ADLINK TECHNOLOGY INC.

aTCA-H8606C

6U 6 slot ATCA Shelf

User's Manual



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Advance Technologies; Automate the World.

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Revision History

Rev	Date	Description
1.00	09/05/2014	Initial release
1.01	27/08/2014	Add Shelf Management Controller; remove SKU list

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Preface

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Caution: Read this manual before working on this unit.



Caution: HAZARDOUS VOLTAGE! Contact may cause electric shock or burn.



Electronic components are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti-static wrist straps be worn and connected to a known ground connection when removing any Field Replaceable Unit in this shelf.



Caution: Rotating fan blades. Can cause minor injury or cut. Keep hands clear when servicing. Allow time for fan blades to slow to a stop before fully removing.

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UL Safety Considerations

Rack Mounting:

If rack mounted units are installed in a closed or multi-unit rack assembly, they may require further evaluation by certification agencies. The following items must be considered:

1. The ambient temperature within the rack may be greater than room ambient.
2. Installation should be such that the amount of air flow required for safe operation is not compromised. The maximum temperature for the equipment in this environment is 45ºC. Consideration should be given to the maximum rated ambient.
3. Installation should be such that a hazardous stability condition is not achieved due to uneven loading.
4. Reliable earthing of rack-mounted equipment should be maintained.

Input Supply:

1. Check nameplate ratings to assure there is no overloading of supply circuits that could have an effect on overcurrent protection and supply wiring.
2. The unit is provided with multiple power inputs. To disconnect all from the unit remove all incoming power sources.

Installing Cards:

1. All I/O cards shall be UL listed accessories, or equivalent cards that are listed to UL/CSA 60950-1 2nd edition, or Kontron Canada, Inc., Model AT8050.

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1 Introduction

1.1 Overview

The ADLINK aTCA-H8606C shelf has the following features and characteristics

- 6U high, 19” wide with brackets for 19” racks
- ESD wrist strap at the front and rear (banana jack)
- Monolithic backplane design
- Triple replicated Full Mesh or Dual Star topology
- Power distribution for 400W+ per slot
- Redundant DC power entry module (PEM) or up to 4 AC-to-DC power supply units
- Cooling capability 350W for front boards and 50W for RTMs
- Four cooling zones: 2 front and 2 rear
- Two high pressure fan tray units, hot swappable, front pluggable
- Air filter mounted on fan tray unit, front pluggable
- Redundant Shelf FRU Data EEPROMs on the backplane
- Redundant control boards for Pigeon Point ShMM-500 shelf manager, RS-232 and Ethernet at front panel, hot swappable
- RoHS compliant

Specifications:

	Unpackaged		Packaged (with 3 PS)	
Weight	23 kg	50.7 lbs	35 kg	77.16 lbs
W	482.60 mm	19.00 inch	600 mm	23.62 inch
H	265.90 mm	10.47 inch	400 mm	15.75 inch
D	431.15 mm	16.97 inch	600 mm	23.62 inch
D (cable trays)	466.15 mm	18.35 inch		

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The front and rear views of the shelf are shown in Figure 1 and Figure 2:



Figure 1. aTCA-H8606C Shelf - Front View

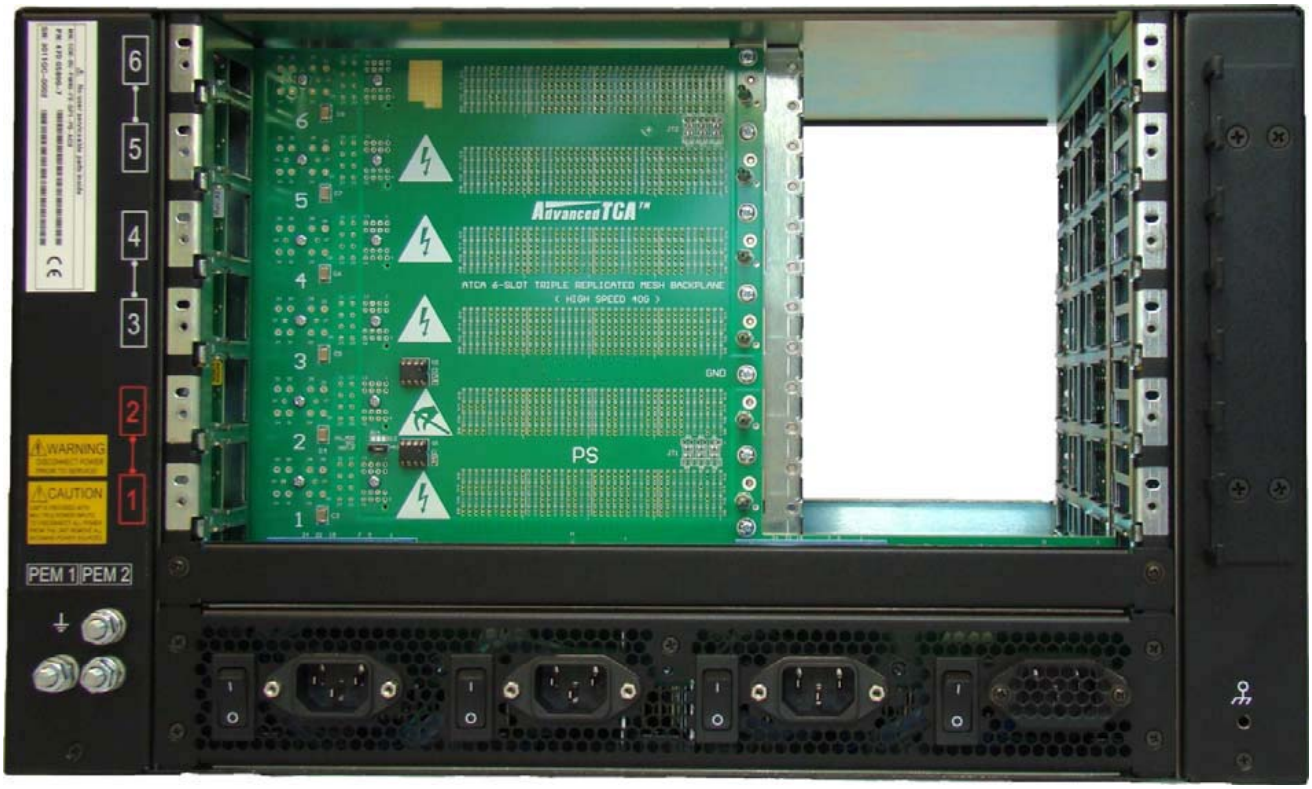


Figure 2. aTCA-H8606C Shelf - Rear View (AC version)

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The front and rear perspective views of the shelf are shown in Figure 3 and Figure 4:



Figure 3. aTCA-H8606C Shelf – Front Perspective View



Figure 4. aTCA-H8606C Shelf - Rear Perspective View (AC version)

1.2 Shelf Installation

Improper installation might cause system damage or personnel injury. Consider the following guidelines:

- Install the system in area with restricted access
- Follow the installation rules appropriate to your country
- Power distribution to the shelf must include overcurrent protection devices
- Use power cords (IEC-320-C13) with minimum 14AWG gauge and 10A current rating
- Use appropriate protective bonding conductors according to overcurrent limits for power lines
- Make sure that the personnel will not interfere with cables and cords connected to the rack/shelf

Make sure that the shelf airflow (i.e. ventilation openings) is not disturbed by cables and rack construction; otherwise this might lead to system damage.

1.3 Power Section

1.3.1 FRU Support

The ADLINK aTCA-H8606Cbackplane supports the following:

- Six AdvancedTCA front board slots
- Six AdvancedTCA RTM slots
- Two fan trays
- Four power supply slots
- Two slots for control board with Pigeon Point ShMM-500
- Two sockets for Shelf FRU Data EEPROM

1.3.2 Physical Layout

Physical layout of FRUs populated in the shelf is shown in Figure 5 and Figure 6.

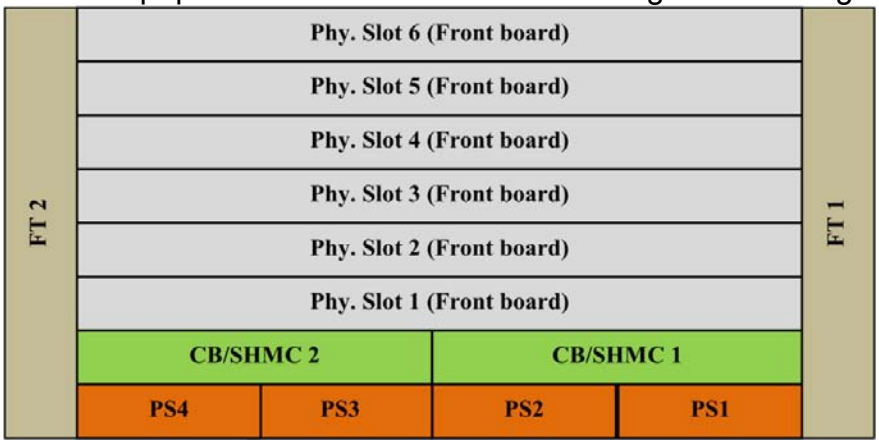


Figure 5. Front FRU Physical Layout (AC version)

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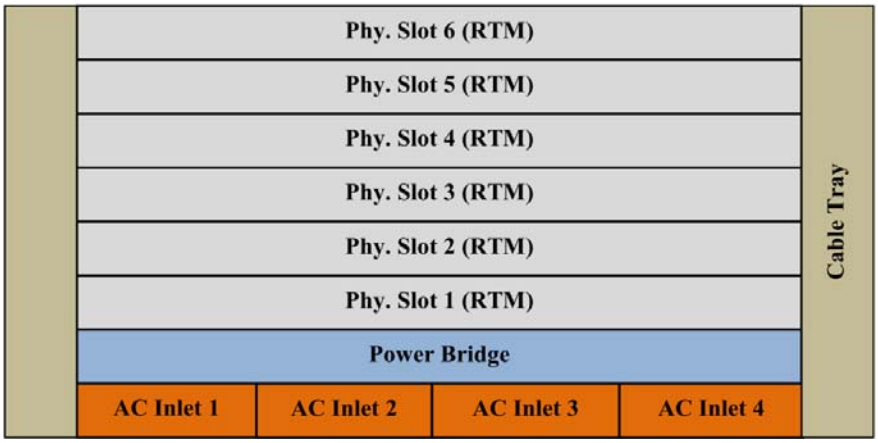


Figure 6. Rear FRU Physical Layout (AC version)

1.3.3 Power Channel Segmentation

Boards are fed with alternate A and B feeds. On the *full mesh backplane*, by default, two power supplies are connected to Channel A and two others are connected to Channel B. Optionally, a Bridge Board allows both power channels to be tied together to enable N+1 redundancy for power supplies. The power distribution is shown in Table 1:

Physical Slot/FRU	1	2	3	4	5	6	Control Boards	Fan Trays
"A" Ch. (PS1 || PS2)	X	X	X	X	X	X	X	X
"B" Ch. (PS3 || PS4)	X	X	X	X	X	X	X	X

Table 1. Power Distribution on Full Mesh Backplane

On the *dual star backplane* all four power supplies are connected to both Channel A and Channel B. The power distribution is shown in Table 2:

Physical Slot/FRU	1	2	3	4	5	6	Control Boards	Fan Trays
"A" Ch. / "B" Ch. (PS1 || PS2 || PS3 || PS4)	X	X	X	X	X	X	X	X

Table 2. Power Distribution on Dual Star Backplane

1.3.4 IPMB Bus Mapping

The power backplane section has a bussed IPMB topology. There are two redundant IPMB busses shared among the intelligent FRUs on the backplane. The bus pull-up resistors are located on the shelf manager which is currently “active”. The bussed topology is shown in Figure 7:

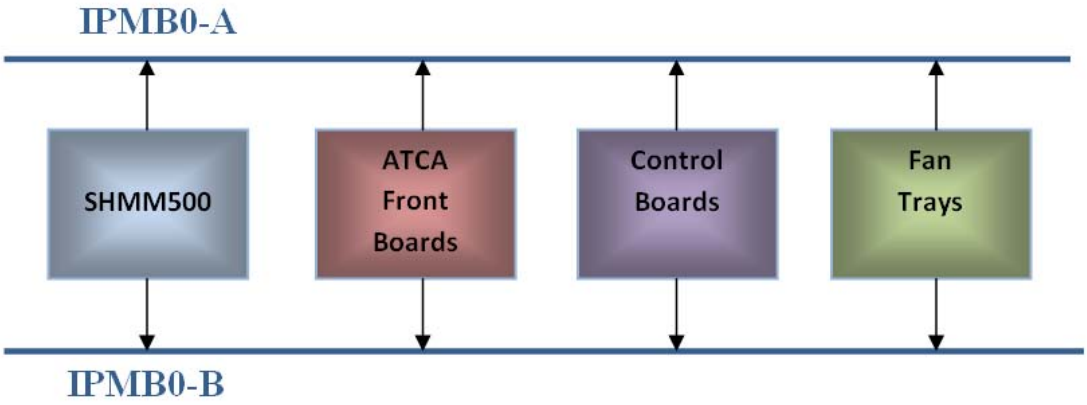


Figure 7. Bussed IPMB Topology

Each FRU has a unique hardware address. Hardware address mapping is given in Table 3:

FRU(Looking from front)	IPMB address	Hardware Address
SHMC1 (right)	10h	08h
SHMC2 (left)	12h	09h
Control Board1 (right)	C4h	62h
Control Board2 (left)	C6h	63h
Fan Tray 1 (right)	C8h	64h
Fan Tray 2 (left)	CAh	65h
ATCA logical slot 1	82h	41h
ATCA logical slot 2	84h	42h
ATCA logical slot 3	86h	43h
ATCA logical slot 4	88h	44h
ATCA logical slot 5	8Ah	45h
ATCA logical slot 6	8Ch	46h

Table 3. Hardware Address Mapping

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1.3.5 Logical to Physical Slot Mapping

The mapping between logical slots and their physical positions is given in the Table 4:

