14U 14-slot ATCA Shelf

User‘s Manual

Product Numbers:

11990-100/101/102/103/140/141

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The details in this manual have been carefully compiled and checked.

The company cannot accept any liability for errors or misprints. The company reserves the right to amendments of technical specifications due to further development and improvement of products.

Table of Contents

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.*

	**Danger 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.com*).

1.3 References and Architecture Specifications

- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference (*www.pigeonpoint.com*)

- PICMG® 3.0 R3.0 AdvancedTCA® Base Specification (*www.picmg.com*)
- Schroff Shelf Manager User's Manual, Order-no. 63972-243

The documentation is available for registered users at www.schroff.biz

1.4 Product definition

The Schroff 11990-1xx is a 14 U / 14 Slot ATCA 40G Shelf with enhanced per-slot power and cooling capability along with 40G or 100G backplane connectivity.

- Product Number 11990-100: 14 U Dual Star 40G Backplane, bused IPMB
- Product Number 11990-101: 14 U Dual Star 40G Backplane, radial IPMB (not for on-blade shelf management)
- Product Number 11990-102: 14 U Dual/Dual Star 40G Backplane, bused IPMB
- Product Number 11990-103: 14 U Dual/Dual Star 40G Backplane, radial IPMB (not for on-blade shelf management)
- Product Number 11990-140: 14 U Dual/Dual Star **100G** Backplane, bused IPMB
- Product Number 11990-141: 14 U Dual/Dual Star **100G** Backplane, radial IPMB (not for on-blade shelf management)

The Schroff 11990-1xx is designed to work with two redundant Schroff ShMM-ACB-VI Shelf Managers. At least one Shelf Manager is needed for a working System.

On-blade Shelf Management for systems with bussed IPMB available on request.

Shelf Manager with bused IPMB: 21990-401 (Product Number)
21990-404 (Catalog Number with packaging)

Shelf Manager with radial IPMB: 21990-402 (Product Number)
21990-405 (Catalog Number with packaging)

The Shelf Managers are not included with the Shelf

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
CMM	Chassis Management Module, same as Shelf Manager
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
VRTN	Voltage Return

2 Hardware Platform

- Mounting brackets for 19“ cabinets
- ESD Wrist Strap Terminals at the front and the rear
- 14 slot ATCA 40G/100G Backplane with Dual Star or Dual/Dual Star Fabric Interface, Dual Star Base Interface and bused or radial IPMB interface, supporting twelve 8 U node board slots and two 8 U hub slots
- 2 dedicated Shelf Manager slots accepting Schroff ShMM-ACB-VI Shelf Managers
- Electrical power 450 W/slot
- Enhanced cooling capability:
  Overall airflow = 2000 m³/h (1180 CFM)
  Front slot airflow = 113 m³/h (67 CFM) at the lowest performing slot
  Rear slot airflow = 16 m³/h (9 CFM) at the lowest performing slot
  (Air flow measured with CP-TA boards)
- Push-Pull Fan Tray arrangement provides optimized cooling for ATCA blades with fault tolerant capability
- Two pluggable, hot swappable Fan Trays
- Air inlet filter including air filter presence sensor
- Telco Alarm interface, Alarm Status LEDs, Fan Tray Alarm LEDs and serial interfaces for the Shelf Managers on bottom Fan Tray
- Rear pluggable dual redundant Power Entry Modules (PEM) with enhanced electrical power capability with 210 A per PEM: Each PEM has 6 internal power branches and providing connection of one power feed.

The torque of all FRU (Fan Tray, Air Filter, PEM, PEM cover) fixing screws is 0.7 Nm (6.2 in-lbs)

2.1 Shelf Front and Rear View

Figure 1: Shelf Front View

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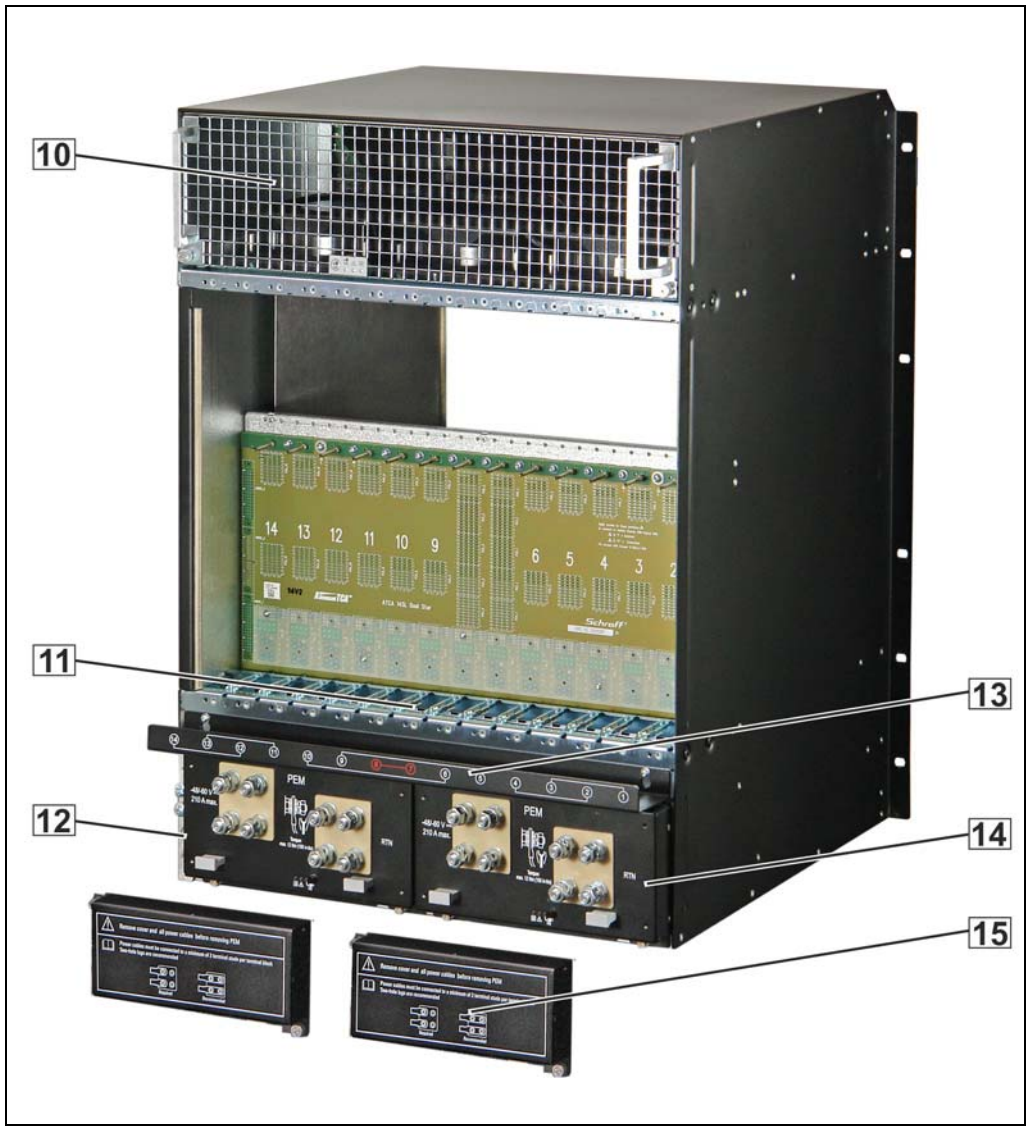
1	Front Cable Tray	6	ESD Wrist Strap Terminal
2	ATCA 14-Slot Backplane	7	Serial Interfaces for the Shelf Managers
3	Front Card Cage	8	Air Filter Tray
4	Fan Tray 1	9	Shelf Manager 2
5	Slot for Shelf Manger 1		

Figure 2: Shelf Rear View



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10	Fan Tray 2	13	Rear Cable Tray
11	Rear Card Cage	14	Power Entry Module A (PEM A)
12	Power Entry Module B (PEM B)	15	PEM Cover

2.2 ESD Wrist Strap Terminals

	**Danger of electrostatic discharge!** **Static electricity can harm delicate components inside the Shelf. You must wear an ESD wrist strap before exchanging any part or electric component!**

Two ESD Wrist Strap Terminals (4 mm banana jacks) are located at the upper front and lower rear side of the Shelf.

3 ATCA Backplane

The 14-slot ATCA Backplane provides:

- 40 Gb/s connectivity (4 lanes with 10 Gb/s) (11990-100/101/102/103)
  100 Gb/s connectivity (4 lanes with 25 Gb/s) (11990-140/141)
- 12 ATCA Node slots
- Two ATCA Hub slots
- Two dedicated Shelf Manager slots
- Two Power Entry Module (PEM) slots
- Two slots for the Chassis Data Modules (CDM)

3.0.1 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.

3.0.2 Dual Star Fabric Interface (11990-100/101)

The Fabric Interface is routed in a Dual Star configuration, supporting four ports per channel. In the Dual Star backplane, Logical Slots 1 & 2 are dedicated Hub Slots, Channels 1 & 2 are connected to Channel 1 & 2 of each Node Slot.

3.0.3 Dual-Dual Star Fabric Interface (11990-102/103/140/141)

The Fabric Interface is routed in a Dual-Dual Star configuration, supporting four ports per channel. In the Dual-Dual Star backplane, Logical Slots 1,2,3 & 4 are dedicated Hub Slots, Channels 1,2,3 & 4 are connected to Channel 1,2,3 & 4 of each Node Slot. Dual Star configurations can be supported by installing Node Boards into Slots 3 & 4 as well as the other Node Slots.

3.0.4 Synchronization Clock Interface

6 differential pairs of synchronization clocks are bused between all 14 ATCA slots and terminated at both ends with 80.5 Ohms between each differential pair.

3.0.5 Update Channel Interface

The Update Channels are wired between two redundant ATCA Backplane slots as 10 differential pairs with 100 Ohms impedance. The Update Channel is intended to pass information between two redundant ATCA Boards.

The Update Channel assignment is printed on the frontside of the Shelf.

3.0.6 Power Interface

Power distribution within the ATCA Backplane is divided into 6 Power Branches. This topology is used for safety reasons to keep the max. current per branch less the 35 A. Slots connected by update ports, are on separate power branches as well as both hub slots, the Shelf Manager slots and the Fan Trays.

3.1 Backplane Overview

Dual Star

	Node	Node	Node	Node	Node	Node	Hub Star 1	Hub Star 2	Node	Node	Node	Node	Node	Node
Physical Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Logical Slot	13	11	9	7	5	3	1	2	4	6	8	10	12	14
HW-Address (Hex)	4D	4B	49	47	45	43	41	42	44	46	48	4A	4C	4E
IPMB-Address (Hex)	9A	96	92	8E	8A	86	82	84	88	8C	90	94	98	9C
Update Channel														
Power Branch	1	1	2	2	3	3	3	4	4	4	5	5	6	6

Dual Dual Star

	Node	Node	Node	Node	Node	Hub Star 3	Hub Star 1	Hub Star 2	Hub Star 4	Node	Node	Node	Node	Node
Physical Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Logical Slot	13	11	9	7	5	3	1	2	4	6	8	10	12	14
HW-Address (Hex)	4D	4B	49	47	45	43	41	42	44	46	48	4A	4C	4E
IPMB-Address (Hex)	9A	96	92	8E	8A	86	82	84	88	8C	90	94	98	9C
Update Channel														
Power Branch	1	1	2	2	3	3	3	4	4	4	5	5	6	6

3.2 Dedicated Shelf Manager Slots

The front accessible Shelf Manager slots accept Schroff ShMM-ACB-VI Shelf Managers and are wired to:

- IPMB-A and IPMB-B (I²C-bus)
- Base Interface Channel 1 (ShMC) of the Base Interface Hub slots, supporting Shelf Manager Cross Connect (10/100 Base T Ethernet)
- Fan Tray connectors
- PEM A and PEM B connector

The dedicated Shelf Manager slots also have interconnected signals that allow the Shelf Managers to run in a redundant configuration.

3.2.1 Intelligent Platform Management Interface

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
  (Product Number: 11990-100/102/140)
- a radial configuration
  (Product Number: 11990-101/103/141)

Figure 3: Bused IPMB

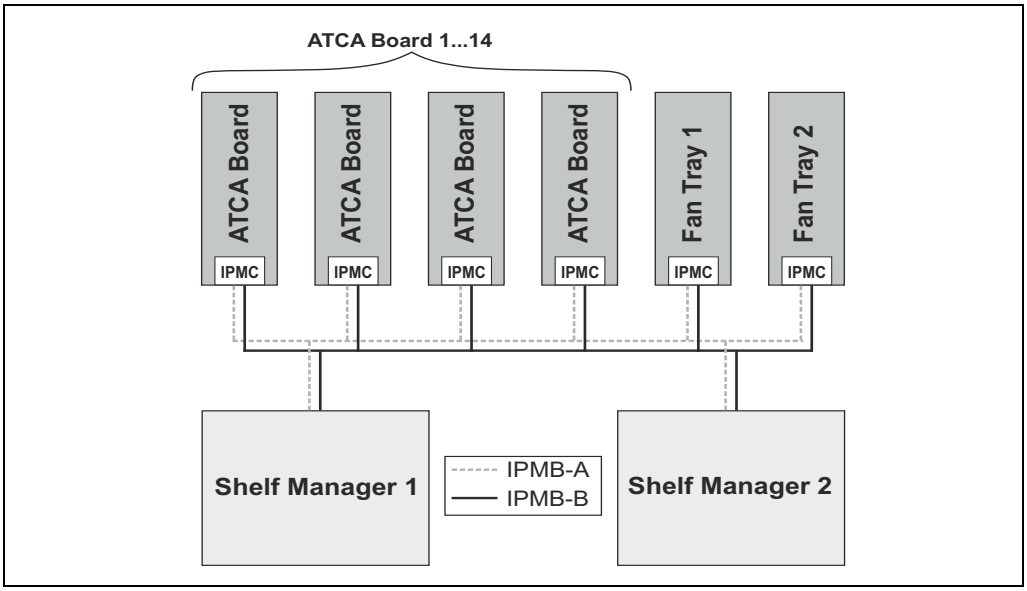

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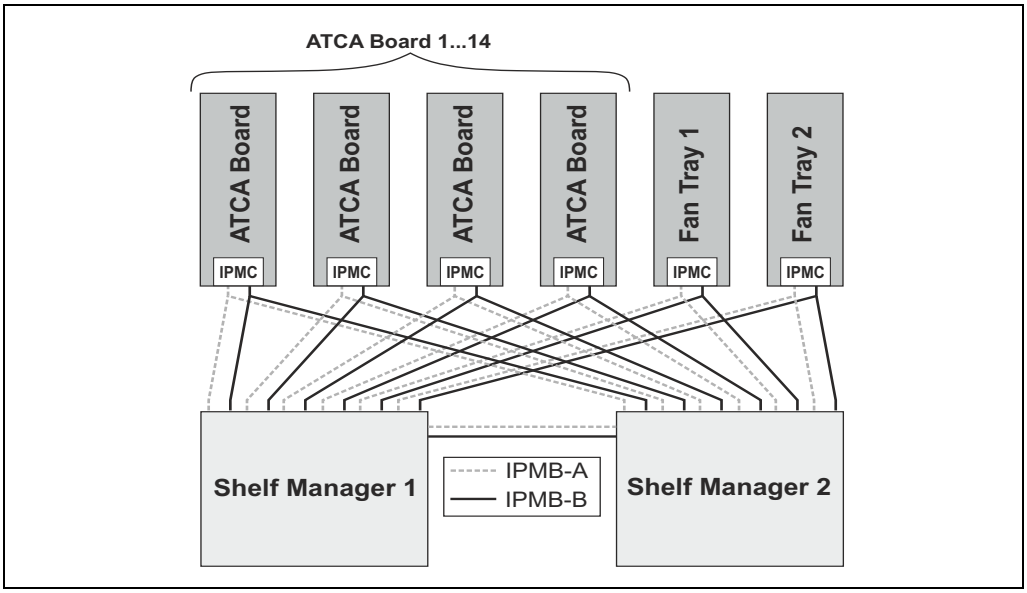
Figure 4: Radial IPMB



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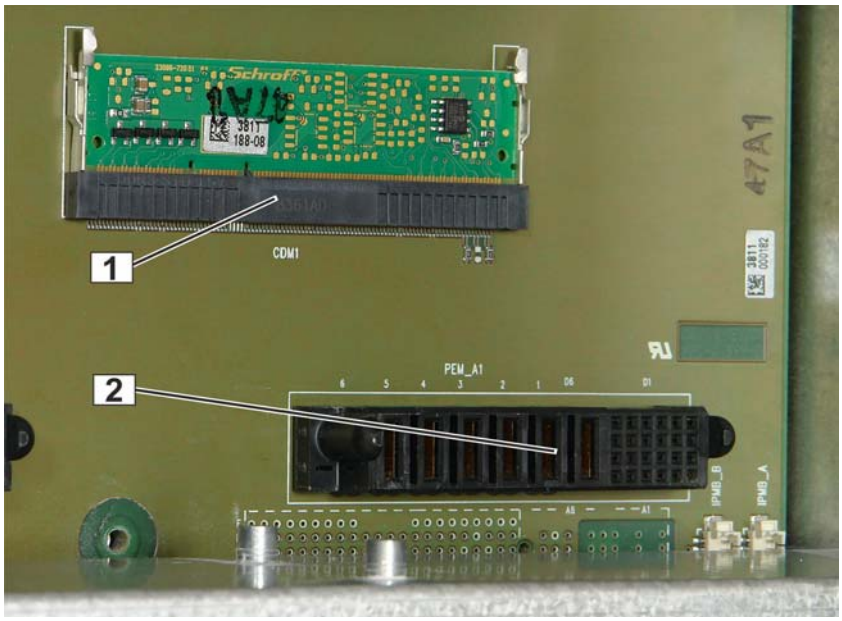
3.3 Chassis Data Modules (CDM)

The Chassis Data Module (CDM) is a carrier board for the FRU SEEPROM (24LC256)

Figure 5: Chassis Data Module 1 (CDM 1)



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1 CDM 1 2 Connector PEM A

Both CDMs are pluggable modules and located on the rear side of the ATCA Backplane. The modules can be accessed after removing the respective Power Entry Module (PEM).

