Genesis700
7-Slot ATCA AC/DC Shelf
User Manual

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Legal Notice and Warranty

Proprietary Notice

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Preface

Always keep this manual close to relevant maintenance workstations and reference it prior to and during maintenance activities including any required testing.

Applicable Documents

For Asis product information and additional resources, please visit the Asis website at www.asis-pro.com.

Downloads (manuals, release notes, software, etc.) are available via the Technical Support Library product links at www.asis-pro.com (for registered customers).

Information about PICMG (PCI Industrial Computer Manufacturers Group) and the ATCA standard may be accessed on the PICMG Web site at www.picmg.com.

Revision History

Revision	Date	Comments	Author
1.0	March 2015	Initial release	Boaz Bar-Ilan
1.1	July 2015	Update	Boaz Bar-Ilan
1.2	October 2015	DC PEM	Boaz Bar-Ilan
1.3	November 2015	Safety cert, 4-fan option	Boaz Bar-Ilan
1.4	December 2015	60VDC option	Boaz Bar-Ilan
1.5	April 2016	60VDC Fan Driver config	Boaz Bar-Ilan
1.6	Oct 2016	DC PEM wiring	Boaz Bar-Ilan
1.7	Sep 2017	FRU ID table: add RJ45	Boaz Bar-Ilan
1.8	Oct 2017	Restore previous version, PS J1 & drawer, 2500W PSU elimination	Boaz Bar-Ilan

Terms and Acronyms

Acronym	Meaning
ANSI	American National Standards Institute
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
CE	"Conformité Européenne" ("European Conformity")
Chassis	Enclosure containing subrack, backplane, boards, cooling devices, PEMs. Same as Shelf
CFM	Cubic Feet per Minute – airflow measurement unit
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
FRU	Field Replaceable Unit
HS	Hot swap
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
NEBS	Network Equipment Building Systems
NRTL	Nationally Recognized Testing Laboratories
PEM	Power Entry Module
RTM	Rear Transmission Module
ShMC	Shelf Management Controller, synonymous with Shelf Manager
Shelf	See Chassis
UL	Underwriters Laboratories- safety standards

Before You Begin

Before you begin using this product, or any installation or service operation, please read the following safety information:

Attention to these warnings helps prevent personal injuries and damage to the products.

It is your responsibility to use the product in an appropriate manner.

This product must not be used in any way that may cause personal injury or property damage.

You are responsible if the product is used for any intention other than its designated purpose or in disregard of Asis Ltd. instructions. Asis Ltd. shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits.

Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product.

Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

Tags and Their Meaning

The following indicators are used in the product documentation in order to warn the reader about risks and dangers:

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

Indicates the possibility of incorrect operation, which can result in damage to the product.

Indicates a hazardous situation involving electricity, which, if not avoided, can result in death or serious injury.

Indicates a hazardous situation involving Electrostatic Discharge (ESD), which, if not avoided, can result in damage to the product.

Indicates that components or equipment is heavy and care should be taken to avoid lifting incorrectly. More than one technician is required to lift and carry this equipment. Incorrect lifting can be dangerous to the personnel lifting and may result in dropping and damaging the components or equipment.

Indicates a hazardous situation involving touching a moving fan, which, if not avoided, can result in serious injury.

Indicates that information related to grounding is provided.

Indicates that information related to safety or system proper information is provided.

Table of Contents

1   Safety Overview

1.1 Safety Conditions of Acceptability

- This equipment is considered Class I product.
- This equipment has been evaluated for use in a Pollution Degree 2 environment.
- This equipment has been evaluated for use in a 50°C (122°F) ambient temperature
- Mains supply cord set used to connect the equipment to AC supply mains must be of an approved type acceptable by the authorities in the country where the equipment is deployed.
- The system was tested with a AC branch circuit breaker of 20Amp.
- Boards/blades installed in the shelf card cage are to be of a separately approved type, provided with basic insulation. Front and rear blade slots must be occupied by Filler panels.
- See the AC Power and DC Power paragraphs for the maximum load of the blades.

1.2 General Safety Practices

Keep personnel away from live circuits! Only trained personnel may open or remove components, remove equipment covers for internal subassembly, replace components, or any internal adjustment.

Only qualified, trained, and authorized electronics service personnel may access the interior of the equipment.

In the event of an equipment malfunction, all repairs must be performed either by an Asis technician or by an authorized agent. It is the customer responsibility to report the need for service to Asis or to one of its authorized agents. For service information, contact Asis customer support.

Never turn on any equipment when there is evidence of fire, exposure to water, or structural damage.

Before handling the product, read the instructions and safety guidelines on the following pages to prevent damage to the product and to ensure your own personal safety.

Use extreme caution when installing or removing components. Refer to the installation instructions in this document for precautions and procedures. If you have any questions, please contact ASIS Technical Support.

Always follow the procedural instructions for the removal and replacement of components in sequence.

Remove all metal jewelry before servicing the system. Metal jewelry may inadvertently be caught on a component and cause an electrical short, which may result in shelf outage and possible physical injury.

Never push objects of any kind through openings in the equipment as they may touch dangerous voltage points or short components, resulting in fire or electric shock.

Beware Electrical shock hazard!

The power supplies produce high voltage and energy hazards, which can cause death or serious injury. In any case, do not open the power supply case. **Under certain conditions, dangerous voltages may exist even with the power cords are disconnected.**

Before any attempt to service the device, be sure that the device is electrically isolated. System control, equipment and electronic controllers are connected to hazardous line voltages. When servicing the system, extreme care should be taken to protect against shock.

High voltages are present inside the shelf when the unit's power is plugged into an electrical outlet. Turn off system power source, turn off the power supplies and then disconnect the power cord from its source before removing the shelf cover.

Turning off the circuit breakers do not remove power to components.

Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this shelf during an electrical storm.

Caution

This PS drawer has more than one power supply cord.

Disconnect power supply cords before servicing to avoid electric shock.

Many components described in this document can be damaged by Electrostatic Discharge (ESD). Follow the precautions described here and before specific procedures detailed in the document to protect static-sensitive components from ESD-related damage.

Static electricity can harm system components. Perform service at an ESD workstation and follow proper ESD procedure to reduce the risk of damage to components. Asis strongly encourages you to follow proper ESD procedure, which can include wrist straps, when servicing equipment.

Take the following steps to prevent damage from Electrostatic Discharge (ESD):

When unpacking a static-sensitive component from its shipping carton, do not remove the component's antistatic packing material until you are ready to install the component in the system. Just before unwrapping the antistatic packaging, be sure you are at an ESD workstation or grounded. This discharges any static electricity that may have built up in your body.

When transporting a sensitive component, first place it in an antistatic container or packaging. Handle all sensitive components at an ESD workstation. If possible, use antistatic floor pads and workbench pads.

Handle components and boards with care. Do not touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.

Do not handle or store system boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.

2 About the Shelf

The 7-Slot ATCA AC/DC shelf hosts up to seven application blades and RTMs in an 5U (DC configuration) or 6U (AC configuration) height chassis. The shelf is 19" rack mounted and complies with the Advanced Telecommunications Computing Architecture – PICMG3.0 standard. It is designed to meet NEBS and ETSI standards and is UL and CE certified. The shelf is intended for high availability and high reliability applications, such as telecom and internet communications. It incorporates Field Replaceable Units (FRUs), thus enabling easy and fast field maintenance with minimum or no downtime. Its backplane has dual- mesh fabric connectivity optimized for performance at 40Gbps per channel. The shelf cooling is push side-to-side with 2 fan trays and 2 cooling capacities.

The shelf is evaluated as Information Technology Equipment (ITE) and may be installed in central offices, telecommunication centers, offices, computer rooms, and similar commercial type locations. It incorporates the latest technologies available to reduce its price while maintaining performance and reliability. The shelf offers redundancy for power input and management functions and is designed to withstand extreme conditions and to meet rigid Telco requirements. An Asis cable-holder frame allows for neat placement of cables attached to the shelf and any of the components it contains.

The shelf is available in AC configuration, 100-240VAC, and DC configurations: -48VDC or -48/-60 VDC. It contains redundant hot swappable IPMI v1.5 Shelf Manager boards based on Pigeon Point ShMM Sentry 700.

2.1 Shelf Components

The key components of the shelf are shown in the diagrams of this section.

2.2 Shelf's Block Diagram
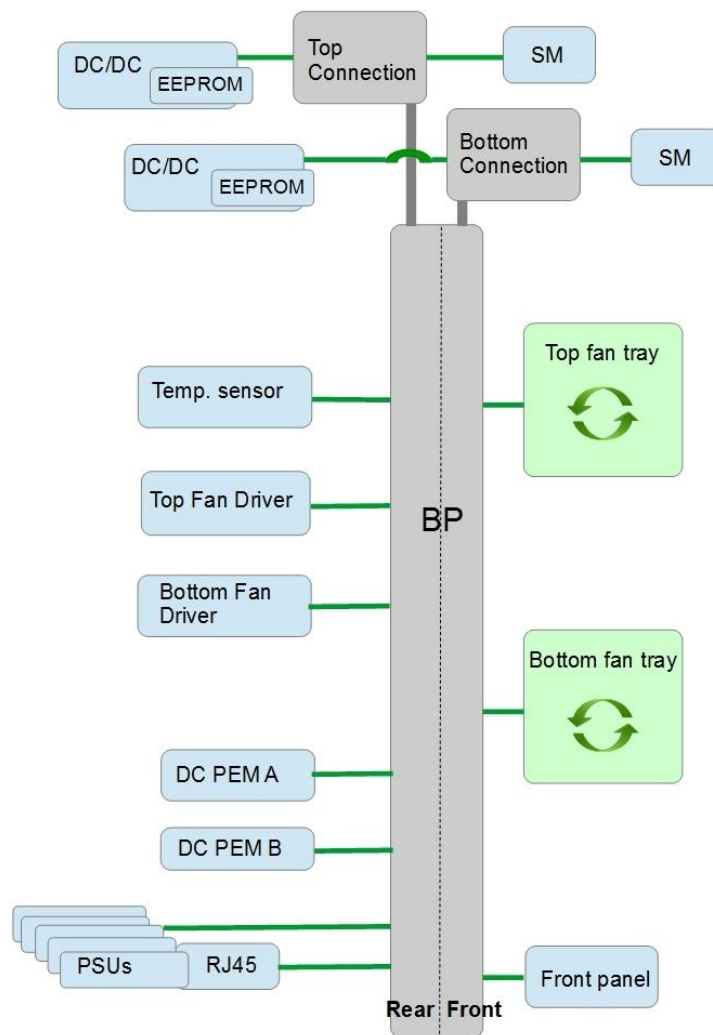
Figure 1: Shelf Block Diagram

Any system contains either DC PEMs or PSUs, but not both DC and AC components.