Physical slot	1	2	3	4	5	6
Logical slot	1	2	3	4	5	6

Table 4. Logical to Physical Slot Mapping

1.3.6 Logic Ground

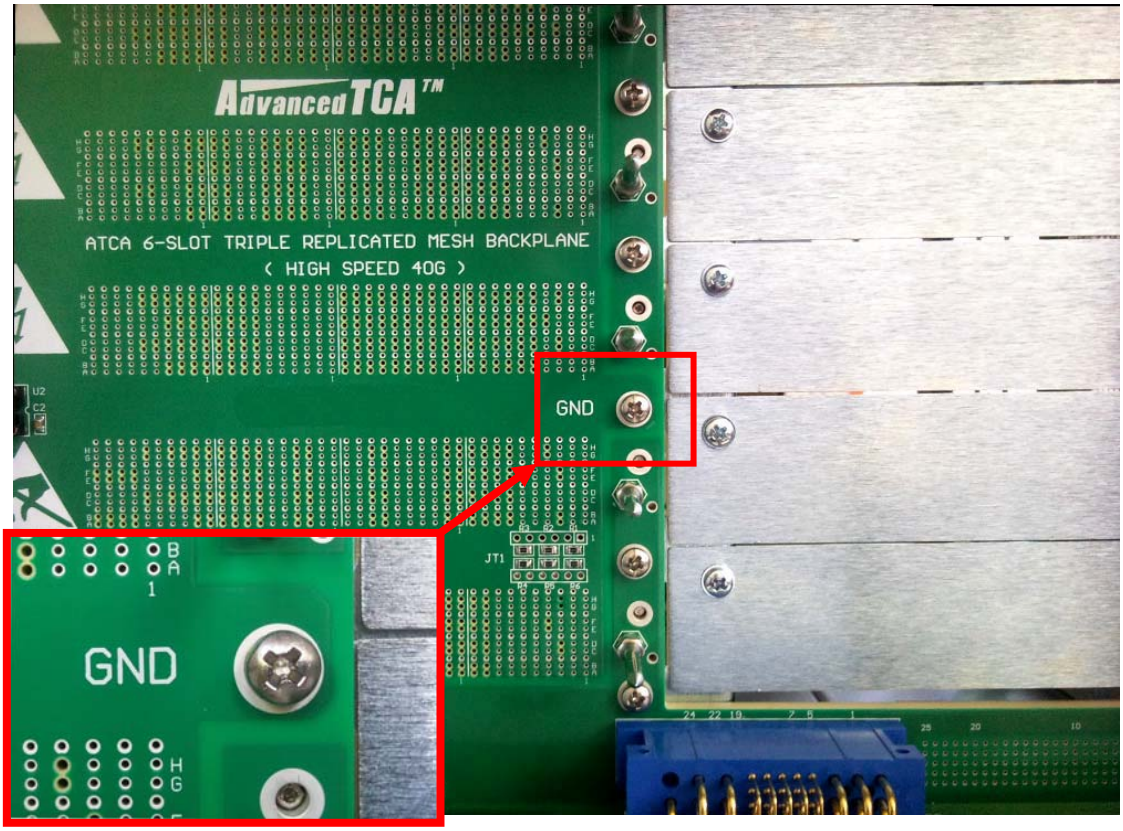


Figure 8. Logic Ground

Logic ground is used as a reference for low voltage electronics and it is isolated from the chassis/shelf ground and 48v power lines. For EMI/EMC purpose, it may be necessary to connect the logic ground and shelf ground together.

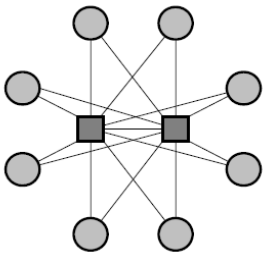
To connect both grounds, a screw with a conductive metal washer is installed in this location (GND) as shown on Figure 8. To disconnect, remove this screw.

Note: *By default, the screw is installed.*

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1.4 High Speed Section

1.4.1 Base Interface



The Zone 2 Base Interface is used to support connections among Boards in the shelf. This interface supports 10/100/1000BASE-T Ethernet. Connections are composed of four differential signal pairs (one row of the ZD connector) called Base Channels. The topology of the Base Interface is Dual Star as shown in Figure 9. It enables connections from multiple Node boards to dedicated Hub boards. The latter are always located in Logical slot 1 and 2. Base Channel 1 is allocated to the shelf manager.

Figure 9. Dual Star Topology

(rectangles: Hub boards, circles: Node boards)

1.4.2 Shelf Manager Ethernet Connections

The backplane P23 connector pinout is implemented according to ECN001, Table 5:

Row#	Interface Designation	AB		CD		EF		GH	
5	ShMC Port with ShMC cross connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Primary ShMC Cross-connect				Secondary ShMC Cross-connect			

Table 5. Cross-connect Implementation on ADLINK Backplanes

Shelf Manager1 is connected to the dedicated Switch1 slot over the primary channel (rows ABCD) and to dedicated Switch2 slot over the secondary cross-connect channel. Accordingly, Shelf Manager 2 connected to the dedicated Switch2 slot and over the secondary channel with Switch1, as shown in Figure 10:

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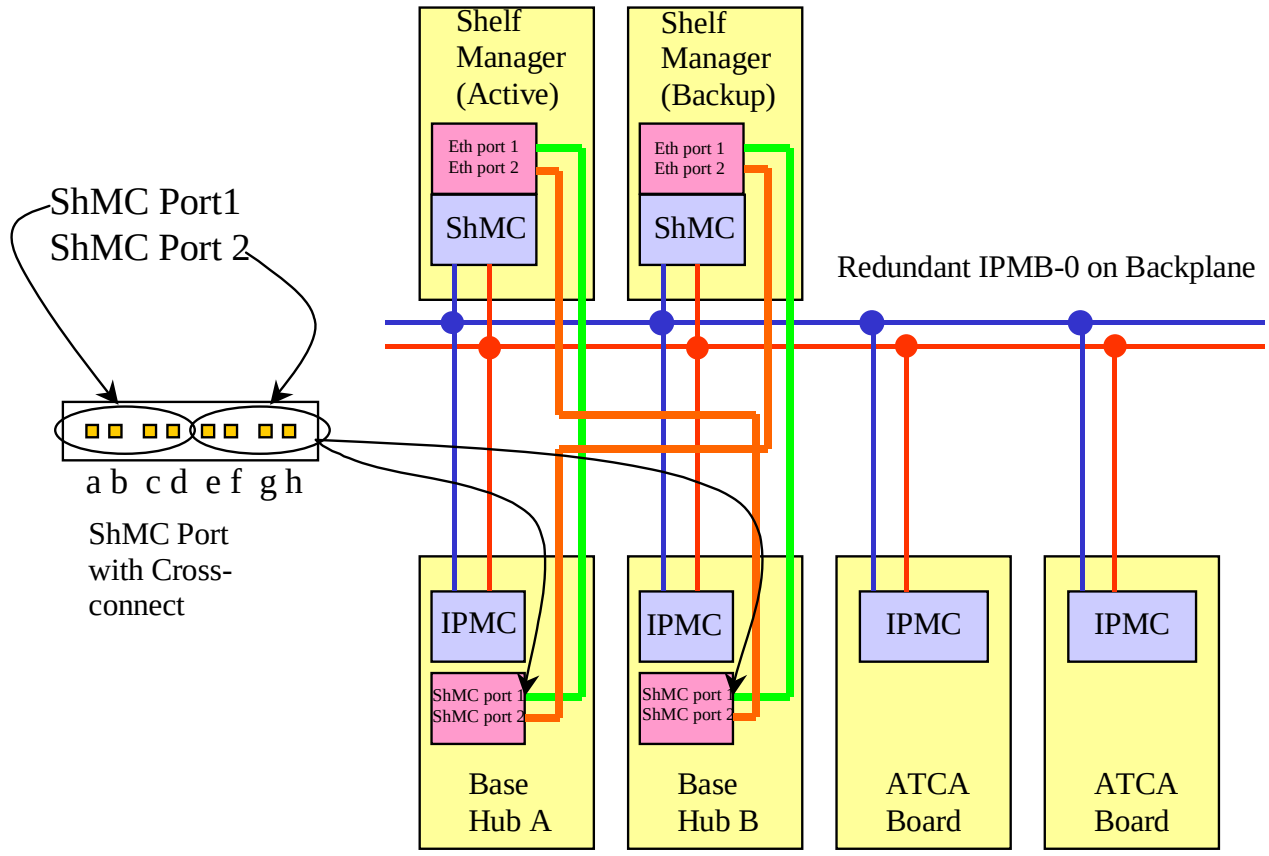


Figure 10. Shelf Manager Ethernet Port Cross-Connect Implementation

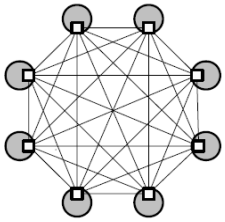
1.4.3 Fabric Interface

The Fabric Interface is mostly used for high throughput data transport and may utilize interfaces such as 1 or 10 Gigabit Ethernet, PCI Express, Serial RapidIO, etc. The Fabric Interface is comprised of 13 channels providing connectivity among the front boards. Each channel occupies two rows of the ZD connector resulting in 8 pairs per channel. ADLINK offers both dual star and triple replicated full mesh backplanes for the aTCA-H8606C.

The Full Mesh topology does not use a central switch fabric. All slots are identical from the point of view of the connection as shown in Figure 11:

Figure 11. Fabric Topology

(Note: There are no dedicated hub boards.)



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1.4.4 Update Channel

The Update Channel interface is comprised of 10 differential signal pairs in a point to point connection between two adjacent physical slots. It can be used for general purpose high speed links between two boards. Update channel connections are shown in Table 6.

Physical slot	**1**	**2**	**3**	**4**	**5**	**6**
Logical slot	**1**	**2**	**3**	**4**	**5**	**6**
Update Channel	◄►		◄►		◄►	

Table 6. Update Channel Connections

1.4.5 Synchronization Clock Interface

The Synchronization Clock interface provides a set of clock buses to enable applications that require the exchange of synchronous timing information among multiple boards in a shelf. Clock lines are bussed between all slots and terminated on both ends.

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2 Cable Trays

A shelf is equipped with a rear cable tray which helps to guide and fasten cables and cords connected to the shelf.

Note: *Contact ADLINK for more information if required.*

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3 Cooling Assembly

3.1 Fan Tray

There are two fan tray cassettes in the system. Cooling is performed from side to side. While the fan tray is a single mechanical unit (see Figure 12) it has two functions: front board cooling and RTM cooling.

The fan tray contains electronics that allow it to be detected as a fully PICMG compliant IPMC device by the shelf manager. Furthermore, it contains hot swap circuitry, common fusing, fan supervising and control circuitry.

The system utilizes push-pull cooling with 2 separately managed fan trays and 4 independent cooling zones. Integrated power supplies enable the use of 48V fans without any degradation in performance with 90 – 264 VAC.

Under normal operating conditions the shelf manager cooling algorithm sets the fan speed in a range from MIN_FAN_LEVEL to 100% using the 'Set_Fan_Speed' command.

The cooling algorithm works based on temperature events coming from FRUs. Fan speed in a particular cooling zone will be increased if any FRU in that zone reports a temperature crossing the *non-critical threshold*. For safety reasons, if any FRU reports a temperature crossing the *critical threshold*, the fan speed in all cooling zones will be increased.

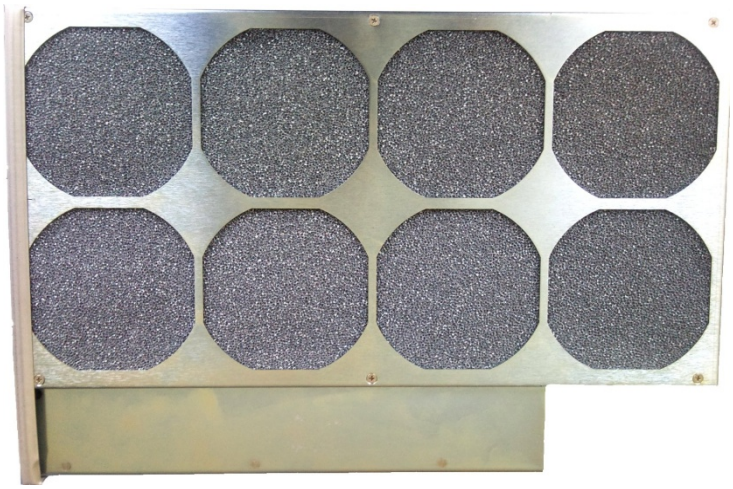


Figure 12. Fan Tray With Air Filter Frame

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Fan Tray Removal:
Loosen the locking mechanism (see Figure 13) and move the head to the left or right (away from the fan tray). Hold the head while pulling out the fan tray using the handle

Fan Tray Insertion:
Loosen the locking mechanism and move the head to the left or right (away from the fan tray). Hold the head while inserting the fan tray using the handle. Tighten the locking mechanism.



Figure 13. Fan Tray Locking Mechanism



Caution: Rotating fan blades can cause minor injury or cuts. Keep hands clear when servicing. Allow time for fan blades to slow to a stop before fully removing.



This unit contains electronic components that are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti static wrist straps be worn and connected to a known good shelf ground connection when servicing.

3.1.1 Air Filter

The air filter is required to provide:

- Filtration of intake air from dust particles
- Additional static pressure to achieve uniform airflow

The air filter frame is mounted on the right fan tray cassette. To change the air filter, remove the fan tray (FT1, right side looking from front). Only the filter material needs to be replaced. The filter frame can be re-used.

3.2 Software Architecture

The board is based on an IPMI and PICMG specification compliant IPMC. The IPMC accesses four FRUs:

- FRU ID 0 – Fan Tray (Front slots, Cooling Zone 1)
- FRU ID 1 – Fan Tray (Front slots, Cooling Zone 2)
- FRU ID 2 – Fan Tray (Rear slots, Cooling Zone 3)
- FRU ID 3 – Fan Tray (Rear slots, Cooling Zone 4)

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There are four independent cooling zones; each can be driven separately by the shelf manager. This enables reduced noise by decreasing fan speed in zones with “cold” FRUs. For example, if no RTM boards are installed, corresponding fans will be spinning at the minimum possible speed.

