» User's Guide «

Kontron SYMKLOUD MS2900 Platform

Document revision 1.6

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1 User Information

1.1 Kontron User Documentation

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1.3 Quality Standards

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This Kontron product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron will at its discretion decide to repair or replace defective products.

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The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

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1.5 Technical Support

Technicians and engineers from Kontron and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your solutions.

Please consult our web site (www.kontron.com) for the latest product documentation, utilities, drivers, and support contacts.

2   About this Guide

The *Kontron SYMKLOUD MS2900 Platform User's Guide* is the central manual in the MS2900 documentation set. It covers all the features of the platform and provides links and references to other documents in the set for more detailed information about all the system components.

The topics covered in this User's Guide are:

» Safety information

» Feature summary and block diagram

» Component overview

» Physical specifications

» Environmental and regulatory specifications

» System management – thermal, power, cables and connectors

For more detailed information on these topics or additional features of the MS2900 platform, see all the available documentation and drivers on the Kontron web site http://www.kontron.com/

3 SYMKLOUD MS2900 Safety Information

Caution! The SYMKLOUD MS2900 Platform is ESD sensitive equipment. Users must observe precautions for handling electrostatic discharge sensitive devices. Also review the following safety instructions before you handle the equipment.

WARNING: Although you may be using this guide or another resource as a reference, before working with SYMKLOUD products, pay close attention to the safety information in this section. Assembly instructions in this guide must be followed to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products/components will void the CSA certification and other regulatory approvals of the product and will most likely result in non-compliance with product regulations in the region(s) in which the product is sold.

Read all caution and warning statements in this section before performing any of the instructions elsewhere in this guide or other SYMKLOUD MS2900 platform documentation.

3.1 General Safety Warnings and Cautions

WARNING: To prevent a fire or shock hazard, do not expose this product to rain or moisture. The chassis should not be exposed to dripping or splashing liquids and no objects filled with liquids should be placed on the chassis cover.

CAUTION: The MS2900 switch and the processor nodes inside the MS2900 system contain CR2032-type lithium batteries. There is a risk of explosion if the batteries are replaced by an incorrect type.
Dispose of used batteries according to the battery manufacturer's instructions.

3.2 General Power Safety Warnings and Cautions

NOTE: This equipment operates over the marked voltage and frequency range without requiring manual setting of any selector switches.

WARNING: The power button on the system does not turn off system power. To remove power from the system, you must unplug each power cord from the wall outlet or the power supply.

CAUTION: This unit usually has more than one power supply cord. Disconnect all power supply cords before servicing to avoid electric shock.

CAUTION: Equipment must be connected to protective earth ground with a minimum 6 AWG cable using the supplied double lug terminal.

Figure 1: Earth Ground Lug Location
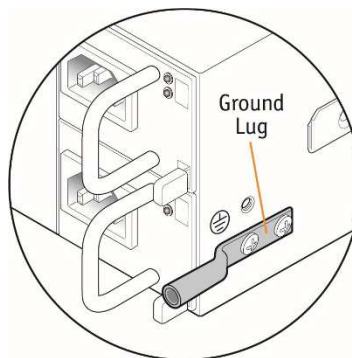
CAUTION: Power cords may not be furnished. Installation of this product must be in accordance with national wiring codes and conform to local regulations. Different types of line cord sets may be used for connections to the mains supply circuit and must comply with the electrical code requirements of the country of use. For India, the plug and power cord must be either certified as per IS 1293 and IS 616, or plug must meet the requirements of IS 1293 and cord should be certified as per IS 616.

CAUTION: The AC power supply plug is intended to serve as a power disconnect device. The socket outlet must be installed near the equipment and must be easily accessible.

3.3   DC Power Supply Safety

WARNING: An MS2900 platform equipped with DC power must be installed in a restricted access area. This equipment when powered by DC current must be protected by a listed branch circuit protector with a maximum 50 A rating. The DC source must be electrically isolated from any hazardous AC source by double or reinforced insulation.

WARNING: The 1100W DC power supply does not have polarity markings. Use the supplied DC power mating connector with a wire and polarities as shown in Figure 2.

Figure 2: 1100W DC Power Supply Connector Polarity
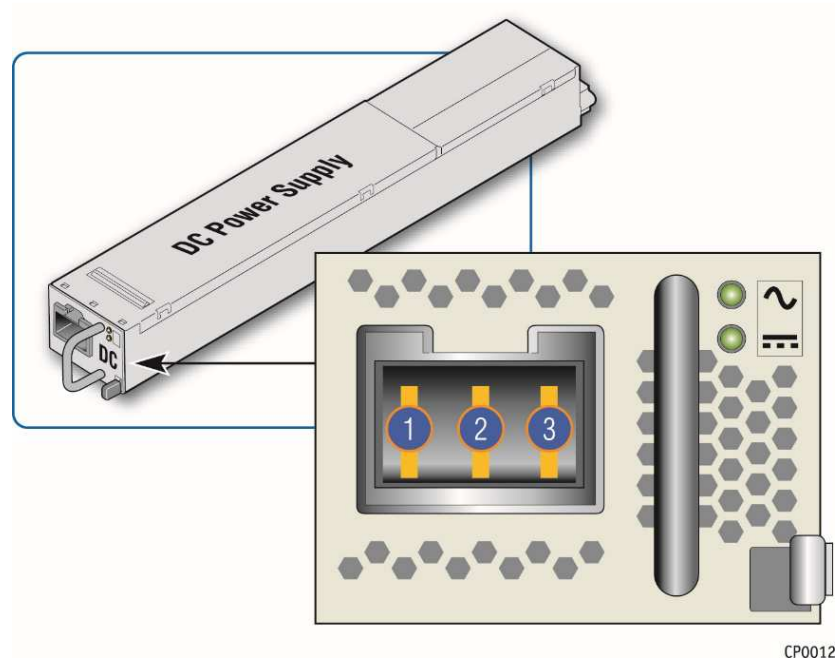
Pin (Input)	Name	Description
1	Vin+	Input positive
2	Vin-	Input negative
3	PE	Ground

Use 8 AWG wires at a minimum for connection to a DC power source
NOTE: the DC power supply is reverse polarity protected by internal diodes and will not operate at all if wired incorrectly.
WARNING: This equipment is designed to permit connecting the earth grounded conductor on the DC supply circuit to the earth grounding conductor on the equipment (MS2900 DC-equipped version only).
To make this connection, all of the following conditions must be met:
1. This equipment must be connected either directly to the DC supply system grounding electrode conductor or to a bonding jumper from a grounding terminal bar or bus to which the DC supply system earth grounding electrode is connected.
2. This equipment must be located in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between:
   a. the same DC supply circuit's earth-grounded conductor and the earth-grounding conductor, and also
   b. at the point of grounding for the DC system. The DC system cannot be grounded anywhere else.
3. The DC power supply source must be located within the same premises as the equipment.
4. The grounded circuit conductor between the DC source and the grounding electrode conductor's point of contact cannot be used for switching or disconnecting devices.

3.4   Rack Installation Safety

The following sections cover important guidelines and considerations for safely installing this equipment in a cabinet or rack.

3.4.1   Elevated Operating Ambient Temperature

If this equipment is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, be careful to install the equipment in an environment that is compatible with the maximum ambient temperature (TMA=55°C) specified by the manufacturer.

3.4.2   Reduced Air Flow

When installing this equipment in a rack, do not compromise the amount of air flow required for safe operation.

3.4.3   Mechanical Loading

When mounting this equipment in a rack, be careful not to create a hazardous condition by loading the equipment unevenly. The system comes with rear mounting flanges already in place on both sides of the chassis. Rails that fit in these flanges also come in the box
NOTE: Because the heaviest components in the chassis, i.e., the processor nodes and power supplies, are in the rear, using the slide rails and L-brackets for rear mounting is strongly recommended. This method will provide the most stable and secure cabinet/rack installation.
For information about installing the MS2900 system in a rack, see Section 4.5.3: Rack Mounting Equipment.