2.2.1   Shelf Front View
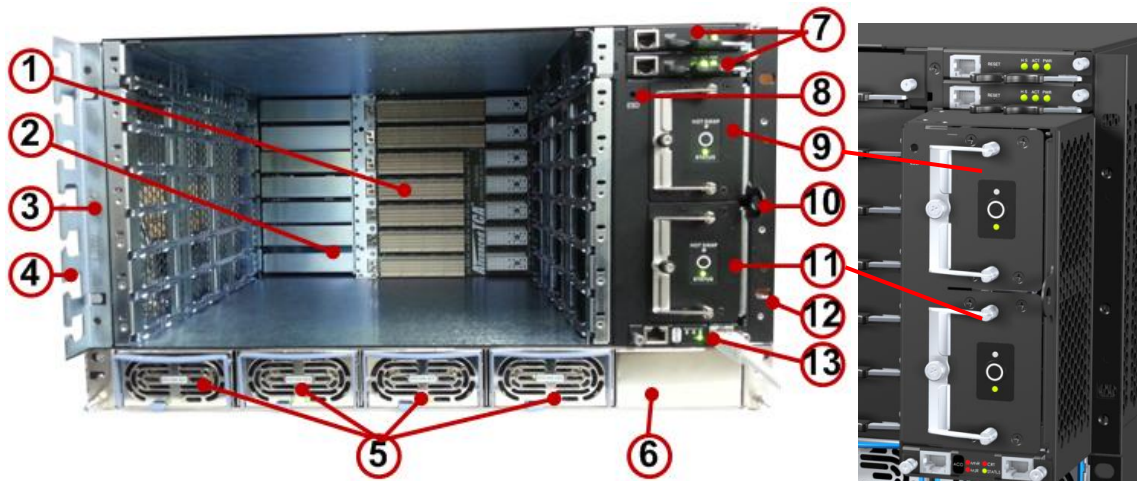
Figure 2: Shelf Front Components

Table 1: Shelf Front Components

#	Component	Description
1	Backplane	Supports up to seven ATCA-compliant application blades
2	Card cage	Portion of the shelf that holds the blades
3/12	Mounting Flange	Right and Left mounting flanges
4	Cable Manager	Holds the cables in an efficient manner
5	AC power supplies	1U drawer with up to five 1600W AC power supplies (AC configuration only)
6	Blank cover	Covers an AC power supply slot
7	Shelf managers	Two shelf managers, controlling and managing the shelf
8	ESD terminal	ESD wrist strap terminal
9/11	Fan trays	Top and bottom fan trays provide cooling to the shelf (right photo – 4-fan configuration)
10	Air filter	Air filter to the right of the fan trays, to keep the airflow free of dust and particles
13	Front panel	Front panel with buttons, LEDs and communication connectors

2.2.2   Shelf Rear View – AC Configuration

Figure 3: Shelf Rear Components – AC Configuration

Table 2: Shelf Rear Components – AC Configuration

#	Component	Description
1	ESD terminal	ESD wrist strap terminal
2	DC2DC boards	Behind a rear panel
3	Grounding stud	Allows shelf grounding to the rack
4	Fan Drivers	Behind two panels
5	RJ45 board & cable	Shelf manager I^2C communication with the PSUs
6	Backplane	Supports up to 7 ATCA-compliant rear transition modules (RTM)
7	Card cage	Portion of the shelf that holds the RTM boards
8	AC PS drawer	Rear side of the AC PS drawer with 4 or 5 power inlets

2.2.3   Shelf Rear View – DC Configuration

The two field replaceable DC Power Entry Modules (PEMs) (1) are shown below.

Figure 4: DC PEMs (all other components - see AC config)

Table 3: Shelf Rear Components – DC Configuration

#	Component	Description
1	DC PEM	two field replaceable DC Power Entry Modules

2.3 Shelf Environmental Requirements

The typical operation temperature and humidity range for the Asis shelf are detailed in the table below.

Table 4: Temperature and Humidity

Temperature	
▪ **Operating**	5°C to 40°C (41°F to 104°F)
▪ **Short-term**	AC: -5^{0}C to 50^{0}C (23^{0}F to 122^{0}F); DC: -5^{0}C to 55^{0}C (23^{0}F to 131^{0}F)
▪ **Short-term with fan failure**	-5°C to 40°C (23°F to 104°F)
▪ **Temperature change rate**	30°C/hr (54°F/hr)
Relative Humidity	
▪ **Operating**	5%-85%
▪ **Short-term**	5% to 90%, but not to exceed 0.024kg water/kg of dry air

Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in one year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that one-year period).

The normal environment of a computer room has an ambient temperature of 20 to 25 °C (68 to 77 °F) and relative humidity of 30-50% during normal operation. Lower temperatures result in better performance and longer MTBF of the equipment.

The operating temperatures apply to the temperature of the air along the right side of the shelf, which draws in ambient air for cooling from the right and discharge heated exhaust air to the left. The power supply units draw in ambient air from the front and discharge heated exhaust air to the rear. There must be sufficient clearance between the Asis shelf and any other systems that may exhaust warm air to allow sufficient cooling.

Proper room cooling is vital for the safe and correct operation of the shelf.

The site cooling system must have adequate capacity for cooling the room. The airflow in the room must be so designed to prevent recirculation of hot air.

Improper room cooling design can result in "environment overload" air temperature gradients causing reduced reliability, component failure, and data loss or system shutdown.

2.4 Card Cage

The shelf's card cage consists of:

- The backplane
- Left and right guide rails to hold the front and rear boards that plug into the backplane.
- Temperature sensor
- The card cage supports up to seven 8U front boards (blades), and seven 8U rear transition module (RTM) boards

2.4.1   Backplane

The AdvancedTCA™ compliant backplane interfaces with up to seven 8U ATCA-compliant front boards and the complementary rear RTMs and provides interconnectivity between all of the shelf's components.

There are no active components on the backplane and no removable or serviceable parts.

Additional backplane features include:

- The two upper slots serve as the hub slots
- Fabric interface with dual-mesh interconnect
- Base interface with dual-star interconnect
- Dual redundant bussed IPMI support

Table 5: Backplane Slot Mapping

	Hub	Hub	Node	Node	Node	Node	Node
Physical slot (top to bottom)	1	2	3	4	5	6	7
Logical slot	1	2	3	4	5	6	7
HW Address (Hex)	0x41	0x42	0x43	0x44	0x45	0x46	0x47
IPMB address (Hex)	0x82	0x84	0x86	0x88	0x8a	0x8c	0x8e
Update channel	●━━●		●━━●		●━━●		
Power segment	1	1	1	1	2	2	2

2.5 Shelf Manager

The shelf includes two front-accessible, redundant, hot-swappable IPMI Shelf Managers based on Pigeon Point ShMM Sentry 700.

The shelf manager board controls and manages the shelf: It controls the fans speed, monitors temperatures across the shelf, manages the hot swap insertion and extraction of modules and boards, as well as various additional tasks.The Shelf Manager contains a Real-Time Clock (RTC) for keeping the date and time. A Supercap is used as a chargeable backup power source for the RTC, and it keeps the RTC data alive for at least 24 hours.
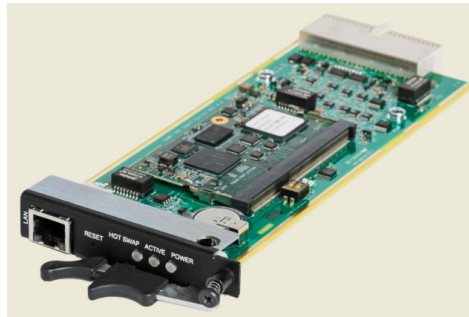
Figure 5: Shelf Manager Board

2.5.1   Shelf Manager Panel

The diagram and table below detail the connection ports and LED indicators of the shelf manager panel.
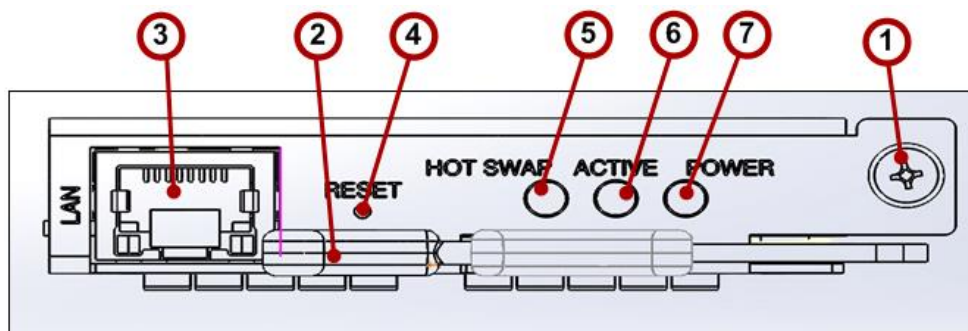
Figure 6: Shelf Manager Board – Front Panel

Table 6: Shelf Manager Board – Front Panel

#	Component	Description	
1	Locking captive screw	Used for securing the shelf manager board inside the shelf	
2	Extraction latch	Used for extraction & insertion of the board from the shelf	
3	LAN port	Ethernet communication, RJ-45 connector. The following is indicated by the Ethernet connector LED's: Green – Line activity Yellow – 100Mbs	
4	Reset button	Resets the shelf manager	
5	Hot swap LED	Steady Blue	Shelf manager is powering up or ready for extraction
		Blinking Blue	Shelf manager hot swap process
		OFF	Shelf manager is operating
6	Active LED	Green	Shelf manager is in Active mode
		Red	Shelf manager boots up
		Blinking Green	Shelf manager is in Standby mode
7	Power LED	Green	voltage supply to Shelf manager is good
		OFF	voltage failure

2.5.2   Ethernet Connection

The Shelf manager contains on-board Dip switches (jumpers) marked SW1, which determines where the Ethernet connection resides.
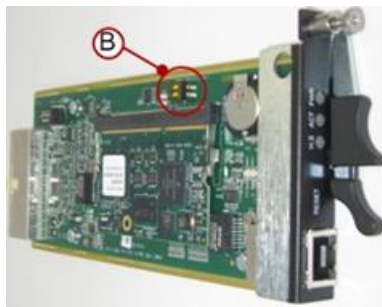
Figure 7: Dip Switch Location

Table 7: Dip Switch Options

#	On	Off
Dip switch1	Ethernet (Eth0) connected to rear (backplane)	Ethernet (Eth0) connected to shelf manager front panel
Dip switch 2	NA	NA

2.5.3   Ethernet Connector

The Ethernet connector is a standard RJ45-8 jack with the following pin-out definition:

Pin	Signal Name	Description
1	Tx+ D1	Transmit Data+
2	Tx- D1	Transmit Data-
3	Rx+ D2	Receive Data+
4	BI+ D3	Bi-directional+
5	BI- D3	Bi-directional-
6	Rx- D2	Receive Data-
7	BI+ D4	Bi-directional+
8	BI- D4	Bi-directional-

The following is indicated by the Ethernet connector LED's:

- Green – Line activity;
- Yellow – 100Mbs.

2.6 AC Power Configuration

Power is provided to the shelf via field replaceable and hot swappable 100 VAC to 240 VAC power supplies (PSUs) in a 1U drawer. Up to five PSUs are supported to form N+1 or N+N configurations. 208VAC is the recommended setup for the USA and Canada. In AC configuration, the whole shelf constitutes one power segment. The PSUs are monitored by the shelf manager: PS Presence, DC power Fault, on/off, fan error (fan not rotating), temperature, output voltage, current and power.

2.6.1   AC Power Supplies

Each power supply provides the following output power:

- 1600W in 220VAC / 208VAC
- 1200W in 110VAC

> The number of power supplies needed is calculated based on the actual load of the blades while taking into account redundancy requirements.
> Each slot is limited to 600W and the shelf total consumption is limited to 4200W.

Table 8: AC Power Distribution for 1600W PS

PSU no. & Redundancy (N+1, N+N)	AC Input Voltage Range	Maximum Payload* 3-fan configuration	Maximum Payload* 4-fan configuration
2 (1+1)	100-170V	900W	800W
	170-240V	1300W	1200W
3 (2+1) or 4 (2+2)	100-170V	2100W	2000W
	170-240V	2900W	2800W
4 (3+1)	100-170V	3300W	3200W
	170-240V	3900W	3800W
5 (4+1)	100-170V	3900W	3800W
5 (3+2)	170-240V	3900W	3800W

> ▪ Payload: blades and RTMs
> ▪ The shelf components consume 300W (3-fan configuration) or 400W (4-fan configuration)
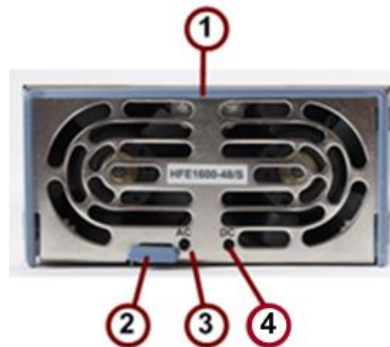
Figure 8: AC Power Supply Panel

Table 9: AC Power supply Panel

#	Component	Description
1	Handle	Used for holding the PS during insertion and extraction
2	Extraction latch	Used for extraction of the PS
3	AC LED	Green indicates that the AC power to the PSU is OK. OFF indicates there is no AC power .
4	DC LED	Green indicates that the DC power from the PSU is OK. Red indicates DC power failure.

2.6.2   Power Cord

Use a power cord with the following rating: rated for the local voltage, 15amps, 2 poles, 3 wires.

The connector can be terminated to 14 -16 AWG (gauge) cord, UL, CSA, VDE approved.

The cable is to contain a female connector IEC 60320 C15 on one end and AC power plug that fits your power AC sockets on the other end. The PSU requires a cable with a 15Amp cable for 115V power and 10 Amp for 208-230V power.

The power cord(s) is considered the disconnect device to the main AC power. The socket outlets that the AC power cables plug into must be installed near the equipment and must be easily accessible.