In Figure 14 the mapping of fans to cooling zones is shown (numbers in fan sensors names also correspond to this mapping). The mapping of cooling zones to FRUs is defined in the shelf FRU data and shown in Table 7.

FRU’s	Cooling Zone1	Cooling Zone2	Cooling Zone3	Cooling Zone4
Control Board 1&2	X			
Shelf Manager 1&2	X			
Front Board 1	X			
Front Board 2	X			
Front Board 3	X			
Front Board 4		X		
Front Board 5		X		
Front Board 6		X		
RTM 1			X	
RTM 2			X	
RTM 3			X	
RTM 4				X
RTM 5				X
RTM 6				X

Table 7. FRU to Cooling Zone Mapping

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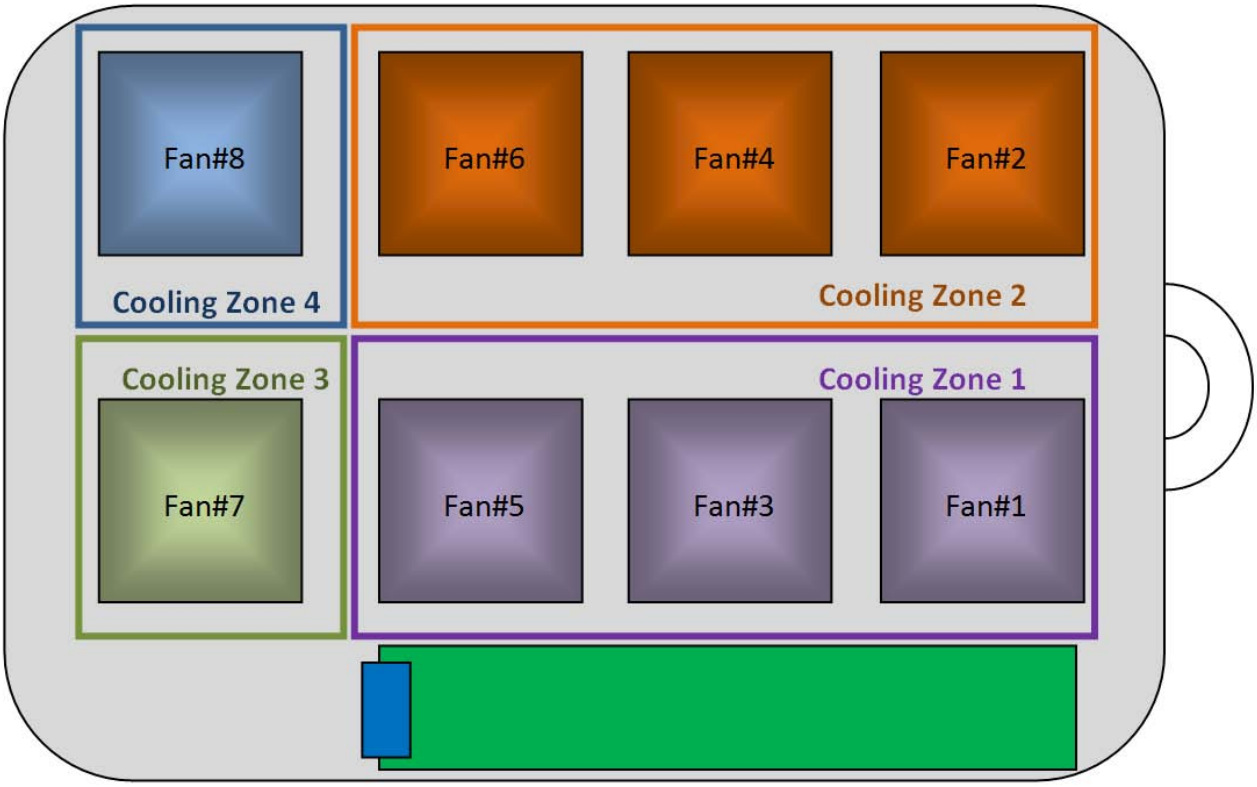


Figure 14. Fan to Cooling Zone Mapping

3.2.1 Sensors

Fan tray sensors provided by the IPMC are given in Table 8:

Sensor Name	Number/ LUN	EntityID/Entity Instance	Sensor Type code	Description
IPMB 0 Status	85h / 0h	1Eh/60h	IPMB Link F1h	System
HS Fans Group F1	84h / 0h	1Eh/60h	Hot Swap F0h	System
HS Fans Group F2	83h / 0h	1Eh/61h	Hot Swap F0h	System
HS Fans Group R1	70h / 0h	1Eh/62h	Hot Swap F0h	System
HS Fans Group R2	71h / 0h	1Eh/63h	Hot Swap F0h	System
IPMC Status	01h / 3h	1Eh/60h	OEM D5h	System
FW Revision ISC	88h / 0h	1Eh/60h	OEM D6h	System
Board Temp 0	00h / 1h	1Eh/60h	Temperature 01h	Redundant on board temperature sensor

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Sensor Name	Number/ LUN	EntityID/Entity Instance	Sensor Type code	Description
Board Temp 1	01h / 1h	1Eh/60h	Temperature 01h	Redundant on board temperature sensor
Fan speed FG1 F1	01h / 0h	1Eh/60h	Fan 04h	Fan tachometer sensor (front cooling zone, lower raw, Fan#1)
Fan speed FG1 F3	03h / 0h	1Eh/60h	Fan 04h	Fan tachometer sensor (front cooling zone, lower raw, Fan#3)
Fan speed FG1 F1	01h / 0h	1Eh/60h	Fan 04h	Fan tachometer sensor (front cooling zone, lower raw, Fan#5)
Fan speed FG2 F2	02h / 0h	1Eh/61h	Fan 04h	Fan tachometer sensor (front cooling zone, upper raw, Fan#2)
Fan speed FG2 F4	04h / 0h	1Eh/61h	Fan 04h	Fan tachometer sensor (front cooling zone, upper raw, Fan#4)
Fan speed FG2 F6	06h / 0h	1Eh/61h	Fan 04h	Fan tachometer sensor (front cooling zone, upper raw, Fan#6)
Fan speed RG1 R1	07h / 0h	1Eh/62h	Fan 04h	Fan tachometer sensor (rear cooling zone, lower raw, Fan#7)
Fan speed RG2 R2	08h / 0h	1Eh/63h	Fan 04h	Fan tachometer sensor (rear cooling zone, upper raw, Fan#8)
Fan Failure	09h / 0h	1Eh/60h	Fan 04h	Failures related to the tachometer sensors
FW Revision TM	0Ah / 0h	1Eh/60h	Cooling device 0Ah	FW revision of Fan Tachometer monitor
Failure TM	0Bh / 0h	1Eh/60h	Cooling device 0Ah	Failures related to the tachometer monitor

Table 8. Fan Tray IPMC Sensors

OEM sensors of the fan tray IPMC are described in Table 9:

Sensor name	Current State Mask
Fan Failure	State Mask bit [0], 1b = There is no stopped fans State Mask bit [1], 1b = One or more fans are stopped
FW Revision TM	Sensor Reading = [7:0] – Tachometer Monitor FW Build State Mask = [7:0] – Tachometer Monitor FW Minor Revision State Mask = [14:8] – Tachometer Monitor FW Major Revision
Failure TM	State Mask bit [0], 1b = There is no communication with tachometer monitor State Mask bit [1], 1b = Communication is OK

Table 9. Fan Tray OEM Sensors

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4 Control Board

4.1 Shelf Management Concept

There are two different approaches to managing the shelf:

- Redundant shelf management with two control boards and two Pigeon Point shelf managers (ShMM-500)
- Non-redundant shelf management with one control board and one ShMM500

The former approach allows access to all of the ATCA features defined in the ATCA specification, such as fully redundant IPMI management of ATCA blades via the IPMB-0 bus and system monitoring. The latter approach is used where redundancy of the shelf manager is not required. A control board is then replaced with a blank front panel in order to preserve the air flow in the shelf. In both cases there is fully redundant access to all of the system sensors (temperature, tachometer, current etc.), remote external access to the shelf via SNMP, RMCP, (optionally) HPI protocol, and intelligent adaptive cooling algorithm, performed by the ShMM-500.

The control board is shown in Figure 15 and includes an IPMC, hot swap circuitry and Pigeon Point ShMM-500.

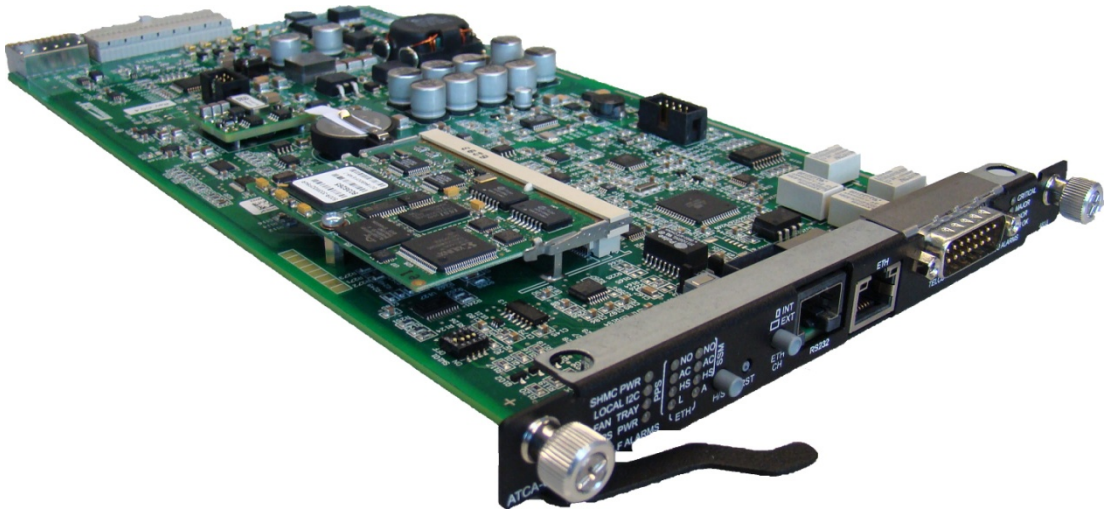


Figure 15. Pigeon Point Shelf Management Control Board



This unit contains electronic components that are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti-static wrist straps be worn and connected to a known good shelf ground connection when servicing.



Remove battery saver before using.

4.2 Overview

The block diagram for the control board is shown in Figure 16:

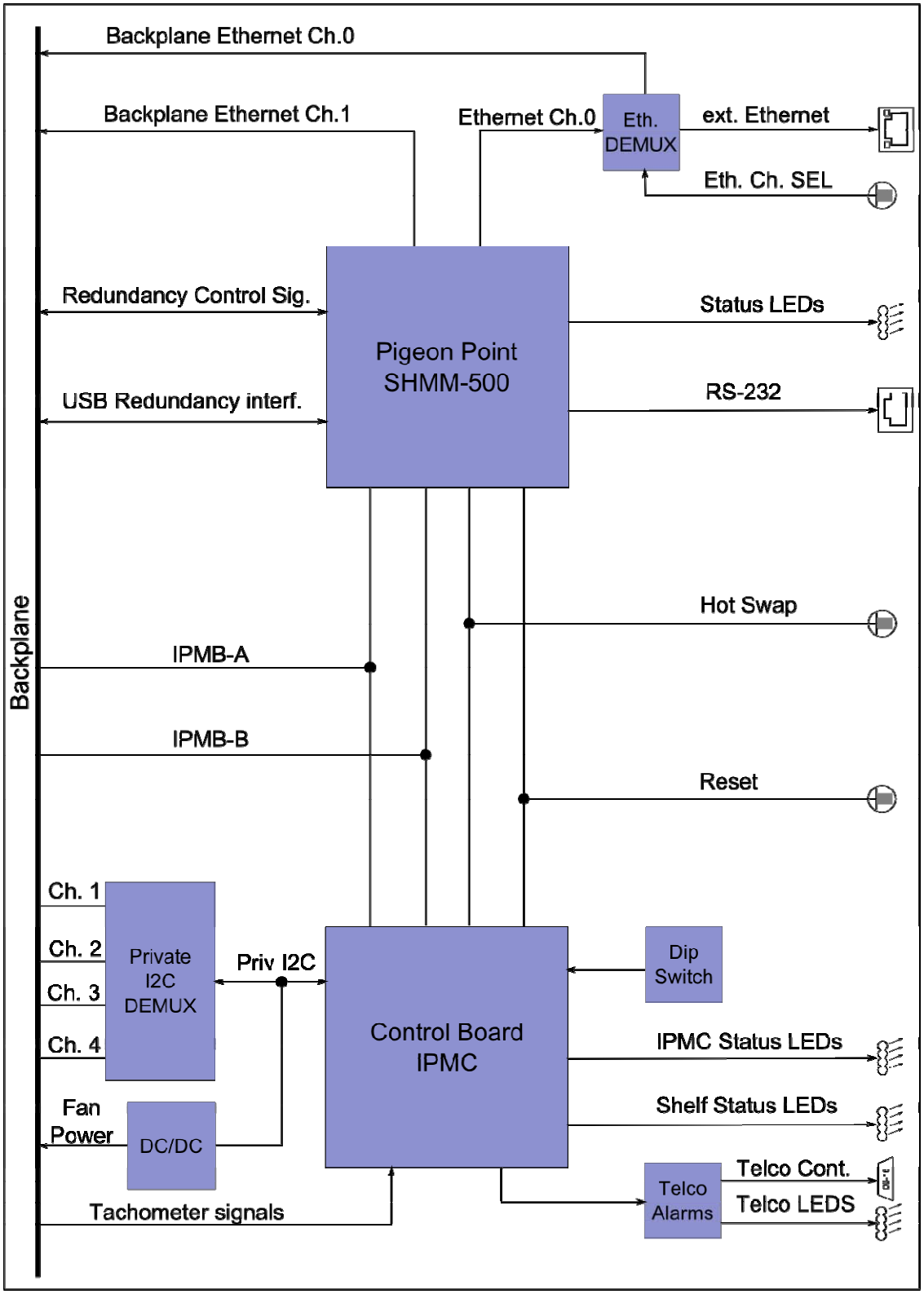


Figure 16. Block Diagram of the Control Board

Up to two control boards can be installed in the shelf in order to provide redundancy.

