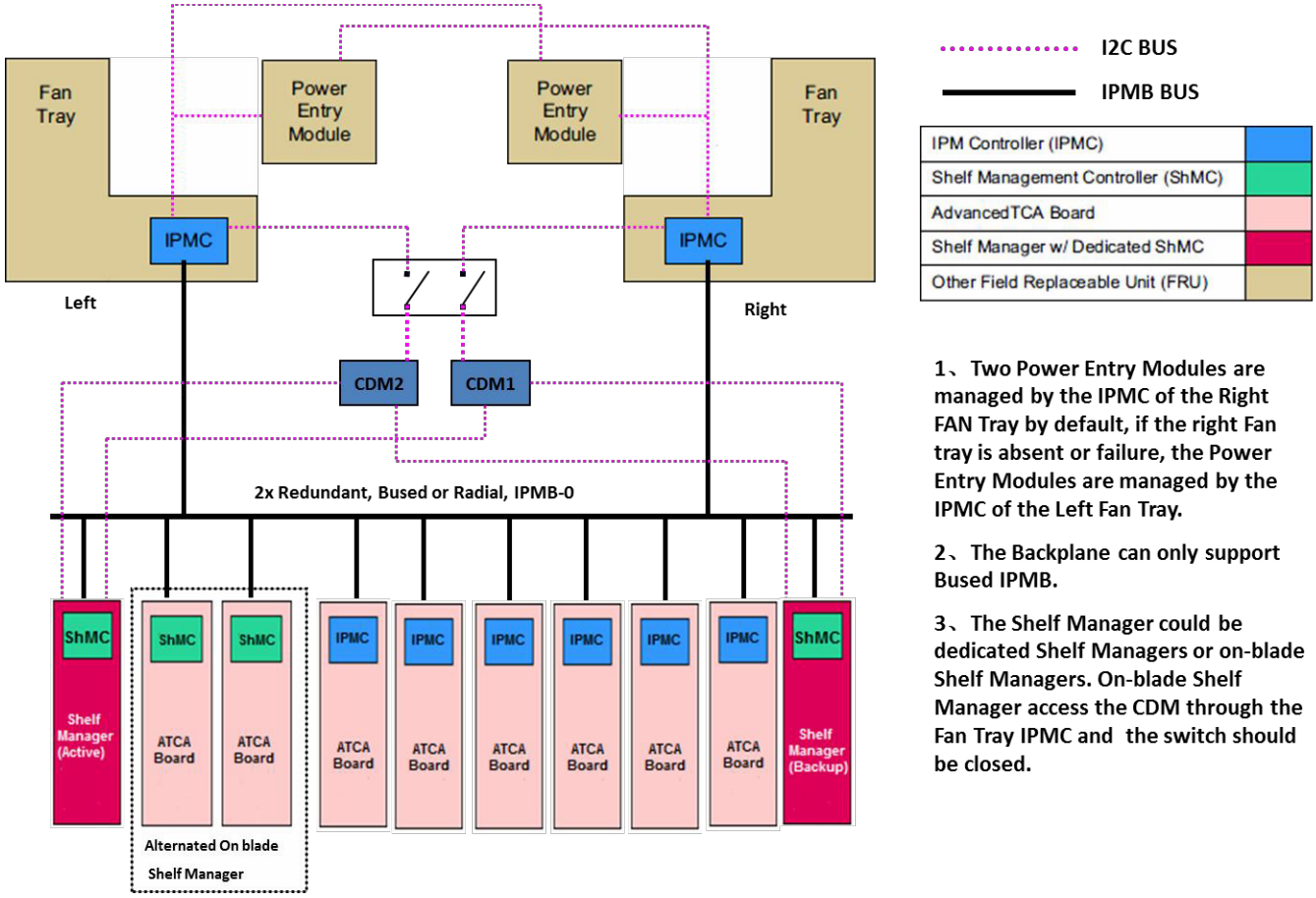
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9 Shelf Management

The ATCA Shelves are designed to work with two redundant Shelf Managers in dedicated Shelf Manager slots.

Upon request also a version with on-blade shelf management is available. With on-blade shelf management, the I²C components of the PEMs and the SEEPROM are connected to the internal I²C bus on the Fan Trays. The on-blade Shelf Manager has access to these components via the IPM controller of the Fan Trays.

Figure 10: Shelf Management



1、Two Power Entry Modules are managed by the IPMC of the Right FAN Tray by default, if the right Fan tray is absent or failure, the Power Entry Modules are managed by the IPMC of the Left Fan Tray.

2、The Backplane can only support Bused IPMB.

3、The Shelf Manager could be dedicated Shelf Managers or on-blade Shelf Managers. On-blade Shelf Manager access the CDM through the Fan Tray IPMC and the switch should be closed.

9.1 Shelf Managers

This section describes the Shelf Manager hardware. For explicit software documentation refer to:

- Pigeon Point Shelf Manager User Guide
- Pigeon Point Shelf Manager External interface Reference

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9.2 Introduction

The Shelf Manager is a 78mmX280mm board that fits into a dedicated Shelf Manager slot in an ATCA Shelf.