2.6.3   Shelf's AC Power Distribution

The diagram below shows the Shelf's AC Power Distribution.
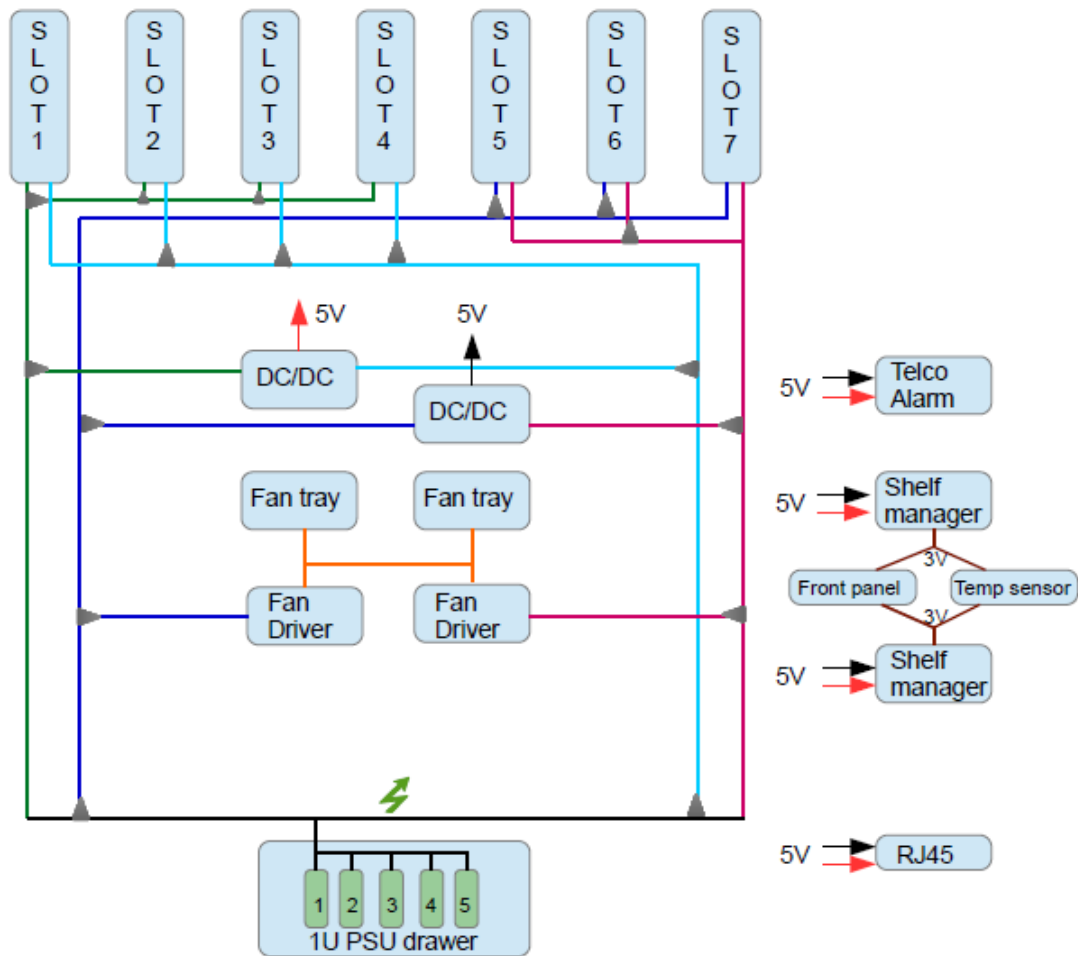
Figure 9: AC Power Configuration

2.6.4   AC Power Supply Drawer

The images below show the PS drawer' rear panel:
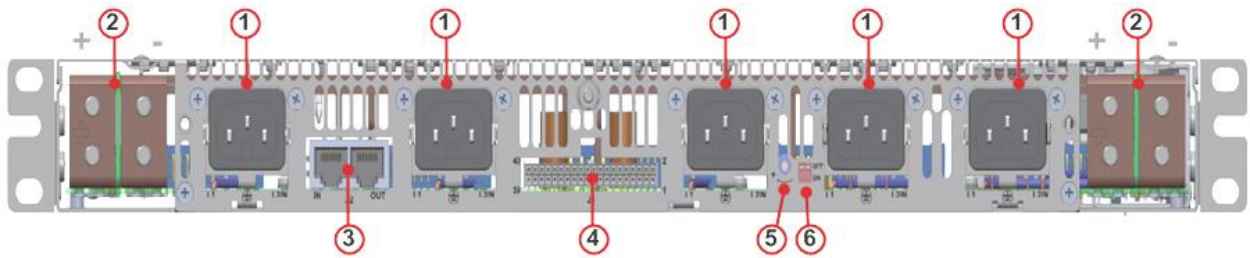
Figure 10: PS Drawer' Rear Panel

Table 10: PS Drawer' Rear Panel Details

#	Description
1	AC Line Inputs
2	Output Bus Bars +/-
3	J2 RJ45 Conenctors
4	J1 Control Plug Jumper setting: 1-2, 3-4, 5-8, 39-40
5	Adjustment Trimmer (not used)
6	Address Selection Dip Switch. Set both locations to On.
	Voltage key – on the drawer top panel. Set to 48V

2.7 DC Power Configuration

The DC power configuration consists of two field replaceable Power Entry Modules (PEMs) with 2 possible variations: rating of -48 VDC (-40 to -57.6 VDC) or -48/-60 VDC (-40 to -72 VDC). Each PEM provides up to 2x50AMP and is capable of supplying 100% of shelf power, so the two-PEM configuration provides full power redundancy.

The DC configuration does not come equipped with its own power source. The customer must provide a mains DC distribution system that includes batteries and branch circuit breaker of 50A per feed. You must also provide two sets of two 6AWG wires per PEM to connect to the mating connector (provided with the shelf).

The shelf is divided to 2 power segments, as detailed in **Figure 11** below. Each segment is limited to 50Amp (2000W for 40VDC) and each blade slot is limited to 600W.

2.7.1   Shelf's DC Power Distribution

The diagram below shows the Shelf's DC Power Distribution with its two power segments.
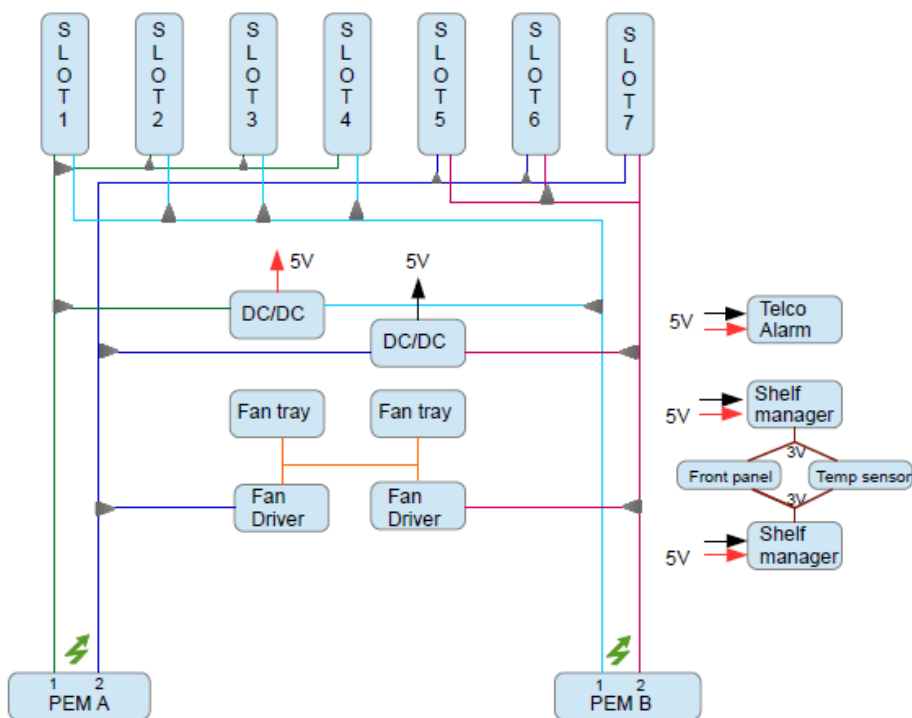
Figure 11: DC Power Distribution

2.7.2   DC PEM
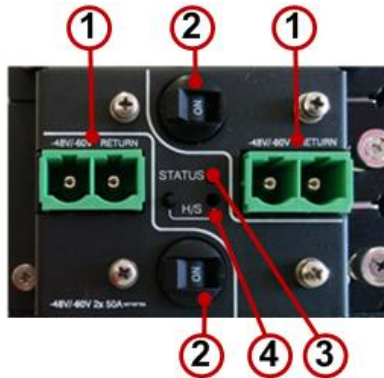
Figure 12: DC PEM and Detail

Table 11: Serial RS232 Pin Assignments

#	Component	Description	
1	Power connectors	DC power to shelf	
1 2	Circuit breakers	One 50A circuit breaker per power segment	
3	Status LED	Green: OK Red: Alarm	
4	Hot Swap switch	Puts the DC PEM in hot-swap mode	
4	Hot Swap LED	Steady Blue	PEM is ready for extraction
		Blinking Blue	PEM hot swap is in process
		OFF	PEM is operating

2.8 Shelf Front Panel

Serial communication ports and 4 LED indicators are located on the shelf's front panel. The front panel receives 3V DC supply from both shelf manager boards.
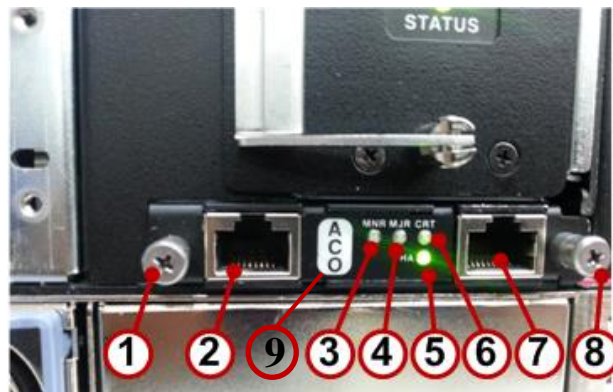
Figure 13: Chassis Front Panel and Detail

Table 12: Shelf Front Panel

#	Component	Status	Description
1/8	Mounting screws		
2/7	Serial ports		For serial connection to the 2 shelf managers
	Telco Alarm LEDs		
3	MNR (Minor)	OFF / Red	Normally off. When red, it reports Minor alarm event.
4	MJR (Major)	OFF / Red	Normally off. When red, it reports Major alarm event.
6	CRT (Critical)	OFF / Red	Normally off. When red, it reports Critical alarm event.
5	HA LED	Green / Red	Green: 2x 48/60V and 2x 5V sources are present & all pre-defined FRUs are present. Red: loss of 48/60V redundancy (48V_AF sensors of Fan Driver 1 & 2) or 5V redundancy (5V output is below its lower threshold) or one of the chassis elements is missing (air filter presence, 2x DC2DC presence, temp sensor board presence, 2x fan driver presence).
9	ACO pushbutton		Alarm Cutoff - the Telco alarm LEDs blink for 10 minutes (default).

2.8.1 Serial RS232 (Console) Connection

The Serial RS232 (Console) port is a miniature RJ45-8 port with the following pin-out definition. The cable length should be up to 3 meters.

Table 13: Serial RS232 Pin Assignments

Pin	Signal Name	Description
1	RTS1	Request To Send
2	DTR1	Data Terminal Ready
3	TxD	Transmit Data
4	GND	Signal ground
5	GND	Signal Ground
6	RxD	Receive Data
7	DSR1	Data Set Ready
8	CTS1	Clear To Send

2.9 DC2DC/ EEPROM

The two DC2DC boards are located behind a panel on the top rear and provide the +5V DC power for all shelf components.

Each DC2DC board hosts a hot swappable EEPROM sub-assembly.