Warning!

Before removing a PEM, make sure that all Power Feeds of the other PEM are fully functional.

Table 2: Chassis Data Module I²C addresses

CDM	Channel	I²C-bus address
CDM 1, SEEPROM	Channel 1	0xa4 / 52
CDM 2, SEEPROM	Channel 2	0xa4 / 52

3.4 Shelf Manager Cross Connect

The ATCA Backplane provides cross connect traces between the Base Hubs and the Shelf Managers according to PICMG Engineering Change Notice ECN 3.0-2.0-001. This ECN adds an option for dual 10/100 Base-T links from each Base Hub to both dedicated Shelf Manager slots.

Figure 6: Shelf Manager Cross Connect

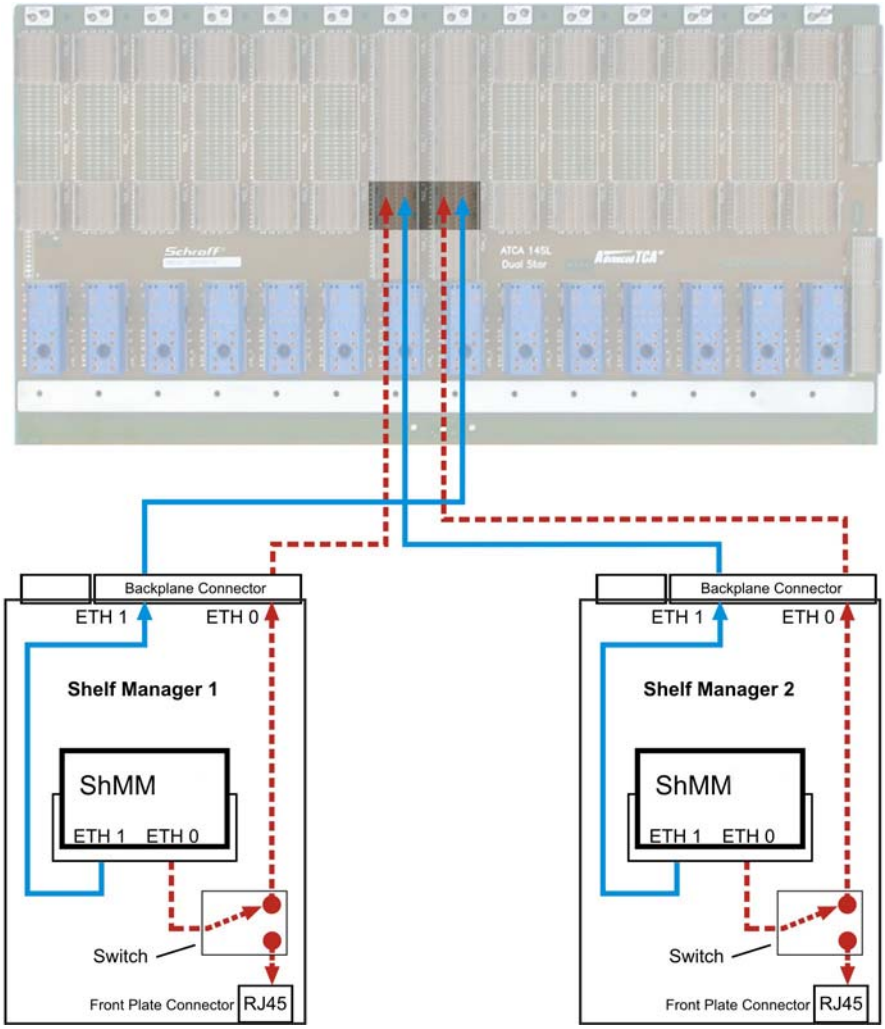

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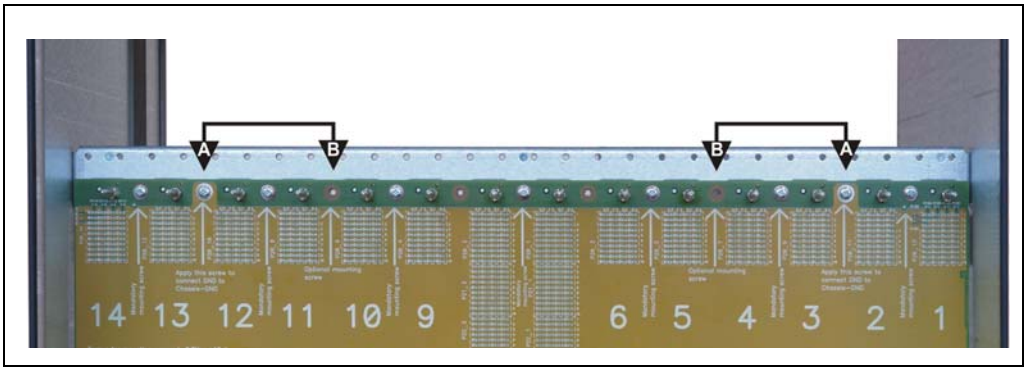
Table 3: Connector (P23) pin assignments for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

3.5 Logic Ground (GND) and Shelf Ground (Shelf_GND)

Figure 7: Logic Ground/Shelf Ground Connection



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The ATCA Backplane provides a mechanism to connect Logic Ground (GND) and Shelf Ground (Shelf_GND). You can connect/isolate Logic Ground by swapping two screws from position (A) to position (B).

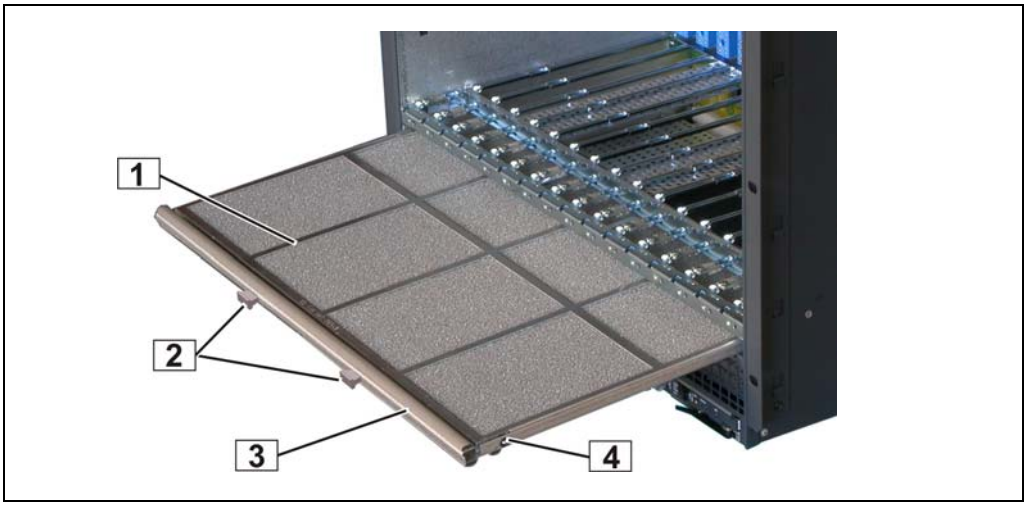
- Screws at position (A): Logic Ground and Shelf Ground connected.
- Screws at position (B): Logic Ground and Shelf Ground isolated.

Torque for the Screws: 0.7 Nm +10%

Logic Ground and Shelf Ground is not connected by default.

4 Air Filter

Figure 8: Air Filter



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1	Filter Element	3	Filter Tray
2	Handles	4	Spring mounted ball lock

4.1 Introduction

The ATCA Shelf provides a front replaceable air filter.

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

4.2 Air Filter Replacement/Maintenance

The air filter tray can be removed by pulling the air filter's handle. To re-install, push the air filter tray into the guide rails at each side of the shelf until the spring mounted ball lock engage.

Filter maintenance intervals are application specific and depend on the environmental conditions. We recommend cleaning or replacing the filter element approximately every 90 days.

When installing the air filter, the filter element must be in top position

4.3 Air Filter Presence Sensor

The air filter presence is detected by a reed contact located on the backplane. The reed contact is activated by a magnet mounted at the rear side of the air filter metal frame.

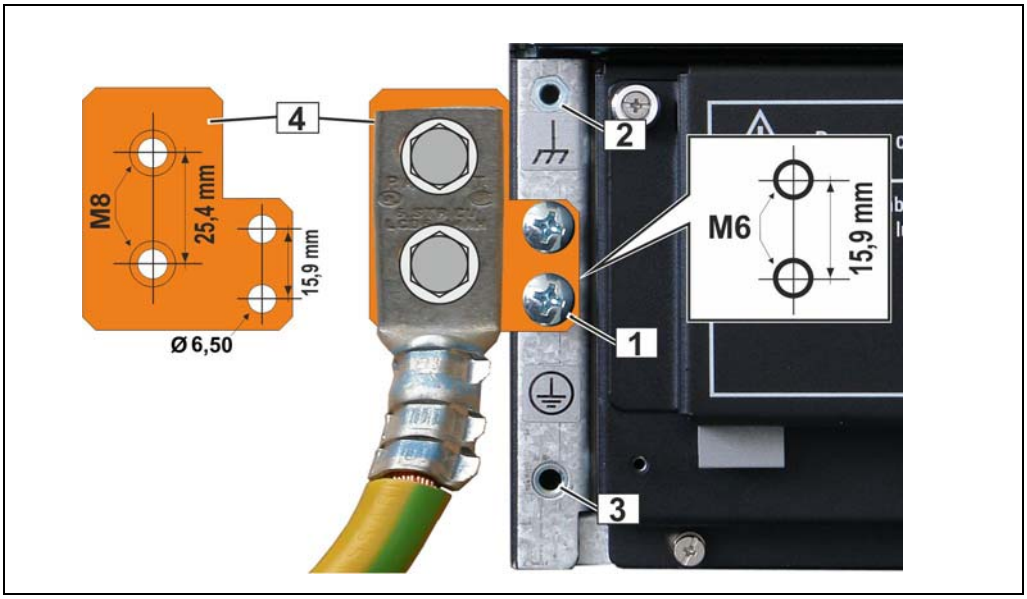
5 Shelf Ground Connection

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

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

The shelf ground cable can be connected at the left rear bottom side. For two hole lugs with 1“ spacing, an adapter kit is available, order no: **21990-413**

Figure 9: Shelf ground terminal with adapter kit



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1	Shelf Ground Terminal	3	Additional fixing point (M6)
2	ESD Terminal	4	Adapter plate

5.1 Specification for the Shelf Ground connection cable

Minimum recommended wire size:

AWG3/0 conductor.

Recommended two hole lugs with 1“ spacing for AWG 3/0:

Burndy YAZ272TC38
Burndy YAZ272TC3845 (45°)
Burndy YAZ272TC3890 (90°)

Torque for Bolts M6: 5.1 Nm (45 in.-lb.)
Torque for Bolts M8: 12.6 Nm (111 in.-lb.)

6 Fan Trays

6.1 Introduction

The Fan Trays are intelligent FRUs controlled by the ShMCs via IPMB.

The ATCA Shelf contains two interchangeable Fan Trays arranged in a push-pull configuration for maximum air flow. The Fan Trays are plugged-in below and on top of the card cage.

Each Fan Tray contains six high speed / high air flow fans controlled as a group by the IPM Controller in the Fan Tray.

The Fan Tray is locked into the Shelf with two captive screws. A hot-swap push button is used to provide hot-swap functionality.

The lower Fan Tray provides the Telco Alarm interface and the serial interfaces for the ShMCs.

Each Fan Tray provides:

- A blue Hot Swap LED
- A red Fan Tray Alarm LED
- A green Fan Tray OK LED
- A Hot Swap push button

The Fan Tray is controlled via an on-board IPM controller. 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 25% of full speed. 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.

The system is designed to run indefinitely with any single fan failure. When one fan fails, all other fans are not increased to full speed. The Fan Tray has sufficient cooling capacity to keep the Shelf cooled with a single fan failure. If two fans in the system fail (one fan in each fan tray or two fans in one fan tray), the remaining fans are set to full speed.

Figure 10: Upper Fan Tray

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Figure 11: Lower Fan Tray

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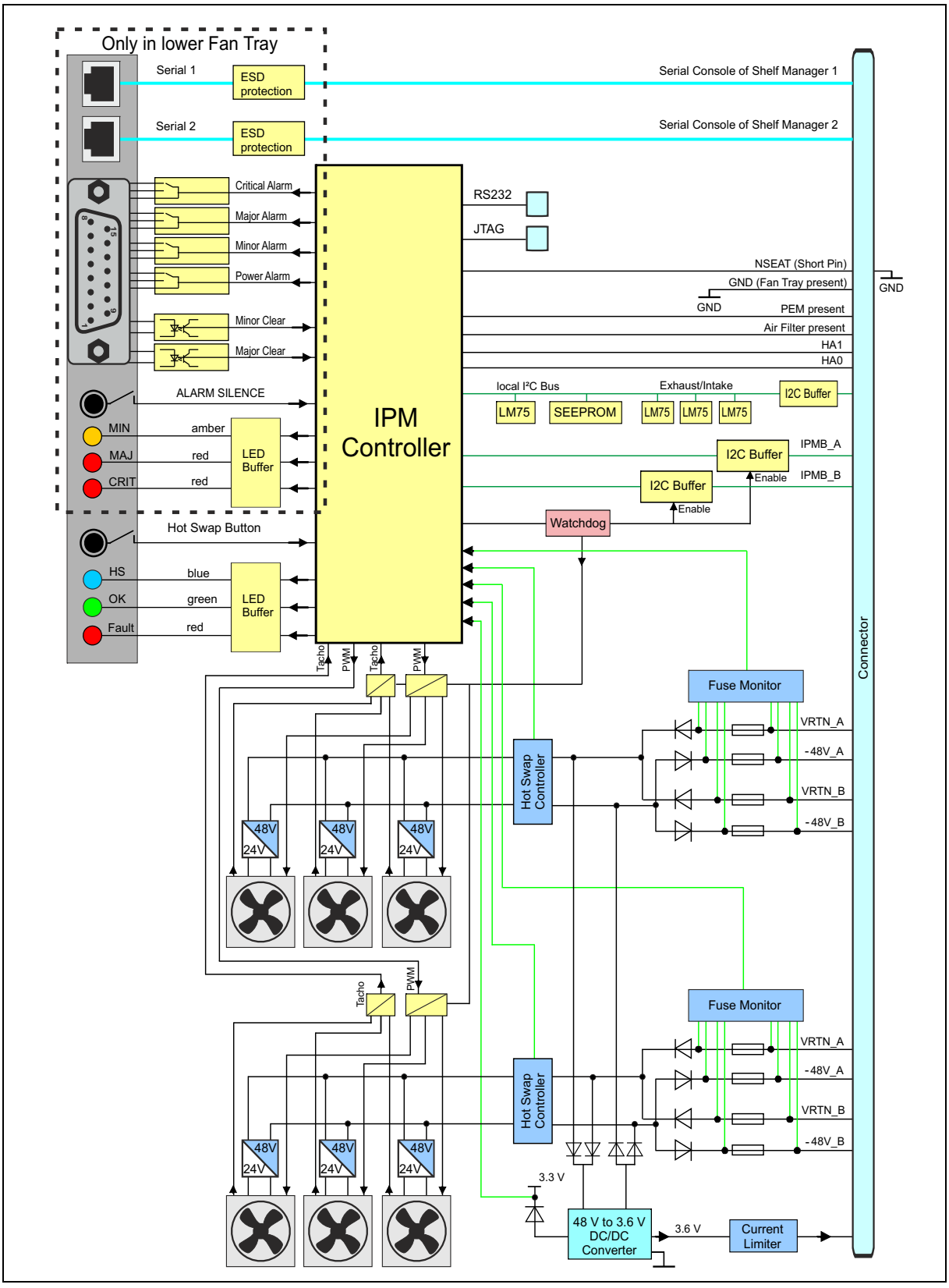
6.2 Maintenance/Service

We recommend a fan tray replacement every 4,5 years.