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4.3 Front Panel

The control board front panel is shown in Figure 17:



Figure 17. Control Board Front Panel

There are four columns of LEDs. The left column indicates the alarm status of the IPMC (see Table 10). The next column shows the status of the Pigeon Point ShMM-500 shelf manager module (see Table 11 and Table 13). The next column indicates the general status of the IPMC (see Table 12) and the right column is the Telco alarms display (see Table 14).

Abbr.	Name	LED	State	Purpose
SHMC PWR	Shelf manager power fault	Red ●	Off On	Normal Operation PPS ShMM-500 power fault
LOCAL I2C	Private I2C malfunction	Red ●	Off On	Normal Operation I2C bus stuck or one of the I2C devices does not reply
FAN TRAY	Fan tray fault	Red ●		Not used / Reserved
PS PWR	Power supplies redundancy lost	Red ●	Off On	Normal Operation At least one power supply lost Power OK signal

Table 10. IPMC Alarm LEDs

Abbr.	Name	LED	State	Purpose
PPS NO	Pigeon Point ShMM-500 *Out of service*	Red ●	Off On	Normal operation Linux reboot or other failures
PPS AC	Pigeon Point ShMM-500 *Active*	Green ●	On Blinking	Active shelf manager (in M4 state) Backup shelf manager (in M4 state)
PPS HS	Pigeon Point ShMM-500 *Hot swap*	Blue ●	Off Blinking On	Normal Operation Hot swap circuit activate (wait) How swap complete (ready to remove)

Table 11. ShMM-500 Status LEDs

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Abbr.	Name	LED	State	Purpose
SSM NO	IPMC *Out of service*	Red ●	Off Blinking On	Normal operation Lost connection to ShMC or no IPMB bus Incorrect hardware address or FRU data corruption
SSM AC	IPMC *Active*	Green ●	On	Normal operation, IPMC is in M4 state
SSM HS	IPMC *Hot swap*	Blue ●	Off Blinking On	Normal Operation (if SSM AC is On), IPMC stuck in M3 (if SSM AC is Off) Hot swap circuit activate (wait) How swap complete (ready to remove)

Table 12. IPMC Status LEDs

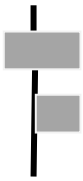
Abbr.	Name	LED	State	Purpose
RJ-45 “ETH”	Ethernet Channel 0 link	Amber ●	On	10/100 Mbit link for Ethernet port 0
RJ-45 “ETH”	Ethernet Channel 0 activity	Green ●	On	Activity on Ethernet port 0
SSM A	Ethernet Channel 1 activity	Green ●	On/ Blinking	Activity on Ethernet port 1
PPS L	Ethernet Channel 1 Link	Amber ●	On	10/100 Mbit link for Ethernet port 1

Table 13. Ethernet Status LEDs

Abbr.	Name	LED	State	Purpose
CRITICAL	Critical Telco alarm	Red ●	Off On	Normal Operation ShMC activated critical alarm
MAJOR	Major Telco alarm	Red ●	Off On	Normal Operation ShMC activated major alarm
MINOR	Minor Telco alarm	Amber ●	Off On	Normal Operation ShMC activated minor alarm
PWR OK	Power OK	Green ●	On	Control board telco alarms interface is active in the shelf

Table 14. Telco Alarms LEDs

The buttons and switches are:
“H/S” push button – allows user to hot swap the control board and ShMM-500.
“RST” push button – allows user to hard reset the control board and ShMM-500.
“Eth Ch” Push Switch - allows user to choose how to route the Ethernet port “0”.



Pulled (flush) switch maps the Ethernet channel “0” of SHMM-500 to RJ-45 connector at front panel

Pushed (recessed) switch maps the Ethernet channel “0” of SHMM-500 to backplane and further to ATCA Hubs

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The RS-232 (115200 baud, N/8/1) pinout connector is given in Table 15.

	RS-232D pinout		
Pin	**Name**	**Dir**	**Description**
1	DSR/RI	←	Data Set Ready/ Ring
2	CD	←	Carrier Detect
3	DTR	→	Data Terminal Ready
4	GND	–	Ground
5	RXD	←	Receive Data
6	TXD	→	Transmit Data
7	CTS	←	Clear to Send
8	RTS	→	Request to Send

Table 15. RS-232 Port Pinout

The D-SUB15 connector provides a Telco alarms contact interface. The pinout is shown in Table 16:

Pin	**Name**	**Pin**	**Name**
1	Minor Reset +	**9**	Minor Alarm NC
2	Minor Reset -	**10**	Minor Alarm COM
3	Major Reset +	**11**	Major Alarm NO
4	Major Reset -	**12**	Major Alarm NC
5	Critical Alarm NO	**13**	Major Alarm COM
6	Critical Alarm NC	**14**	Power NO
7	Critical Alarm COM	**15**	Power COM
8	Minor Alarm NO		

Table 16. Telco Contacts Pinout

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4.4 Software Architecture

The control board is based on an IPMI and PICMG specification compliant IPMC.

The IPMC accesses up to three FRUs:

- FRU ID 0 – Combo board
- FRU ID 1 – Shelf FRU Data
- FRU ID 3 – Telco alarms

4.4.1 Shelf FRU Information

Shelf FRU data is stored in EEPROMs mounted on the backplane. The control board reads the SFRU data and accesses it as its own logical FRU at FRU ID 1.

The following shelf data is stored:

- Chassis information per IPMI section 10
- Backplane (board) information per IPMI section 11
- Product information per IPMI section 11
- OEM records per IPMI section 16
- Multirecord areas per IPMI section 16 and PICMG 3.0 are as follows:
    - IP address
    - Address area
    - Power area
    - Activation record
    - Base channel connectivity
    - Update channel connectivity
    - Fabric channel connectivity
    - Fan geography

Power Distribution specifies current capability of the shelf, available power feeds and their mapping on FRUs.

Power Management specifies maximum power capability and activation readiness of each FRU supported in the shelf.

Backplane Connectivity specifies how Base, Fabric, Update and ShMC cross connect channels are routed on the backplane.

Shelf Manager IP Connection specifies IP-address, Gateway and Netmask for the primary ShMC Ethernet port.

Address Table maps Site Type and Site Number to FRU physical location within a shelf. Site Types and Site Numbers were introduced to simplify communication with craft personnel.

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Fan Geography Record provides FRU to cooling zone mapping. Based on this information a shelf manager concurrently runs N independent cooling algorithms, each of them for a particular cooling zone (N is the total number of cooling zones).

Hardware and physical address mapping for the aTCA-H8606C shelf is given in Table 17.

Hardware Address	IPMB Address	Physical address	
		Site Number	Site Type
08h	10h	1	Dedicated ShMC (03h)
09h	12h	2	Dedicated ShMC (03h)
41h	82h	1	AdvancedTCA Board (00h)
42h	84h	2	AdvancedTCA Board (00h)
43h	86h	3	AdvancedTCA Board (00h)
44h	88h	4	AdvancedTCA Board (00h)
45h	8Ah	5	AdvancedTCA Board (00h)
46h	8Ch	6	AdvancedTCA Board (00h)
62h	C4h	1	OEM (C0h)
62h	C4h	1	Shelf FRU Information (02h)
62h	C4h	1	Alarm (06h)
63h	C6h	2	OEM (C0h)
63h	C6h	2	Shelf FRU Information (02h)
63h	C6h	2	Alarm (06h)
64h	C8h	1	Fan Tray (04h)
64h	C8h	2	Fan Tray (04h)
64h	C8h	3	Fan Tray (04h)
64h	C8h	4	Fan Tray (04h)
65h	CAh	5	Fan Tray (04h)
65h	CAh	6	Fan Tray (04h)
65h	CAh	7	Fan Tray (04h)
65h	CAh	8	Fan Tray (04h)

Table 17. Site Types and Site Numbers To Hardware Address Mapping

Note that the Pigeon Point ShMM-500 is located physically on the control board (hardware address 62h and 63h) while logically residing on hardware address 08h and 09h. The ShMM-500 and control board in terms of IPMI specification are two separate and independent IPMC controllers and thus require unique hardware and logical addresses.

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4.4.2 Telco Alarms

The IPMC manages the Telco Alarms interface as well. This interface provides a simple way to indicate any pre-programmed unhealthy state somewhere in the shelf.
The shelf or system managers are responsible for receiving events from sensors on FRUs and then to process them with a PEF (Platform Event Filtering) mechanism. The system integrator can assign filter rules to set any kind of alarm severity in case if a FRU sends predefined events. ADLINK shelves are pre-configured to set alarms on temperature and fan spinning events assertion.

The Telco Alarms interface consists of Telco relay contacts and LED indicators on the front panel of the board. The relay contacts can withstand maximum 72VDC or 1 Ampere. Major and minor alarms can be reset via dedicated reset inputs by applying voltage in range 4V up to 72V. The current will not exceed 10 mA.

4.4.3 Sensors

Sensors provided by IPMC are given in Table 18:

Sensor Name	Number /LUN	EntityID/ Entity Instance	Sensor Type code	Description
IPMB 0 Status	85h / 0h	07h/60h	IPMB Link F1h	System
HotSwap	84h / 0h	F1h/60h	Hot Swap F0h	System
Ejector State	7Fh / 0h	F1h/60h	Button 14h	System
IPMC Status	01h / 3h	F1h/60h	OEM D5h	System
FW Revision ISC	88h / 0h	F1h/60h	OEM D6h	System
HS Shelf FRU	83h / 0h	F2h / 60h	Hot Swap F0h	System
PrivateI2C State	2Fh / 0h	07h/60h	OEM D2h	System
Version Change	30h / 0h	07h / 60h	Reserved	System
HS Telco Alarm	72h / 0h	F3h / 60h	Hot Swap F0h	System
Board Temp 0	00h / 1h	07h/60h	Temperature 01h	Redundant on board temperature sensor
Board Temp 1	01h / 1h	07h/60h	Temperature 01h	Redundant on board temperature sensor
Inlet Temp SL. 4	02h / 1h	07h/60h	Temperature 01h	Inlet temperature on slot #4
Inlet Temp SL. 5	03h / 1h	07h/60h	Temperature 01h	Inlet temperature on slot #5
Front Temp SL.0	04h / 1h	07h/60h	Temperature 01h	Temperature on control board

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Sensor Name	Number /LUN	EntityID/ Entity Instance	Sensor Type code	Description
Front Temp SL.1	05h / 1h	07h/60h	Temperature 01h	Front board temperature on slot #1
Front Temp SL.2	06h / 1h	07h/60h	Temperature 01h	Front board temperature on slot #2
Front Temp SL.3	07h / 1h	07h/60h	Temperature 01h	Front board temperature on slot #3
Front Temp SL.4	08h / 1h	07h/60h	Temperature 01h	Front board temperature on slot #4
Front Temp SL.5	09h / 1h	07h/60h	Temperature 01h	Front board temperature on slot #5
Front Temp SL.6	0Ah / 1h	07h/60h	Temperature 01h	Front board temperature on slot #6
Rear Temp SL.1	0Bh / 1h	07h/60h	Temperature 01h	RTM temperature on slot #1
Rear Temp SL.2	0Ch / 1h	07h/60h	Temperature 01h	RTM temperature on slot #2
Rear Temp SL.3	0Dh / 1h	07h/60h	Temperature 01h	RTM temperature on slot #3
Rear Temp SL.4	0Eh / 1h	07h/60h	Temperature 01h	RTM temperature on slot #4
Rear Temp SL.5	0Fh / 1h	07h/60h	Temperature 01h	RTM temperature on slot #5
Rear Temp SL.6	10h / 1h	07h/60h	Temperature 01h	RTM temperature on slot #6
PS Present 1	21h / 0h	0Ah/60h	OEM D2h	Presence of Power Supply #1
PS Present 2	22h / 0h	0Ah/60h	OEM D2h	Presence of Power Supply #2
PS Present 3	23h / 0h	0Ah/60h	OEM D2h	Presence of Power Supply #3
PS Present 4	24h / 0h	0Ah/60h	OEM D2h	Presence of Power Supply #4
PS Power OK 1	25h / 0h	0Ah/60h	OEM D2h	Power OK of Power Supply #1
PS Power OK 2	26h / 0h	0Ah/60h	OEM D2h	Power OK of Power Supply #2
PS Power OK 3	27h / 0h	0Ah/60h	OEM D2h	Power OK of Power Supply #3
PS Power OK 4	28h / 0h	0Ah/60h	OEM D2h	Power OK of Power Supply #4
Telco Alarms	7Dh / 0h	0Ah/60h	Telco Alarm input F4h	Telco Alarms input

Table 18. Control Board Sensors

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ADLINK utilizes OEM sensors, their descriptions can be found in Table 19:

Sensor Name	Discrete Sensor Readings
IPMC Status	[11] – 1b = ISC1 SPI watchdog [10] – 1b = ISC0 SPI watchdog [9] – 1b = IMC SPI watchdog [8] – 1b = Board information error [7] – 1b = ISC1 storage error [6] – 1b = ISC0 storage error [5] – 1b = IMC storage error [4] – 1b = Internal error [3] – 1b = Reset reason: External reset [2] – 1b = Reset reason: Watchdog [1] – 1b = Reset reason: Brown Out [0] – 1b = Reset reason: Power On
Private I2C State	[3] – 1b = DC/DC Potentiometer does not respond [2] – 1b = Temperature sensor(s) do not respond [1] – 1b = Cypress PSoC does not respond [0] – 1b = Private I²C bus malfunction

Table 19. OEM Sensor Description

4.4.4 Pigeon Point ShMM-500 Default IP-address

The shelf manager is accessible over a telnet session. The default IP-address is **192.168.0.171**

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5 Shelf Management Controller

This chapter describes operation of the Shelf Management Controller (control board and Pigeon Point SHMM-500 mezzanine) for the ADLINK aTCA-H8606C 6U 6 slot ATCA Shelf.