The EEPROMs store shelf-related product and manufacturer information such as shelf serial number, part number, backplane routing assignment, and shelf heat budget.
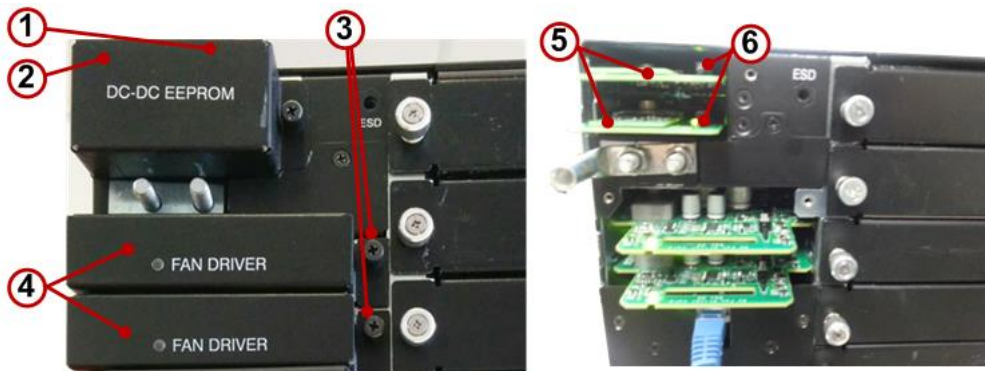
Figure 14: DC2DC / EEPROM Boards

Table 14: DC2DC / EEPROM Boards

#	Component	Description
1/3	Captive screws	Captive screw fasten the panels in place
2	DC2DC Panel	A rear panel covers the DC2DC boards and EEPROMs
4	Fan Drivers Panels	Two rear panels cover the Fan Drivers See the section, *Fan Drivers* on page 35
5	DC2DC	Two DC2DC boards, each with an EEPROM sub-assemblies
6	Hot-swap button and LED	Puts the DC2DC board in hot-swap mode

When the shelf manager board boots up, it compares the information stored in the two EEPROMs:

- If EEPROM data coincides the shelf initializes.
- In case of a mismatch, the data on the EEPROMs and the saved copy in the shelf manager board are compared: if two of the three copies match, it is assumed to be the right one, the shelf manager initiates and tries to write it to the 3rd non-conforming location. Consequently, the shelf manager can boot up with just one EEPROM.
- If the three locations are all different, the shelf manager board does not boot up.

2.10   Fan Trays

The shelf incorporates two hot-swappable fan trays providing push side-to-side cooling. There are 2 fan tray configurations: 3-fan unit and 4-fan unit.

Figure 15: Fan Tray

There are two Fan Driver boards that drive the fan trays: they provide the power and control to the fans. The Fan Drivers are power-redundant covering each other: each one can drive the two fan trays. In case of a Fan Driver fault, its corresponding fan tray loses its control and reverts to full speed rotation, the fans rotation speed readouts stay at the previous level (they do not show full speed) and the other fan tray isn't affected. In DC configuration each Fan Driver is fed by just one PEM and there are 2 Fan Driver configurations: for 48 VDC and for 48/60 VDC.

The shelf manager fully controls the fans speed based on temperature across the shelf and has 15 levels of fan speed to adjust as needed.

Cooling ability is maintained in the case of a single fan and fan tray failure, since the remaining fans provide the required cooling to dissipate the heat generated by the occupied slots. A faulty fan is to be replaced as soon as possible.
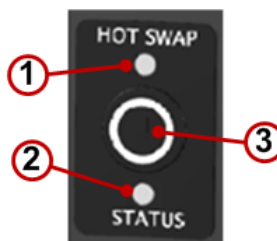
Figure 16: Fan Tray Panel

Table 15: Fan Tray panel

#	Component	Description
1	Hot swap LED	Off: Operating (see the note below.)
		Blue: Can be safely extracted; in case the fan tray isn't extracted within 5 seconds the status changes from HS (blue) to Operating (off) and fan speed returns to its previous level
		Blinking: Fans are in a process of decreasing their rotation speed to a minimum

#	Component	Description
2	Status LED	Green: all fans rotate at a speed equal to or above the lower threshold
		Red: at least one fan rotates at speed below the lower threshold
3	Hot-swap button	Puts the fan tray in hot-swap mode

 If the corresponding Fan Driver board is faulty, both the Hot-swap LED and the Status LED may be off.

2.10.1   Fan Drivers
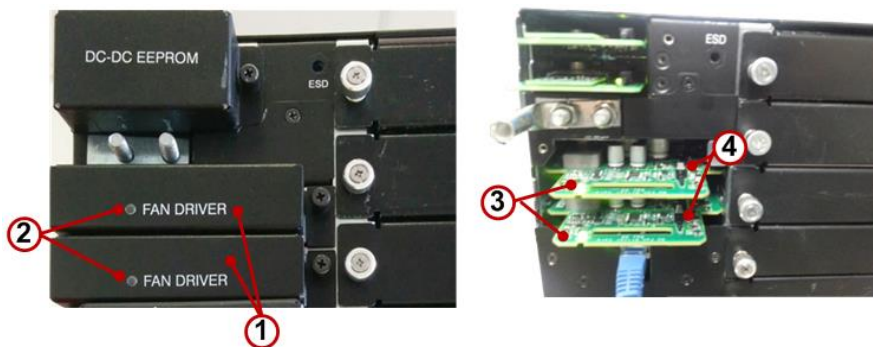
Figure 17: Fan Driver

Table 16: Fan Driver

#	Component	Description
1	Fan Drivers Panels	Two rear panels cover the Fan Driver boards
2	Status LED	Green: 48/60V output to the fans (-48 Fan sensor) is above its threshold and SM communicates with all Fan Driver I2C components
		Red: 48/60V output failure (below threshold) or SM fails to communicate with at least one Fan Driver I2C component
3	Hot swap LED (behind the cover)	Off: Fan Driver is operating
		Blue: Can be safely extracted
4	Hot-swap switch (behind the cover)	Puts the Fan Driver in hot-swap mode

2.11   Air Filter Tray

A shelf-based micro-switch detects the installed filter and reports its presence to the shelf manager.

Figure 18: Air Filter Tray

The air filter must be cleaned periodically. Cleaning frequency depends on how dusty the chassis environment is. It is recommended that the air filter be cleaned once every three months and replaced every year.

2.12   Filler Panels

To ensure a steady airflow, a filler panel must be installed to cover all front and rear empty slots.
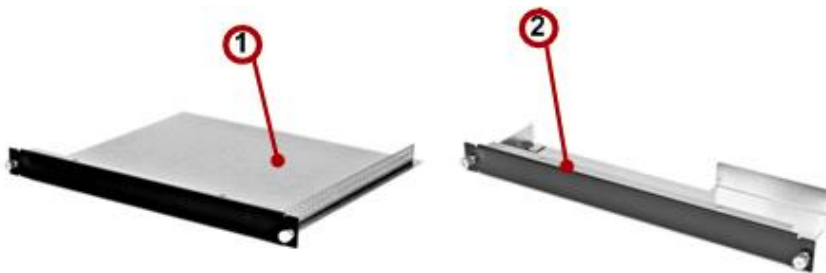
Figure 19: Filler Board Panels

Table 17: Filler Board Panels

#	Component	Description
1	Front board filler panel	Blank front board panels with air baffle.
2	RTM filler panel	Blank RTM panels with air baffle.

2.13   Cable Management

The shelf incorporates front cable management holder.

Figure 20: Cable Management Frame

3 Installing the Shelf

Installing the shelf and preparation for its usage is comprised of some or all of the following tasks:

- Site planning.
- Checking package contents.
- Rack mounting.
- Inserting the front and rear boards into the shelf.
- Shelf power-up.

⚠️ **Due to the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of the shelf.**

ℹ️ Before installing the shelf, note which cables are to be needed for equipment and power, and whether they are to be connected in the front or rear of the shelf.

3.1 Installation Requirements

The shelf must be installed according to the national electrical codes in your country. For North America, equipment must be installed in accordance to the US National Electrical Code (NEC) Articles 110–6, 110–17, and 110–18, and the Canadian Electrical Code (CEC), Sections 2-202 and 2-308.

To install the shelf in a standard 19" rack, the following tools are required:

- Standard Philips screwdriver set.
- ESD Wrist Strap.

3.2 Site Planning

Select a location for the shelf that provides adequate room for operating and servicing.

Choose a site that is:

- Clean and free of airborne particles (other than normal room dust).
- Well-ventilated and away from sources of heat including direct sunlight.
- Away from sources of vibration or physical shock.
- Isolated from strong electromagnetic fields produced by electrical devices.
- In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor.
- For AC systems, provide properly grounded wall outlets and branch circuit breaker of 15A for each of the power supplies.
- For DC systems, provide mains DC power system that includes for each PEM an external battery and two branch circuit breakers of 50A each.
- Provided with sufficient space to access and replace the power supply modules, fan tray, front and rear boards.
- Provided with sufficient space at the front and sides of the shelf to enable free airflow to cool the boards and power supplies.

⚠ Only qualified personnel should be involved with this installation procedure.

3.2.1 Preventing Electromagnetic Interference

The shelf emits electromagnetic waves that may interfere with nearby equipment. Conversely, nearby electronic equipment may emit electromagnetic waves that interfere with the shelf.

To prevent such interferences:

- The EMC specifications of the shelf and all nearby equipment should be considered when choosing the placement of the shelf and surrounding equipment.
- In the shelf and most other equipment, the use of blank/fillers panels in unoccupied openings is necessary to keep the product's emissions within their specified limits.
- If the shelf experiences unexpected and intermittent data errors, carefully consider the possibility of electromagnetic interference from nearby equipment as a possible source of the problem.

3.2.2   Preparing for Rack Installation

The shelf is to be installed in a standard 19" rack. All sides of the shelf must be easily accessible.

To maintain proper cooling, the equipment rack must provide sufficient airflow to the front and sides of the shelf. The rack must also include ventilation sufficient to provide exhaust of a maximum of 4500W or 15350 BTUs (British Thermal Units) per hour for the shelf.

The prerequisites for setting up the shelf for use in the facility involve:

- The rack should be properly earthed.
- To ensure sufficient airflow for the boards, allow at least two inches of clearance at the air inlets and outlets.

3.3 Checking Package Contents

Check that all items listed below are intact:

- Shelf
- Shelf manager boards
- Fan trays
- Air filter tray
- Power supplies (AC Configuration) or PEMs (DC Configuration)
- Cable-management holders

Use of equipment damaged during delivery could prevent proper functioning of the Shelf and/or cause permanent damage to it. Check for visual damage to the package and all its content before using any component.

3.4 Installation Overview

The phases of the Shelf installation are listed below.

1. Mount the shelf in the rack.

2. Connect the shelf to earth.

3. Wear an ESD wristband and connect it to an ESD point on the shelf.

4. Insert front and rear boards.

5. Connect the shelf to its power source.

   - For AC power, connect the AC power cords.
   - For DC power, connect the PEMs to the mains DC power system.

6. Power up the shelf.

3.5 Mounting the Shelf on the Rack

Prior for rack mounting:

- Confirm the rack is stable so that the weight of the shelf does not cause it to tip over.
- Rack mounting is to be carried out by at least two technicians.
- Four M6x10 screws are needed to mount the shelf on the rack.

The shelf is heavy: it weighs up to 20Kg (44lbs).Two technicians are required to lift and carry the shelf safely.

⊃ To mount the shelf on the rack:

1. Install support **L** brackets on the rack (optional).

2. Two people are required to lift and insert the shelf into the rack, one on each side of the shelf, grasping the base on the front and the back. With a person on each side of the shelf, lift it and fit it onto the **L** brackets in the rack.

3. The shelf must be leveled and not positioned at an angle in the rack. The rack's doors must be able to be closed.

4. While one person is holding the shelf in place, the second person fastens the shelf to the rack rails using four screws (not provided), four on each side of the chassis or as appropriate for your rack type.

3.6 Earthling the Shelf

The shelf includes a two-hole earthling lug, Panduit LCD4-38D-L. 4 AWG grounding cable is to be used with this lug.

Grounding design must comply with the local electrical codes.

In the United States, grounding must comply with Article 250 of the NEC unless superseded by local codes.

An earthling connection is essential before connecting the power supply.

There must be an uninterruptable safety earth ground from the main power source to the shelf. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

To avoid the potential for an electrical shock hazard, the safety-grounding conductor must be determined based on the feed current rating and cable length.

Figure 21: Rear Grounding Stud

➲ **To connect the earthling:**

1. On the rear of the shelf, locate the earthling connection on the right.

2. Using the appropriate wrench, unfasten the two bolts and remove the lug.

3. Crimp 4 AWG grounding wire to the lug.

4. Return the lug to its place and refasten the bolts.

5. Connect the ground wire to the appropriate ground connection to the building's earthling system.

3.7 ESD Safety Requirements

Electronic components on printed circuit boards are sensitive to static electricity and normal amounts of static electricity generated by clothing can damage electronic equipment. To reduce the risk of damage due to electrostatic discharge when installing or servicing electronic equipment, use anti-static grounding straps and mats.

The shelf contains two (ESD) grounding sockets, one at the front of the shelf and one in the rear of the shelf. Persons involved in the shelf installation must wear an ESD Wrist Strap attached to one of these grounding sockets.