6.3 Fan Tray Block Diagram

Figure 12: Fan Tray Block Diagram



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6.4 Fan Tray Signals

The Fan Tray provides signals for:

- Voltage 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.

6.5 Fan Tray Temperature Sensor

The temperature sensors (LM75) in the Fan Trays measure the input and exhaust temperatures of the Shelf.

6.6 Fan Tray Connectors and Indicators

The front panel includes a green and red Status 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 4: LEDs on Fan Tray front panel

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

6.7 Telco Alarms

6.7.1 Telco Alarm Interface

The lower Fan Tray provides a Telco Alarm interface on the DB15-male connector. Three relay outputs are used for remote alarm distribution, reflecting the state of the three Alarm LEDs. The relays are capable of carrying 72 VDC or 1 A with a max. rating of 30 VA.

6.7.2 Telco Alarm LEDs

The lower Fan Tray provides the Telco Alarm LEDs. These LEDs indicate presence of Critical, Major and Minor alarms as follows:

Table 5: Telco Alarm LEDs

State	Description
Off	No alarm active
On	Alarm active
Flashing	Alarm active, but silenced

6.7.3 Alarm Silence Push Button

The Alarm Silence push button on the lower Fan Tray faceplate deactivates the alarm relays. During the time Alarm Silence is activated, the Alarm LEDs flash. By pressing the Alarm Silence push button a second time, the alarm relays are reactivated and the Alarm LEDs are solid.

*The **Alarm Silence** push button only activates the Alarm Silence state, but does not reset the alarms. If the silence interval (default 600 s) is exceeded without resolving the alarms, the alarms will be re-initiated.*

6.7.4 Alarm Reset

Hardware Reset:

Two relay inputs at the DB15 connector are used to reset the Minor and Major alarm state.

The reset inputs accept timed pulse inputs for clearing Minor and Major alarm states. Reset is accomplished by asserting a voltage differential from 3.3 VDC to 72 VDC for between 200 ms and 300 ms. The acceptance voltage range is from 0 to 48 VDC continuous (handles up to 60 VDC at a 50% duty cycle, 72 VDC at a 30% duty cycle). The current drawn by a reset input does not exceed 12 mA.

There is no hardware reset (reset input) for the Critical Alarm state.

Software Reset:

The RMCP and CLI functions can be used to set and reset the Telco Alarms (incl. Critical Alarm). See the Pigeon Point Shelf Manager External Interface Reference for more information.

6.7.5 Telco Alarm Connector (DB15-male)

Figure 13: Telco Alarm Connector (DB15-male)

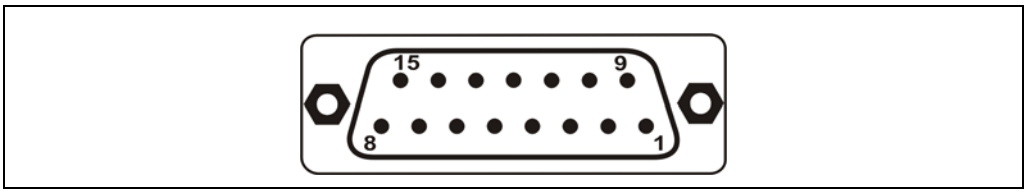

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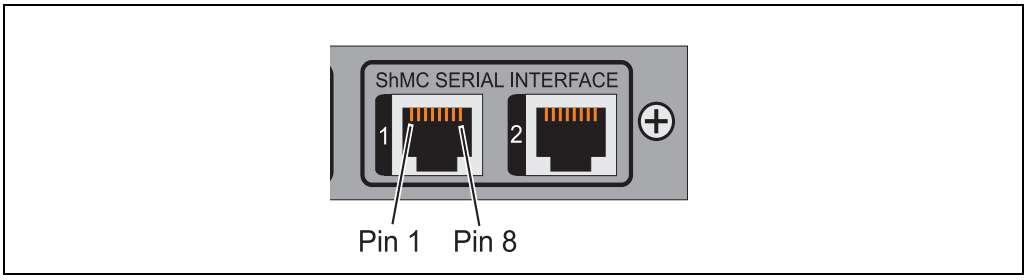
Table 6: Telco Alarm Connector Pin Assignment

Pin	Name	Description
1	AMIR+	MinorReset+
2	AMIR-	MinorReset-
3	AMAR+	MajorReset+
4	AMAR-	MajorReset-
5	ACNO	CriticalAlarm - NO
6	ACNC	CriticalAlarm - NC
7	ACCOM	CriticalAlarm - COM
8	AMINO	MinorAlarm – NO
9	AMINC	MinorAlarm – NC
10	AMINCOM	MinorAlarm – COM
11	AMANO	MajorAlarm – NO
12	AMANC	MajorAlarm – NC
13	AMACOM	MajorAlarm – COM
14	APRCO	PwrAlarm – NO
15	APRCOM	PwrAlarm - COM
Shield	Shelf-GND	Shelf Ground

6.8 RS-232 Serial Console Interfaces

Figure 14: RS-232 Serial Console Interfaces



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The lower Fan Tray provides two RS-232 serial console connectors for Shelf Manager 1 and 2. The connectors are 8-pin RJ45 modular receptacles.

A full set of RS-232 signals, including modem control is provided. The serial interface is implemented on the ShMM-500.

The serial console default configuration is:

- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

Table 7: RS-232 Serial Console Interface Pin assignment

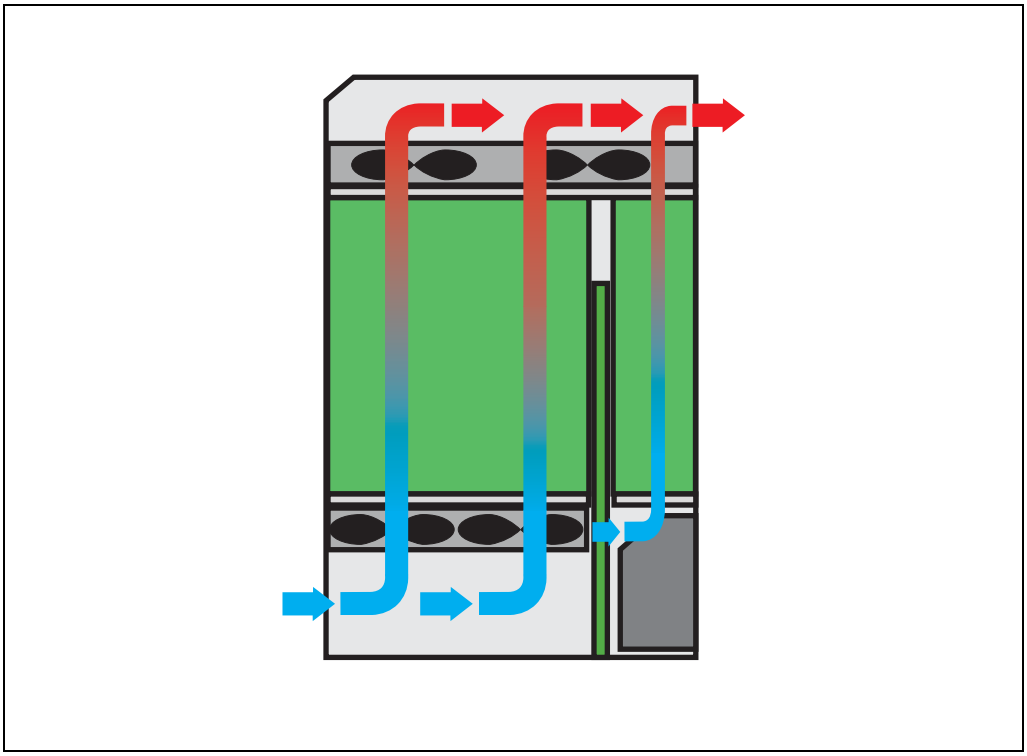
RJ45 Pin	RS-232 Signal	ShMM-500 Signal	Type	Description
1	RTS	RTS	Out	Request To Send
2	DTR	DTR	Out	Data Terminal Ready
3	TxD	TXD0	Out	Transmit Data
4	GND	GND	---	Logic Ground
5	GND	GND	---	Logic Ground
6	RxD	RXD0	In	Receive Data
7	DSR	DSR	In	Data Set Ready
8	CTS	CTS	In	Clear To Send

7 Thermals

7.1 System Airflow Path

The Schroff 14 slot ATCA Shelf provides airflow using two Fan Trays, one below the card cage and one above the card cage. Each Fan Tray has 6 fans moving air from the bottom to the top 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 15: System Airflow Path



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Overall airflow = 2000 m³/h (1180 CFM)

Front slot airflow = 113 m³/h (67 CFM) at the lowest performing slot

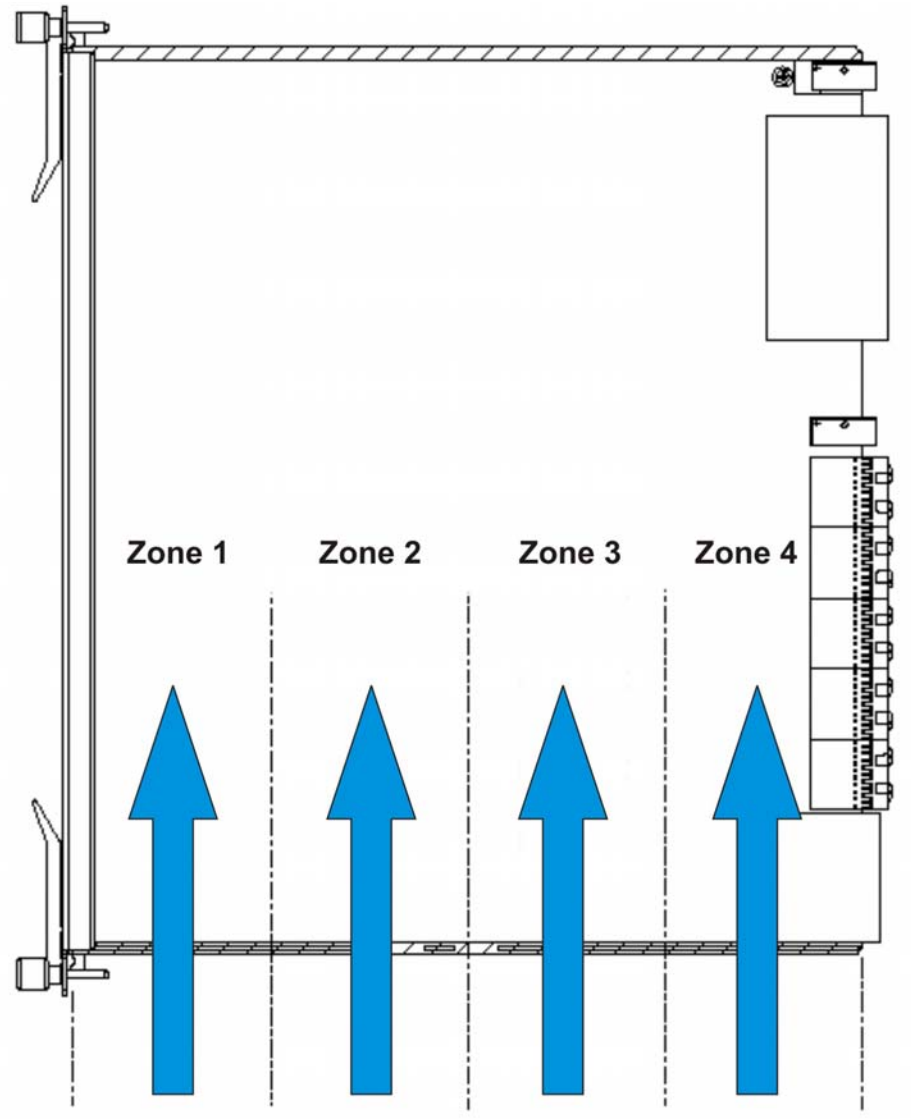
Rear slot airflow = 16 m³/h (9 CFM) at the lowest performing slot

(Air flow measured with CP-TA boards)

The airflow is measured with air filter installed and test boards in each slot. The test boards have a pressure drop of 37 Pa@ 0.85 m³/min for Front Slots and 24.9 Pa@ 0.14 m³/min for RTM Slots.

For further information and explanations see PICMG 3.0 R3.0, Chapter 5.4 and NEBS (GR-63).

Front slot measurement zones



7.2 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 m³/min

Figure 16: Front Board Air Distribution

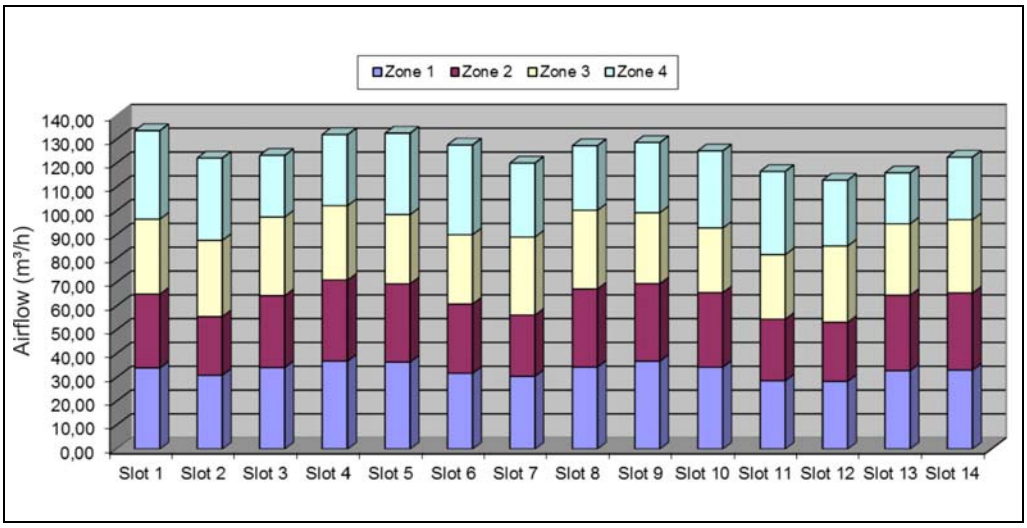


Figure 17: Front Board Air Flow

	Zone 1 [m³/h]	Zone 2 [m³/h]	Zone 3 [m³/h]	Zone 4 [m³/h]	∑ [m³/h]	∑ [cfm]
Slot 1	34,06	31,01	31,54	37,12	**133,72**	**78,66**
Slot 2	31,01	24,66	32,00	34,56	**122,23**	**71,90**
Slot 3	34,27	30,15	33,05	25,89	**123,37**	**72,57**
Slot 4	37,00	34,00	31,26	29,82	**132,09**	**77,70**
Slot 5	36,52	32,91	29,08	34,15	**132,66**	**78,04**
Slot 6	31,82	29,09	29,11	37,70	**127,72**	**75,13**
Slot 7	30,57	25,75	32,73	31,08	**120,13**	**70,66**
Slot 8	34,44	32,83	33,05	27,10	**127,42**	**74,96**
Slot 9	36,92	32,55	29,86	29,43	**128,75**	**75,74**
Slot 10	34,38	31,31	27,16	32,37	**125,23**	**73,66**
Slot 11	28,73	25,83	27,13	34,92	**116,60**	**68,59**
Slot 12	28,44	24,83	32,02	27,63	**112,92**	**66,43**
Slot 13	32,94	31,70	29,96	21,38	**115,99**	**68,23**
Slot 14	33,17	32,42	30,76	26,27	**122,61**	**72,12**
∑ [m³/h]	**464,27**	**419,03**	**428,70**	**429,44**	**1741,43**	**1024,37**