The control board is a heart of system management and contains electronic blocks to perform all vital functions necessary to support robust and reliable shelf operation.



5.1 Front Panel

Shelf manager IOs and IPMC IOs are located at the front panel of the control board and on the backplane connector as well. The Front panel provides:

- Hot swap push button
- Reset push button
- Ethernet select switch button
- Ethernet RJ-45 connector
- RS-232 RJ-45 connector
- Telco Alarms DB-15 connector
- SHMM-500 status LEDs
- IPMC status LEDs
- Shelf status LEDs
- Telco Alarms LEDs

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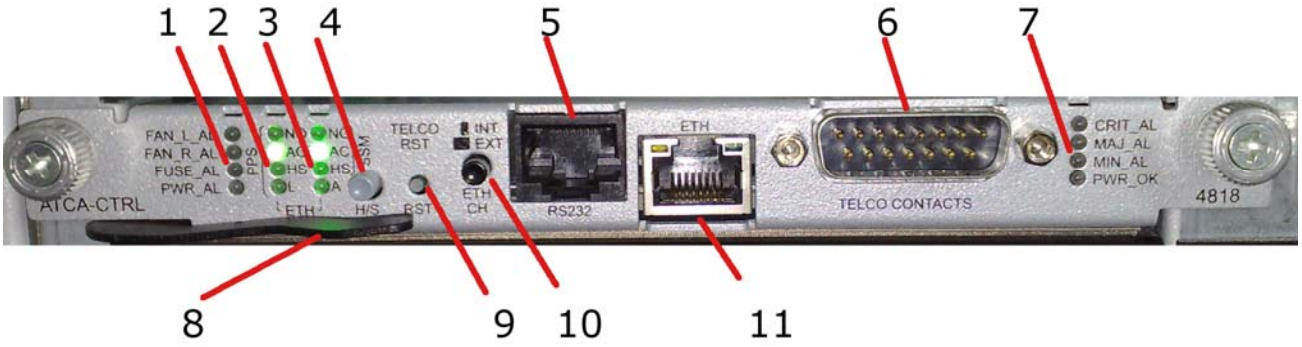


Figure 18. Front Panel

1. **Shelf Status LEDs (top to bottom)**
   - SHMM-500 power fail
     - ON if power switch for SHMM-500 is in current limit
   - Private I2C error
     - ON if there is a problem on private I2C bus
   - Fan tray error
     - ON if the fan tray is extracted
     - BLINKING if at least one fan fails
   - Power supply redundancy lost
     - ON if at least one power supply lost Power OK signal

2. **SHMM-500 Status LEDs (top to bottom)**
   - SHMM-500 not in operation
     - ON if SHMM-500 is not in operation
   - SHMM-500 active
     - ON if SHMM-500 is active
     - BLINKING if SHMM-500 is backup
   - SHMM500 Hot swap
     - ON if SHMM-500 is in M1 FRU state
     - BLINKING if SHMM-500 is in M2 FRU state
   - Ethernet Channel 1 Link
     - ON if there is a link (10/100Mbit)

3. **IPMC Status LEDs (top to bottom)**
   - IPMC OOS
     - ON if IPMC is out of service
   - IPMC active
     - ON if IPMC is active
   - IPMC Hot swap
     - ON if IPMC is in M1 FRU state
     - BLINKING if IPMC is in M2 FRU state
   - Ethernet Channel 1 Activity
     - ON/BLINKING if there is an activity (10/100Mbit)

4. **Hot Swap Button**
   - Push the button to deactivate (transition to M1 state) SHMM-500 and IPMC

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- Push the button again to activate (transition to M4 state) SHMM-500 and IPMC
- After power up SHMM-500 and IPMC are always activated automatically

5. RS-232 Connector

- SHMM-500's RS-232D port (115200 baud, N/8/1)

Pin	Name	Dir	Description
1	DSR/RI	←	Data Set Ready/ Ring
2	CD	←	Carrier Detect
3	DTR	→	Data Terminal Ready
4	GND	–	GROUND
5	RXD	←	Receive Data
6	TXD	→	Transmit Data
7	CTS	←	Clear to Send
8	RTS	→	Request to Send

Table 20. RS-232 RJ-45 Connector pinout

6. Telco Alarms Relay Contacts

Pin	Name
1	Minor Reset +
2	Minor Reset -
3	Major Reset +
4	Major Reset -
5	Critical Alarm NO
6	Critical Alarm NC
7	Critical Alarm COM
8	Minor Alarm NO
9	Minor Alarm NC
10	Minor Alarm COM

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Pin	Name
11	Major Alarm NO
12	Major Alarm NC
13	Major Alarm COM
14	Power NO
15	Power COM

Table 21. Telco Alarms D-SUB 15 connector pinout

7. **Telco Alarms LEDs (top to bottom)**
   - Critical Alarm
   - Major Alarm
   - Minor Alarm
   - Power OK Alarm

8. **Board Handle**
   The board handle allows to insert and extract the board from the shelf.

9. **Reset Button**
   Push and hold the button during few seconds to reset SHMM-500 and IPMC

10. **Ethernet Channel Select Switch**



Pushed switch maps the first Ethernet channel of SHMM-500 to backplane and further to ATCA Hubs



Pulled switch maps the first Ethernet channel of SHMM-500 to RJ-45 connector at front panel

11. **Ethernet Connector**

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5.2 Hardware Structure

A block diagram of the Shelf Management Controller is shown below.

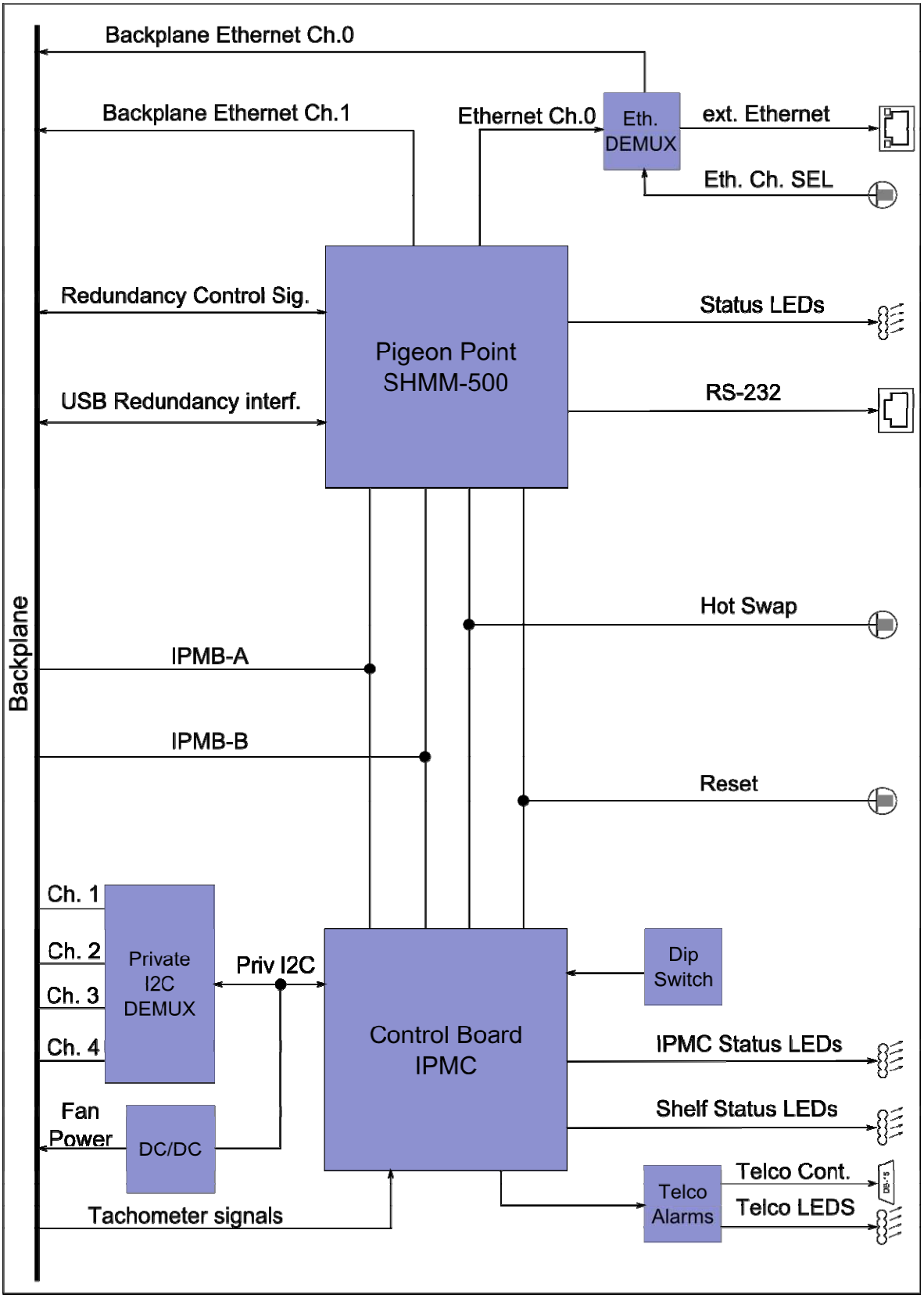


Figure 19. Block Diagram of Shelf Management Controller

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The Shelf Management Controller consists of:

- Control board IPMC (IPMI Management Controller)
- Pigeon Point SHMM-500 mezzanine

The IPMC has an access to all shelf resources such as temperature sensors, fans, power entry modules (PEM), power supplies (PS), Shelf FRU data EEPROMs (SFRU) and has a link to dual redundant IPMB busses.

The SHMM-500 represents the highest intelligence level in the shelf and can access each FRU via dual redundant IPMB-0 bus.

5.2.1 Ethernet Ports

The Pigeon Point shelf manager provides two 10/100BASE-TX Ethernet ports. The first channel (eth0) can be connected either to the backplane or to RJ-45 connector at front panel. To choose destination to connect the “Ethernet channel select” switch has to be set in corresponding position (see Front Panel description). There are two status LEDs for the first channel. They are integrated in Ethernet RJ-45 connector. The second channel (eth1) is always connected to the backplane. Its status LEDs are located at front panel (see Front Panel description).

5.2.2 SHMM-500 Shelf Manager Status LEDs

The shelf manager indicates its status via three LEDs (see Front Panel description).

5.2.3 SHMM-500 Redundancy control

The shelf manager has a number of dedicated hardware signals which basically cross-connected via the backplane to the other shelf manager in the shelf. It allows exchanging status information between two shelf managers in order to decide which of them is “active” and which “stand-by”.

There is a cross-connected USB interface. Via this interface the data available on the “active” shelf manager is transferred to the “stand-by” shelf manager during switch over event.

Note: The U-boot environment setting “ip1device” has to be set to “usb0”

5.2.4 SHMM-500 RS-232 Serial Port

A command line interface on the shelf manager is provided via RS-232 port.
The serial port is RS-232D compatible and has the following settings - 115200 baud, N/8/1.

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5.2.5 IPMB-0 Bus

The control board supports only bussed operation of IPMB-0 bus. There are two channels – IPMB-A and IPMB-B. These busses are always pulled-up with 2.7 kOhm resistors on the "active" shelf manager.

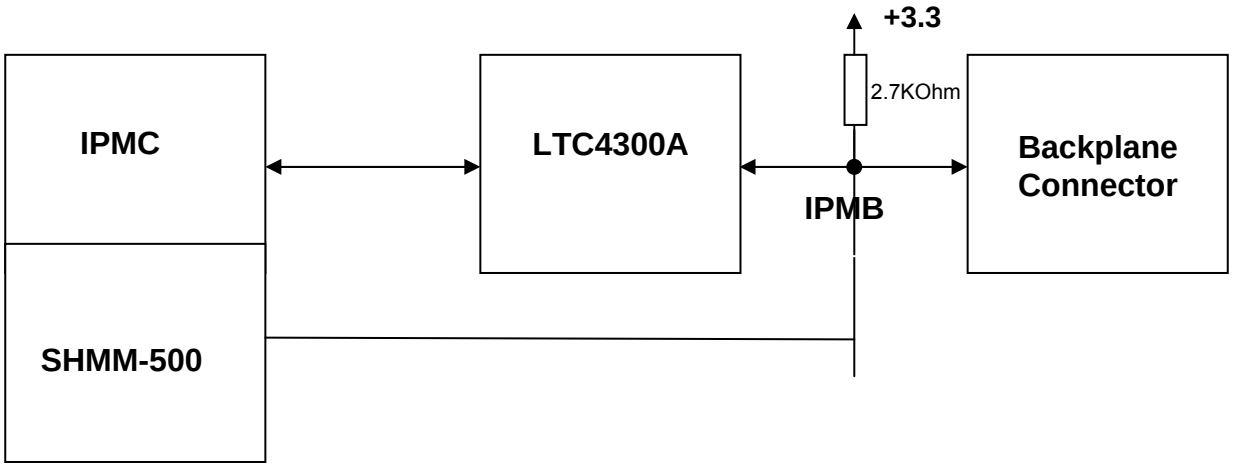


Figure 20. IPMB Bus Connection

5.2.6 Reset Push Button

The reset button is connected to reset pin of both SHMM-500 and the IPMC. To avoid unwanted reset situation the signal is delayed with 1 second.

5.2.7 Hot Swap Push Button

The hot swap push button is connected to both SHMM-500 and the IPMC. To perform hot swap transition the button has to be pushed.