 Any person involved in handling the shelf or board installation or replacement is required to wear an ESD Wrist Strap,

⊃ To prepare ESD protection:

1. Locate the ESD grounding sockets on the shelf.

2. Attach a wrist strap for electrostatic discharge (ESD) and connect it to an ESD grounding socket on the shelf using a banana plug or an alligator clip.

3.8 Electrical Connections

This shelf is supplied with either AC or DC power.

For AC power configurations, the power outlets to be utilized must contain a third connection for grounding.

An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the Customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.

Ensure the building's power circuit breakers are turned off BEFORE you connect the system's power cord(s) to the building power.

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that the shelf current consumption do not exceed branch circuit protection requirements.

Refer to the information that is provided in this document or the power-rating label on the shelf. The input voltage range and power rating are marked the shelf by a label on the side of the shelf. Ensure that the voltages and frequency rating of the power receptacle match the electrical rating label on the equipment.

3.8.1   Connecting AC Power

See the section *Power Cord* on page 25.

⊃ To connect AC power:

1. Check that the circuit breaker at the mains is off.

2. On the rear of the shelf, connect an AC power cord to each PSU. No specific order is required.

3. Connect the (blue) cable between the J2 RJ45 In (left side) of the PS drawer to the left AC PEM

3.8.2   Connecting DC Power

Each PEM contains two terminal blocks. For the DC power cables, use red (+) and black (-) 6 AWG cables to connect to the terminal block pluggable connectors. The connectors are Phoenix Contact PC 16/ 2-ST-10,16 (1967375).

For power redundancy, connect the two PEMs to two separate power sources.

The two power sources have to be disconnected one from the other, to prevent excessive EMC radiation due to imbalance of the incoming and outgoing currents of each PEM. **Specifically, do not connect the two PEMs to the same power source and do not connect the Return lines of the two PEMs.**

While the power cables are being connected to the PEM, the power source and the PEM's circuit breakers must be **OFF**.

➲ To connect DC power:

1. Set the branch circuit breakers at the mains to the Off position.

2. On each PEM, set all of the circuit breakers to the Off position.

3. Strip the ends of the red and black 6 AWG wire leads to be attached – stripping length is 7.5mm.

4. Using an appropriate screwdriver, insert the stripped end of the red (+) 6 AWG wire lead into the rightmost contact and tighten the screw clamp. Repeat for the black (-) wire lead into the leftmost contact.

5. Plug the terminal connector into its terminal block socket on the PEM.

6. Repeat for the remaining terminal blocks.

7. Set the branch circuit breakers at the mains to the On position.

8. Using a voltmeter, verify that the voltage polarity and reading are correct.

Figure 22: PEM's Circuit Breaker Position

9. On each PEM, set all of the circuit breakers to the On position.

3.9 Inserting Front and Rear Boards

Follow the manufacturer's instructions for inserting front and rear RTM boards.

➲ To insert the front and rear boards:

• Insert ATCA-compliant blades according to the manufacturer's instructions, making sure they are properly positioned in their slots and are secured to their respective connectors.

3.10   Shelf Power-Up

For AC power, share the power cables among more than one electrical phase to ensure AC power redundancy.

➲ To power up the shelf:

1. At the mains, set the branch circuit breakers to the On position.

2. Wait up to one minute for the shelf to stabilize.

3. Check that the LEDs on the front panel and on each shelf component appear in normal mode.

3.11   Real Time Clock Setup

Setting the Reat Time Clock: see par. 5.6

4   Maintenance

Caution

This PS drawer has more than one power supply cord.

Disconnect the appropriate power supply cords before servicing to avoid electric shock as per the requirements of each procedure.

The covers on the product and the latches locking components are to be closed at all times except for service by trained service personnel. All covers must be returned to their locations and latches locked at the conclusion of the service operation.

Any person involved in handling the shelf or board installation or replacement is required to wear an ESD wrist strap For more information, see section 3.7 *ESD Safety Requirements* on page 42.

4.1 Resetting the Shelf

If for any reason the shelf manager board is not responding, you can use the shelf reset options.

➲ **To reset the shelf:**

1.   On the active Shelf Manager front panel, press the Reset button, Or

2.   Extract the active shelf manager board from the shelf and re-insert it.

4.2 Cleaning and Replacing the Air Filter

The air filter must be checked regularly to ensure media durability and eliminate residual dust build-up that can cause airflow resistance. The air filter must be cleaned every three months and replaced every year.

Figure 23: Air Filter Removal for Inspection

⮂ **To clean or replace the air filter:**

1.   On the front of the shelf, to the right of the fan trays, pull the air filter (1) out.

2.   Replace with a new air filter or clean the air filter with slightly compressed air, vacuum, or rinsed with clean water.

3.   If a degreaser is required, use only a mild detergent, such as, dishwashing liquid. Avoid using harsh solvents or cleaning agents.

4.   Allow the filter to dry.

5.   Insert the air filter (1) into its slot, and slide it in.

4.3 Replacing a Power Supply

If power supply redundancy is implemented, one of the power supplies can be extracted without interfering with the normal operation of the shelf.

Figure 24: Power Supply Replacement-AC Configuration

4.3.1 Removing a Power Supply

Refer to Figure 20 above while following the directions in this section.

⮞ **To extract the power supply:**

• Raise the latch (2) and grasping the handle (1) pull the power supply out.

4.3.2 Inserting the Power Supply

Refer to Figure 20 above while following the directions in this section.

⮞ **To insert the power supply:**

1. Slide the power supply into the slot until it plugs into the backplane connector.

2. Loct the handle (1) in place pushing it inward.

3. Verify that the LED (3) is illuminating green.

4.4 Replacing the DC PEM

If DC PEM redundancy is implemented, one of the DC PEMs may be extracted and replaced without stopping service.

> ⚡ While the power cables are being connected to the DC PEM, the power source and the circuit breakers to the DC PEM must be OFF.

4.4.1　　Removing the DC PEM

While following the directions in this section, refer to the figure above.

➲ **To extract the DC PEM:**

1. Set its branch circuit breaker at the mains to the Off position.

2. On the DC PEM to be replaced, remove each of the terminal block connectors (1).

3. Release two captive screws (3)

4. Grasp the handle (4) and pull out the DC PEM.

4.4.2　　Inserting the DC PEM

While following the directions in this section, refer to the figure above.

➲ **To install the DC PEM:**

1. Slide the replacement DC PEM into the slot until it plugs into the backplane connector.

2. Fasten two captive screws (3) on the front side of the panel.

3. Plug in each of the terminal block connectors (1) into their respective terminal block sockets (2).

4. Set the branch circuit breaker at the mains to the On position.

5. Set the DC PEM circuit breakers to the On position

6. Verify that the PEM's LEDs are appropriate for normal operation.

4.5 Replacing a Shelf Manager Board
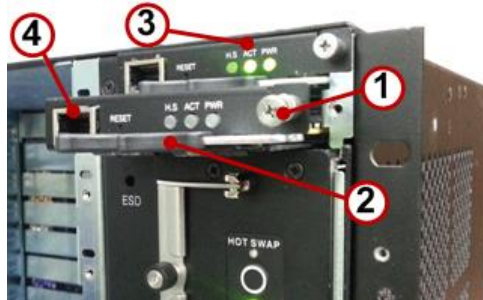
Figure 25: Shelf Manager Board Replacement

4.5.1 Removing a Shelf Manager Board

Follow the directions in this section using the figure above.

 To extract a shelf manager board:

1. If attached, remove the Ethernet cable (4).

2. Release the captive screw (1) and partially open the extraction latch (2).

3. Wait until the HS blue LED (3) stops blinking and lights steady.

4. Using the extraction latch (2), pull the shelf manager out.

4.5.2 Inserting Shelf Manager Board

Follow the directions in this section using the figure above.

 To insert a shelf manager board:

1. With the shelf manager board extraction latch (2) open, slide it into the slot until the latch is engaged.

2. Lock the extraction latch (2) in place.

3. Fasten the captive screw (1).

4. Verify that the LEDs (3) appear as in normal operation: the blue LED blinks for a few seconds and turns off,.the ACT and PWR LEDs illuminate green.

5. Reattach the Ethernet cable (4) if needed.

4.6 Replacing a Fan Tray

The fan trays are located on the front of the shelf. A malfunctioning fan tray should be replaced immediately, in order to prevent thermal damage to the installed application boards.

 Use care when extracting a fan tray – the fans may still be rotating after the fan tray is removed.

4.6.1   Replacing a Fan Tray

While following the directions in this section, refer to the figure below.
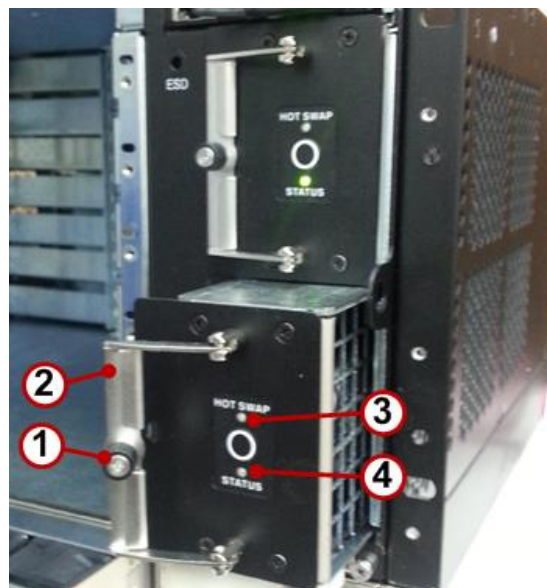
Figure 26: Fan Tray Replacement

➲ To replace a fan tray:

1. On the fan tray to be replaced, open the thumbscrew (1) holding the handle (2) and pull the fan tray slightly out.

2. Wait for the fans to stop in full (could take a few seconds) and pull the fan tray out.

---

3. Insert the replaceable fan tray, pushing it back all the way.

4. Pust the handle (2) back into place and fasten its thumbscrew (1).

5. Verify that the fan tray Status LED (4) illuminates in green.

4.7 Replacing a Fan Driver Board

The two hot-swappable Fan Driver boards reside in the rear mid- left of the shelf, behind a panel.
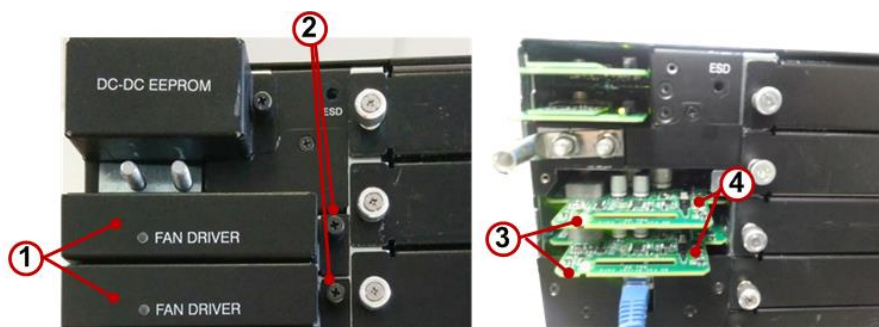
Figure 27: Fan Driver Replacement

➲ To replace a Fan Driver board:

1. Unfasten the captive screws (2) of the rear panel covering the Fan Driver boards and remove the panel (1).

2. Press the Fan Driver board's hot swap switch (4).

3. Pull out the Fan Driver board (3) with two fingers.

4. Insert the replacement Fan Driver board (3) and press it all the way into its socket.

5. Return the panel (4) and fasten the captive screws (2).

4.8 Replacing a DC2DC Board

The two hot-swappable DC2DC boards reside in the rear top- left of the shelf, behind a panel.
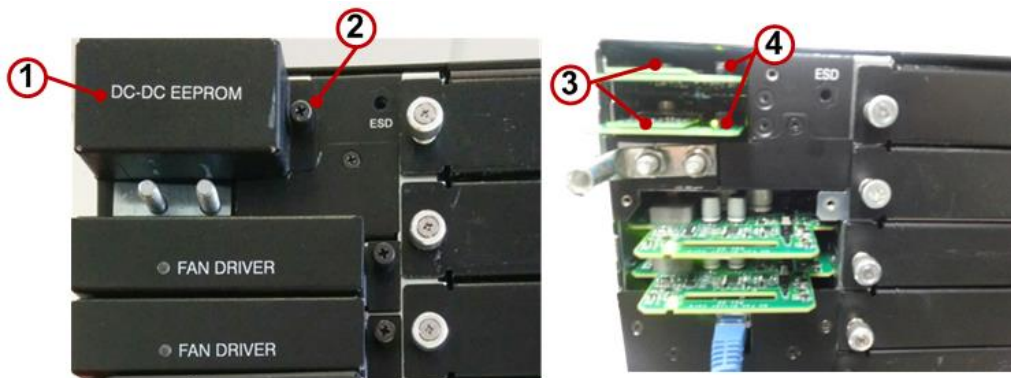
Figure 28: DC2DC Replacement

⊃ To replace a DC2DC board:

1. Unfasten the captive screw (2) of the rear panel covering the DC2DC / EEPROM components and remove the panel (1).

2. Press the DC2DC board's hot swap switch (4).

3. Pull out the DC2DC board (3) with two fingers.

4. Insert the replacement DC2DC board (3) and press it all the way into its socket.

5. Return the panel (2) and fasten the captive screw (2).

4.9 Replacing an EEPROM Board

Each of the two hot-swappable EEPROM boards ia attached to a DC2DC board and resides behind a rear top-left panel.