3.4.4   Circuit Overloading

When connecting this equipment to the supply circuit, be sure not to overload the circuits, as this can adversely affect overcurrent protection and the supply wiring. Check the supply equipment nameplate ratings when addressing this concern.

3.4.5   Reliable Earth-Grounding

Always maintain reliable grounding of rack-mounted equipment. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. when using power strips).

4   The SYMKLOUD MS2900 Platform

This chapter describes the main features of the Kontron MS2900 platform. It provides an overview and block diagram of the product, a list of the platform features, and also covers the mechanical, environmental, and regulatory specifications.

The Kontron SYMKLOUD MS2900 Platform is a fully integrated cloud computing infrastructure platform that uses a modular hardware and software design to provide excellent performance, energy savings, and ease of system management. The MS2900 platform supports high-availability features such as hot-swappable hubs (for the switch/ShMC), processor nodes, fans, and power supplies. The platform scales from one to nine processor nodes per system to multiple stacked systems in a cabinet/rack. The MS2900 platform also includes integrated System Monitor software and specialized management software/firmware for individual components such as the switch(es), etc. Figure 3 illustrates the flexible integrated features for this cloud computing solution.

Figure 3: Integrated Software and Hardware Components
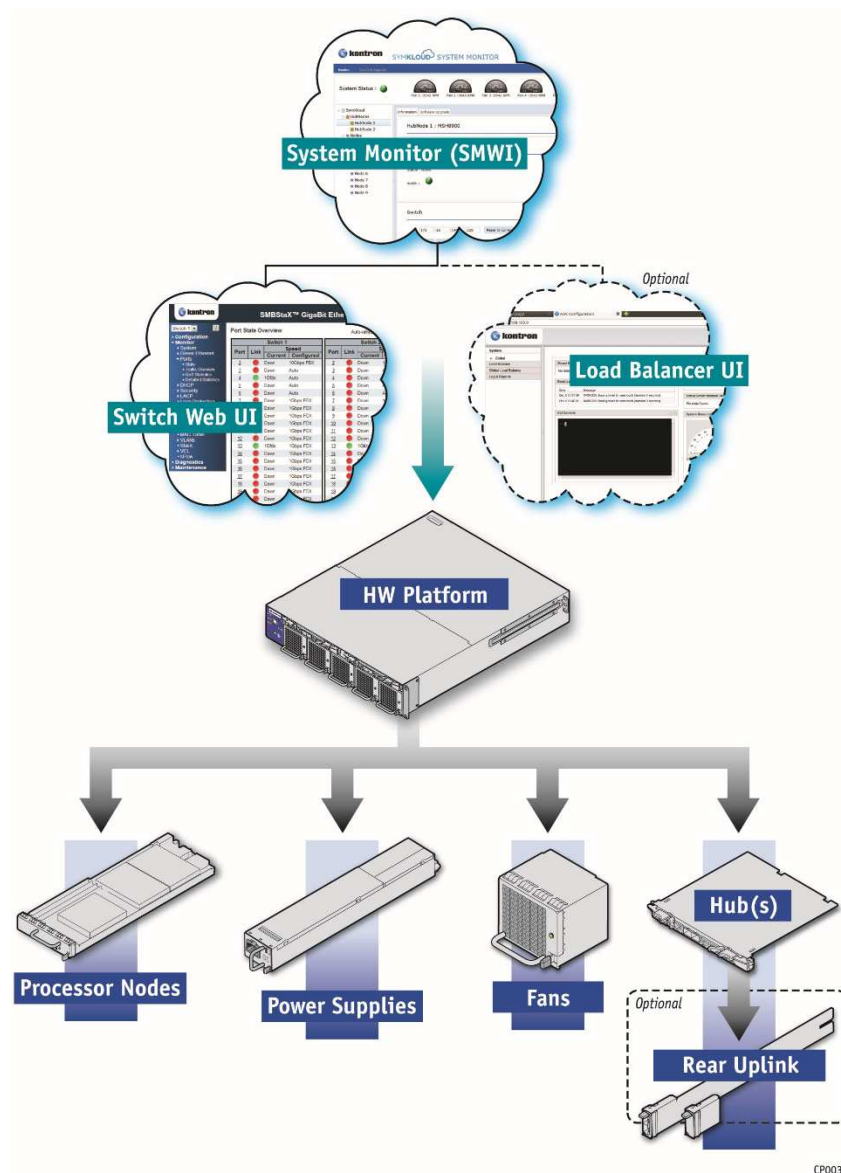
4.1   Feature Summary

Table 1 lists the key features of the MS2900 platform.

For up-to-date details of available Nodes, power supplies and other configurable options, please refer to the Symkloud Ordering Guide.

Table 1: Key Features

Feature	Description
Hardware Layer	
Hardware Platform	Ruggedized modular platform design 2U height, 21 inches deep Up to nine hot-swappable processor modules One or two hot-swappable hubs Up to two hot-swappable rear uplink modules Redundant management ports Five hot-swappable fans for front to back cooling Dual redundant AC or DC hot-swappable power supplies
Processor Node options (for each processor node)	Many configurable options exist across the various Processor Nodes available for the Symkloud platform (Single- or Dual-CPU, up to 32GB memory, GbE or 10G backplane Ethernet, on-board storage, etc.) See the Ordering Guide for a complete list of available Node models and options, or refer to the manual of the specific MSP node for more details.
Power Supplies	Two hot-swappable power supply units (AC or DC), 12 VDC output, 80 PLUS® silver or better efficiency
Fans	Five hot-swappable and redundant fans for uninterrupted front-to-back cooling
Switching Interface	Up to two hot-swappable MSH8900 hubs (See the *MSH8900 Hub Module User's Guide* for more information.)
Network Interfaces	High uplink capacity; 4x 10GbE ports, SFP+ (front or rear) 8x 1GbE ports, RJ-45
Management interface	2x 1GbE ports, RJ-45 2x serial port, RJ-45
Software Layer	
System Management	System Monitor Dedicated System Manager Remote management for diagnostics and AMT provisioning One-click updates for streamlined maintenance
Switch Management	Integrated BMC with IPMI and KVM Switch Web GUI
Support	Product life cycle support for 5 – 7 years
Compliance/Regulatory	Meets the following environmental, safety, and EMC requirements: EN 300 019 (meets) Telcordia GR-63 (designed to meet) Telcordia SR-3580 level 3 (designed to meet) Telcordia GR-1089 (designed to meet) EN 300 386 (meets) IEC/EN/CSA/UL 60950-1 (meets) FCC Part 15 (meets) (**Some limitations may apply, depending on the configuration)

4.2   Block Diagram

Figure 4 is the block diagram, which shows the internal connections among the components as well as how signals are routed.