5.2.8 IPMC

There is an IPMI management controller (IPMC) on the control board. It consists of two Atmel 8 bit controllers which have a SPI connection between each other. Each controller is mapped on one channel of the IPMB-0 bus. Both controllers monitor the status of each other and if one fails the other will apply the reset to the first in order to recover normal operation. There are two temperature sensors located near to the controllers.

5.2.9 IPMC Private I2C Bus

The private I2C is used to exchange information between IPMC and shelf resources such as

- Backplane shelf FRU(SFRU) data EEPROMs
- Power entry modules
- Shelf temperature sensors

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- Power supplies
- Fan DC/DC
- Fan tachometer sensors

On the control board there is a de-multiplexor circuitry to split a single I2C bus into four channels and therefore to increase reliability of the bus. Depend on shelf implementation the shelf resources are distributed among these channels.

5.2.10 IPMC Status LEDs

The IPMC provides its status via three LEDs (see Front Panel description).

5.2.11 Shelf Status LEDs

Based on the information from the shelf sensors the IPMC shows a fault condition for single or multiple fans, fan trays, power supplies and power sensor of SHM-500 (see Front Panel description).

5.2.12 Dip Switches

Dip switches allow setting a fan type used in the shelf.

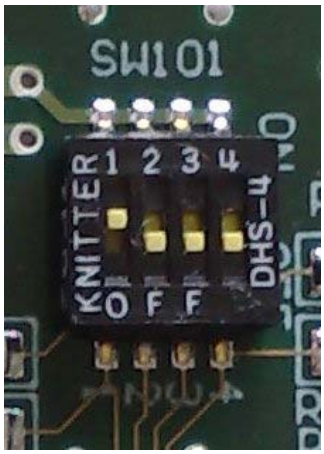


Figure 21 DIP-switches on the PCB

	1	2	3	4
ON	Fan Type 0	RSV	RSV	RSV
OFF	Fan Type 1	RSV	RSV	RSV

Table 22 DIP-switches set up

Where:

- Fan Type 0 – DELTA FFB0924EHE
- Fan Type 1 – Sanyo Denki San ACE92 9G0924A2011

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5.2.13 DC/DC

The DC/DC converter operates in a standard telecom input voltage 36-72V range and provides a programmable 8-24V output voltage. Therefore the fans are controlled by changing the speed across the fans.

5.2.14 Telco Alarms

The Telco Alarms function provides dry contact relays and LEDs at the front panel for power, minor, major and critical alarms. It has also connector inputs to reset minor and major alarms (see Front Panel description).

5.3 Software Architecture

5.3.1 IPMC

FRUs

The IPMC manages 5 FRU devices. For each device a dedicated FRU device ID is assigned.

- Fan tray (FRU ID 0)
- Shelf FRU Data (FRU ID 1)
- Telco Alarms (FRU ID 2)
- PEM1 (FRU ID 3)
- PEM2 (FRU ID 4)

Accessing the fan tray at FRU ID 0 the shelf manager can change the fan speed and read out the tachometer sensors. The Shelf FRU Data is located on the FRU ID 1 as required per ATCA specification and physically it is stored in the EEPROM chip on the shelf backplane. The IPMC has an access to it via the private I2C bus.

The Telco Alarms are implemented in accordance with PICMG 3.0 R3 specification and are located at FRU ID 2. It appears in the FRU device list only on the board where the Pigeon Point shelf manager is active. Therefore there is only one active Telco device in the shelf. Both power entry modules are located at FRU ID 3 and 4 on the control board where the Pigeon Point shelf manager is active.

During shelf manager switchover the other control board in the shelf overtakes the FRU devices at FRU ID 2, 3, 4.

FRU Data

For each FRU device a FRU Data is assigned. Basically it contains three sections:

- Common Header
- Board Information

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- Product Information

The Shelf FRU Data has Multi-record sections as well:

- Address Table
- Power distribution
- Power Management
- Shelf Manager IP Connection
- Backplane Connectivity
- Shelf Fan Geography (optionally)

Sensors

The control board has an access to all the shelf resources such as shelf temperature sensors, sensors on the Power Entry Module, fan tachometer sensors, FRU present sensors, hot swap sensors etc. These sensors are available to the user via a standard Get Sensor Reading command.

Since different shelves have a unique set of resources for each shelf type, an own sensor list is assigned. The sensor lists for the 2 slot ATCA Pizza Box shelf (CO2) and for the 6 slot ATCA Pizza Box shelf (CO6) are given below

Sensor name	Number / LUN	Entity ID / Entity Instance	Sensor type code	Event	Event/Reading type code
IPMB 0 Status	85h / 0h	Fan (1Eh) / 60h	IPMB (F1h)	Yes	Sensor specific (6Fh)
HotSwap	84h / 0h	Fan (1Eh) / 60h	HotSwap (F0h)	Yes	Sensor specific (6Fh)
Ejector State	7Fh / 0h	Fan (1Eh) / 60h	Button (14h)		Sensor specific (6Fh)
IPMC Status	01h / 3h	Fan (1Eh) / 60h	OEM (D5h)		Sensor specific (6Fh)
FW Revision ISC	84h / 0h	Fan (1Eh) / 60h	OEM (D6h)		Sensor specific (6Fh)
HS Shelf FRU	83h / 0h	Shelf FRU Data (F2h) / 60h	HotSwap (F0h)	Yes	Sensor specific (6Fh)
HS Telco Alarm	70h / 0h	Alarm Panel (F3h) / 60h	HotSwap (F0h)	Yes	Sensor specific (6Fh)
HS PEM Right	71h / 0h	PEM (0Ah) / 60h	HotSwap (F0h)	Yes	Sensor specific (6Fh)
HS PEM Left	72h / 0h	PEM (0Ah) / 61h	HotSwap (F0h)	Yes	Sensor specific (6Fh)

Table 23. Sensor List for the aTCA-H8606C

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Sensor name	Number / LUN	Entity ID / Entity Instance	Sensor type code	Event	Event/Reading type code
Version Change	1Eh / 0h	Fan (1Eh) / 60h	Version change (2Bh)	Yes	Sensor specific (6Fh)
Board Temp 0	00h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Board Temp 1	01h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Inlet Temp SL.4	02h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Inlet Temp SL.5	03h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Front Temp SL.0	04h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Front Temp SL.1	05h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Front Temp SL.2	06h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Front Temp SL.3	07h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Front Temp SL.4	08h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Front Temp SL.5	09h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Front Temp SL.6	0Ah / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Rear Temp SL.1	0Bh / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Rear Temp SL.2	0Ch / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Rear Temp SL.3	0Dh / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Rear Temp SL.4	0Eh / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Rear Temp SL.5	0Fh / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Rear Temp SL.6	10h / 1h	Fan (1Eh) / 60h	Temperature (01h)	Yes	Threshold (01h)
Fan Speed 1	01h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)

Table 23. Sensor List for the aTCA-H8606C (cont'd)

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Sensor name	Number / LUN	Entity ID / Entity Instance	Sensor type code	Event	Event/Reading type code
Fan Speed 2	02h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)
Fan Speed 3	03h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)
Fan Speed 4	04h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)
Fan Speed 5	05h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)
Fan Speed 6	06h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)
Fan Speed 7	07h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)
Fan Speed 8	08h / 0h	Fan (1Eh) / 60h	Fan (04h)	Yes	Threshold (01h)
Telco Alarms	7Dh / 0h	Alarm Panel (F3h) / 60h	Telco Alarm (F4h)	Yes	Sensor specific (6Fh)
PEM Current R	0Eh / 0h	PEM (15h)/60h	Current (03h)	Yes	Threshold (01h)
PEM Current L	0Fh / 0h	PEM (15h)/60h	Current (03h)	Yes	Threshold (01h)
Voltage 48V	10h / 0h	Fan (1Eh) / 60h	Voltage (02h)	Yes	Threshold (01h)
Voltage Fans	11h / 0h	Fan (1Eh) / 60h	Voltage (02h)	Yes	Threshold (01h)
Private I2C State	12h / 0h	Fan (1Eh) / 60h	OEM (D2h)	No	Sensor specific (6Fh)

Table 23. Sensor List for the aTCA-H8606C (cont'd)

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The “Private I2C State” and “IPMC Status” sensors belong to the OEM type. The description is given in the table below

Sensor name	Discrete Sensor Readings
IPMC Status	[11] – 1b = ISC1 SPI watchdog [10] – 1b = ISC0 SPI watchdog [9] – 1b = IMC SPI watchdog [8] – 1b = Board information error [7] – 1b = ISC1 storage error [6] – 1b = ISC0 storage error [5] – 1b = IMC storage error [4] – 1b = Internal error [3] – 1b = Reset reason: External reset [2] – 1b = Reset reason: Watchdog [1] – 1b = Reset reason: Brown Out [0] – 1b = Reset reason: Power On
Private I2C State	[3] – 1b = DC/DC Potentiometer does not respond [2] – 1b = Temperature sensor(s) do not respond [1] – 1b = Cypress PSoC does not respond [0] – 1b = Private I²C bus malfunction

Table 24 OEM Sensors Description

5.3.2 Shelf Manager Configuration

The Pigeon Point shelf manager is based on a special version of the Linux operating system, called Monterey Linux. The software stack up consists of three layers. The lowest layer is the firmware monitor (U-boot). The intermediate layer is Monterey Linux. On top of Linux runs the shelf manager application.

In order to run a SHMM-500 on the different shelves the carrier and shelf specific settings have to be modified to satisfy the shelf environment.
To apply modification to the shelf manager the RS-232 and Ethernet connections are required.

RS-232 settings are:

- Baud rate - 115200
- Number of data bits - 8
- Parity – No
- Stop bits - 1

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For the Ethernet connection a crossover cable has to be used. The default IP-address used in the ADLINK shelves is 192.168.0.171. This address is defined in the shelf FRU data under section *Shelf Manager IP Connection*.

U-boot Configuration

The U-Boot environment has a number of variables. To enter the U-Boot set up press any key in the console window just after power up. To assign a value to a variable use the following format:

shm500 setenv <variable name> <new value>

To save this value in the flash use the following format:

shm500 saveenv

To print all the variables in the console window use the following format:

shm500 printenv

A full list with supported variables is given in the “Pigeon Point Shelf Manager User Guide”.

A typical printout for the U-boot running on the ADLINK shelves is shown below

```
shmm500 printenv
baudrate=115200
ipaddr=192.168.0.22
serverip=192.168.0.7
netmask=255.255.255.0
bootfile=sentry.kernel
ramdisk=sentry.rfs
rootpath=/rootfs
ramargs=setenv bootargs root=/dev/ram rw
net=tftpboot 80400000 $(bootfile); tftpboot 81200000 $(ramdisk); run ramargs addmisc; bootm 80400000 81200000
nfsargs=setenv bootargs root=/dev/nfs rw nfsroot=$(serverip):$(rootpath)
addip=setenv bootargs $(bootargs) ip=$(ipaddr):$(serverip):$(gatewayip):$(netmask):$(hostname):$(ipdevice)
addmisc=setenv bootargs $(bootargs) $(quiet) console=$(console),$(baudrate) reliable_upgrade=$(reliable_upgrade)
nfs=tftpboot 80800000 $(bootfile); run nfsargs addip addmisc; bootm
bootcmd=run ramargs addmisc; bootm $(kernel_start) $(rfs_start)
console=ttyS0
quiet=quiet
ipdevice=eth0
ip1addr=192.168.1.2
gatewayip=192.168.0.1
rmcpaddr=192.168.0.2
password_reset=n
logging=ram
timezone=UTC
rc_ifconfig=n
```


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```
reliable_upgrade=y
ethact=Au1X00 ETHERNET
flash_reset=n
rc2=/etc/rc.comtel
ip1device=usb0
bootdelay_old=3
post_normal=
bootdelay=3
start_rc2_daemons=y
hostname=ADLINK_HPDL_2_6_3
stdin=serial
stdout=serial
stderr=serial
ethaddr=00:18:49:00:28:6e
eth1addr=00:18:49:00:28:6f
serial#=08013069
kernel_start=0xbfb00000
rfs_start=0xbfc40000

Environment size: 1208/3067 bytes
```

The variable “rc2” has to be set to notify the shelf manager which platform to run on.
The script file “rc.comtel” is common for all ADLINK shelves and located in the /etc/ directory.
The variable “ip1device” assigns the USB interface as a redundant network interface to ensure redundant operation of two shelf managers.
The variable “start_rc2_daemons” instructs the secondary startup script to start or not start the daemons snmpd (SNMP server), boa (HTTP server) and shelfman (the Shelf Manager) after Monterey Linux boots.

Setting Up Shelf Manager Configuration File

The Shelf Manager configuration file (shelfman.conf) is located in the /etc/ directory. The vital parameters that have to be set to run on ADLINK shelves are duplicated in the file (shelfman.conf.comtel). These parameters override the values in the original file.

A typical printout for the ADLINK shelf manager configuration file is shown below

```
# cat /etc/shelfman.conf.comtel
CARRIER = COMTEL
HPDL=TRUE
MIN_SHELF_FRUS = 1
LOCAL_SHELF_FRU = FALSE
EXIT_IF_NO_SHELF_FRU = FALSE
MIN_FAN_LEVEL = 50
RMCP_NET_ADAPTER = eth0
RMCP_NET_ADAPTER2 = eth1
SWITCHOVER_ON_HANDLE_OPEN = TRUE
ALLOW_CLEARING_CRITICAL_ALARM=TRUE
```

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```
REDUNDANCY_NET_ADAPTER = usb0
SHELF_FRU_IPMB_SOURCE1 = 0xC4
SHELF_FRU_IPMB_SOURCE2 = 0xC6
CARRIER_OPTIONS = $CARRIER_OPTIONS
```

The parameter **CARRIER** set the platform to run on. It instructs the shelf manager to include ADLINK specific features supporting.

The parameter **HPDL** enables the Hardware Platform Description Language. This language allows the users of SHMM-500 to support different types of shelves and carrier boards without changing the shelf manager firmware. The ADLINK full shelf manager control board has a unique HPDL description that suits all the Pizza Box shelves.