7.3 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

Figure 18: Rear Board Air Distribution

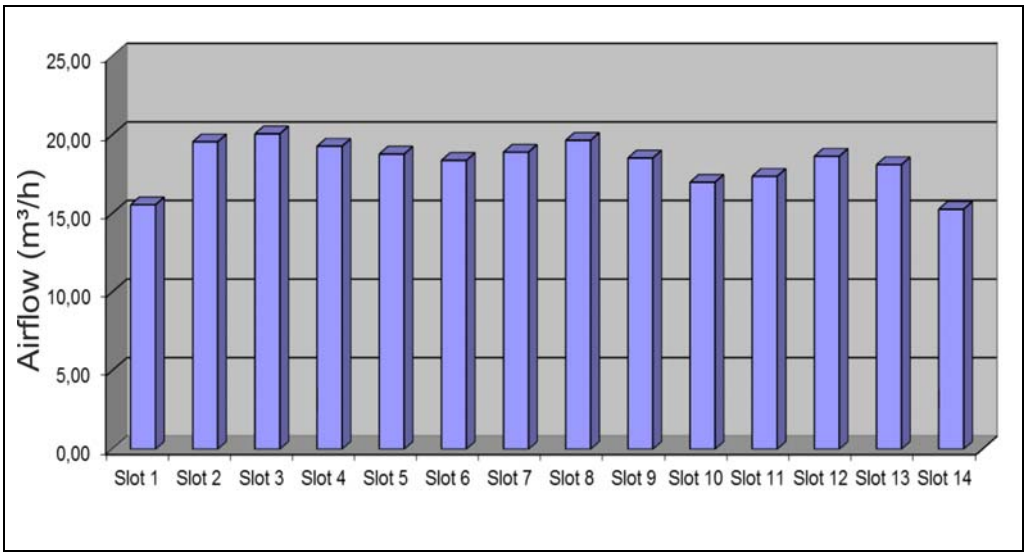


Figure 19: Rear Board Air Flow

	∑ [m³/h]	∑ [cfm]
Slot 1	**15,55**	**9,15**
Slot 2	**19,56**	**11,51**
Slot 3	**20,07**	**11,81**
Slot 4	**19,28**	**11,34**
Slot 5	**18,78**	**11,05**
Slot 6	**18,38**	**10,81**
Slot 7	**18,91**	**11,12**
Slot 8	**19,66**	**11,56**
Slot 9	**18,53**	**10,90**
Slot 10	**16,99**	**9,99**
Slot 11	**17,37**	**10,22**
Slot 12	**18,64**	**10,97**
Slot 13	**18,11**	**10,65**
Slot 14	**15,27**	**8,98**
∑ [m³/h]	**255,09**	**150,05**

8 Power Entry Module (PEM)

	**Hazardous voltage!** *Before working ensure that the power is removed from the power connection cables. When the system is powered on, do NOT touch the power terminals.*

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 VDC to -72 VDC.The Shelf supports redundant power supplies but the two supplies should be independently powered.

8.1 Introduction

Two pluggable redundant Power Entry Modules (PEMs) are located at the rear bottom side of the Shelf. Each PEM provides power terminals for a 210 A power feed. Each power feed consists of up to four –48 VDC cables and the corresponding return cables.
Each input feed is divided internally at the PEM in 6 output branches toward the backplane. In this way, each PEM has 1 input feed and 6 output branches.

Over current protection is provided by 50 A fuses in each output branch. The segmentation is shown in *Chapter 8.4, "Power Branches"*.

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 -40 VDC to -72 VDC.

In each power feed, input voltage and measurement is implemented, by means of dedicated voltage monitor device.

Current measurement is available only as an option.

The PEM provides:

- PCA9555 I/O device for voltage monitoring and Hot Swap functionality
- LM75 temperature sensor
- 24LC256 FRU SEEPROM
- 2 INA220B Current/Voltage measurement devices

These devices are connected to the I²C-bus via an LTC4300 I²C buffer. In order to guarantee a galvanic insulation, I²C-bus insulation devices have provided for the INA220B Current/Voltage Monitors.

To detect a blown fuse, the voltages after the fuses are monitored by threshold comparators. The threshold comparators are coupled to the PCA9555 chip through optical-isolation devices. The threshold for the blown fuse alarm is -29.5 VDC ±2 V.

To indicate to the Shelf Manager the presence of the PEM, a presence signal is grounded by the PEM.

A Hot Swap Push Button and a Blue Hot Swap LED provide Hot Swap functionality.
A red (power failure) and a green (OK) LED provide status indication.

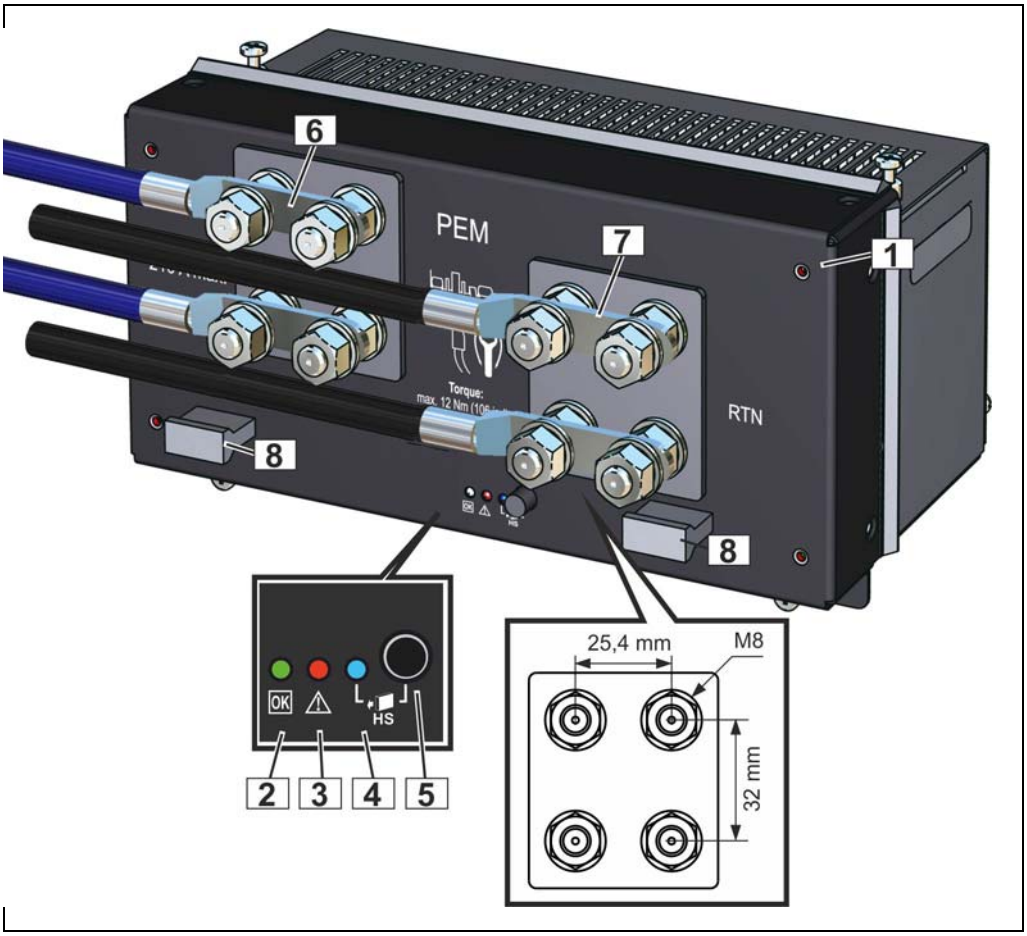
Each of the 6 redundant output branches supply power to a separate part of the ATCA Backplane.

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 PEM itself and other shelf related FRUs can sustain this level of pulse.

8.2 PEM Front View

Figure 20: PEM Front View



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1	PEM	5	Hot-Swap Push Button
2	Status LED „OK“ (green)	6	-48 V Input (-)
3	Status LED „Failure“ (red)	7	RTN Input (+)
4	Hot-Swap LED (blue)	8	Handle

8.3 Specifications for the Power Cables

	**Caution!** *The wiring must be in compliance with local and national electrical codes and regulations.*

The PEM provides 4 M8 studs for the -48 V and the RTN feed to connect the power cables. The following cabeling scenarios are possible.

1. Single cable wiring:
Connect one cable at the -48 V and one at the RTN feed with a two-hole terminal to either the upper or lower row of M8 studs.

Required cable size: AWG 3/0, suitable for min. 90°C (194°F), maximum length = 3 m.

Recommended cable lug: BLU3/0D2TC 38 (elecdirect.com) Burndy YA272TC3845, ILSCO CSWD-3/0-38-1, ILSCO CSWN-3/0-38-1 or equivalent.

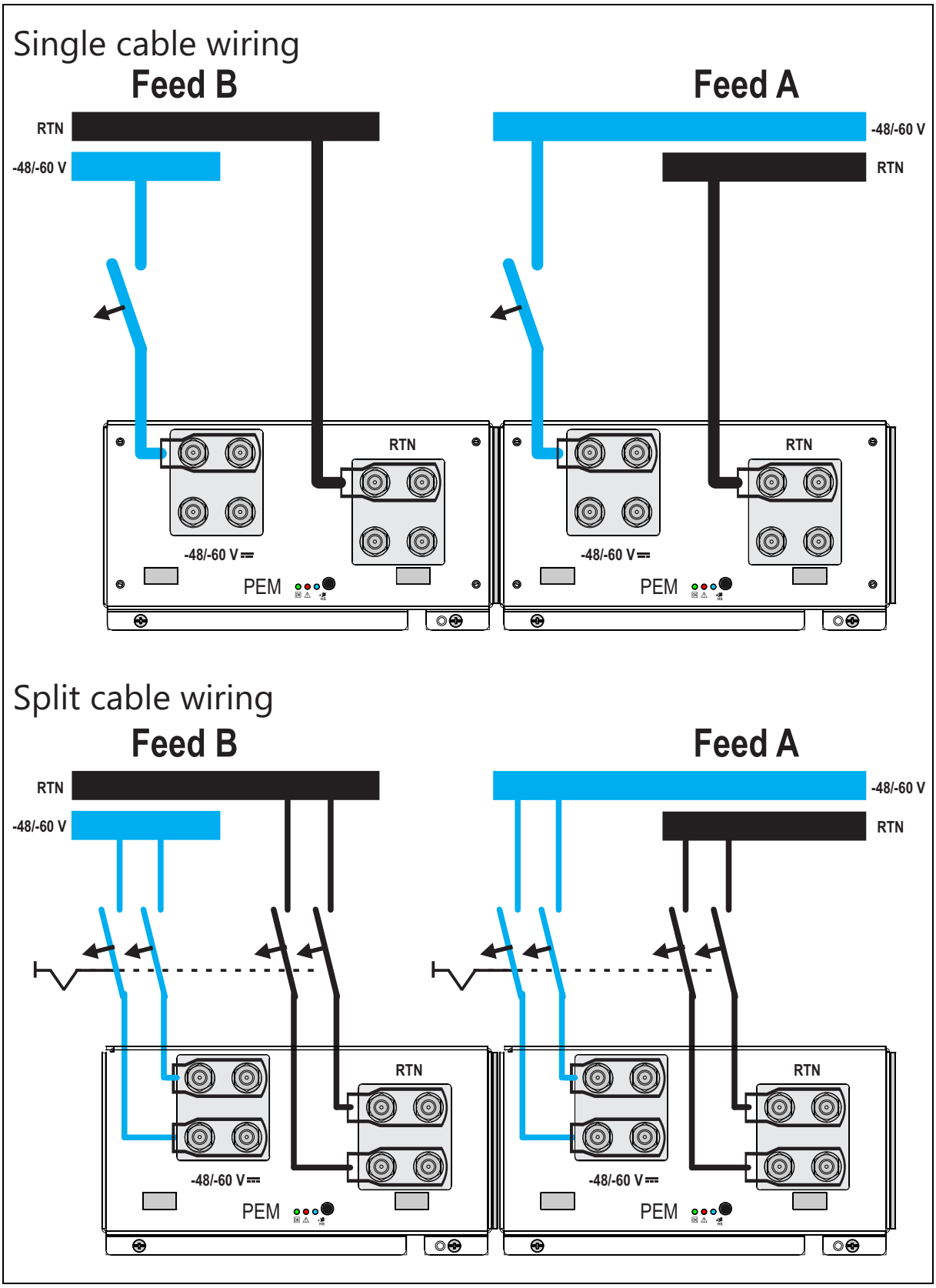
2. Split cable wiring:
Connect two cables at the -48 V and two at the RTN feed with a two-hole terminal to the upper and lower row of M8 studs.

The two -48 V and the two RTN cables must be fused separately at the Power Distribution Unit.

Required cable size: AWG 2, suitable for min. 90°C (194°F), maximum length = 3 m.

Recommended cable lug: Panduit LCDN2-38D-Q, Panduit LCCX2-38D-E, Panduit LCC2-38DW-Q, ILSCO CLWD-2-38-1, Burndy YA2CL2TC516or equivalent.

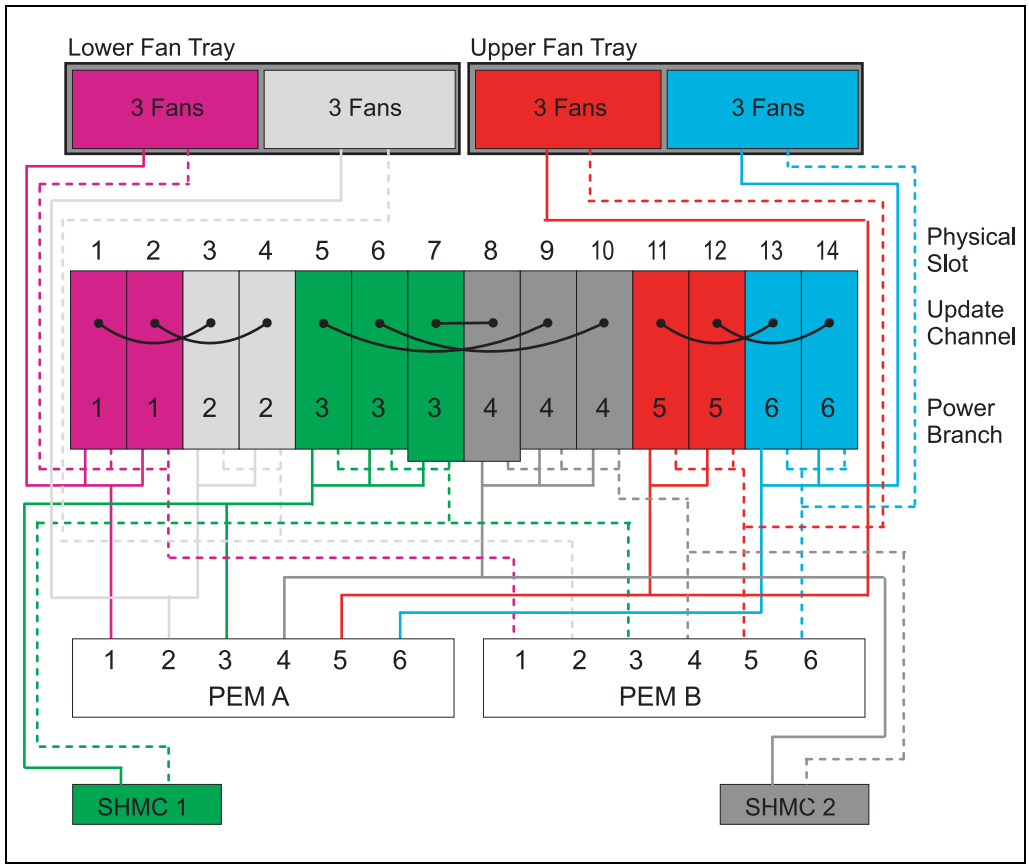
Figure 21: PEM Wiring



8.4 Power Branches

The Backplane‘s power supply is divided into 6 power branches. Each of the PEM’s 6 power branches supplies power to a group of slots and a Fan or Shelf Manager. This topology is used to keep the max. current per branch less then 35 A.