Figure 4: MS2900 System Block Diagram
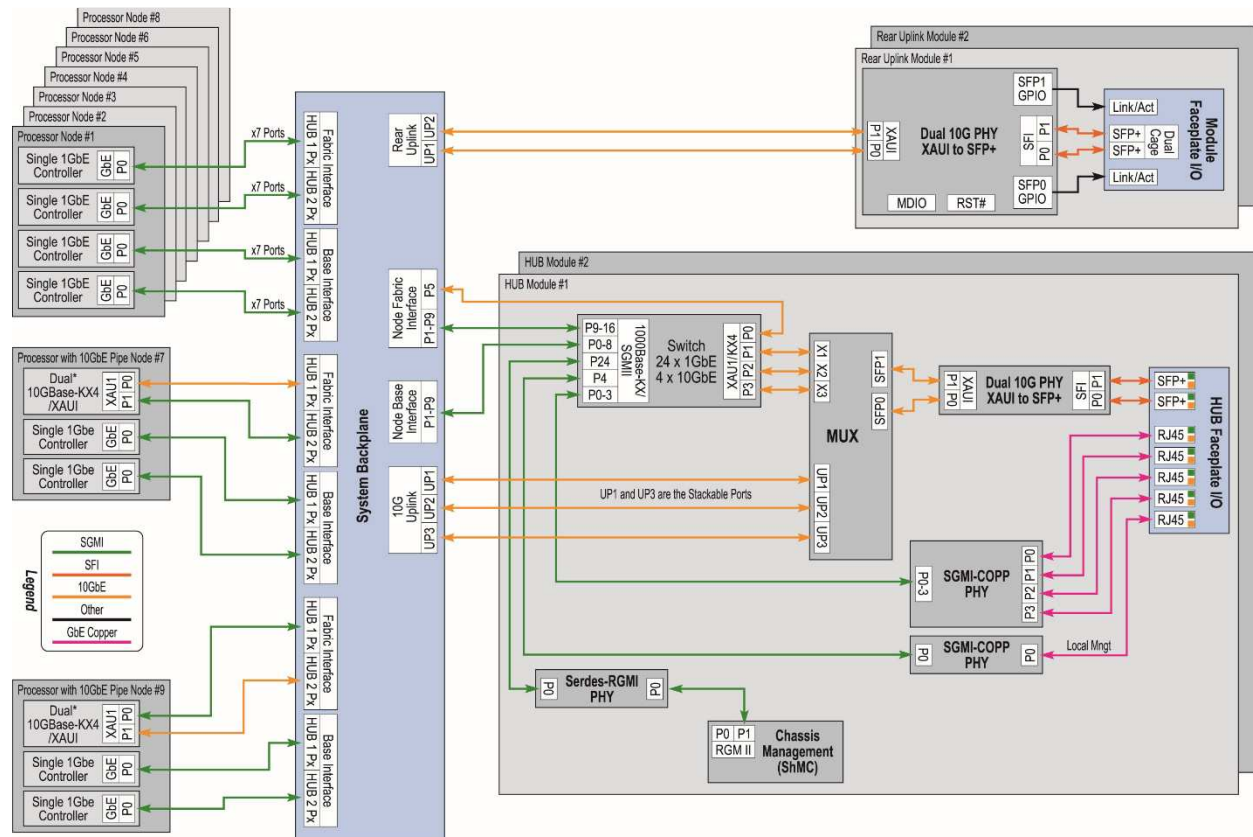
*Dual connectors to the backplane fabric interface have one 10GbE connector and one 1GbE connector each.

4.3   System Components

The modular design of the MS2900 platform makes all of the key system components hot-swappable, whether accessible from the front or rear external chassis panel.

4.3.1   Chassis Front Panel

Figure 5 shows the features and accessible components on the MS2900 system front panel.
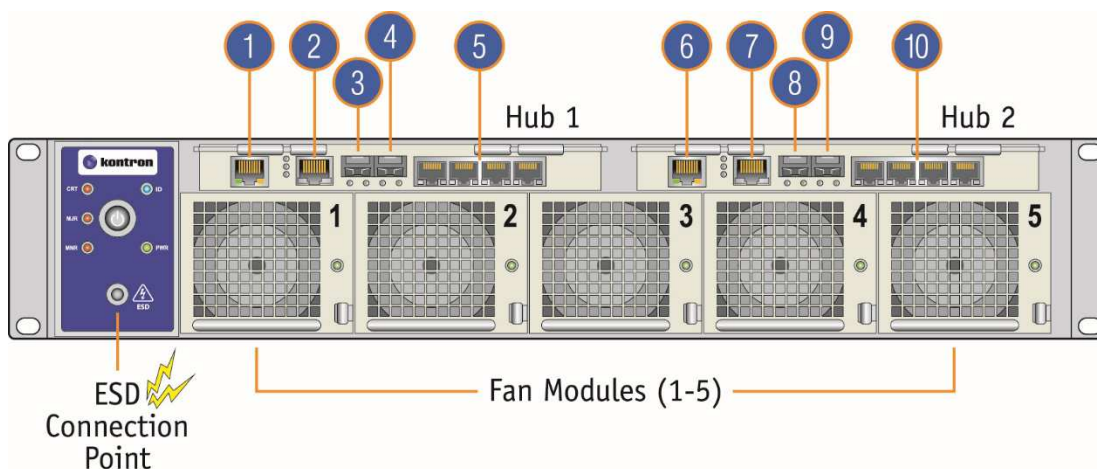
Figure 5: Front View

Table 2: Front View Components

Component	Description
1	Management 1GbE RJ-45 port (Switch/ShMC 1) (Marked "MNGT" on the Hub 1 faceplate)
2	Serial Console RJ-45 port (Switch/ShMC 1)
3	SFP+ stacking port (Switch/ShMC 1) (Marked ''1'' on the Hub 1 faceplate)
4	10GbE SFP+ uplink port (Switch/ShMC 1) (Marked ''2'' on the Hub 1 faceplate)
5	Quad GbE RJ-45 ports (Switch/ShMC 1) (Marked "3", "4", "5", and "6" on the Hub 1 faceplate)
6	Management GbE RJ-45 port (Switch/ShMC 2) (Marked "MNGT" on the Hub 2 faceplate)
7	Console RJ-45 port (Switch/ShMC 2)
8	SFP+ stacking port (Switch/ShMC 2) (Marked ''1'' on the Hub 2 faceplate)
9	10GbE SFP+ uplink port (Switch/ShMC 2) (Marked ''2'' on the Hub 2 faceplate)
10	Quad GbE RJ-45 ports (Switch/ShMC 2) (Marked "3", "4", "5", and "6" on the Hub 2 faceplate)

4.3.2 MS2900 Hot-Swappable Components

Table 3: Hot-Swappable Components

ID	Description	Location	Quantity
Hub	MSH8900 hub module	Front	2
Fan	Fan module	Front	5
Hub Uplink	Uplink module	Rear	2
Node	Node module	Rear	9

ID	Description	Location	Quantity
PSU	Power supply unit	Rear	2

4.3.3   System Control Panel

The control panel is the main health and status interface for the whole platform. Figure 6 shows the features on the control panel.

Figure 6: System Control Panel
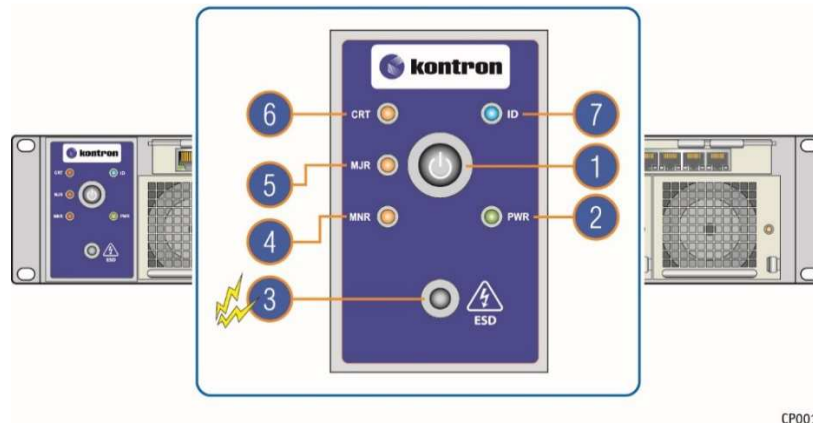
Table 4: System Control Panel Features

Feature	Description
1	Power button
2	Power LED (green)
3	ESD connection
4	Minor alarm LED (amber)
5	Major alarm LED (red)
6	Critical alarm LED (red)
7	Chassis ID LED (blue)

Table 5: Chassis Power Button Functionality

Current State	Short Press	Long press (>4 seconds)
Power OFF (Standby) Chassis is powered. PWR Led off and ID Led ON (Blue)	• Power on "Active" and "Stand-By" hub. • PWR Led will start to blink during the transition. • "Active" hub waits 30 seconds for switch to be up and running. • "Active" Hub sends power on command to all nodes. • Once all nodes and hubs reach the M4 State (power on) the PWR Led is turned on (green).	Nothing happens
Power ON Chassis is powered	• "Active" Hub sends graceful shutdown to all nodes. • PWR Led will start to blink during the transition to the "Power Off" state. • Wait for all nodes in the chassis to reach the M1	• Hub sends immediate power off command to all nodes. • Hub Sends immediate power off to "Stand-By" hub. • Power off "Active" hub.