The parameter **MIN_SHELF_FRUS** specifies the minimum number of FRUs that contain Shelf FRU Data information. In Pizza Box shelves there possible two sources of SFRU data (both control boards). At least one source shall be present in the system.

The parameter **LOCAL_SHELF_FRU** instructs the shelf manager to search for the SFRU data in the shelf FRUs and not to use the internal copy of SFRU data stored on the active shelf manager.

The parameter **EXIT_IF_NO_SHELF_FRU** allows booting up the shelf manager and starting the shelf even when no valid SFRU data was found.

The parameter **MIN_FAN_LEVEL** specifies the minimum possible fan speed level in the shelf. Please refer to “Pigeon Point Shelf Manager User Guide” for more information. The minimum possible value for the ADLINK shelves is 40%, but the recommended value is 50%.

The parameter **RMCP_NET_ADAPTER** specifies the name of the default network adapter used for RMCP communication. This is eth0 in the ADLINK shelves.

The parameter **RMCP_NET_ADAPTER2** specifies the name of the alternate network adapter used for RMCP communication. This is eth1 in the ADLINK shelves.

The parameter **SWITCHOVER_ON_HANDLE_OPEN** allows switching-over between two redundant SHMM-500 by performing the transition from M4 to M1 state for the active shelf manager.

The parameter **ALLOW_CLEARING_CRITICAL_ALARM** allows clearing the critical Telco alarm via shelf manager external interfaces i.e. RS-232.

The parameter **REDUNDANCY_NET_ADAPTER** specifies the name of the network adapter used for communication between two redundant shelf managers. The usb0 is used for redundant communication in the ADLINK shelves.

The parameter **SHELF_FRU_IPMB_SOURCE1** specifies the IPMB address of the first designated source of SFRU Information in the shelf – 0xC4 for the ADLINK shelves.

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The parameter **SHELF_FRU_IPMB_SOURCE2** specifies the IPMB address of the second designated source of SFRU Information in the shelf – 0xC6 for the ADLINK shelves.

HPDL configuration

HPDL related files that describe the carrier (control board) and the shelf are stored in the /var/nvdata/ directory:

- carrier_data
- carrier_sdrs
- chassis_data

TELCO Alarms Configuration

The System integrator shall set the alarm policy implementation. By default the shelf manager is supplied with the following policy:

- If the upper thresholds for the temperature sensors from any FRUs in the shelf are crossed the alarm with corresponding severity will be set
- If the lower thresholds for the tachometer sensors are crossed the alarm with corresponding severity will be set

The following PEF configuration example shows how to set TELCO Alarms on assertion of temperature events.

1. Disable PEF for configuration period.

```
clia setpefconfig control 0

clia sel clear
```

2. Three filters to set corresponding Alarm on UNC, UC, UNR events.

```
# SetPefCfgParam  Event_Filter
#               Filter#
#               Flags=0x80 (Enabled, SoftwareConfigurable)
#               Action=0x10 (OEM Action = TELCO Alarm)
#               AlertPolicy#=0 (not needed to OEM Action)
#               EventSeverity=0x8(minor) 0x10(major) 0x20(critical)
#               GeneratorID=0xFF(any) chan/lun=0xFF(any)
#               SensorType=0x01(temperature)
#               Sensor#=0xFF(any)
#               SensorReadingType=01(threshold,asserted)
#               EventOffsetMask=0xFFFF(any)
#               EventData Byte 1 (0x?7=UNC 0x?9=UC 0x?B=UNR)
#               EventData Byte 2 (match any)
#               EventData Byte 3 (match any)
```

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clia setpefconfig event_filter 61 80 10 0 08 ff ff 1 ff 1 ff ff f f 7 0 0 0 0 0 0

clia setpefconfig event_filter 62 80 10 0 10 ff ff 1 ff 1 ff ff f f 9 0 0 0 0 0 0

clia setpefconfig event_filter 63 80 10 0 20 ff ff 1 ff 1 ff ff f f b 0 0 0 0 0 0

3. Enable OEM action and PEF itself

clia setpefconfig action_control 10

clia setpefconfig control 1

The following PEF configuration example shows how to set TELCO Alarms on assertion of tachometer sensor events.

```
# SetPefCfgParam  Event_Filter
   #            Filter#
   #            Flags=0x80 (Enabled, SoftwareConfigurable)
   #            Action=0x10 (OEM Action = TELCO Alarm)
   #            AlertPolicy#=0 (not needed to OEM Action)
   #            EventSeverity=0x8(minor) 0x10(major) 0x20(critical)
   #            GeneratorID=0xFF(any) chan/lun=0xFF(any)
   #            SensorType=0x04(fans)
   #            Sensor#=0xFF(any)
   #            SensorReadingType=01(threshold,asserted)
   #            EventOffsetMask=0xFFFF(any)
   #            EventData Byte 1 (0x00=LNC 0x02=LC 0x04=LNR)
   #            EventData Byte 2 (match any)
   #            EventData Byte 3 (match any)
```

clia setpefconfig event_filter 51 80 10 0 08 ff ff 04 ff 1 ff ff f f 0 0 0 0 0 0 0

clia setpefconfig event_filter 52 80 10 0 10 ff ff 04 ff 1 ff ff f f 2 0 0 0 0 0 0

clia setpefconfig event_filter 53 80 10 0 20 ff ff 04 ff 1 ff ff f f 4 0 0 0 0 0 0

5.4 Hot Swap Procedure

Follow these steps to extract the Shelf Management Controller:

1. Push the hot swap button to deactivate the Pigeon Point shelf manager and the control board
2. Wait until the hot swap LEDs transit to ON state after blinking
3. Take the fixing screw at the front panel out
4. Pull the handle toward yourself
5. Extract the controller

Note: After controller insertion it transits to M4 state automatically without any interaction with the hot swap button.

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6 AC-to-DC Power Supplies (Optional)

Up to 4 AC power supplies can be plugged into the shelf. The power supply is shown in Figure 22 and features the following:

- Total output power 850W -48VDC output under 90-264 VAC input
- AC frequency range 47-63 Hz
- EMI filter EN55022 Class B, FCC Part 15
- Active PFC = 0.99
- Hot swappable
- Power supply present and power OK sensors
- Bi-colour LED indicates Power OK



CAUTION:

*** Internal fusing.**

*** Input voltage to this unit is classified as a hazardous connection.**

This unit contains electronic components that are sensitive to static electricity. All electronic boards in this shelf are protected by Shelf Ground. It is recommended that anti static wrist straps be worn and connected to a known good shelf ground connection when servicing.

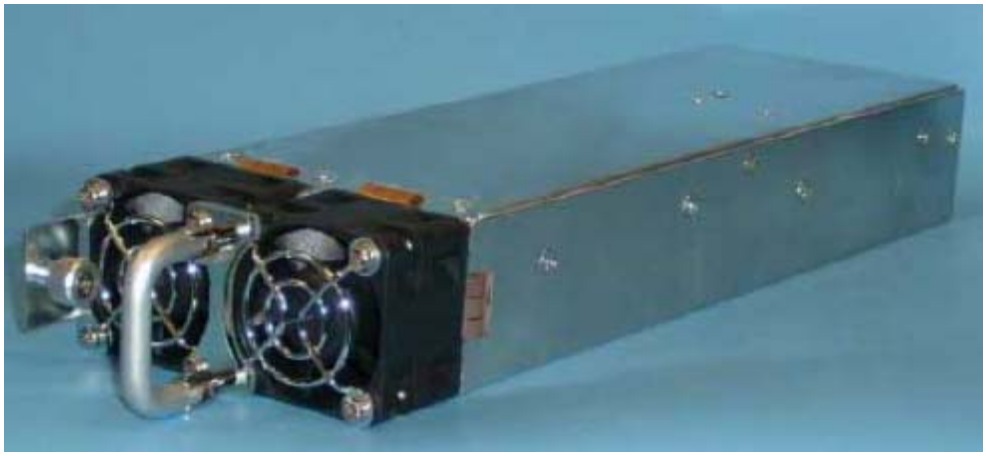


Figure 22. Power Supply PS-850-48V

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6.1 Power Distribution

A default power distribution diagram for the *full mesh backplane* is shown in Figure 23.

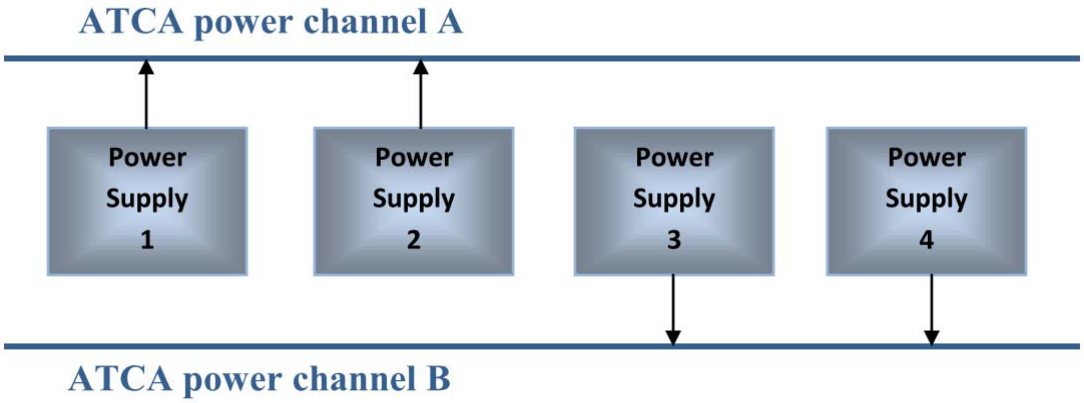


Figure 23. Default Power Distribution on Full Mesh Backplane

To switch to **N+1** redundancy operation mode a special power bridge PCB (see Figure 24) can be used. This board is mounted at the rear of the shelf and connects power channel **A** and power channel **B** together.

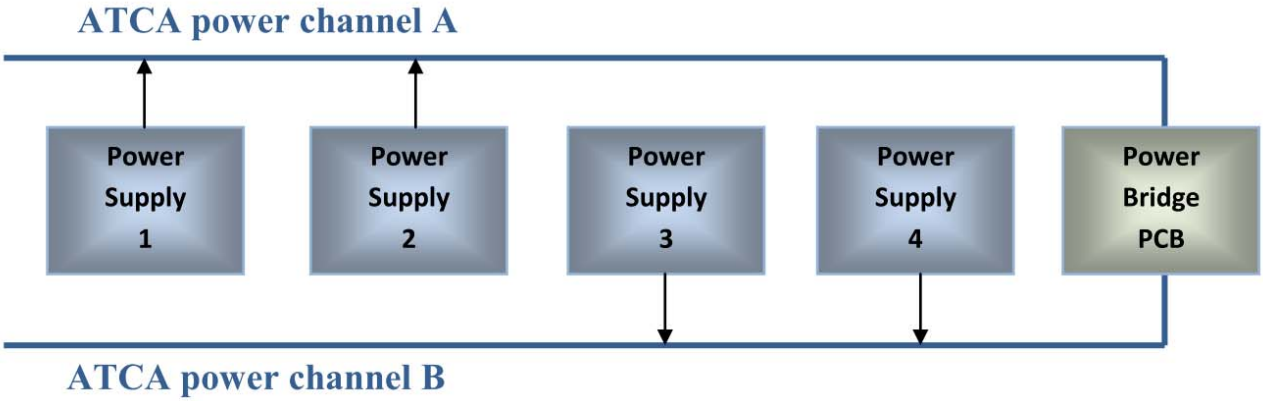


Figure 24. N+1 Redundancy on Full Mesh Backplane

On the *dual star backplane* both channels A and B are connected together by default (see Figure 25).

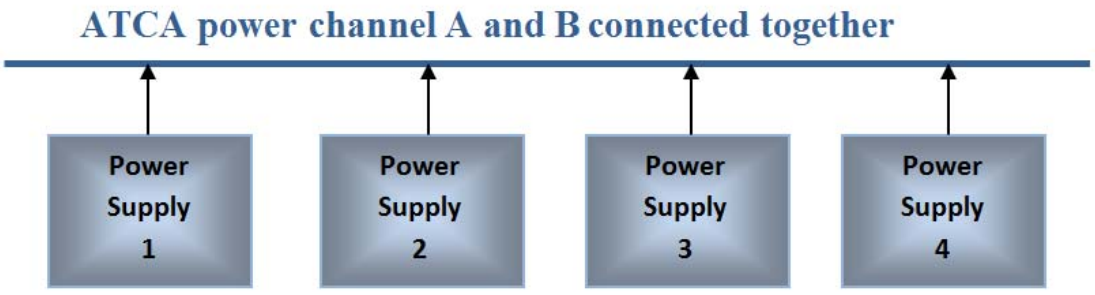


Figure 25. Default Power Distribution on Dual Star Backplane

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6.2 Powering The Shelf

For each power supply a separate AC inlet and switch are provided. Use power cords (IEC-320-C13) with minimum 14AWG gauge and 10A current rating.



Note: Caution must be taken when working near the power supply power inlets. The shelf operating voltage falls into 90-263 VAC range. This voltage is considered hazardous.

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7 System Maintenance

To keep the shelf operating properly, the following maintenance procedures may need to be performed:

- Replacing the air filters
- Replacing fan trays
- Replacing power supplies

Under normal conditions (i.e. no system malfunction), only replacement of the air filter is necessary.

7.1 Maintaining Air Filters

Due to the environment the system operates in, the filters will accumulate dust, causing degradation in filtration and airflow to the system. Therefore the filters have to be replaced periodically with the frequency depending on the environment; for instance, in clean laboratory environment, once every six months.

The first air filter is mounted in the right fan tray and intended for filtering the air used for cooling the ATCA blades. The second air filter is located at the lower front of the shelf and used for filtering the air used to cool the AC power supplies.