Figure 29: EEPROM Replacement

⮑ **To replace an EEPROM board:**

1. Unfasten the two thumbscrews (2) of the panel covering the DC2DC / EEPROM components and remove the panel (1).

2. Press the side of the EEPROM board (3) with your finger to make it pop out of its socket and extract it.

3. Insert the replacement EEPROM board (3) and press it with your finger. It plugs into the socket.

4. Return the front panel (1) and fasten the two captive screws (2).

4.10   Replacing the Temperature Sensor

The temperature sensor card connects to the backplane and is located in rear left side behind the ESD panel, below blade #4. The temperature sensor card is hot swappable.
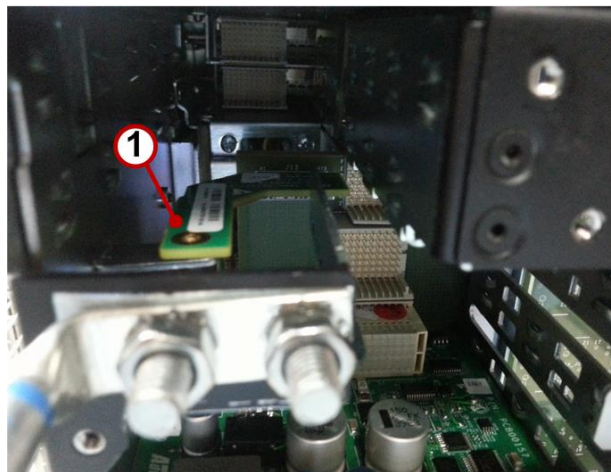
Figure 30: Temperature Sensor Card Replacement

⮑ **To replace a temperature sensor card:**

1. From the rear of the shelf, remove the Fan Drivers panel cover and remove the upper Fan Driver board.

2. Unfasten the screw on the bottom and carefully grasp the temperature sensor card (1) and pull it out.

3. Insert the card into its connector and tighten the screw on the bottom.

4. Return the upper Fan Driver board and its panel to their place.

5 Shelf Manager Software

This section details various shelf manager software functions.

5.1 Shelf Manager Software Upgrade

Before you upgrade the shelf manager software, verify the Dip Switch settings, IP addresses and IP connection parameters.

There are two steps for the software upgrade:

- Loading the new version using rupgrade_tool
- Configuring the chassis using install.sh shell script.

5.1.1   Verify Dip Switch Settings

The shelf manager includes a Dip Switch.The Dip Switch settings much be verified before you upgrade the software.

➲ To verify the Dip Switch settings:

On both shelf manager boards, set Dipswitch 1 to Off to connect Ethernet (Eth0) via the shelf front panel.

5.1.2   Communication

For IP communication, on the shelf manager panel, connect the Ethernet cable to the Eth socket.

The chassis is shipped with these default IP addresses:

ipaddr=192.168.0.2

ip1addr=192.168.1.2

serverip=192.168.0.7

gatewayip=192.168.0.1

For serial communication: connect an RS232 serial cable of up to three meters to the corresponding Front Panel RJ45 connector. The connection setup is **115200,8,N,1**.

5.1.3   Preparing the Shelf Manager Upgrade File

⮑ **To prepare the Shelf Manager Upgrade File:**

1.   Create a directory on your PC (for example c:\asisver)

2.   Extract the version zip file to that directory.

5.1.4   Verify Chassis EEPROM Content

⮑ **To verify the chassis EEPROM content:**

1.   Rewrite the 2 EEPROMs content by **# clia shelf info_force_update**

The following message appears:

Pigeon Point Shelf Manager Command Line Interpreter

Starting the Shelf FRU Info source device update

2.   Run **clia fruinfo 20 1** and **clia fruinfo 20 2**

3.   Proceed with the software upgrade as long as the commands issue legible returns, such as:

Pigeon Point Shelf Manager Command Line Interpreter

20: FRU # 2, FRU Info

Common Header: Format Version = 1

Internal Use Area:

**   Version = 1**

Chassis Info Area:

**   Version   = 1**

If you receive an error message from any one of the two commands , do not continue the

upgrade process and consult Customer Support.

5.1.5   Performing the Software Upgrade

➲ **To upgrade without a Linux server:**

1. Log in to the ShMM-700 and make sure you have an operational network interface; configure it if necessary:

    User name: root
    Password : <blank>

    # ifconfig eth0
    eth0 ... inet addr:192.168.0.2 Bcast:192.168.0.255 ...
    # ifconfig eth0 192.168.0.3

2. Open PC FTP client, such as WinSCP, and connect to the ShMM using the shelf manager IP address in the Host name field:

    User name: root
    Password: <blank>
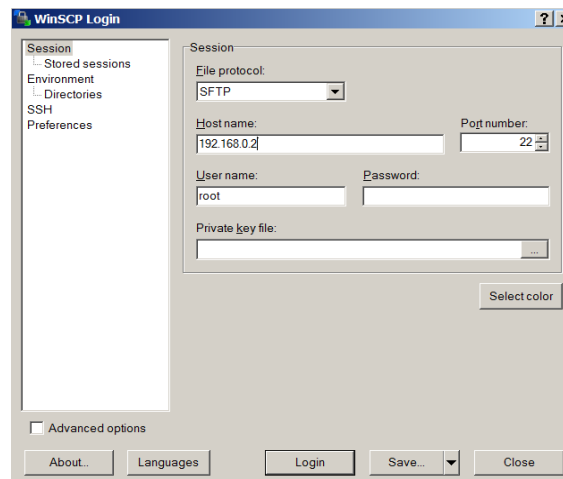
Figure31 **Typical WinSCP Login Screen**

3. Copy the following 5 files from the directory, **/asisver/SSH/,** (see the section, *Performing the Software Upgrade,* above) to **/tmp directory on the ShMM**.

    sentry.shmm700.app
    sentry.shmm700.hpm
    sentry.shmm700.kernel

sentry.shmm700.rfs

sentry.shmm700.u-boot

4. On the terminal emulation utility, execute the following commands:

cd /tmp

clia terminate

setenv custcnf C00011

setenv rc2 /etc/rc.0000-14

rupgrade --erase-all --base *file:///tmp*/**sentry.shmm700. -k kernel -r rfs -a app**

5. After the chassis reboots, check the new version using the command **clia version** and place a
sticker with the version number on ShMM.

➲ To upgrade with a Linux server:

1. Unzip and copy the files from the SSH directory to the TFTP/FTP/SCP/HTTP server in your
network

2. Log in to the ShMM-700 and make sure you have an operational network interface; configure it
if necessary. For example:

    ifconfig eth0 192.168.0.3

3. Invoke the rupgrade utility on the Shelf Manager.

    If images are located at the TFTP server root:

    # rupgrade --erase-all --base tftp://192.168.0.7/sentry.shmm700. -k kernel -r rfs -a app

    For a FTP, SCP or HTTP server, change the firmware location base to:

    FTP: --base ftp://username:password@192.168.0.7/sentry.shmm700

    SCP: --base scp://username@192.168.0.7/sentry.shmm700

    HTTP: --base http://192.168.0.7/sentry.shmm700

5.1.6   Configuring the Chassis

⮌ **To configure the chassis:**

1.   In the terminal emulator utility run: **install.sh**.

     The process ends with following message:

     >>> Press ENTER to reboot, ^C to abort

2.   To reboot the shelf manager and complete the upgrade process, press **ENTER**.

5.1.7   Restoring the Previous Version

To restore the previously-loaded version, located on the other flash memory half, run :

rupgrade --rollback

5.2 Accessing the Shelf Manager

5.2.1   Accessing the Shelf Manager's Linux OS

Log in to Linux using the following access:

User: root

Pass: <Blank>   no password; just press **Enter**

5.2.2   Connecting via Serial Port

By default the serial port is defined as **115200 kbps** and **8-N-1**.

To set a new baud rate: **setenv baudrate 9600**

Setenv console ttySP0,9600n8

5.2.3 Connecting via Ethernet Port

Check to see if you are interacting with the active Shelf Manager, which has a steady Active LED while the backup shelf manager's Active LED blinks. Otherwise look for **Active** in the **hwri** command printout.

To check basic data transfer: **ping <IP address>**

Test physical link between the shelf manager and hub slot: using the following commands:

Command	Possible Results
iftest eth0	Examining "eth0" interface... "eth0" link is UP
iftest eth1	Examining "eth1" interface... "eth1" link is DOWN

5.3 IP Configuration

The table below displays the IP configuration commands.

Command	Results
Ifconfig	prints the configuration
Clia getlanconfig 1 3	prints the shelf manager eth0 address
Clia setlanconfig 1 3 <IP address>	sets the IP address of SM eth0
Clia setlanconfig 2 3 <IP address>	sets the IP address of SM eth1
Clia setlanconfig 1 6 <IP address>	sets the subnet mask of SM eth0
Clia setlanconfig 2 6 <IP address>	sets the subnet mask of SM eth1

5.4 Chassis EEPROM Parameters

To read Chassis EEPROM content, use the command clia **fruinfo 20 1**

5.4.1 Repairing Specific Chassis EEPROM Fields

Use the command, **patch_fru_info** to repair specific EEPROM fields.

⮑ To repairing specific Chassis EEPROM fields:

- To change the serial number of the chassis: **patch_fru_info 20 1 p Serial Number 12312345**

    patch_fru_info<fru_id>i|c|b|p|n<n|field><value>
    Field names:
    Internal section: Text Hex
    Chassis section: PartNumber SerialNumber
    Board section: Manufacturer ProductName SerialNumber PartNumber FRUFileID MfgDate
    Product section: Manufacturer ProductName PartModelNumber Version SerialNumber
    AssetTag FRUFileID
    Multi section: IP Gateway Netmask IP2 Gateway2 Netmask2

5.4.2　Restoring EEPROM Content

The system includes three identical non-volatile copies of the chassis EEPROM content: two physical EEPROM chips (1 & 2) and a copy in the Flash memory (254). During the bootup process, the system compares their values and completes the boot process successfully with (at least) two identical copies. In case one copy is different than the other two, the system tries to restore its value.

The following procedure manually restores the content of EEPROM #2:

    clia frudatar 20 1 /var/bin/filename.bin　// write the EEprom1 content into a file
    clia frudataw 20 2 /var/bin/filename.bin　// write the file to EEprom2

5.5 Fan Controls

5.5.1　Minimum Fan Level

The range of the fan's operating level is 3-15. If needed, you can reduce the fan's noise by reducing their operating level.

⮑ To change the fan's minimal operating level:

- For a temporary solution (is not retained after reboot), use the command:

clia minfanlevel n where n= 3 to 15

- For a permanent solution that holds after a reboot:

    1. On both shelf managers: in the file **/etc/shelfman.conf.asis** modify the value **MIN_FAN_LEVEL** to **n**

    2. Power cycle the chassis or log off the (single) shelf manager.

5.5.2   Fan Rotation Speed Control

➲ To set the fan's rotation speed:

- To set cooling mode to manual:

    Clia setfanpolicy 20 fru# disable   fru#: 9-12

    Clia setfanlevel 20 fru# n   n: 3-15

    or

    Clia setfanlevel all n

➲ To revert to the auto cooling mode:

Use the command: **Clia setfanpolicy 20 fru# enable**

- To reduce the fan's rotation speed to its lowest possible value as defined by the fan vendor:

    Clia setfanlevel 20 fru# 254

5.5.3   Fan Debug Commands

Display fans state: **clia fans**

Display fan's rotation speed in RPM: **clia sensordata 20 | grep RPM**

5.6 Setting the Real Time Clock (RTC)

To set the RTC on the SM, use the following commands:

Date MMDDhhmm[[CC]YY][.ss]

hwclock –w

Where **MMDDhhmm[[CC]YY][.ss]:**

MM - Month

DD - Day

hh - Hour (using 24 hour notation)

mm - Minute

CC – Century

YY - Year

ss - Second

For example:

date 042916282013 sets the RTC to Sat Apr 29 16:28 UTC 2013

5.7 Debug

As a first step to reporting any issue, you are asked to generate a log file

⭮ **To report an issue:**

1.   run: **/etc/summary**

and email the /tmp/**debug.log** file to Asis Tech Support.