Current State	Short Press	Long press (>4 seconds)
PWR Led ON (green) and ID Led OFF.	State (power off).* • Send graceful shutdown to "Stand-By" hub. • Perform graceful shutdown of "Active" hub.	• Once all nodes and hubs reach the M1 State (power off) the PWR Led is turned off.
Power State Transition	Nothing happens	Nothing happens

*Note: The node's BMC waits up to 5 minutes for the OS to shut down the CPU engine before forcing a power off.

4.3.4   MSH8900 Hub Modules

The MS2900 platform supports two hot-swappable hub modules installed from the front of the chassis. Each Hub modules includes both a Shelf Manager (ShMC) module and an Ethernet Switch (with 24x GbE + 4x 10GbE and associated PHYs).

The Hub 1 module is installed by default with the system. The Hub 2 module is optional. Adding a second hub gives the platform the following configurable capabilities:

>   » ShMC function: active-standby

>   » Switch function: active-active

Figure 5 shows the locations of the hubs on the front panel and the I/O connections on both Hub 1 and Hub 2 faceplates. Figure 9, "Rear View" shows the location of the uplink connections on the rear panel of the chassis. The 10GbE uplink ports can be used for high-speed connections to switch/ShMC Hub 1 and switch/ShMC Hub 2 instead of the front panel 10GbE ports.

The main functions of the hub modules are:

>   » Chassis shelf manager functions such as fans controls, system monitoring and reporting

>   » Web interface and IPMI 2.0 management

>   » Redundancy and hot-swap management

>   » Power management

>   » One-click updates

>   » Stacking support

>   » Chassis switching functions among all system components

Figure 7 shows the location on the chassis front panel of the hot-swappable hub modules.

Figure 7: Hot-Swappable hub module
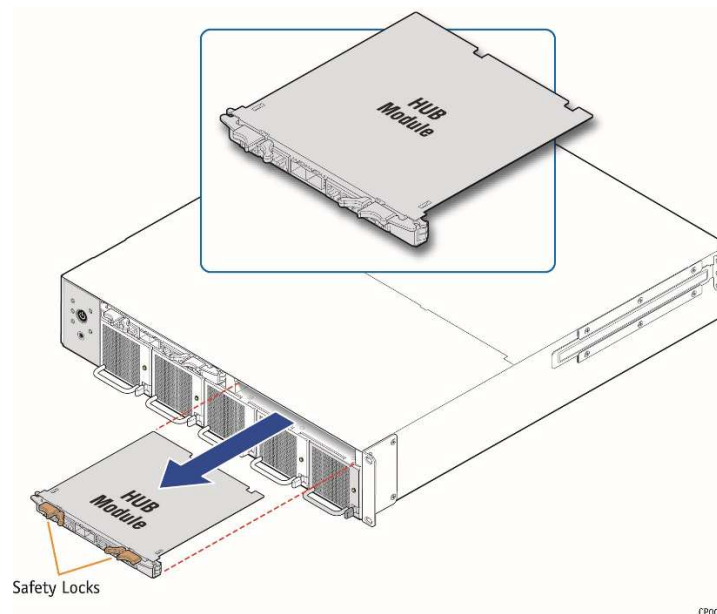
NOTE: See the *Kontron SYMKLOUD MSH8900 Hub Module User's Guide* on the Kontron web site at http://www.kontron.com/ for detailed information about this subsystem.

4.3.5   System Fans

There are five hot-swappable system fans on the MS2900 platform. Each fan module consists of a single 60x60x38mm fan, its housing, lock, and status LED. Figure 8 shows the location of the system fans on the chassis front panel.

For information about cooling and thermal management within the MS2900 platform, see Section 5.2.2, "Cooling and Thermal Management".

Figure 8: Hot-Swappable System Fan Module
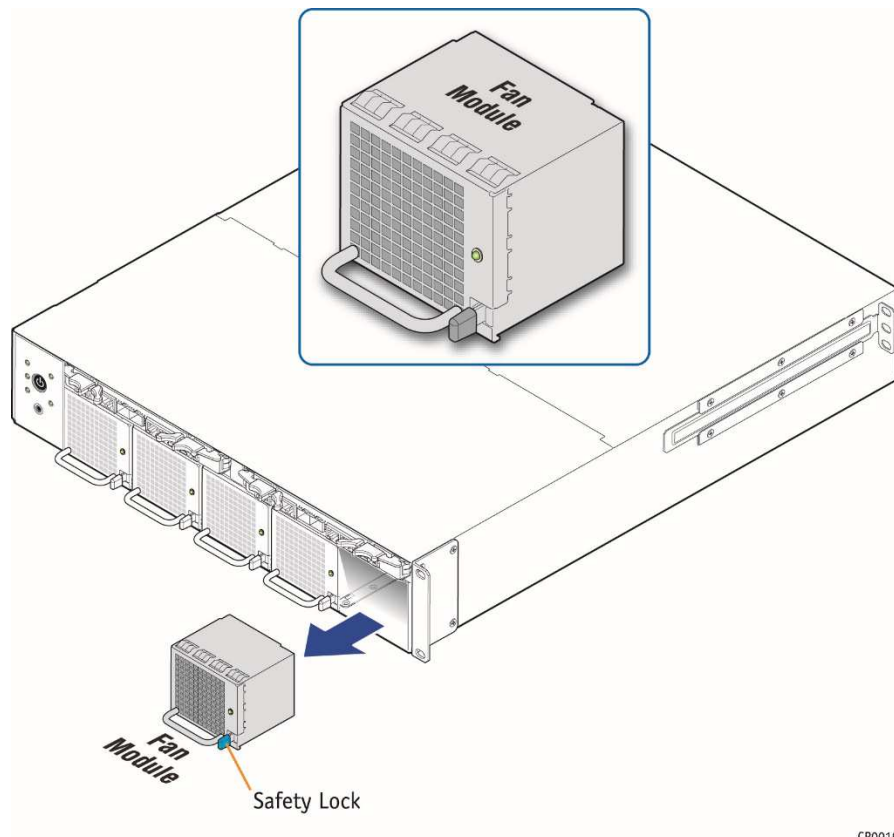
4.3.6   Chassis Rear Panel

Figure 9 shows the features and accessible components on the rear panel of the chassis.