Figure 22: Power distribution of the 6 Power Branches within the Shelf



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8.5 Slot Power Calculation

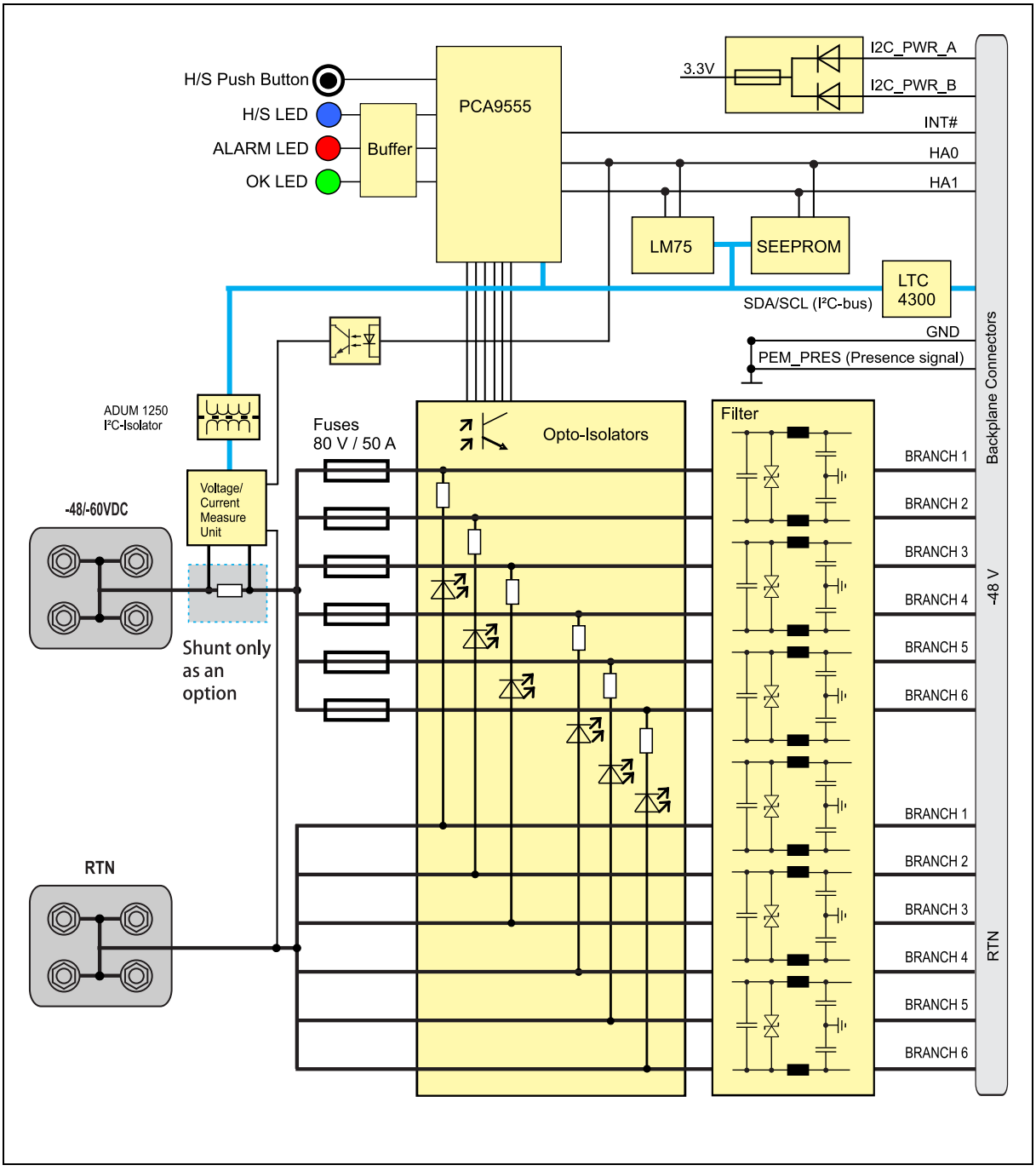
Each branch supplies power to group of slots and/or a Fan Tray or a Shelf Manager.

The Shelf Manager calculates the maximum branch power by the minimum expected operating voltage (default 40 V) and the maximum branch current (35 A) stored in the Shelf's FRU file.

With the default settings the available branch power is calculated with 1400 W. With the power topology shown in Figure 18, the Shelf can supply a minimum of 450 W per slot (40 V operating voltage, 540 W with 48 V operating voltage.)

8.6 PEM Block Diagram

Figure 23: PEM Block Diagram



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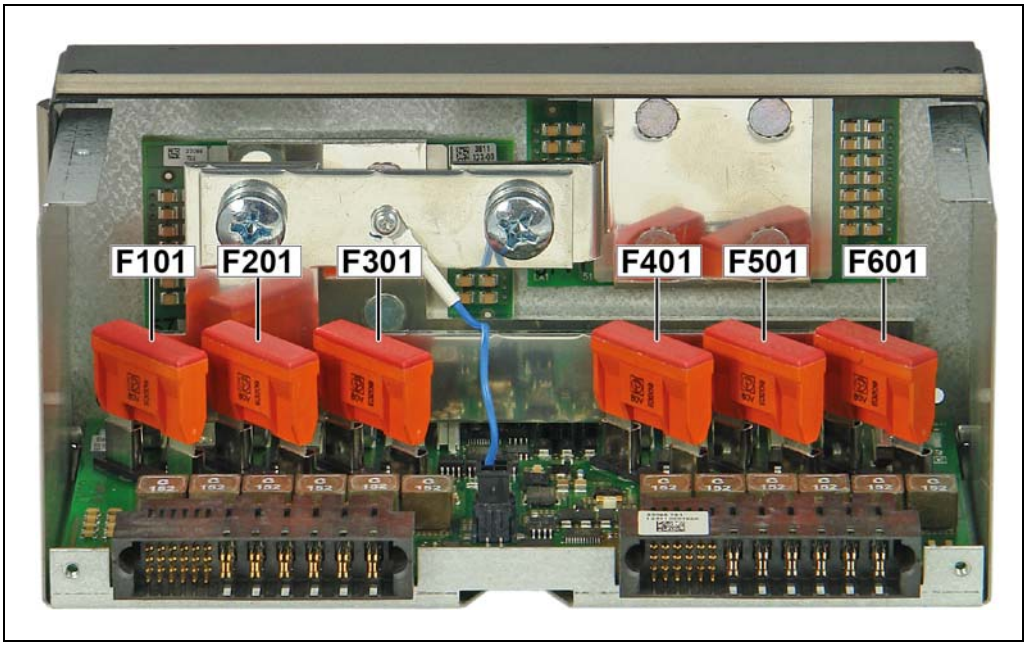
8.7 PEM Fuses

Figure 24: PEM Fuses



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F101	Fuse Branch 1 (50 A/80 V)	F401	Fuse Branch 4 (50 A/80 V)
F201	Fuse Branch 2 (50 A/80 V)	F501	Fuse Branch 5 (50 A/80 V)
F301	Fuse Branch 3 (50 A/80 V)	F601	Fuse Branch 6 (50 A/80 V)

8.8 PEM I²C-bus addresses

Geographic address pins (HA0, HA1) on the PEM Backplane connector determine the I²C addresses of the devices. The I²C devices on the PEMs are connected to channel 4 of the Master-Only I²C-bus of the Shelf Managers.

Table 8: PEM I²C-bus addresses

PEM Location	SEEPROM	LM75	PCA9555
PEM A (Right, view from rear)	0xa8/54	0x98/4c	0x48/24
PEM B (Left, view from rear)	0xaa/55	0x9a/4d	0x4a/25

8.9 PEM I/O Device

The PEM I/O device (PCA9555):

- controls the status of the LEDs
- reads the status of the Hot Swap push button
- reads the status of the -48 VDC inputs

Table 9: PEM PCA 9555 pin assignment

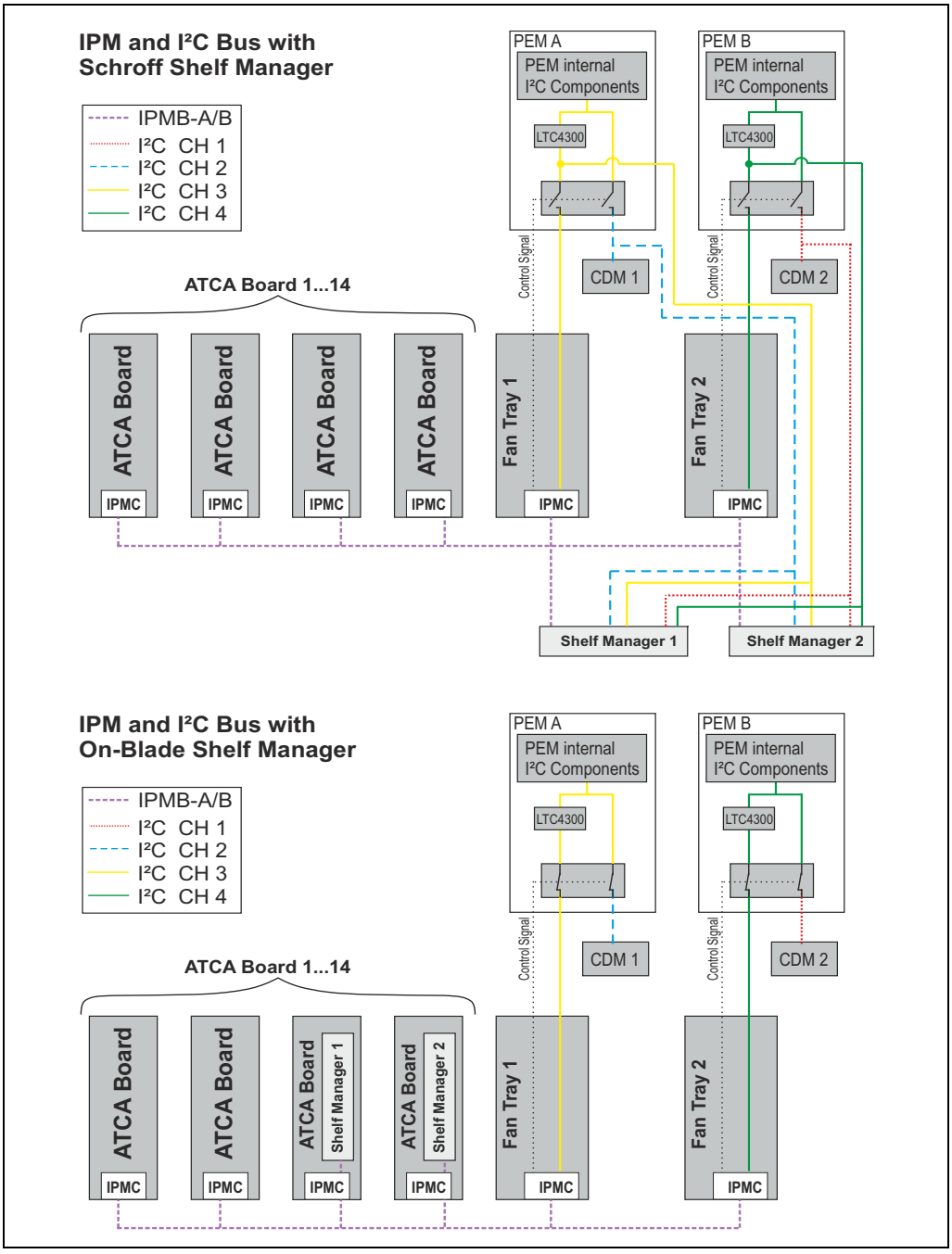
PCA9555 I/O pin	Function	State
0.0	n.c.	
0.1	Power Branch 1 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.2	n.c.	
0.3	Power Branch 2 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.4	Power Branch 6 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.5	Power Branch 5 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.6	n.c.	
0.7	Power Branch 3 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.0	n.c.	
1.1	Power Branch 4 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.2	n.c.	
1.3	Green LED	1=on
1.4	Hot Swap Push-button switch	1=not pushed, 0=pushed
1.5	Red LED	1=on
1.6	n.c.	
1.7	Blue LED	1=on

9 Shelf Management

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

Upon request is also a version with on-blade shelf management available. With on-blade shelf management, the I²C components of the PEMs and the SEEPROM of the CDMs 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 25: Shelf Management



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9.1 Schroff Shelf Manager ACB-VI

These Chapters describe the Shelf Manager hardware. For explicit software documentation see:

- Pigeon Point Shelf Manager User Guide
- Pigeon Point Shelf Manager External Interface Reference
- Schroff Shelf Manager User‘s Manual, Order-no. 63972-243

The documentation is available for registered users at www.schroff.biz

Shelf Manager with bused IPMB: 21990-401 (Product Number)

21990-404 (Catalog Number with packaging)

Shelf Manager with radial IPMB: 21990-402 (Product Number)

21990-405 (Catalog Number with packaging)

The Schroff Shelf Manager ACB-VI is a 78 mm x 280 mm board that fits into a dedicated Shelf Manager slot in a Schroff ATCA Shelf.

The Shelf Manager has two main responsibilities:

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

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

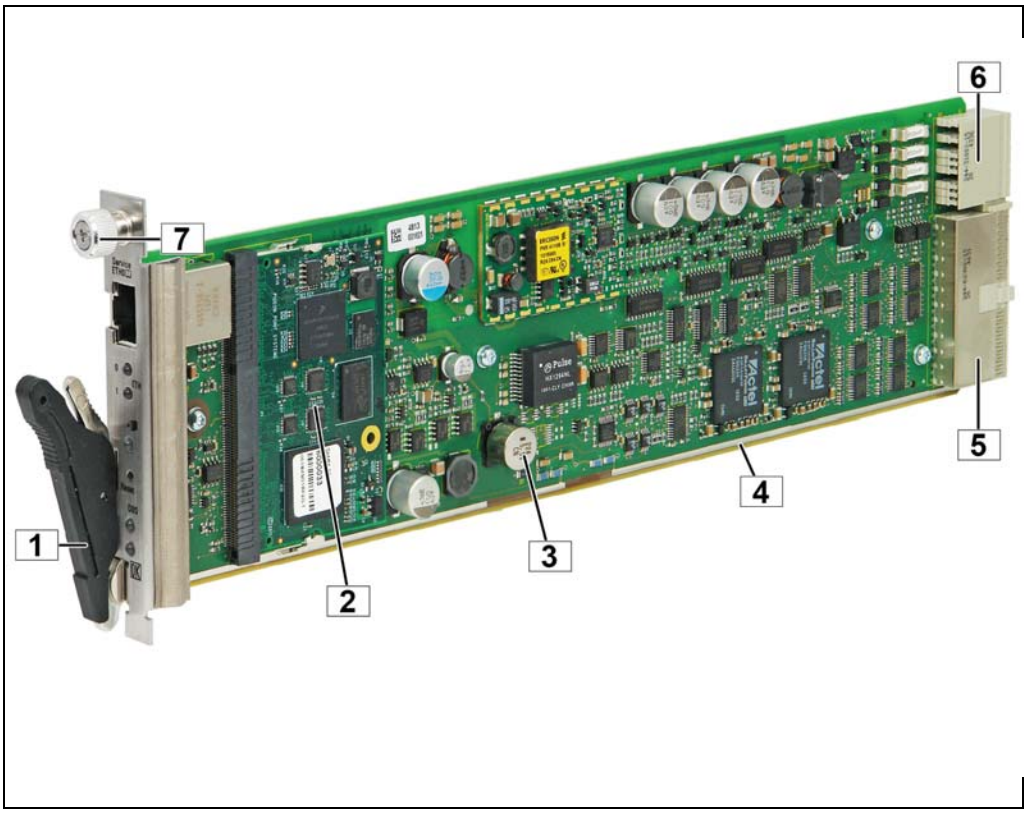
The Shelf management software runs on the Pigeon Point Shelf Management Mezzanine 700 (ShMM-700R), a compact 204-pin SO-DIMM form-factor module, installed on theACB-VI carrier board.

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

The ACB-VI also provides the Fan Controller for up to 9 Fans and individual Ethernet connections to both Base Hubs (ShMC cross connect).

The Shelf Manager communicates inside the Shelf with IPM controllers over the Intelligent Platform Management Bus (IPMB). The Shelf Manager also provides an IPMB interface for the non-intelligent FRUs in a Schroff Shelf. The Shelf Manager communicates with the non-intelligent FRUs over I²C busses and expose the sensors for these FRUs at IPMB address 0x20.