2.   To print the version details, use the command: **clia version**

3.   To print the Telco alarm status, use the command: **clia alarm**

4.   To print the last alarm event details, use the command: **clia alarm info**

5.8 Power On / Activation

In the default settings of the Shelf Activation And Power Management record, the entry for IPMC 84h (HW 42h) is after IPMC 82h (HW 41h) and this is their power activation order.

You can set a 5 second delay after IPMC 82h FRUs activation using the command:

clia shelf pwrdelay 41 0xfe 50

After the chassis power cycle, the shelf manager powers up 82h while 84h stays in the M3 state and powers up after the 5-second delay. Also, when any IPMCs are started shortly after 82h at runtime, there is 5-second delay before this IPMC gets power.

5.9 SNMP

If you are using SNMP, you must translate the sensor parameters from LUN and Sensor ID to SNMP OID.

The translation is by the following calculation:

(Sensor ID) + 256 x (LUN)
Example:
For sensor **155 LUN 1: 155+ 1x256=411**

5.10   Ethernet Connections and Cross Connect

Each shelf manager has three NICs: Eth0, eth1 and usb.

- **Eth0** may be used for front connection through the shelf manager front panel or through the backplane to the hubs.
- **Eth1** is used through the backplane to the hubs
- **USB0** is used for communication between the shelf managers as a redundancy interface.

The IP of each NIC must be from a different subnet.

The shelf manager is configured with active/backup instances to maximize availability. The figure below shows how both instances are accessible to the System Manager, with only the active instance interacting at any given time. Similarly, only the active instance communicates over IPMB-0 with the IPM Controller population in the shelf. The two instances communicate over TCP/IP, with

the active instance posting incremental state updates to the backup ShMMs using USB connection between the ShMMs. As a result, the backup can quickly step into the active role if necessary.

There are three cross-connected signals between the two shelf managers:

- **Presence:** each shelf manager knows whether the other is present in the shelf.
- **Health:** each SM knows whether the other considers itself *healthy*.
- **Switchover:** the backup SM can force a switchover if necessary.
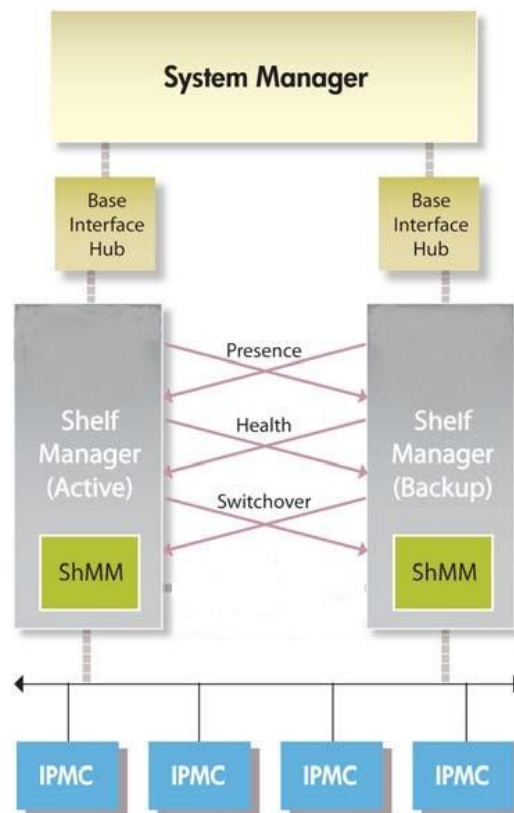
Figure 32: Shelf Manager Cross Connection Diagram

Cross-connect allows both shelf managers to be connected with both hubs using the Base Interface and allows either hubs or SMs to switchover independently, if necessary.

The Cross-connect is implemented as follows:

ETH0 of SM1 (0x10) is connected to hub1 base port 1:1, and ETH1 is connected to hub2 base port 1:2.

ETH0 of SM2 (0x12) is connected to hub2 base port 1:1, and ETH1 is connected to base hub1 port 1:2.
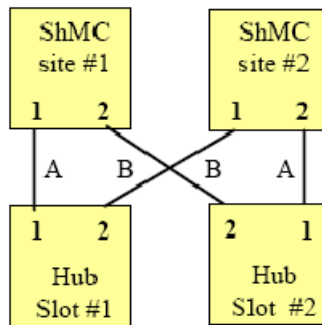
Figure 33: ShMC Cross Connection Diagram

5.10.1   IP Addresses Swap

The following scenario helps us understand the behavior of the IP address swap.

Suppose ETH0 of the active shelf manager has IP address A and ETH1 has address B. After switchover ETH0 of the backup shelf manager receives address A and ETH1 address B. The problem of this situation is that ETH0 connects to another slot.

Suppose that ETH0 of the active shelf manger (SM1) has IP address **X** and ETH1 has address **Y**. Consequently HUB1 interacts with the shelf manger by using IP address **X**.

After switchover, both of the Ethernet adapters of the incoming Active shelf manager (SM2) inherit their IP addresses from the previous Active shelf manager (SM1). Since the HUB1 interacts with SM2 by using the ETH1 interface, it must switch to IP address **Y**.

In order to prevent this situation, the parameter, SWAPPED_CROSS_CONNECTS, must be set to TRUE.

In this case, after switchover, the IP address A of the ETH0 interface of previously Active shelf manager is attached to the ETH1 interface of the incoming Active shelf manager (previously Backup) and the HUB1 continues using **X** address.

The USB interface as a communication link between the 2 SMs is a must for Cross-connect and without it, the shelf manager boots endlessly.

5.11   Shelf Cooling

The Shelf Manager manages shelf cooling by controlling the speed of the fans in the fan tray(s) according to PICMG 3.0 specification. The Shelf Manager monitors temperature sensors in the shelf in 5 sec poll interval and reacts appropriately when the temperature exceeds the specified thresholds. The Shelf Manager keeps track of the population of Fan Tray devices in the system, distinguishing them during initial IPM controller enumeration and during subsequent hot insertions.

The goal of the cooling management strategy is to hold the level of the fans as low as possible, but at the same time keep the shelf in the normal cooling state with no temperature sensors crossing their upper thresholds. To achieve that, an adaptive approach is used.

In normal mode the shelf manager periodically reduces the fan speed by one level (in 30 seconds intervals) until the fan speed reaches the minimum fan level or the shelf goes to abnormal mode (with at least one of the temperature sensors reporting one of its upper thresholds crossed).

The shelf manager attempts to minimize the fan level and prevent thermal alerts by adaptively choosing the lowest possible fan level that allows the shelf to avoid thermal alerts:

- In the minor alert cooling state (non-critical thermal thresholds are crossed for one or more sensors) the Shelf Manager periodically increases the fan level, until the fan level reaches its maximum or the thermal condition goes away.
- In the major alert cooling state (critical thermal thresholds are crossed for one or more sensors) the Shelf Manager sets the fan level to the maximum. In addition, if the thermal condition is caused by a specific FRU, and the FRU supports power levels lower than the current one, the shelf manager reduces power consumption of the FRU by assigning it the next lower power level.
- In the critical alert cooling state (non-recoverable thermal thresholds are crossed for one or more sensors) the shelf manager sets the fan level to maximum. In addition, if the thermal condition is caused by a specific FRU, the FRU is powered down. If the thermal alert is caused by a shelf-wide temperature sensor, all FRUs are powered down, as prescribed by the PICMG 3.0 specification.

The shelf manager changes the minimum fan level over time to prevent oscillations of the shelf between normal and abnormal cooling mode. When the shelf transitions from normal to abnormal cooling mode, this means that the current fan level is insufficient for effective cooling of the shelf. In that case, the shelf manager dynamically changes the minimum fan level to the current level + 1, so that next time in normal mode the shelf manager does not try to decrease the fan level so low.

After the shelf stays in normal cooling mode at a stable fan level for a substantial period of time (specified as a configuration parameter NORMAL_STABLE_TIME, with a default of 1 hour), the

minimum fan level is decreased by one and the current fan level is allowed to drop to the new minimum. If the thermal load in the shelf has decreased, the shelf continues to operate at the reduced fan level. Otherwise, the shelf transitions to the abnormal cooling state and the fan level converges to a new stable value after several oscillations.

The figure below illustrates the behavior of the above cooling algorithm in finding a stable fan level in real shelf, in the presence of a substantial thermal load in the shelf. The configuration parameter NORMAL_STABLE_TIME is set to 30 minutes. The graph presents the fan speed changes over a period of 70 minutes.

The fan speed is initially lowered to 3. This causes a thermal alert, and increase in fan speed until the temperature is stabilized. Subsequently the fan speed is reduced and the level stabilizes at 4. After 30 minutes, the level is lowered to 3, which again causes a thermal alert, an increase in fan speed, with subsequent reductions, and the fan level again stabilizes at 4.

In addition, the fan level is set to the maximum for all fans in the following situations:

- Missing fan trays
- Fan tachometer sensor has a major or critical threshold crossed (a fan is stopped or rotates too slowly).
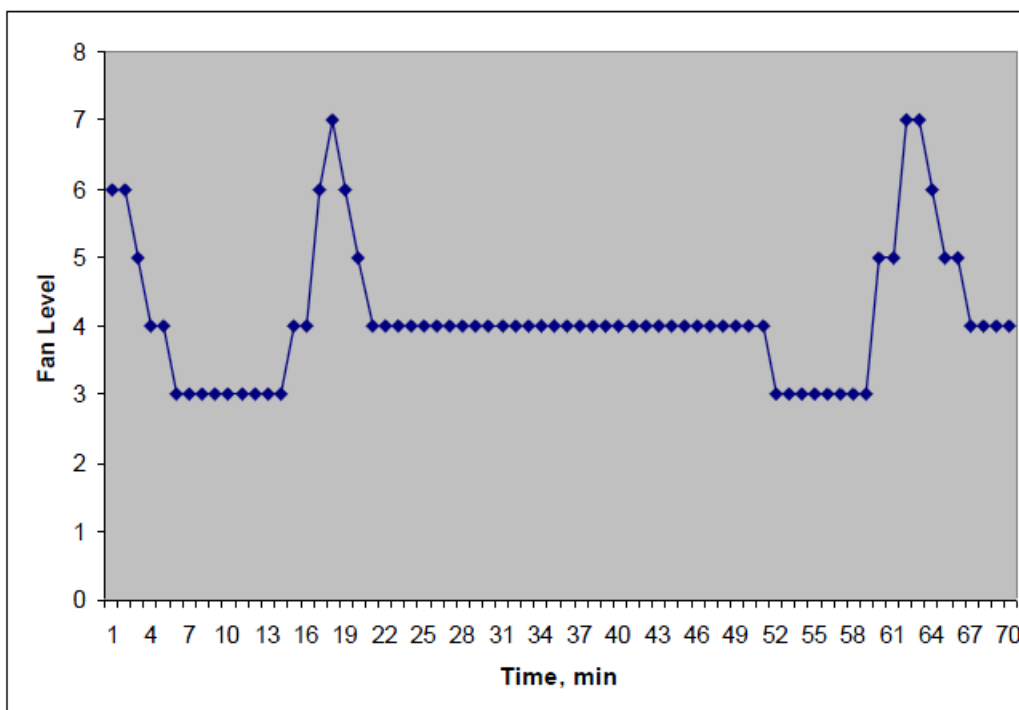
Figure 34: Cooling Algorithm Behavior

5.12   Shelf Power Management

The shelf manager performs power management of the shelf in accordance with the section 3.9 of the PICMG 3.0 specification.