Figure 9: Rear View
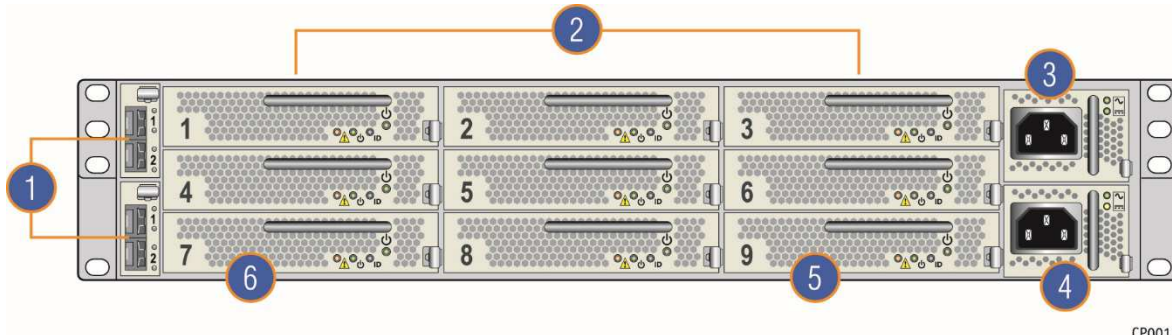
Table 6: Rear View Components

Feature	Description
1	Rear-Uplink ports (with 2x MSU8900) - Hub 2 Uplink ports (top): port 1 stacking, port 2 uplink - Hub 1 Uplink ports (bottom): port 1 stacking, port 2 uplink
2	Up to nine processor subsystem nodes, slots 1 – 9 NOTES: 1) Slots 7 and 9 have one 10GbE port, see lines 5 and 6 　　　　　 2) Unpopulated slots ship with blank filler modules
3 & 4	AC or DC power supply unit (PSU 1 & 2)
5 & 6	Slots 7 & 9; with 3x GbE and 1x 10GbE ports

4.3.7   Processor Nodes

Up to nine processor nodes can be installed in the rear of the chassis. Figure 9, "Rear View" shows the node numbering. Filler modules are used in all slots that do not have processor nodes installed.

Figure 10 shows a hot-swappable processor node being removed from the chassis rear panel.

Figure 10: Hot-Swappable Processor Nodes
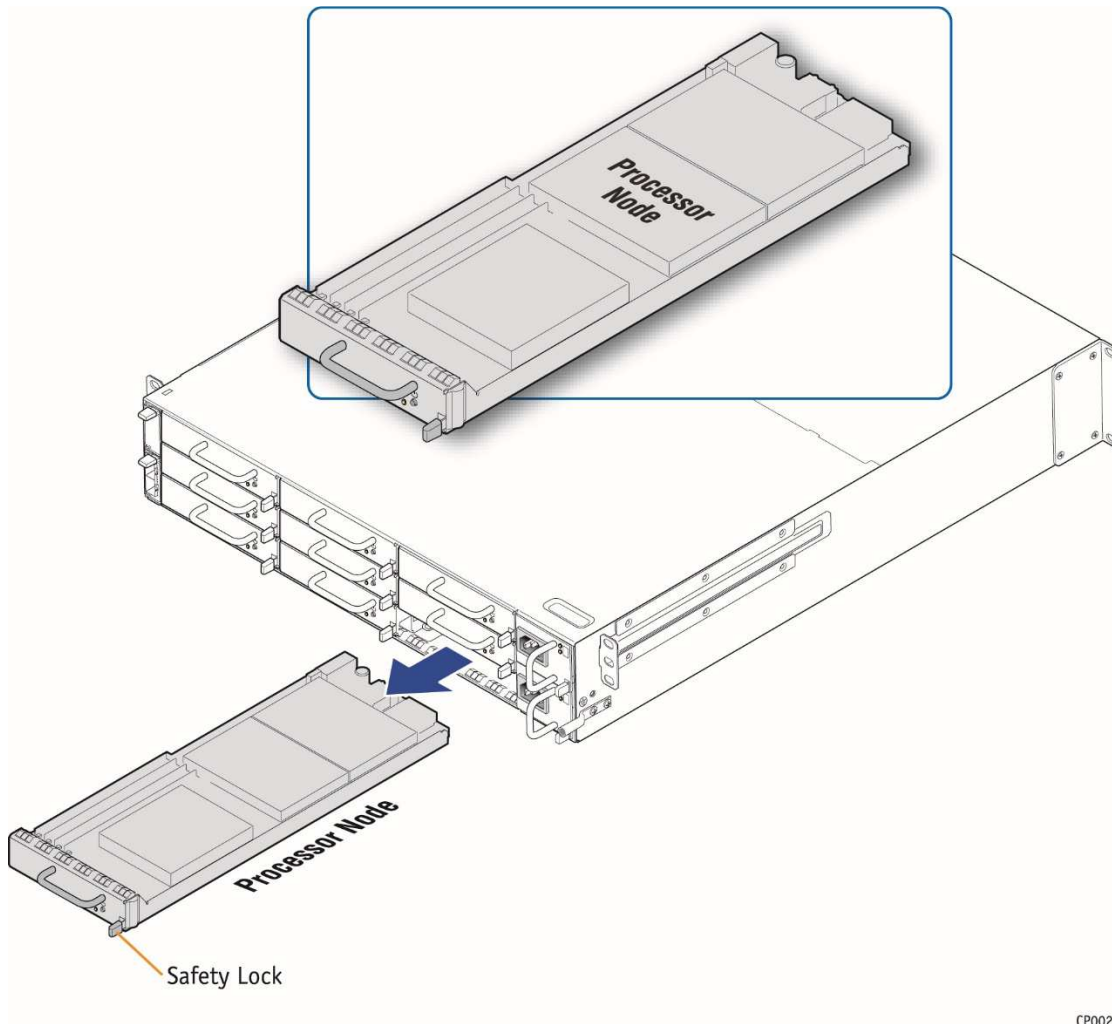
NOTE: See the *Kontron SYMKLOUD MSP8000/MSP8001 Processor Node User's Guide* or the *MSP8020 Processor Node User's Guide* on the Kontron web site at www.kontron.com for detailed information about this subsystem.

The MS2900 platform provides one internal 10GbE connection to each slot 7 (from Hub 1) & slot 9 (from Hub 2) (when used with 10G-enabled nodes). See Figure 9, "Rear View" for these slot locations.

4.3.8   Uplink/Stacking Module

The MS2900 platform provides for two optional uplink/stacking modules, one for each hub, accessible from the rear panel of the chassis. Figure 11 shows the location of the two slots (one for each hub). If a slot is not used for an uplink module, there is a blank filler module in the slot.

Figure 11: Hot-Swappable Uplink Module
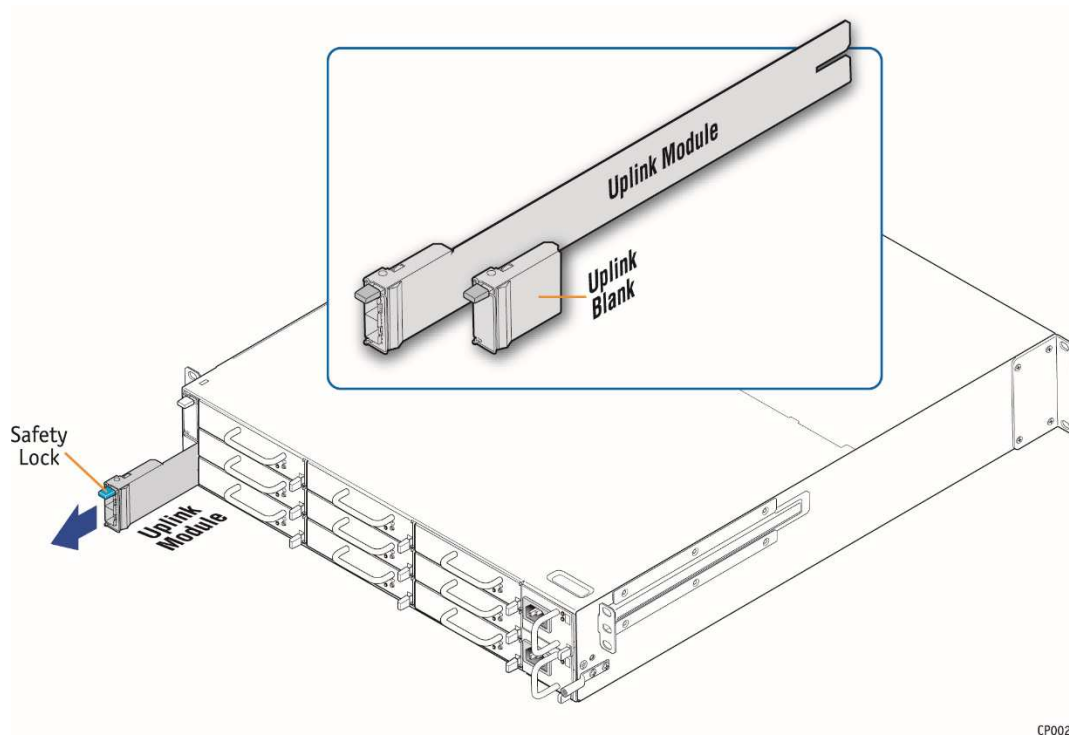
The key features of the uplink module are:

» Two SFP+ cages

» Status LEDs

» Electrically hot swappable

NOTE: When using optical SFP+ modules in Uplink Modules, the chassis alignment bracket may prevent easily pulling or closing the SFP+ release clamp. Pulling out the whole Uplink Module to release the SFP+ module is suggested.

4.3.9 Power Supply Units

The MS2900 platform provides two bays for hot-swappable power supply units (PSUs), either AC or DC. Two PSUs ship with the platform. Figure 12 shows the location of the power supply units at the rear of the chassis.

NOTE: Read the power safety warnings in Sections 3.2 and 3.3 before handling the power supply units.

Figure 12: Hot-Swappable Power Supplies
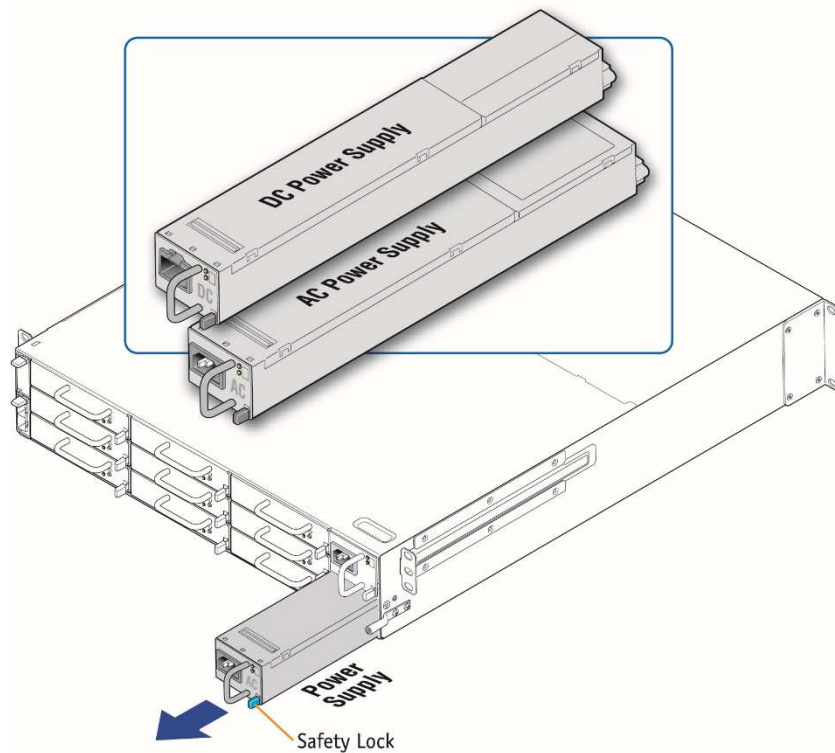
See section 5.2.3 for information about the MS2900 platform power requirements.

The key features of the power supply units are:

» Hot-swappable

» PMBus

The MS2900 supports up to two (2) redundant AC or DC power supplies. The rated power output of these PSUs is directly related to the Voltage input and the ambient temperature.

Table 7: Power Supply

Description	Input Voltage Range	Power (W)	Quantity	Subtotal (W)
AC power supply module (1100W)	90 to 264 VAC	1080[1]	2	2160
DC power supply module (1100W)	-40 to -72 VDC	1080[1]	2	2160
AC power supply module (1300W)[2]	90 to 264 VAC	1300[1]	2	2600
AC power supply module (1500W)[3]	85 to 264 VAC	1500[1]	2	3000
DC power supply module (1500W)	-40 to -72 VDC	1500[1]	2	3000

[1] Subject to temperature or input voltage de-rating

[2] A 12 Amps cable rated 105°C must be used to limit de-rating

[3] A 15 Amps cable rated 105°C must be used to limit de-rating

Table 8: Output Power (Watts) as a function of ambient temperature and AC input voltage (de-rating)
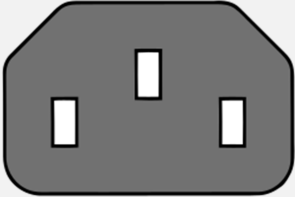
Ambient Temperature (C)

		25	30	35	40	45	50
90	1100W	984	984	984	900	900	825
	1300W	960	960	960	960	960	936
	1500W	1260	1260	1260	1260	1160	1075
115	1100W	1080	1080	1080	1080	1080	1005
	1300W	1080	1080	1080	1080	1080	1008
	1500W	1500	1500	1500	1500	1500	1300
120	1100W	1080	1080	1080	1080	1080	1005
	1300W	1300	1200	1200	1080	1069	1068
	1500W	1500	1500	1500	1500	1500	1400
180	1100W	1080	1080	1080	1080	1080	1005
	1300W	1300	1300	1300	1200	1200	1164
	1500W	1500	1500	1500	1500	1500	1400

Table 9: Output Power (Watts) as a function of ambient temperature or DC input voltage (de-rating)

Ambient Temperature (C)

		25	30	35	40	45	50
-40V to -72V	1100W	1080	1080	1080	1080	1080	924
-40V to -72V	1500W	1500	1500	1500	1500	1500	1350

AC Power Supply Inlet

Table 10: Power Supply Connector

Description	Max. Input Current (A)	PSU Receptacle Type	Mating Cable Description
1100W AC power supply module	13A	IEC60320-C14	A cable with **C13** plug rated at 105°C must be used.
1300W AC power supply module	12A	IEC60320-C14	A cable with **C13** plug rated at 105°C must be used.
1500W AC power supply module	15A	IEC60320-C16	A cable with **C15** plug rated at 105°C must be used.

DC Power Supply Inlet

Table 11: Power Supply Connector

Description	Max. Input Current (A)	Conditions
1100W DC power supply module	33	N/A
1500W DC power supply module	51	Vin = -48VDC to -60VDC

Figure 13: 1100W DC Power Supply

CP0012
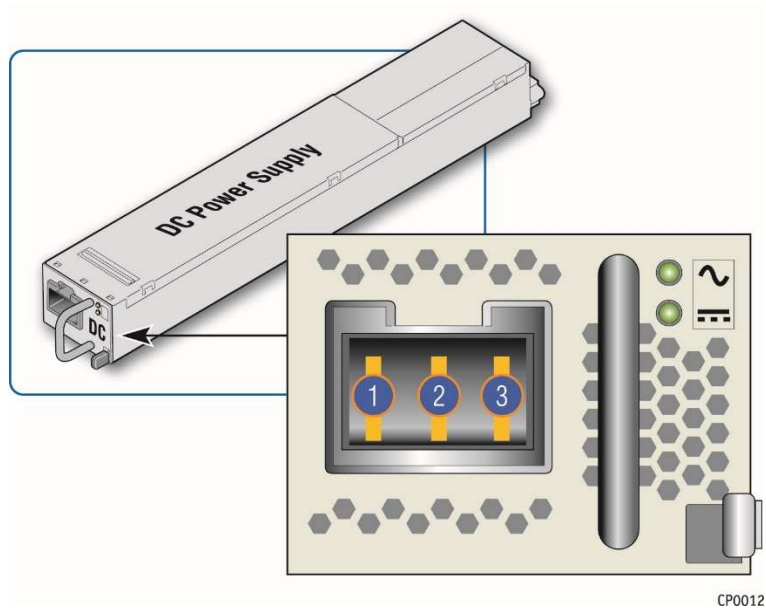
Pin (Input)	Name	Description
1	Vin+	Input positive
2	Vin-	Input negative
3	PE	Ground