The Shelf Manager has two main responsibilities:

1. Manage/track the FRU population and common infrastructure of a Shelf, especially the power, cooling and interconnect resources and their usage.
2. Enable the overall system manager to join in that management/tracking through the System Manager Interface, which is typically implemented over Ethernet.

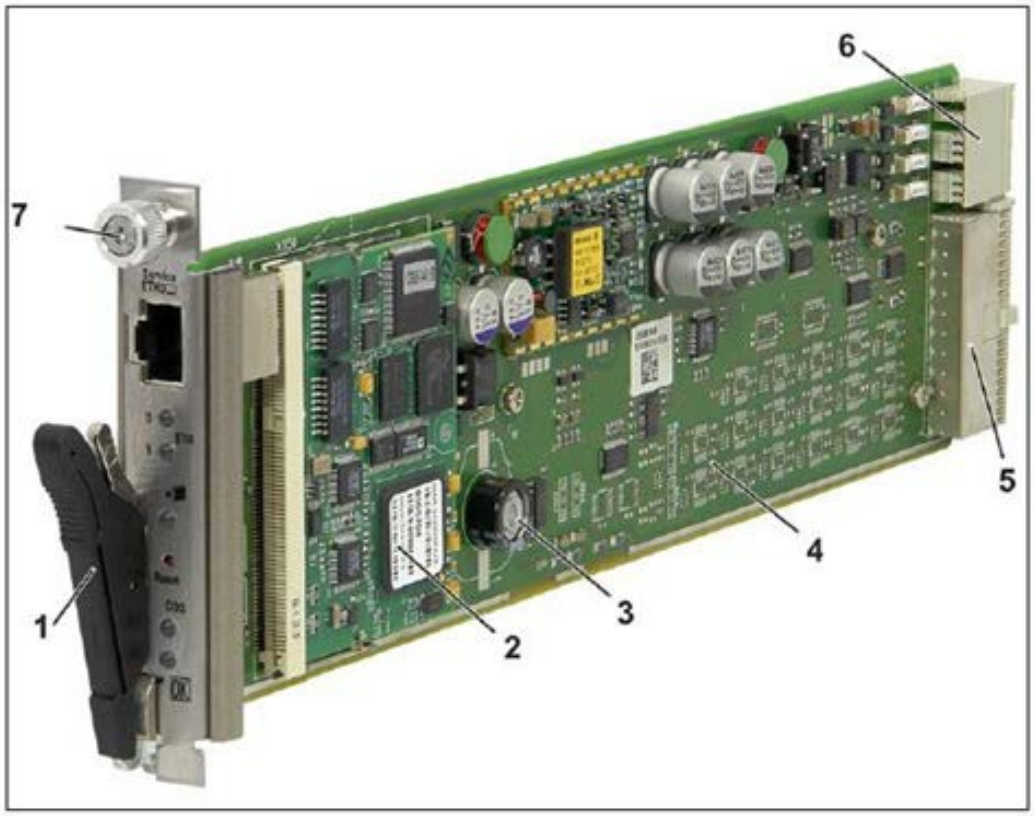
The Shelf management based on the Pigeon Point Shelf management solution for AdvancedTCA products.

The Shelf management software executes on the pigeon point Shelf Management Mezzanine 700 (ShMM-700), a compact SO-DIMM form-factor module, installed on the carrier board.

The carrier board includes several on-board devices that enable different aspects of Shelf management based on the ShMM-700. These facilities include I2C-based hardware monitoring/control and GPIO expander devices.

To maximize availability, the ATCA Shelves are designed to work with two redundant Shelf Managers.

Figure 11: Shelf Manager

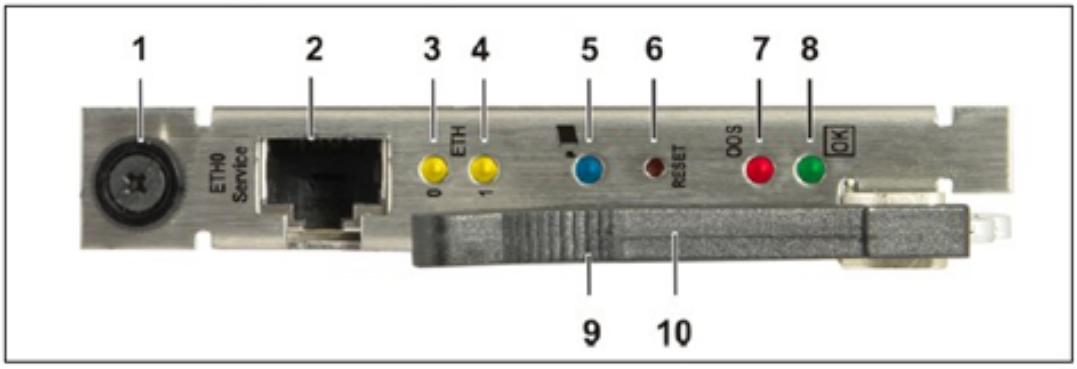


1	Extraction handle	5	Backplane Connector (J2)
2	ShMM-700	6	Backplane Connector (J1)
3	RTC Backup Capacitor	7	Fixing screw
4	Carrier Board		