Figure 26: Schroff Shelf Manager



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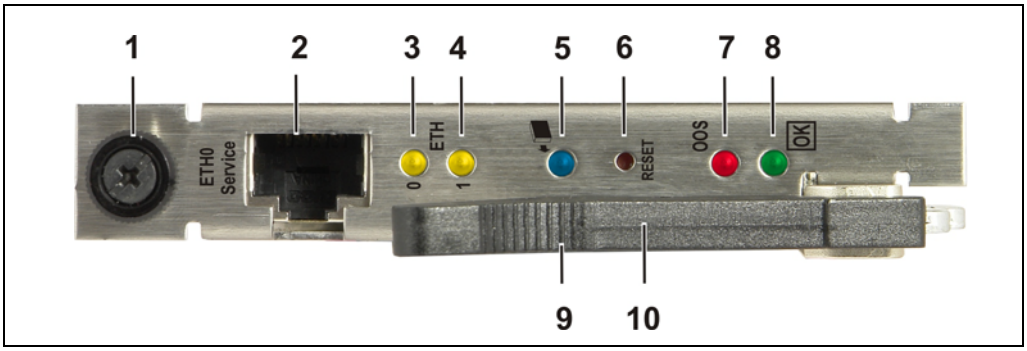
1	Extraction handle	5	Backplane Connector (X100)
2	ShMM-700R	6	Backplane Connector (X102)
3	RTC backup capacitor	7	Fixing screw
4	ACB-VI Carrier Board		

9.2 Front Panel Components

Figure 27: Shelf Manager Front Panel Components



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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

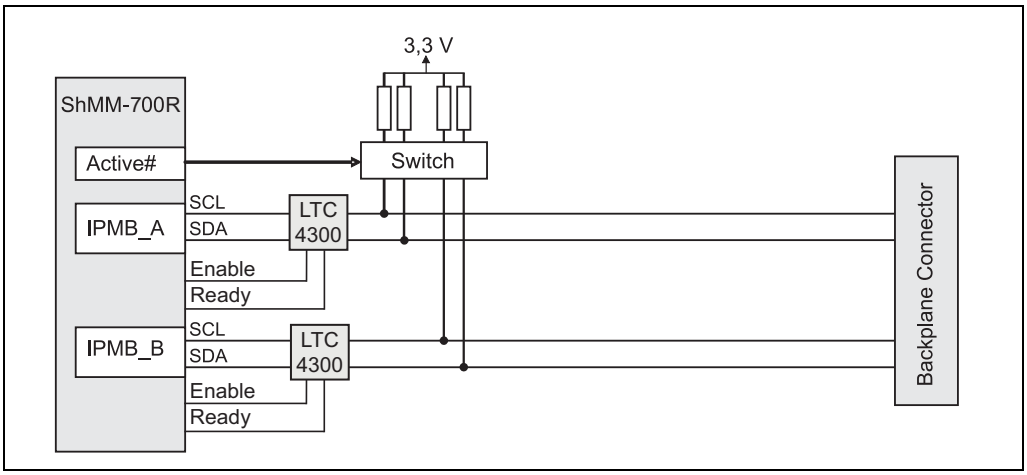
9.3 Bused IPMB Interface

Only Shelf Managers with Product Number: 21990-401-291

The ShMM-700R provides two IPMBs. The IPMB-A and IPMB-B from the ShMM-700R are routed to the Backplane connector through I2c buffers. The ATCA Backplane buses the two IPMBs to the ATCA boards.

The Active# signal of the ShMM-700R is used to switch on/off the pull-up resistors of the IPMBs.

Figure 28: Block diagram bused IPMB

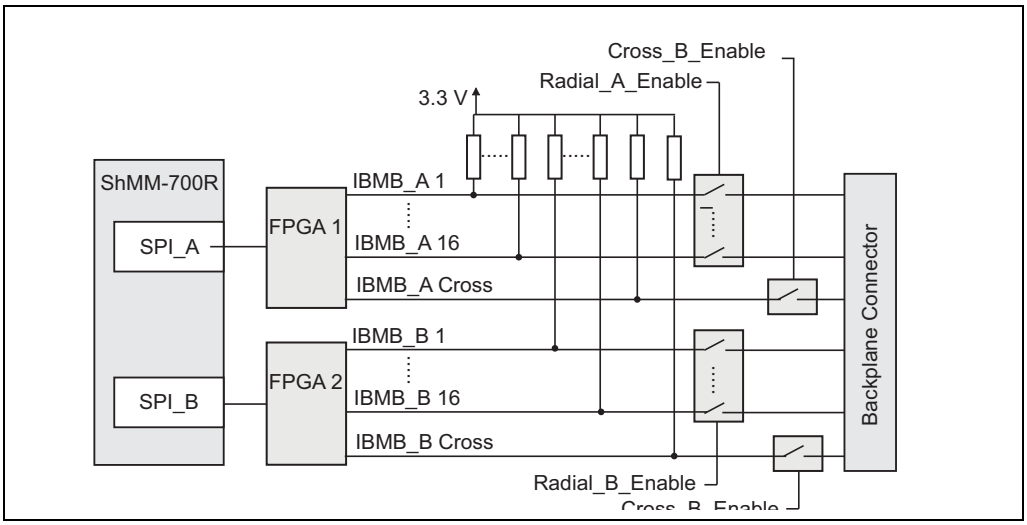


9.4 Radial IPMB Interface

Only Shelf Managers with Product Number: 21990-402

Radial IPMB is implemented by 2 FPGAs connected to the Serial Peripheral Interfaces (SPI) on the ShMM700R.

Figure 29: Block diagram radial IPMB



9.5 Ethernet Interfaces

The front panel ETH0 Ethernet connector is intended for service use only or for debugging purposes in laboratory environment. The computer which is connected to this interface must be located nearby the shelf manager with an Ethernet cable that is not longer than 10 m.

The front panel Ethernet connector MUST NOT be connected to a Telecommunication Network Circuit that leaves the building.

The ETH0 interface of the shelf manager can manually be switched between the front panel RJ45 connector (“Front”-position of the rocker-switches) and the backplane connector going to the hub board base interface (“Back”-position of the rocker-switches).

The ATCA specification requires a base channel interface between the shelf manager and the Hub board. The ETH0 rocker-switches MUST be in “Back”-position in normal operation of the shelf manager in an ATCA-shelf.

Figure 30: ETH Switches shown in default position

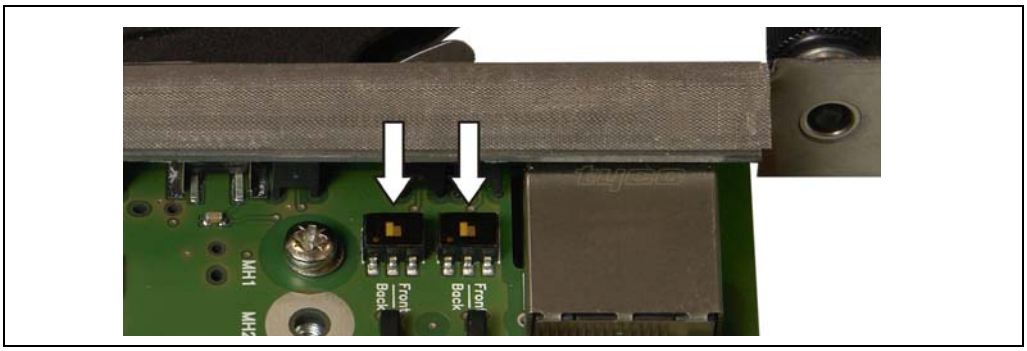


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Figure 31: Shelf Manager Cross Connect

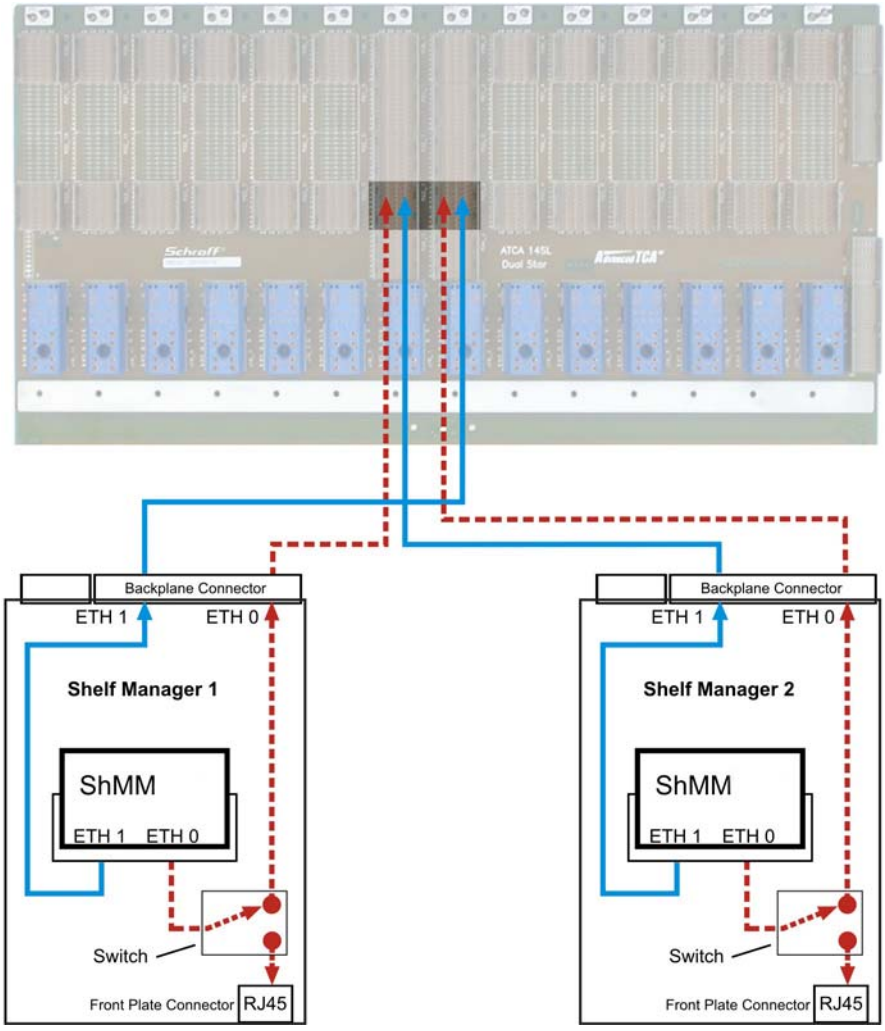

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Table 10: Connector (P23) pin assignment for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

9.6 Shelf Manager RS-232 Console Serial Interface

The Shelf Manager provides an RS-232 console interface that provides a full set of RS-232 signals, including modem control. These signals are routed through the Shelf Manager backplane connector to a RJ45 connector on the front panel of the lower Fan Tray.

The serial console default configuration is:

- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

9.7 Front Panel RESET push button

The Shelf Manager provides a RESET push button on the front panel. It is connected to the ShMM-700's MRST_IN# signal.

Pushing the RESET button will reset the Shelf Manager

9.8 Hot Swap Interface

The Shelf Manager provides a Hot Swap interface allowing the Shelf Manager to be replaced without powering down the Shelf. The interface is composed of three components:

- Hot Swap switch at injector/ejector handle
- Presence signal indicating that the Shelf Manager is fully seated in its backplane connector
- Hot Swap LED

9.8.1 Hot Swap LED

The Shelf Manager provides a a blue Hot Swap LED. The LED indicates when it is safe to "remove" the Shelf Manager from a powered Shelf.

Table 11: Hot Swap LED

LED State	Condition
Off	The Shelf Manager is not ready to be removed/disconnected from the Shelf
Solid Blue	The Shelf Manager is ready to be removed/disconnected from the Shelf
Long-blink	The Shelf Manager is activating itself
Short-blink	Deactivation has been requested

9.9 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 (HA[0], HA7) at the Backplane connector determine bit 0 and bit 7, bit 1...6 are hardware-coded on the Shelf Manager PCB.

	HW-Addr.	IPMB-Addr.	HA[0]	HA7
Shelf Manager 1	0x08	0x10	GND	GND
Shelf Manager 2	0x09	0x12	n.c.	n.c.

9.10 Redundancy Control

The Shelf Manager supports redundant operation with automatic switchover using redundant Shelf Managers. In a configuration where two Shelf Manager are present, one acts as the active Shelf Manager and the other as a standby. The Shelf Managers monitor each other and either can trigger a switchover if necessary.

9.10.1 Hardware Redundancy Interface

The two Shelf Manager communicate over the TCP/IP based Software Redundancy Interface (SRI) which is implemented via a pair of USB links between the ShMM-700Rs. The active instance posts incremental state updates to the backup via this interface. As a result, the backup can quickly step into the active role if necessary.

The Hardware Redundancy Interface (HRI) between the two Shelf Manager instances enables the exchange of hardware level ShMM-700R state information, including the following:

- Presence: each Shelf Manager instance knows whether the other instance is present in the shelf.
- Health: each instance knows whether the other instance considers itself „healthy“.
- Switchover: the backup instance can force a switchover if necessary.

The ACB-VI Hardware Redundancy Interface supports the upgrade from ACB-V to ACB-VI in an ATCA System without interruption. For details see the firmware release note.

9.11 Command Line Interface (CLI)

The Command Line Interface (CLI) connects to and communicates with the IPM-devices of the Shelf, the boards, and the Shelf Manager.
The CLI is an IPMI-based library of commands, service personnel or system administrators can access the CLI through Telnet, SSH, or the Shelf Managers serial port on the SAP.
With the CLI, users can access information about the current system status including sensor values, threshold settings etc.
Users can also access and modify Shelf- and Shelf Manager configurations, perform actions on a FRU a.e. set fan speeds etc.

The default user account is “root“ and there is no password.
The default IP address of the primary Shelf Manager is 192.168.0.2

To access all sensor data you have to connect to the active Shelf Manager!

9.11.1 Basic CLI Commands

Service personnel can read system information, FRU information and sensor datas with the following basic commands. For a full list of all CLI commands refer to the Pigeon Point Shelf Manager External Interface Reference Manual.

- **Change IP address of the primary Shelf Manager:**

```
clia setlanconfig channel ip value
```

Value represents the IP address in dotted decimal notation.

```
clia setlanconfig 1 ip 192.168.0.2
```

- **Display the Shelf Managers firmware version:**

```
clia version
```

Info: To get a complete list of all information just type in “`version`“.

- **List all IPM Controllers in a Shelf:**

```
clia ipmc
```

- **List all boards in the Shelf:**

```
clia board
```

- **List all sensors on a board:**

```
clia sensor IPMI-address
```

- **List only sensors which are outside of established thresholds:**

```
clia sensor -t
```

- **Get data (value) from a sensor on a board:**

```
clia sensordata IPMI-address sensor-number
```

- **Display the FRU information in a board:**

  ```
  clia fruinfo IPMI-address FRU-id
  ```

- **Change the speed for a Fan Tray:**

  ```
  clia setfanlevel IPMI-address Fru-id speed
  ```

Info: The value for the speed is from 0 to 15.

- **Display the contents of the System Event Log (SEL):**

  ```
  clia sel
  ```

- **Clear the System Event Log (SEL):**

  ```
  clia sel clear
  ```

9.12 Sensor Table

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
10	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 0.
10	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.
10	2	0	Local Temp	Temperature	0x01	Threshold	This sensor measures the local temperature.
10	3	0	3V3_local	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
10	4	0	I2C_PWR_A	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply A voltage supplied to I2C devices in volts.
10	5	0	I2C_PWR_B	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply B voltage supplied to I2C devices in volts.
10	7	0	5V0_local	Voltage	0x02	Threshold	This sensor measures the 5 V supply voltage for the ShMM700R on the local shelf manager in volts.
10	8	0	1V5_FPGAA	Voltage	0x02	Threshold	This sensor measures the 1.5 V voltage supplied to FPGAA in volts. (Only with radial IPMB)
10	9	0	1V5_FPGAB	Voltage	0x02	Threshold	This sensor measures the 1.5 V voltage supplied to FPGAB in volts. (Only with radial IPMB)
10	16	0	-48A Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A at the shelf manager backplane connector.
10	17	0	-48B Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B at the shelf manager backplane connector.
10	18	0	-48A ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A behind the shelf manager's main fuse.
10	19	0	-48B ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B behind the shelf manager's main fuse.
10	20	0	20V AUX	Entity Presence	0x25	Discrete	This sensor indicates the presence of 20 V aux voltage on shelf manager.
10	21	0	-48A ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_A input fuse on the shelf manager.
10	22	0	-48B ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_B input fuse on the shelf manager.
10	128	0	HWRI State	OEM reserved	0xde	Discrete	This sensor indicates the high-level redundancy state of the ShMM.
10	129	0	Reboot Reason	OEM reserved	0xdd	Discrete	This sensor indicates the reason for the last reboot.
12	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 0.
12	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.
12	2	0	Local Temp	Temperature	0x01	Threshold	This sensor measures the local temperature.
12	3	0	3V3_local	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
12	4	0	I2C_PWR_A	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply A voltage supplied to I2C devices in volts.