To replace the ATCA card cage air filter:

- Remove the right fan tray slowly
- Remove the screws securing the filter on the fan tray
- Remove the filter cage with filter
- Remove the dust from the fan tray with a soft brush
- Insert a new filter into the frame and secure it to the fan tray
- Insert the fan tray into the chassis

To replace the AC power supply filter:

- Remove the front panel covering the power supply slots
- Remove the old filter slowly and carefully
- Put in a new filter and secure it
- Reinstall the front panel

Used air filters can be cleaned with a vacuum cleaner but this is not recommended since the filter will never regain its original properties after cleaning.

7.2 Replacing Fan Trays

Fan trays sometimes need to be replaced due to fans wearing out. A malfunction of a fan tray will be reported via the shelf manager (fan tachometer sensors). In case of failure, immediately replace the faulty fan tray, otherwise the degradation in cooling performance may cause overheating of the ATCA blades. Fan tray replacement is described in Section 3.1 Fan Tray.

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7.3 Replacing Power Supplies

A power supply should be replaced in case of failure. A malfunction of the power supply will be reported via the shelf manager (Power OK sensor), the red LED at the front of the power supply and additionally via the front panel LED.

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Appendix A - Standards

Organization	Standard	Description
PICMG	PICMG 3.0 R2.0	Advanced Telecommunications Computing Architecture
UL	UL/EN/IEC 60950	Information Technology Equipment - Safety – Part 1: General Requirements
EN	EN55024	Information Technology Equipment Immunity Characteristics – limits and Methods of Measurement
Telcordia	FR-2063	NEBS Family of Requirements
Telcordia	SR-3580	NEBS Criteria Levels
Telcordia	GR-63-CORE	NEBS Requirements, Physical Protection
Telcordia	GR-78-CORE	General Requirements for the Physical Design and Manufacture of Telecommunications Products and Equipment
Telcordia	GR-1089-CORE	Electromagnetic Compatibility & Electrical Safety
Telcordia	GR-2914-CORE	Human Factors Requirements for Equipment to Improve Network Integrity
Telcordia	GR-3028	Thermal Management in Telecommunications Central Offices
ETSI	ETS 300 019-1-0	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-0 Classification of Environmental Conditions - Introduction
ETSI	ETS 300 019-1-1	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-1 Classification of Environmental Conditions – Storage, Class 1.1
ETSI	ETS 300 019-1-2	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-2 Classification of Environmental Conditions – Transportation, Class 2.3
ETSI	ETS 300 019-1-3	Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-3 Classification of Environmental Conditions – Stationary Use at Weather protected Locations, Class 3.1E
ETSI	ETS 300 119-1	European Telecommunications Standard for Equipment Practice, Part 1, Introduction & Terminology
ETSI	ETS 300 119-2	European Telecommunications Standard for Equipment Practice, Part 2, Engineering requirements for Racks & Cabinets
ETSI	ETS 300 119-3	European Telecommunications Standard for Equipment Practice, Part 3, Engineering requirements for Miscellaneous Racks & Cabinets
ETSI	ETS 300 119-4	European Telecommunications Standard for Equipment Practice, Part 4, Engineering requirements for Subracks in Miscellaneous Racks & Cabinets
ETSI	ETS 300 753	Acoustic Notice emitted by Telecommunications Equipment
ETSI	ETS 300 132	Power Supply Interface at the Input to Telecommunications Equipment
ETSI	ETS 300 253	Earthing and Bonding Configuration Inside Telecommunications Centres
EMC	ETSI EN 300 386 (Europe)	
EMC	FCC part 15 (US)	

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Appendix B - Chassis General Dimensions

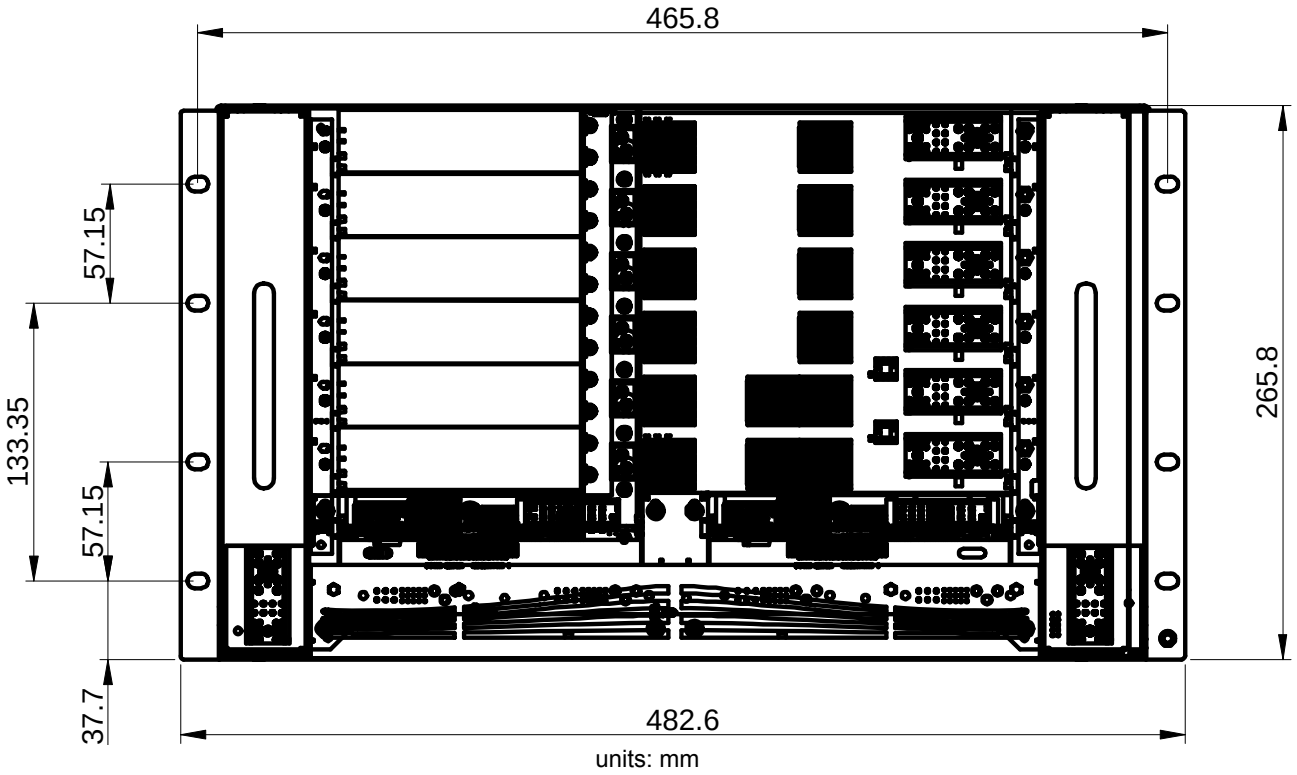


Figure 26. Chassis Dimensions - Front View

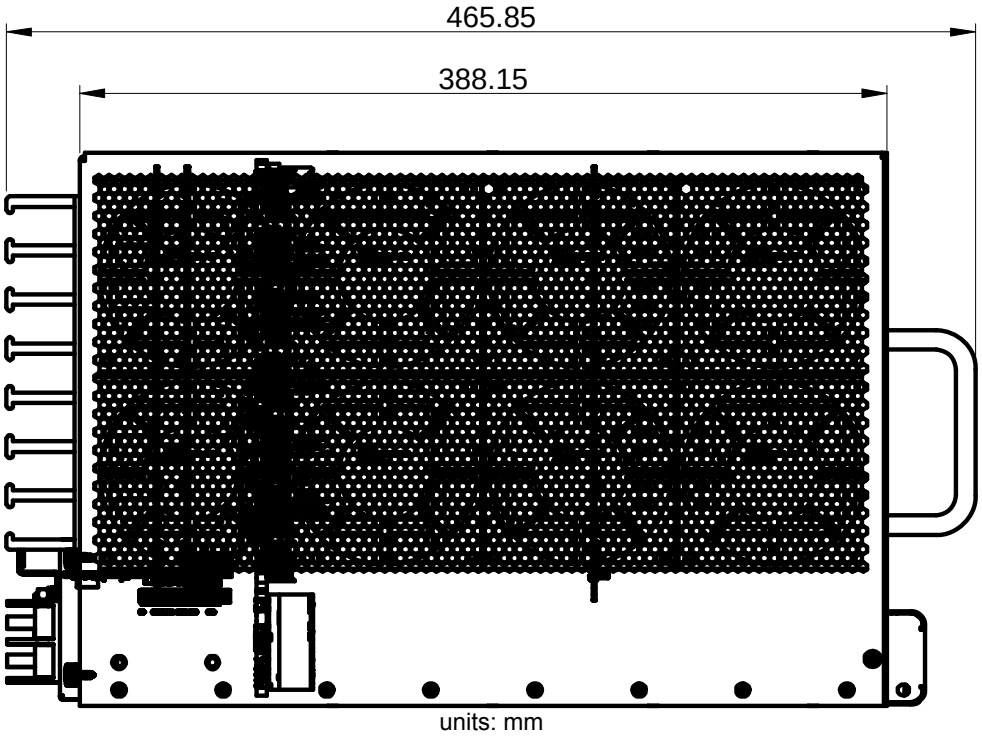


Figure 27. Chassis Dimensions - Side View

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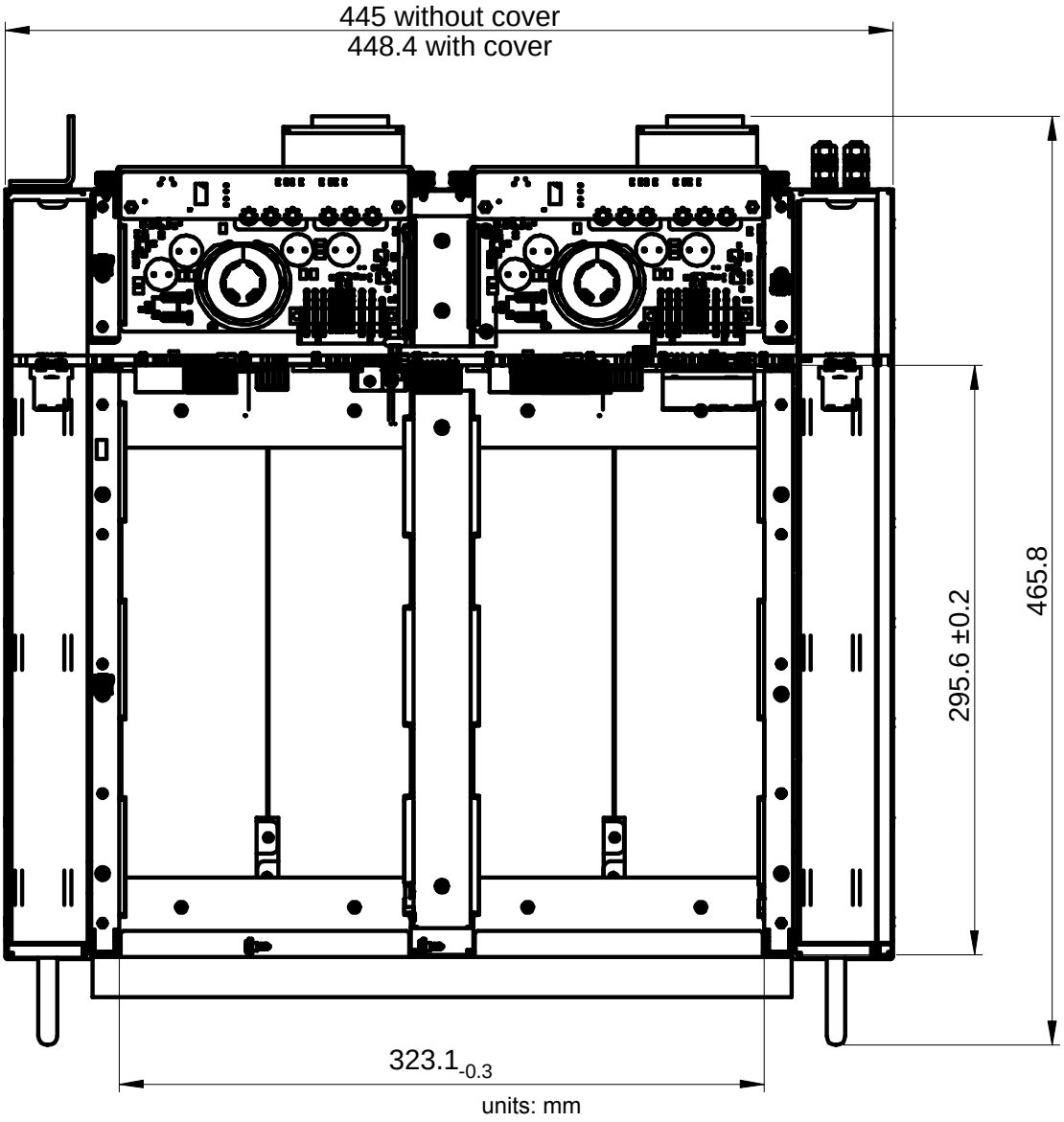


Figure 28. Chassis Dimensions - Top View

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Safety Instructions

1. Please read these safety instructions carefully.
2. Please keep this User‘s Manual for later reference.
3. One AC Inlets provided and service as Disconnect Devices, disconnect the equipment from both AC outlets use these AC Inlets before servicing or clearing. Use moisture sheet or cloth for cleaning.
4. For pluggable equipment, that the socket-outlet shall be installed near the equipment and shall be easily accessible.
5. Please keep this equipment from humidity.
6. Lay this equipment on a reliable surface when install. A drop or fall could cause injury.
7. Make sure the voltage of the power source when connect the equipment to the power outlet.
8. Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
9. All cautions and warnings on the equipment should be noted.
10. If the equipment is not use for long time, disconnect the equipment from mains to avoid being damaged by transient overvoltage.
11. Never pour any liquid into openings; this could cause fire or electrical shock.
12. Never open the equipment. For safety reason, the equipment should only be opened by qualified service personnel.
13. If one of the following situations arises, get the equipment checked by a service personnel:
    a. The Power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment has not work well or you can not get it work according to user‘s manual.
    e. The equipment has dropped and damaged.
    f. If the equipment has obvious sign of breakage.

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