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9.3 Front Panel Components

Figure 12: Shelf Manager Front Panel Component



1	Fixing screw	6	RESET push button
2	ETH 0 Ethernet Service Connector (RJ45)	7	Shelf Manager Status LED (red) - Red = Out of Service (OOS)
3	ETH 0 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	8	Shelf Manager Status LED (green) - Solid Green = in Service, active Shelf Manager - Blinking = in Service, Backup Shelf Manager
4	ETH 1 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	9	Hot Swap Switch - Activated by extraction handle
5	Hot Swap LED (blue) - Solid Blue = ready to remove - Blinking = Hot Swap is requested - Off = No Hot Swap possible	10	Extraction handle

9.4 Hardware Address

The Shelf Manager reads the hardware address and parity bit from the backplane connector of the Dedicated Shelf Manager slot. Geographic address pins (HA0, HA7) at the Backplane connector determine bit 0 and bit 7, bit 1...6 are hardware-coded on the Shelf Manager PCB.

Table 10: Hardware Address

	HW-Addr.	IPMB-Addr.
Primary Shelf Manager (left)	0x08	0x10
Secondary Shelf Manager (right)	0x09	0x12

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10 Technical Data

Table 11: Technical Data

Physical Dimensions	
Height	6U
Width	482.6 mm (19“)
Depth (w/o handles)	426.65 mm
Weight	
Shipping weight completely assembled with packaging	41.5 Kg
Shelf weight completely assembled	25.5 Kg
Power DC	
Input voltage nom.	-48 VDC/-60 VDC
Input voltage range	40.5 ... 72 VDC
Input Power Protection	60 A
Overcurrent Protection	40 A fuses for each branch
Power and Cooling Capacity	
Front Boards	300 W/board
RTM	35 W/board
Environmental	
Ambient temperature	+5°C…+40°C (long term) -5°C…+55°C (short term)
Humidity	+5%...+85%, no condensation
EMI	
Conducted Emissions	EN 55022 Class A
Radiated Emissions	EN 55022 Class A
Safety	
Protected Earth Test	EN50514, test current 25A, resistance <100 mOhm
Hipot Test (DC system)	EN60950 -1000 VDC

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10.1 Shelf Mechanical Dimensions

All dimensions below are in mm.

Figure 13: Front View Dimensions

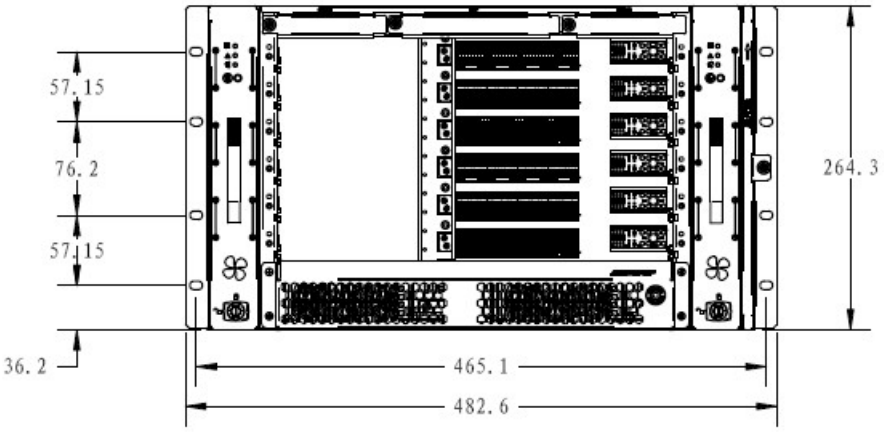
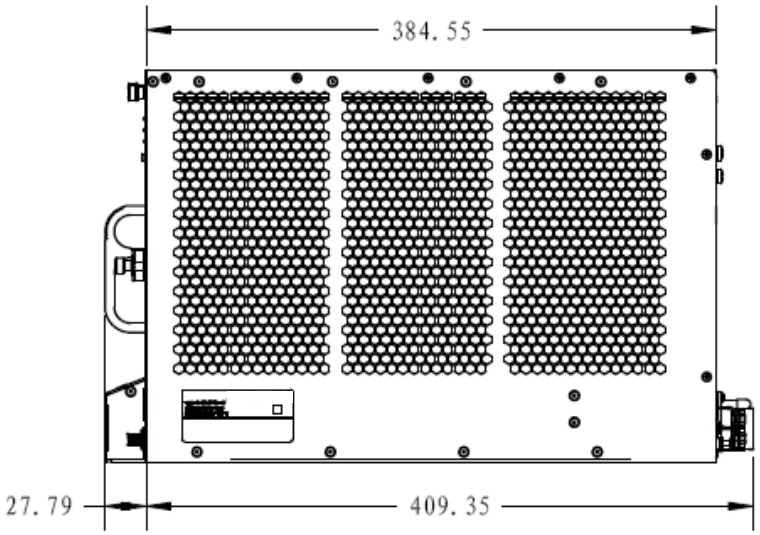


Figure 14: Side View Dimensions



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