Figure 14: 1500W DC Power Supply

CP0101A
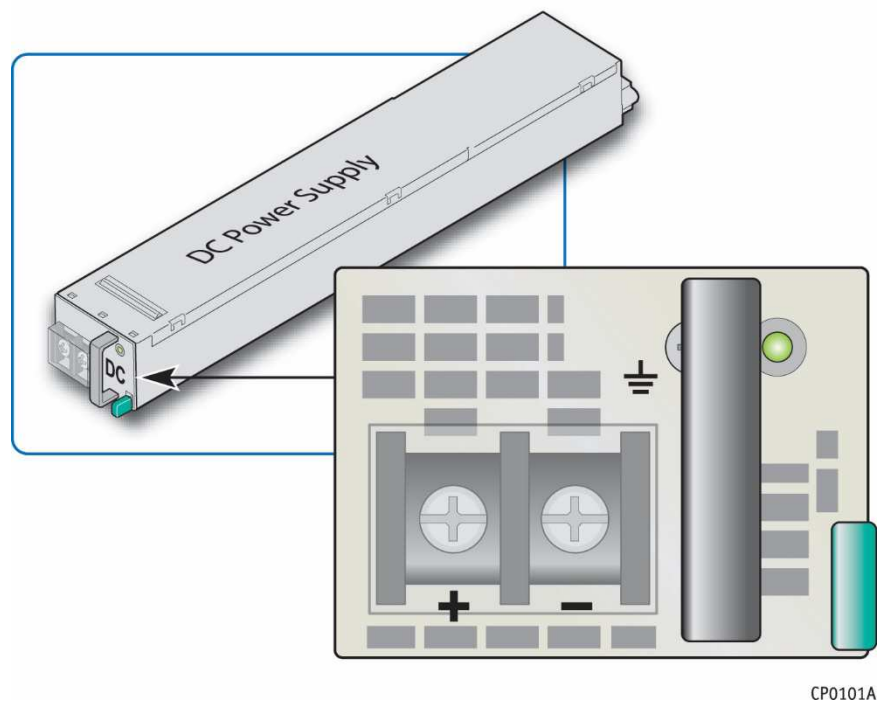
1500W DC Power Supply Mating Cable Preparation

Kontron suggests using crimp lugs (model: Molex LLC 0190710178, ring terminal, straight, 8 AWG, isolated, UL94V-0, 50A rated) on the power cables. Connect the appropriate cable to the appropriate polarity.

NOTE: Read the power safety warnings in Sections 3.2 and 3.3 before handling the power supply units.

NOTE: Pliers may be used to bend the crimp lugs.
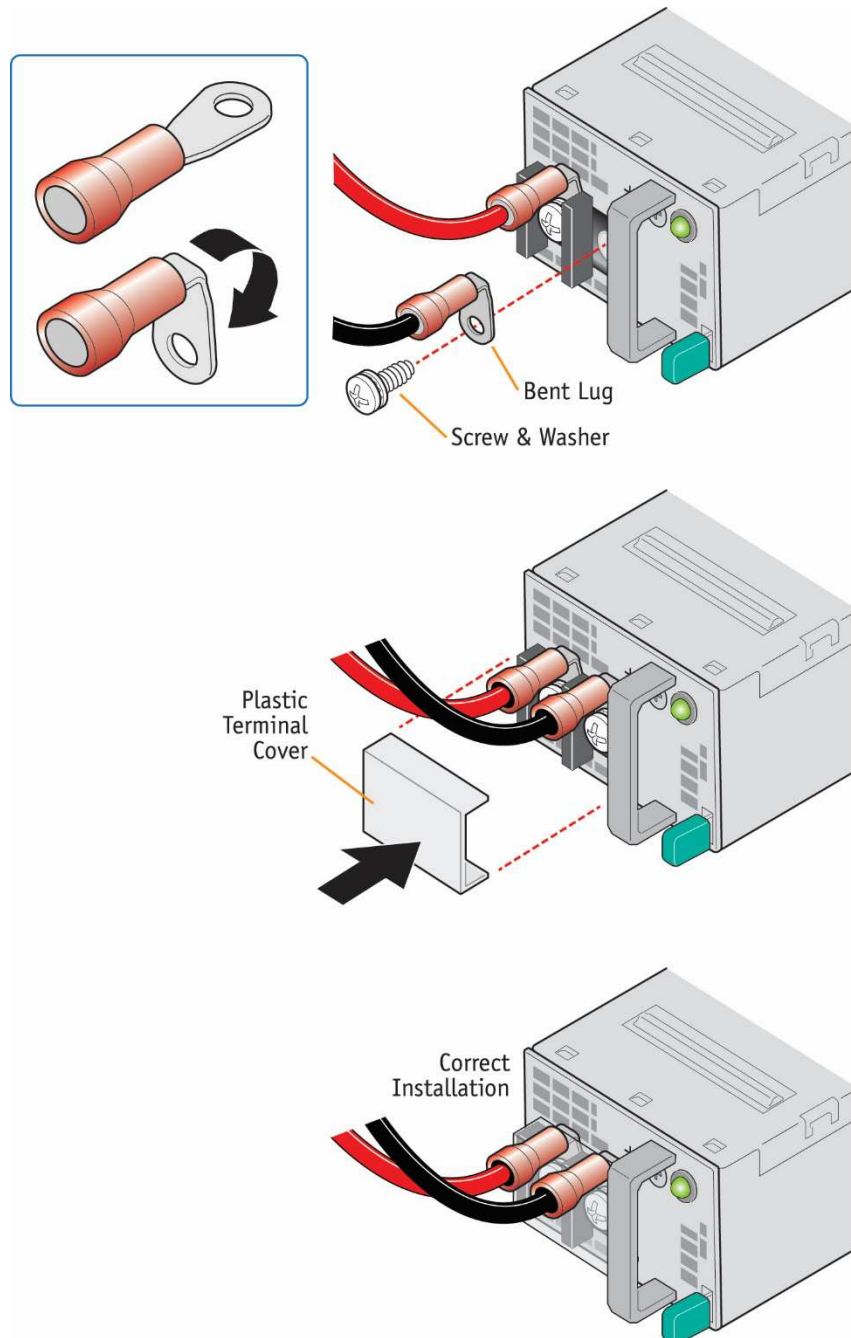
Figure 15: 1500W DC Power Supply Cable Preparation and Connection

4.4 Supported Operating Systems

The MS2900 platform supports most major OS distributions. Refer to the processor node User's Guide that covers the processor node and CPU model used on your platform for a list of supported OS versions. Kontron continuously improves and extends the product documentation set for this platform. The latest documentation covering supported operating systems will be made available on the Kontron web site (www.kontron.com).

4.5 Mechanical Specifications

The MS2900 chassis is a modular 19-inch rack-mount unit that is 2U x 21 in. deep. The system has brackets and rails to support front or middle solid rack/cabinet mounting as well as adjustable rear mounting.

4.5.1 Physical Dimensions

This table shows the height, width, and depth measurements for the chassis.