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
12	5	0	I2C_PWR_B	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply B voltage supplied to I2C devices in volts.
12	7	0	5V0_local	Voltage	0x02	Threshold	This sensor measures the 5 V supply voltage for the ShMM700R on the local shelf manager in volts.
12	8	0	1V5_FPGAA	Voltage	0x02	Threshold	This sensor measures the 1.5 V voltage supplied to FPGAA in volts. (Only with radial IPMB)
12	9	0	1V5_FPGAB	Voltage	0x02	Threshold	This sensor measures the 1.5 V voltage supplied to FPGAB in volts. (Only with radial IPMB)
12	16	0	-48A Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A at the shelf manager backplane connector.
12	17	0	-48B Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B at the shelf manager backplane connector.
12	18	0	-48A ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A behind the shelf manager's main fuse.
12	19	0	-48B ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B behind the shelf manager's main fuse.
12	20	0	20V AUX	Entity Presence	0x25	Discrete	This sensor indicates the presence of 20 V aux voltage on shelf manager.
12	21	0	-48A ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_A input fuse on the shelf manager.
12	22	0	-48B ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_B input fuse on the shelf manager.
12	128	0	HWRI State	OEM reserved	0xde	Discrete	This sensor indicates the high-level redundancy state of the ShMM.
12	129	0	Reboot Reason	OEM reserved	0xdd	Discrete	This sensor indicates the reason for the last reboot.
20	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 0.
20	0	3	HPI Sys Event	OEM reserved	0xdb	Discrete	The purpose is to enhance the interaction between the shelf manager and Pigeon Point HPI implementations: IntegralHPI and Pigeon Point OpenHPI. This sensor sends IPMI events in a special format to signal HPI implementations that changes have occurred within the shelf manager.
20	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state. (Only bussed IPM Bus)
20	2	0	FRU 1 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 1.
20	3	0	FRU 2 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 2.
20	4	0	FRU 3 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 3.
20	5	0	FRU 4 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 4.
20	6	0	IPMB LINK 1	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 1 state. (Only radial IPM Bus)
20	7	0	IPMB LINK 2	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 2 state. (Only radial IPM Bus)

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
20	8	0	IPMB LINK 3	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 3 state. (Only radial IPM Bus)
20	9	0	IPMB LINK 4	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 4 state. (Only radial IPM Bus)
20	10	0	IPMB LINK 5	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 5 state. (Only radial IPM Bus)
20	11	0	IPMB LINK 6	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 6 state. (Only radial IPM Bus)
20	12	0	IPMB LINK 7	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 7 state. (Only radial IPM Bus)
20	13	0	IPMB LINK 8	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 8 state. (Only radial IPM Bus)
20	14	0	IPMB LINK 9	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 9 state. (Only radial IPM Bus)
20	15	0	IPMB LINK 10	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 10 state. (Only radial IPM Bus)
20	16	0	IPMB LINK 11	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 11 state. (Only radial IPM Bus)
20	17	0	IPMB LINK 12	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 12 state. (Only radial IPM Bus)
20	18	0	IPMB LINK 13	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 13 state. (Only radial IPM Bus)
20	19	0	IPMB LINK 14	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 14 state. (Only radial IPM Bus)
20	20	0	IPMB LINK 15	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 15 state. (Only radial IPM Bus)
20	21	0	IPMB LINK 16	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 16 state. (Only radial IPM Bus)
20	22	0	IPMB LINK 17	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 17 state. (Only radial IPM Bus)
20	119	0	TelcoAlarmInput	TELCO Alarm Input	0xf4	Discrete	Telco alarm input sensor.
20	131	0	TELCO Alarms	OEM reserved	0xdf	Discrete	This sensor indicates the presence of critical, major and minor alarm.
20	132	0	BMC Watchdog	Watchdog 2	0x23	Discrete	BMC watchdog sensor.
20	133	0	SYSTEM EVENT	System Event	0x12	Discrete	System event sensor.
20	135	0	FT Oper.Status	Management Subsyst. Health	0x28	Discrete	This sensor monitors if all the fan trays are operational or if some fan trays is not operation.
20	136	0	Cooling State	Management Subsyst. Health	0x28	Discrete	This sensor monitors the cooling status.
20	137	0	Fans State	Management Subsyst. Health	0x28	Discrete	This sensor monitors the fan status.
20	138	0	SHM Redundancy	Management Subsyst. Health	0x28	Discrete	This sensor monitors the shelf manager redundancy status.
20	140	0	PEM A Temp	Temperature	0x01	Threshold	This sensor measures the PEM A temperature.
20	141	0	PEM B Temp	Temperature	0x01	Threshold	This sensor measures the PEM B temperature.
20	150	0	Air Filter	Entity Presence	0x25	Discrete	This sensor checks the presence of the air filter.
20	151	0	CDM 1 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of CDM 1.
20	152	0	CDM 2 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of CDM 2.
20	153	0	PEM A Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of PEM A
20	154	0	PEM B Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of PEM B.
20	155	0	Fan Tray 1 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of fan tray 1. (lower fan tray)

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
20	156	0	Fan Tray 2 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of fan tray 2. (upper fan tray)
20	160	0	PEM A Voltage	Voltage	0x02	Threshold	This sensor measures the output voltage of PEM A.
20	161	0	PEM A Current	Current	0x03	Threshold	This sensor measures the output current of PEM A. (Optional)
20	162	0	PEM A Power	Power Supply	0x08	Threshold	This sensor measures the input power of PEM A in the past hour. (Optional)
20	163	0	PEM A Branch 1	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 1 of PEM A.
20	164	0	PEM A Branch 2	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 2 of PEM A.
20	165	0	PEM A Branch 3	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 3 of PEM A.
20	166	0	PEM A Branch 4	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 4 of PEM A.
20	167	0	PEM A Branch 5	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 5 of PEM A.
20	168	0	PEM A Branch 6	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 6 of PEM A.
20	170	0	PEM B Voltage	Voltage	0x02	Threshold	This sensor measures the output voltage of PEM B.
20	171	0	PEM B Current	Current	0x03	Threshold	This sensor measures the output current of PEM B. (Optional)
20	172	0	PEM B Power	Power Supply	0x08	Threshold	This sensor measures the input power of PEM B in the past hour. (Optional)
20	173	0	PEM B Branch 1	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 1 of PEM B.
20	174	0	PEM B Branch 2	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 2 of PEM B.
20	175	0	PEM B Branch 3	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 3 of PEM B.
20	176	0	PEM B Branch 4	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 4 of PEM B.
20	177	0	PEM B Branch 5	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 5 of PEM B.
20	178	0	PEM B Branch 6	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 6 of PEM B.
20	180	0	Shelf Power	Power Supply	0x08	Threshold	This sensor measures the total input power of the shelf as a sum of both PEMs.
5a = Lower Fan Tray							
5a	0	0	HOT SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states.
5a	1	0	Version Change	reserved	0x2b	Discrete	This sensor indicates a hardware or software change.
5a	2	0	IPMB Physical	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
5a	3	0	Telco Alarm	TELCO Alarm Input	0xf4	Discrete	Telco alarm input sensor.
5a	4	0	+3.3V	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
5a	5	0	+3.6V External	Voltage	0x02	Threshold	This sensor measures the external 3.6 V voltage in volts.
5a	6	0	Temp Controller	Temperature	0x01	Threshold	This sensor measures the temperature of the IPM Controller.
5a	7	0	Temp_In Left	Temperature	0x01	Threshold	This sensor measures the left inlet temperature.
5a	8	0	Temp_In Center	Temperature	0x01	Threshold	This sensor measures the central inlet temperature.
5a	9	0	Temp_In Right	Temperature	0x01	Threshold	This sensor measures the right inlet temperature.
5a	10	0	Fan Tach. 1	Fan	0x04	Threshold	This sensor indicates the speed of the fan 1 (RPM).
5a	11	0	Fan Tach. 2	Fan	0x04	Threshold	This sensor indicates the speed of the fan 2 (RPM).
5a	12	0	Fan Tach. 3	Fan	0x04	Threshold	This sensor indicates the speed of the fan 3 (RPM).
5a	13	0	Fan Tach. 4	Fan	0x04	Threshold	This sensor indicates the speed of the fan 4 (RPM).
5a	14	0	Fan Tach. 5	Fan	0x04	Threshold	This sensor indicates the speed of the fan 5 (RPM).
5a	15	0	Fan Tach. 6	Fan	0x04	Threshold	This sensor indicates the speed of the fan 6 (RPM).
5a	16	0	Air Filter	OEM reserved	0xc0	Discrete	This sensor checks the presence of the air filter.
5a	17	0	-48V A Branch 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 1 at the lower fan tray connector.
5a	18	0	-48V A Fused 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 1 after fan tray's main fuse.
5a	19	0	-48V A Branch 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 2 at the lower fan tray connector.
5a	20	0	-48V A Fused 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 2 after fan tray's main fuse.
5a	21	0	-48V B Branch 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 1 at the lower fan tray connector.
5a	22	0	-48V B Fused 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 1 after fan tray's main fuse.
5a	23	0	-48V B Branch 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 2 at the lower fan tray connector.
5a	24	0	-48V B Fused 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 2 after fan tray's main fuse.
5c = Upper Fan Tray							
5c	0	0	HOT SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states.
5c	1	0	Version Change	reserved	0x2b	Discrete	This sensor indicates a hardware or software change.
5c	2	0	IPMB Physical	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.
5c	3	0	Telco Alarm	TELCO Alarm Input	0xf4	Discrete	Telco alarm input sensor.

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
5c	4	0	+3.3V	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
5c	5	0	+3.6V External	Voltage	0x02	Threshold	This sensor measures the external 3.6 V voltage in volts.
5c	6	0	Temp Controller	Temperature	0x01	Threshold	This sensor measures the temperature of the IPM Controller.
5c	7	0	Temp_In Left	Temperature	0x01	Threshold	This sensor measures the left inlet temperature.
5c	8	0	Temp_In Center	Temperature	0x01	Threshold	This sensor measures the central inlet temperature.
5c	9	0	Temp_In Right	Temperature	0x01	Threshold	This sensor measures the right inlet temperature.
5c	10	0	Fan Tach. 1	Fan	0x04	Threshold	This sensor indicates the speed of the fan 1 (RPM).
5c	11	0	Fan Tach. 2	Fan	0x04	Threshold	This sensor indicates the speed of the fan 2 (RPM).
5c	12	0	Fan Tach. 3	Fan	0x04	Threshold	This sensor indicates the speed of the fan 3 (RPM).
5c	13	0	Fan Tach. 4	Fan	0x04	Threshold	This sensor indicates the speed of the fan 4 (RPM).
5c	14	0	Fan Tach. 5	Fan	0x04	Threshold	This sensor indicates the speed of the fan 5 (RPM).
5c	15	0	Fan Tach. 6	Fan	0x04	Threshold	This sensor indicates the speed of the fan 6 (RPM).
5c	16	0	Air Filter	OEM reserved	0xc0	Discrete	This sensor checks the presence of the air filter.
5c	17	0	-48V A Branch 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 5 at the upper fan tray connector.
5c	18	0	-48V A Fused 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 5 after fan tray's main fuse.
5c	19	0	-48V A Branch 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 6 at the upper fan tray connector.
5c	20	0	-48V A Fused 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 6 after fan tray's main fuse.
5c	21	0	-48V B Branch 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 5 at the upper fan tray connector.
5c	22	0	-48V B Fused 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 5 after fan tray's main fuse.
5c	23	0	-48V B Branch 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 6 at the upper fan tray connector.
5c	24	0	-48V B Fused 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 6 after fan tray's main fuse.

9.13 Shelf Manager Front Panel and Backplane connectors

Table 12: Front Panel 10/100 Ethernet Service Connector

Pin #	Ethernet Signal
1	TX+
2	TX-
3	RX+
4, 5	n.c.
6	RX-
7, 8	n.c.

Figure 32: Backplane Connectors

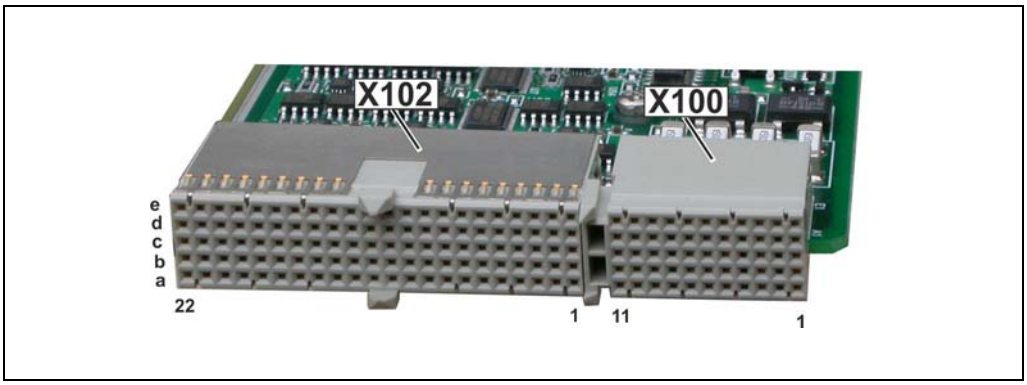


Table 13: Pin Staging (PS)

Pin#	length
A	**8.25 mm**
B	**9.75 mm**
C	**11.25 mm**

The Pin Staging (PS) is the length of the Pins of the connector at the Backplane not at the Shelf manager.

Table 14: Backplane Signal Connector (X100) pin assignment

	a	PS	b	PS	c	PS	d	PS	e	PS
1	-48 V_A	**B**	VRTN_A	**B**	NC	**B**	-48 V_B	**B**	VRTN_B	**B**
2	-		-		-		-		-	
3	SHELF_GND	**B**	SHELF_GND	**B**	SHELF_GND	**B**	SHELF_GND	**B**	SHELF_GND	**B**
4	-		-		-		-		-	
5	FAN_TACH0	**A**	FAN_TACH1	**A**	FAN_TACH2	**A**	FAN_TACH3	**A**	FAN_TACH4	**A**
6	FAN_TACH5	**A**	FAN_TACH6	**A**	FAN_TACH7	**A**	FAN_TACH8	**A**	PWM_C	**A**
7	FAN_SPEED	**A**	NC	**A**	FAN_24V	**A**	FAN_24V_RTN	**A**	PWM_E	**A**
8	-		-		-		-		-	
9	PEM_PRES_A	**A**	SAP_PRES	**A**	SWR_Input#	**A**	HLY_Input#	**A**	SWR_Output#	**A**
10	TX+	**A**	TX-	**A**	HS_EN	**A**	HLY_Output#	**A**	HA7	**A**
11	AIR_FILT_PR	**A**	PEM_PRES_B	**A**	RX+	**A**	RX-	**A**	PRES_1#	**A**