During shelf initialization and when an FRU is hot inserted the shelf manager performs a power negotiation sequence for each FRU / blade and turns their power on. In this process, the shelf manager compares the FRU power requirement with the Maximum FRU Power value specified for its slot and calculates its impact on the available power of the segment. If the shelf power budgeting limitations are not met, the shelf manager leaves the FRU in state M3 (Activation in process) or powers down that FRU.

6 Debugging &Troubleshooting

6.1 Debugging

As a first step to any issue debugging:

Run the Summary script on the Active shelf manager:

. /etc/summary

Email the debug.log file that is created in the/tmp**/** directory.

The Active shelf manager has its Active LED lit in green, while the backup shelf manager has a blinking green Active LED.

To verify that you are interacting with the active Shelf Manager, use the cpld command and look for Active in the output of the command:

hwri

HWRI word: xxxx

:

   0040h – Active

clia version prints the version details

clia alarm prints the current alarm status

clia alarminfo prints the last alarm event details

6.2 Basic Log Analysis

To read the Debug logs, which are long text docs, you are advised to use utilities, such as Notepad++.

6.2.1   System Error Log

Towards the end of the Summary log file, the System Event Log (SEL) is listed. A typical error message looks like:

0x00F6: Event: at Dec 18 19:37:43 2013; from:(0x9a,0,0); sensor:(0x01,12); event:0x1(asserted): "Upper Non-Critical", Threshold: 0x2d, Reading: 0x2d

In this case on Dec 18 19:37:43 sensor #12 of board 9a reported a threshold crossing with a value of 2d (Hexa; =45).

In other parts of the log, you can find the following info regarding this event:

Sensor #12 of board 9a is the air intake temperature sensor, its current value is 38^0C and its Upper Non-Critical threshold is 45^0C:

9a: LUN: 0, Sensor # 12 ("Temp Air Intake")
   Type: Threshold (0x01), "Temperature" (0x01)
   Belongs to entity (0x03, 0x60): FRU # 0
   Status: 0xc0
      All event messages enabled from this sensor
      Sensor scanning enabled
      Initial update completed
   Raw data: 38 (0x26)
   Processed data: 38.000000 degrees C
   Status: 0x00

   9a: LUN: 0, Sensor # 12 ("Temp Air Intake")
    Type: Threshold (0x01), "Temperature" (0x01)
      Lower Non-Critical Threshold, Raw Data: 0x05 ; Processed data: 5.000000 degrees C
      Lower Critical Threshold, Raw Data: 0x01 ; Processed data: 1.000000 degrees C

Lower Non-Recoverable Threshold, Raw Data: 0xfb ; Processed data: -5.000000 degrees C

Upper Non-Critical Threshold, Raw Data: 0x2d ; Processed data: 45.000000 degrees C

Upper Critical Threshold, Raw Data: 0x37 ; Processed data: 55.000000 degrees C

Upper Non-Recoverable Threshold, Raw Data: 0x46 ; Processed data: 70.000000 degrees C

After the events log the system messages are displayed. Error messages have the following format:

Mar 17 19:54:01 shmm500 daemon.err shelfman[374]: Failed to read EEPROM #0 data byte

The main parts of the Summary log are:

Table 18: Summary Log Sections

Log section	Info
Shelfman version	Software and hardware versions
Shelfman status	Active/Backup shelf manager status
Board Information	Blade list
Detailed FRU Information	FRU status
Sensor Data	Sensor status
Sensor Thresholds	Sensor thresholds
Chassis Info Area	Chassis P/N and S/N
System Event Log	System events
System messages	System messages

The log and Telco Alarm use different names for the shelf's various alarm states:

Log state	Telco Alarm state
non-critical	Minor
critical	Major
non-recoverable	Critical

6.2.2   FRU ATCA State

The table below lists the FRU ATCA states.

Table 19: FRU ATCA States

Code	FRU ATCA states
M0	Not Installed
M1	Inactive
M2	Activation Request
M3	Activation in Progress
M4	FRU Active
M5	Deactivation Request
M6	Deactivation in Progress
M7	Communication Lost

6.3 FRU IDs

Front View
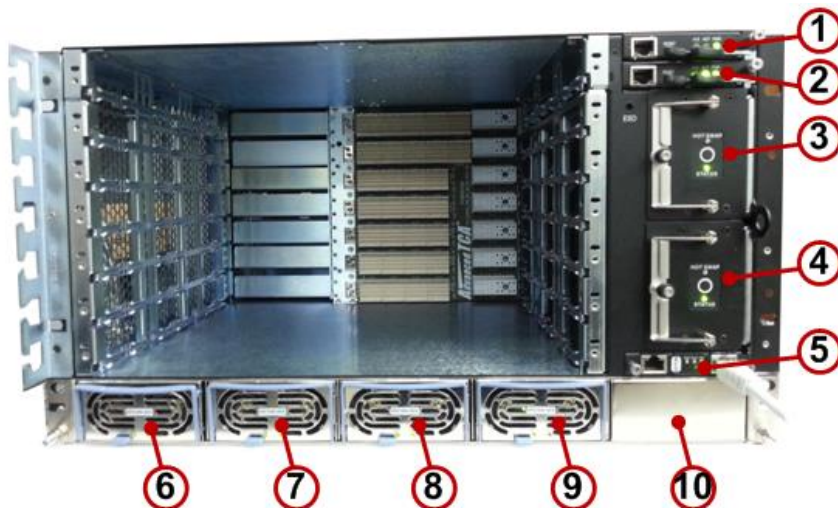
Figure 35: FRU IDs on Front View

Table 20: FRU IDs - Front View

#	Item	FRU ID
1	Shelf Manager 2 (top)	12
2	Shelf Manager 1 (bottom)	10
3	Fan Tray 2 (top)	20 10
4	Fan Tray 1 (bottom)	20 9
5	Front Panel	20 11
6	PS 1	20 14
7	PS 2	20 15
8	PS 3	20 16
9	PS 4	20 17
10	PS 5	20 18

Rear View (DC)

Figure 36: FRU IDs - Rear View

Table 21: FRU IDs - Rear View

#	Item	FRU ID
	Behind a rear panel:	
2	DC2DC2/ EEPROM2 (top)	20 6 / 20 2
1	DC2DC1/ EEPROM1 (bottom)	20 5 / 20 1
	Behind rear panels:	
3	Fan Driver 2 (top)	20 8
4	Fan Driver 1 (bottom)	20 7
5	DC PEM2 (top)	20 4
6	DC PEM1 (bottom)	20 3

#	Item	FRU ID
	RJ45 (AC only	20 13

6.4 Alarm States

Below is a table containing the Telco alarms and their states.

Table 22:Telco Alarms

Category	Telco alarm	Alarm source
Shelf	Minor	Temperature: shelf (Inlet), shelf manager (Top & Bottom), PEM, DC2DC, fan tray, Fan Driver
	Major	Temperature: shelf (Inlet), shelf manager (Top & Bottom), PEM, DC2DC, fan tray, Fan Driver Presence: DC2DC, fan tray Fan speed (low RPM)
	Critical	Temperature: shelf (Inlet), shelf manager (Top & Bottom), PEM, DC2DC, fan tray, Fan Driver
Blades	Minor	Per blades' definition
	Major	Per blades' definition
	Critical	Per blades' definition

6.4.1   Fans

The shelf manager commands all fans to rotate at their maximum speed in the following cases:

- One or more fans are missing
- One or more fans rotate below their lower speed threshold
- One or more temperature sensors are above their critical threshold (Major alarm)
- One or more temperature sensors are above their non-critical threshold and the cooling algorithm steps the fan rotation speed up until it reaches its maximum while the alarm condition is still on

7 Regulatory and Certification Information

By the time of its release, the shelf will hold certifications and will comply with a comprehensive list of regulations.

Some regulation tests may have to be repeated for the system level. System level regulation approvals are the integrator responsibility and Asis offers support for it.

7.1 Safety Compliance

The shelf complies with the following safety requirements:

- UL60950-1 /CSA 60950-1 (USA / Canada)
- EN60950-1 (Europe)
- IEC60950-1 (International), CB Certificate & Report including all group and country deviations
- Low Voltage Directive 2006/95/CE (Europe)

7.2 EMC Compliance

The shelf has been tested and verified to comply with the following electromagnetic compatibility (EMC) regulations:

- FCC Part 15 Class A /ICES-003 - Emissions (USA/Canada)
- CISPR 22 & CISPR 24 - Emissions (International)
- EN55022 - Emissions (Europe)
- EN55024 - Immunity (Europe)
- EN61000-3-2 - Harmonics (Europe)
- EN61000-3-3 - Voltage Flicker (Europe)
- EMC Directive 2004/108/EC (Europe)

7.3 Additional Certifications

The shelf holds certifications for the following:

- CE Declaration of Conformity (Europe)
- ROHS compliant - Directive 2011/65/EU
- Reach compliant
- Conflict Minerals compliant

8   Technical Specifications

This section details the technical specifications for each of the shelf's elements.

Category or Property	Description/Value
Physical	
Number of slots	7 slots 8Ux280mm (11 inches) front boards
	7 slots 70mm (2.76 inches) RTMs
Dimensions	Height - 5U: 222mm (8.75 inches); 6U: 267mm (10.5 inches)
	Width - 448mm (17.5 inches) (19" rack mount)
	Depth - 383mm (15 inches)
	Not including handles, latches and cable holders
Weight	AC configuration (including 4 power supplies) - 20Kg (44lbs)
	DC configuration (including 2 PEMs) - 15Kg (33lbs)
Other	Front and rear ESD jack
	Front rack flanges
	Front cable management tray
Environmental	
Temperature ▪ Operating ▪ Short-term	5°C to 40°C (41°F to 104°F) AC: -5°C to 50°C (23°F to 122°F); DC: -5°C to 55°C (23°F to 131°F)
Short-term with fan failure	-5°C to 40°C (23°F to 104°F)
Rate of temperature change	30°C/hr (54°F/hr)
Relative Humidity ▪ Operating	5%-85%
Short-term	5% to 90%, but not to exceed 0.024kg water/kg of dry air
Accessibility	
Front	Shelf Managers, Fan Trays, Front blades, Air Filter, Power Supplies
Rear	PEMs, RTMs, DC2DC, Fan Drivers, Alarm Panel

Category or Property	Description/Value
Backplane	
Base interface	Dual star bus Base channel interconnect between two ATCA slots, with support for 10/100/1000 BASE-T Ethernet Base channel 1 is allocated to Shelf Manager board
Fabric interface	Dual-replicated Mesh connectivity; 40Gbps per channel
Hub slots	Logical slots 1 and 2 (upper slots)
Update channels	Physical slot 1&2, 3&4 and 5&6
IPMB support	Dual redundant, full IPMB support with Asis shelf manager
Power	
AC Power Supply	Up to five 1600W redundant, self-cooled, hot swappable, integral power supplies in a 1U drawer Line voltage range: 100 – 240 VAC
DC input	-48 VDC (-40 to -57.6 VDC) or -48/-60 VDC (-40 to -72 VDC); Up to 2 redundant PEM modules, designed to carry 100 Amp each
Redundancy	Dual redundant DC PEM modules, each capable of supplying 100% of shelf power N+1 or N+N AC power supplies
EMC filtering	AC: Dual redundant EMC filtered power feeds DC PEMs provide common-mode and differential-mode filtering for conducted emissions, reducing differential-to-common-mode conversion
Cooling	
Number of fan trays	Two front accessible and hot swappable fan trays in a push scheme
Redundancy	N+1 (i.e., any one fan can fail with no service degradation)
Fan speed	Variable speed under shelf manager control

Cooling capacity

Configuration	Hub slots (2)	Node slots (5)	RTM (7)
Standard (6 fans)	56CFM 320W @ ΔT-10°C	74CFM 420W @ ΔT-10°C	8 CFM 45W @ ΔT-10°C
Enhanced (8 fans)	64CFM 365W @ ΔT-10°C	80CFM 455W @ ΔT-10°C	10 CFM 57W @ ΔT-10°C

Air filter	Front washable field replaceable

Category or Property	Description/Value
Shelf Management	
Shelf Manager	Two front accessible, redundant, hot-swappable IPMI Shelf Managers based on Pigeon Point ShMM Sentry 700
Managed IPMI Peripherals	Shelf EEPROM, AC Power Supply, Fan Tray, Fan Driver, PEM, Front Panel
Protocol Support	Multiple management interfaces supported: RMCP, SNMP, CLI and OpenHPI
Interface	10/100/1000 Base-T Ethernet and serial link
Software Upgrades	Software version is remotely upgradable
IPM Sensor Entries	Fan speed, temperature, voltage, presence