Table 15: Backplane Signal Connector (X102) pin assignment (Radial IPMB)

	a	PS	b	PS	c	PS	d	PS	e	PS	f	PS
1	FT0_PRES#	A	UART0_TXD	A	UART1_TXD	A	FT2_PRES#	A	INT#	A	GND	C
2	FT1_PRES#	A	UART0_DTR	A	Pres_GND	A	AUX_PRES#	A	UART0_DSR	A		C
3	UART0_CD	A	UART0_RTS	A	UART1_RXD	A	HA0	A	UART0_CTS	A	GND	C
4	UART0_RXD	A	I2C_SDA_CH1	A	ACTIVE	A	I2C_SDA_CH0	A	GND	A		C
5	I2C_SCL_CH1	A	I2C_SCL_CH0	A	UART0_RI	A	GND	A	I2C_SDA_CH3	A	GND	C
6	ETH0_TX+	A	ETH0_TX-	A	GND	B	USB1_DP	A	USB1_DM	A		C
7	ETH0_RX+	A	ETH0_RX-	A	GND	B	USB0_DP	A	USB0_DM	A	GND	C
8	I2C_SDA_CH4	A	I2C_SCL_CH4	A	I2C_SCL_CH3	A	I2C_SCL_CH2	A	I2C_PWR_B	A		C
9	IPMB_SCL_B15	A	IPMB_SDA_B15	A	IPMB_SCL_A15	A	IPMB_SDA_A15	A	I2C_SDA_CH2	A	GND	C
10	IPMB_SDA_B16	A	IPMB_SCL_B16	A	IPMB_SDA_A16	A	IPMB_SCL_A16	A	I2C_PWR_A	A		
11	IPMB_SDA_A3	A	IPMB_SDA_B3	A	IPMB_SCL_B3	A	IPMB_SDA_B8	A	IPMB_SCL_B8	A	GND	
12	IPMB_SCL_A3	A	IPMB_SDA_A5	A	IPMB_SCL_A5	A	IPMB_SDA_A8	A	IPMB_SCL_A8	A		
13	IPMB_SDA_A1	A	IPMB_SDA_B7	A	IPMB_SCL_A1	A	IPMB_SDA_A10	A	IPMB_SCL_A10	A	GND	
14	IPMB_SCL_B7	A	IPMB_SDA_A7	A	IPMB_SCL_A7	A	IPMB_SDA_A6	A	IPMB_SCL_A6	A		C
15	IPMB_SDA_A9	A	IPMB_SDA_B14	A	IPMB_SCL_B14	A	IPMB_SDA_B10	A	IPMB_SCL_B10	A	GND	C
16	IPMB_SCL_A9	A	IPMB_SDA_A4	A	IPMB_SCL_A4	A	IPMB_SDA_B6	A	IPMB_SCL_B6	A		C
17	CROSS_SDA_B	A	IPMB_SDA_B11	A	IPMB_SCL_B11	A	IPMB_SDA_B4	A	IPMB_SCL_B4	A	GND	C
18	CROSS_SCL_B	A	IPMB_SDA_A11	A	IPMB_SCL_A11	A	IPMB_SDA_A14	A	IPMB_SCL_A14	A		C
19	IPMB_SDA_A13	A	IPMB_SCL_A13	A	IPMB_SCL_B12	A	IPMB_SDA_B12	A	IPMB_SDA_B9	A	GND	C
20	IPMB_SDA_B1	A	IPMB_SCL_B1	A	CROSS_SCL_A	A	CROSS_SDA_A	A	IPMB_SCL_B9	A		C
21	IPMB_SDA_B13	A	IPMB_SDA_B5	A	IPMB_SCL_B5	A	IPMB_SDA_B2	A	IPMB_SCL_B2	A	GND	C
22	IPMB_SCL_B13	A	IPMB_SDA_A12	A	IPMB_SCL_A12	A	IPMB_SDA_A2	A	IPMB_SCL_A2	A		C

Table 16: Backplane Signal Connector (X102) pin assignment (Bused IPMB)

	a	PS	b	PS	c	PS	d	PS	e	PS	f	PS
1	FT0_PRES#	A	UART0_TXD	A	UART1_TXD	A	FT2_PRES#	A	INT#	A	GND	C
2	FT1_PRES#	A	UART0_DTR	A	Pres_GND	A	AUX_PRES#	A	UART0_DSR	A		C
3	UART0_CD	A	UART0_RTS	A	UART1_RXD	A	HA0	A	UART0_CTS	A	GND	C
4	UART0_RXD	A	I2C_SDA_CH1	A	ACTIVE	A	I2C_SDA_CH0	A	GND	A		C
5	I2C_SCL_CH1	A	I2C_SCL_CH0	A	UART0_RI	A	GND	A	I2C_SDA_CH3	A	GND	C
6	ETH0_TX+	A	ETH0_TX-	A	GND	B	USB1_DP	A	USB1_DM	A		C
7	ETH0_RX+	A	ETH0_RX-	A	GND	B	USB0_DP	A	USB0_DM	A	GND	C
8	I2C_SDA_CH4	A	I2C_SCL_CH4	A	I2C_SCL_CH3	A	I2C_SCL_CH2	A	I2C_PWR_B	A		C
9		A		A		A		A	I2C_SDA_CH2	A	GND	C
10		A		A		A		A	I2C_PWR_A	A		
11		A		A		A		A		A	GND	
12		A		A		A		A		A		
13		A		A		A		A		A	GND	
14		A		A		A		A		A		C
15		A	IPMB_SDA_B	A	IPMB_SCL_B	A		A		A	GND	C
16		A		A		A		A		A		C
17	CROSS_SDA_B	A		A		A		A		A	GND	C
18	CROSS_SCL_B	A		A		A	IPMB_SDA_A	A	IPMB_SCL_A	A		C
19		A		A		A	I	A		A	GND	C
20		A		A	CROSS_SCL_A	A	CROSS_SDA_A	A		A		C
21		A		A		A		A		A	GND	C
22		A		A		A		A		A		C

Table 17: Backplane connector (J1) and (J2) pin description

-48V_A	-48 VDC supply A
-48V_B	-48 VDC supply B
AIR_FILT_PR	Air filter presence (grounded by air filter presence switch to detect a missing air filter)
CROSS_SCL_A	Serial Clock of IPMB-A, cross-connected on Backplane to serial clock of IPMB-B of other Shelf Manager
CROSS_SCL_B	Serial Clock of IPMB-B, cross-connected on Backplane to serial clock of IPMB-A of other Shelf Manager
CROSS_SDA_A	Serial Data of IPMB-A, cross-connected on Backplane to serial data of IPMB-B of other Shelf Manager
CROSS_SDA_B	Serial Data of IPMB-B, cross-connected on Backplane to serial data of IPMB-A of other Shelf Manager
ETH0_RX(+-)	Ethernet interface (ETH0)
ETH0_TX(+-)	Ethernet interface (ETH0)
ETH1_RX(+-)	Ethernet interface (ETH1)
ETH1_TX(+-)	Ethernet interface (ETH1)
FAN_24V	Auxiliary 24 VDC (max. 100 mA) generated on Fan Trays (Voltage supply for opto-couplers on Shelf Manager)
FAN_24V_RTN	Return path (Ground reference) for the auxiliary 24 VDC, generated on Fan Trays, used also as reference ground for the fan control voltage
FAN_PRES[0...2]	Fan Tray present (grounded on Fan Tray when present)
FAN_SPEED	DC for Fan Speed Control (0 V to 10 V, 10 mA)
FAN_TACH[0...8]	Tachometer signals from Fan Trays
GND	logic ground
HA[0]	Hardware address of Shelf Manager - grounded: Shelf Manager IPMI address is 0x10 - open: Shelf Manager IPMI address is 0x12
HA7	Hardware address of Shelf Manager - grounded: Shelf Manager IPMI address is 0x10 - open: Shelf Manager IPMI address is 0x12
HLY_Input#	Health input Shelf Manager (proprietary signal cross-connected on Backplane to HLY_Output of other Shelf Manager)
HLY_Output#	Health output Shelf Manager (proprietary signal cross-connected on Back-plane to HLY_Input of other Shelf Manager)
HS_EN	Tells the Shelf Manager that it is plugged in (Grounded on Backplane)
I2C_PWR_A	3.6 V (max. 500 mA) generated on Shelf Manager, redundant path A for Shelf I^2C-devices on Fan Trays, PEMs and SAP
I2C_PWR_B	3.6 V (max. 500 mA) generated on Shelf Manager, redundant path B for Shelf I^2C-devices on Fan Trays, PEMs and SAP
INT#	External Interrupt request (Master Only I^2C-bus)
INV_ACTIVE	This ShMM is in active mode (inverted signal of ShMM)
I2C_SCL_CH0	Master Only-I^2C-bus Channel 0 to SAP
I2C_SCL_CH1	Master-Only I^2C-bus Channel 1
I2C_SCL_CH2	Master-Only I^2C-bus Channel 2
I2C_SCL_CH3	Master-Only I^2C-bus Channel 3

I2C_SCL_CH4	Master-Only I^2C-bus Channel 4
I2C_SDA_CH0	Master Only-I^2C-bus Channel 0 to SAP
I2C_SDA_CH1	Master-Only I^2C-bus Channel 1
I2C_SDA_CH2	Master-Only I^2C-bus Channel 2
I2C_SDA_CH3	Master-Only I^2C-bus Channel 3
I2C_SDA_CH4	Master-Only I^2C-bus Channel 4
IPMB_SCL_A_[1...16]	Serial Clock, IPMB-A
IPMB_SCL_B_[1...16]	Serial Clock, IPMB-B
IPMB_SDA_A_[1...16]	Serial Data, IPMB-A
IPMB_SDA_B_[1...16]	Serial Data, IPMB-B
NC	not connected
PEM_PRES_[A, B]	PEM [A, B] presence signal (grounded on PEM when present)
PRES_1#	ACB-VI: Only used for transition from ACB-V to ACB-VI in a live chassis Formerly used on the ACB-V: Shelf Manager board presence signal (proprietary signal cross-connected on Backplane to PRES_GND of other Shelf Manager)
PRES_GND#	ACB-VI: Only used for transition from ACB-V to ACB-VI in a live chassis Formerly used on the ACB-V: Shelf Manager presence ground (proprietary signal cross-connected on Backplane to PRES_1# of other Shelf Manager)
PWM_C	Opto isolated PWM signal for fan speed control, collector U_{CE0} = max. 70 V, I_{max} = 2 mA
PWM_E	Opto isolated PWM signal for fan speed control, emitter, connected to FAN_24V_RTN on Backplane
SAP_PRES	Presence signal of SAP (Grounded on SAP when present)
SHELF_GND	Shelf Ground
SWR_Input#	Switchover signal from the other Shelf Manager (proprietary signal cross-connected on Backplane to SWR_Output of other Shelf Manager)
SWR_Output#	Switchover signal to the other Shelf Manager (proprietary signal cross-connected on Backplane to SWR_Input of other Shelf Manager)
UART0_CD	Serial Interface 1 Carrier Detect
UART0_CTS	Serial Interface 1 Clear To Send
UART0_DSR	Serial Interface 1 Data Set Ready
UART0_DTR	Serial Interface 1 Data Terminal Ready
UART0_RI	Serial Interface 1 Ring Indication
UART0_RTS	Serial Interface 1 Request To Send
UART0_RXD	Serial Interface 1 Receive Data
UART0_TXD	Serial interface 1 Transmit Data
UART1_RXD	Serial Interface 2 Receive Data (not used in Schroff Shelves)
UART1_TXD	Serial interface 2 Transmit Data (not used in Schroff Shelves)
USB0_DP/DM	USB interface, cross-connected on Backplane toother Shelf Manager
USB1_DP/DM	USB interface, cross-connected on Backplane toother Shelf Manager
VRTN_A	Voltage return supply A
VRTN_B	Voltage return supply B

10 Technical Data

Table 18: Technical Data

Physical Dimensions	
See drawing	
Weight	
Shelf weight completely assembled	35 kg
Power	
Input voltage	-40 VDC …. -72 VDC
Input Power	210 A per power feed (Each power feed is divided internally at the PEM in 6 output branches with 35 A each)
Overcurrent Protection	50 A fuses on PEM
Environmental	
Ambient temperature (long term)	+5°C…+40°C (41°F to 104°F)
Ambient temperature (short term)	-5°C…+55°C (23°F to 131°F)
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 25 A, resistance <100 mOhm
Hipot Test	EN60950-1, 1000 VDC

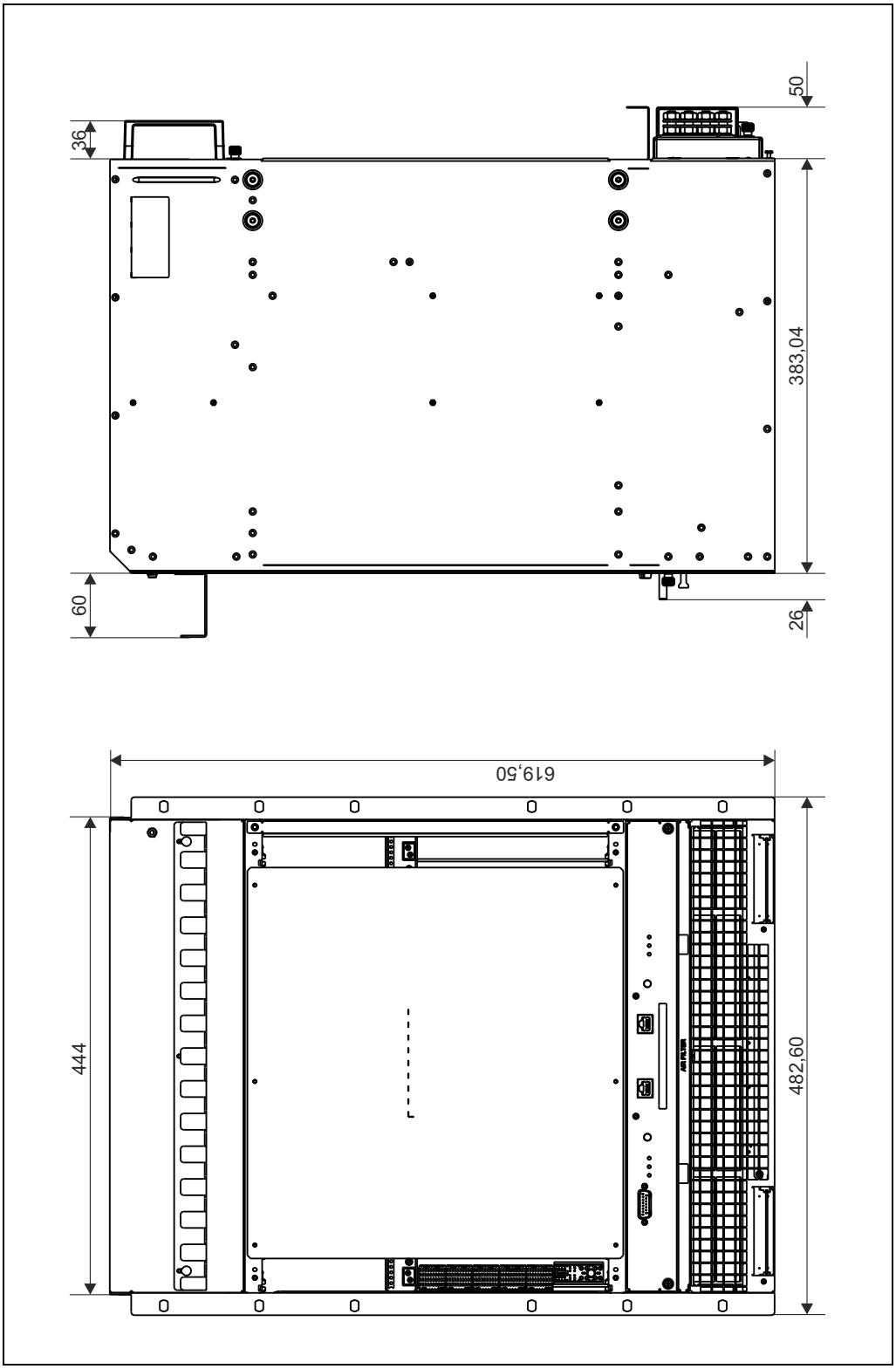
10.1 Part Numbers

Table 19: Part Numbers

Number	Part
11990-100	14-Slot ATCA Shelf, Dual Star Backplane, bused IPMB
11990-101	14-Slot ATCA Shelf, Dual Star Backplane, radial IPMB
11990-102	14-Slot ATCA Shelf, 40G Dual/Dual Star Backplane, bused IPMB
11990-103	14-Slot ATCA Shelf, 40G Dual/Dual Star Backplane, radial IPMB
11990-140	14-Slot ATCA Shelf, 100G Dual/Dual Star Backplane, bused IPMB
11990-141	14-Slot ATCA Shelf, 100G Dual/Dual Star Backplane, radial IPMB
21990-404	Shelf Manager ShMM-ACB-VI with bused IPMB
21990-405	Shelf Manager ShMM-ACB-VI with radial IPMB
21990-413	Adapter Shelf Ground Terminal
21990-227	Replacement upper Fan Tray
21990-228	Replacement lower Fan Tray
21990-224	Replacement PEM(without cover)
21990-418	Cover PEM A
21990-419	Cover PEM B
21990-225	Fuse 50 A/80 V for PEM (10 pcs)
21990-229	Air Filter Element
21596-012	Filler Panel (stainless steel) for empty Shelf Manager slot
21591-079	Filler Panel (stainless steel) with airflow buffle for empty front slots
21596-008	Filler Panel (Aluminium profile) with airflow buffle for empty front slots
21591-107	Filler Panel (stainless steel) with airflow buffle for empty RTM slots
21591-099	Filler Panel (Aluminium profile) with airflow buffle for empty RTM slots
21990-226	Chassis Data Module (CDM)

10.2 Shelf Mechanical Dimensions

Figure 33: Shelf dimensions



All dimensions are in millimeters (mm).

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