Table 12: Physical Dimensions

Chassis	Measurements (mm [in])	Notes
Depth	533,4 mm [21 in]	Body
	580,2 mm [22.8 in]	Total with front handle (19 mm [0.75 in]) and rear power supply handles (27,8 mm [1.1in])
Width	449 mm MAX [17.6 in]	Body
	483,4 mm MAX [19 in]	Overall width: front/mid mounting brackets included (2x 17,2 mm [0.7 in])
	465.5 mm [18.3 in]	Between rack mounting points
Height	88.1 mm MAX [3.5 in]	Body
Side clearance	76.2 mm [3 in]	Between rack mounting points
Front clearance	100 mm [4 in]	Recommended
Rear clearance	150 mm [6 in]	Recommended

4.5.2   Shipping Weights

The following table shows the weights of all components in both kilograms and pounds.

Table 13: Shipping Weights

Descriptions	Weight (kg)	Weight (lbs)
System weight - with fan modules only	12.1	26.6
System packaging	1.94	4.3
MSP8000/MSP8001 – typical processor node (with CPU and DIMM)	0.880	1.9
MSP8020 – typical processor node (with CPU and DIMM, without HDD)	1.08	2.4
MSH8900 hub	0.64	1.4
MSU8700 uplink module	0.30	0.7
AC power supply	1.34	2.95
DC power supply	1.34	2.95
Node carrier (bare sled - for unused slots)	0.36	0.80
Hub filler panel	0.14	0.3
Uplink module filler panel	0.04	0.09
Fan module	0.30	0.7
Generic DIMMs (2)	0.02	0.04
Solid State Drive (SSD)	0.15	0.3

4.5.3   Rack Mounting Equipment

The MS2900 platform comes with both front and rear mounting attachments. The front of the chassis has brackets attached on each side for fastening the system in a cabinet/rack. These brackets can also be mounted on the chassis center of mass for mid-mount applications. The system also comes with two slide rails to enable mounting at the rear of the cabinet/rack and an optional set of longer slide rails can be ordered for cabinets deeper than 24 inches.

NOTE: Because the heaviest components in the chassis (i.e. the processor nodes and power supplies) are in the rear, rear mounting using the slide rails and L-brackets is required, unless you must use the center mounting method. Using both front and rear mounting provides the most stable and secure cabinet/rack installation.

For installing the slide rails, the system has rear mounting flanges already in place on both sides of the chassis. No screws are needed; just slide the rails between the flanges with the L-bracket facing the rear of the chassis. See Figure 16.

Once the rails are installed on the MS2900 system, you will need four screws to fasten the rails to the rack posts. Depending on the width of the cabinet or rack you are using, the grounding lug on the left rear side of the chassis may make this a tight fit. If the chassis doesn't slide in easily, you may have to tilt or wiggle the chassis to get it into the rack. If that doesn't work, you can remove the grounding lug by unscrewing the two fasteners and re-attaching the lug from the rear of the cabinet/rack once you have the chassis in place. See Figure 16.

Figure 16: Attaching Slide Rails for Rear Mounting
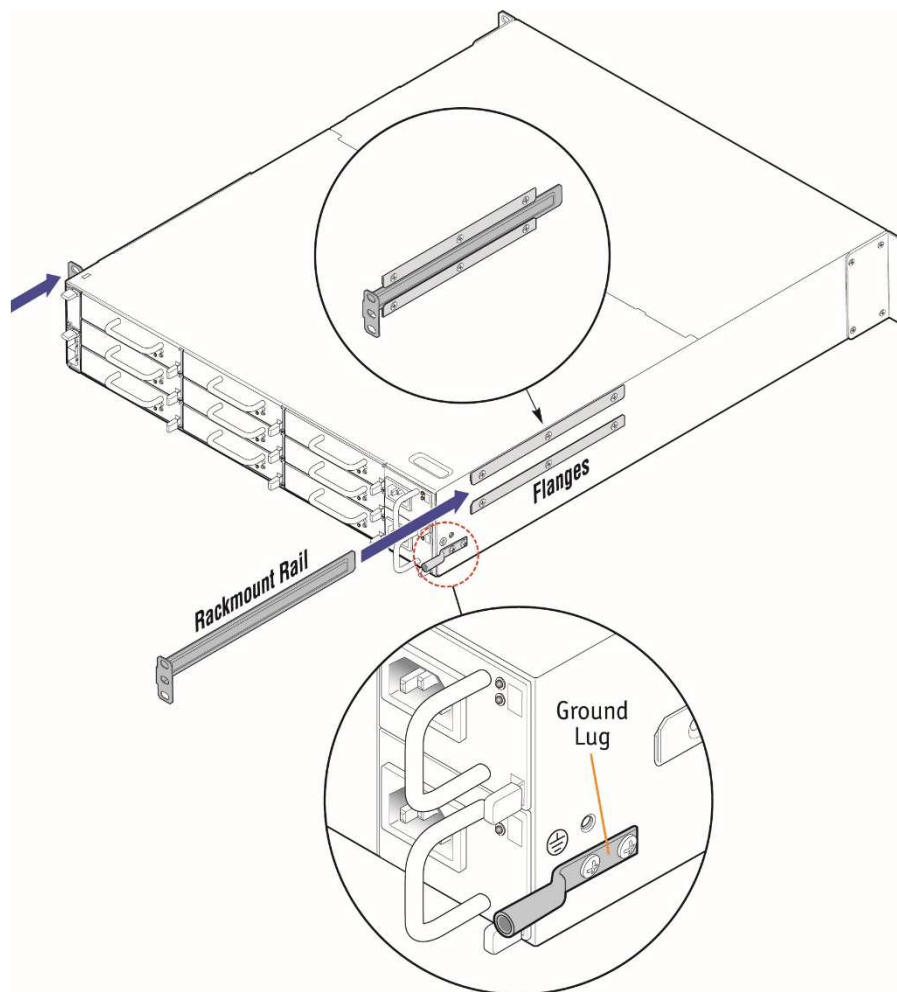
4.5.4   Environmental Specifications

The MS2900 Platform meets the following environmental tests and standards:

Table 14: Environmental Specifications

Environment	Specification
Temperature, operating	-5ºC to +55ºC (23º F to 131º F) (some limitations may apply, depending on the configuration)
Temperature, non-operating	-40º C to +85º C (-40º F to 185º F)
Temperature, operating (high altitude)	Up to 61ºC for altitude compensation at 6,000 ft (1800 m) 1ºC rise per 1000 ft
Humidity, operating	This product meets a test profile based on GR-63, ETSI EN 300 019-2-3 Class 3.1E, ETSI EN 300 019-2-2 Class 2.3, and ETSI EN 300 019-2-1 Class 1.2 5% to 93%, non-condensing at 40ºC
Humidity, non-operating	5% to 93%, non-condensing at 40º C (104º F)
Altitude/pressure, operating	Testing done at sea level; ambient temperature is increased 1ºC per 1,000 ft to reflect the altitude effect on cooling -300 m to 4,000 m at aisle-ambient 40ºC (May require cooling above 1,800 m)
Altitude/pressure, non-operating	-300 m to 14,000 m
Vibration, operating	This product meets operational swept sine vibration Test profile based on GR-63, clause 5.4.2, and ETSI EN 300 019-2-3, class 3.2 5 Hz to 200 Hz @ 0.2g This product meets operational random vibration Test profile based on ETSI EN 300 019-2-3, class 3.2 5 Hz to 10 Hz @ +12 dB/oct (slope up) 10 Hz to 50 Hz @ 0.02 m2/s3 (0.0002 g2/Hz (flat) 50 Hz to 100 Hz @ -12 dB/oct (slope down) 30 minutes per each of three axes
Vibration, non-operating	This product meets transportation and storage swept sine vibration Test profile based on ETSI EN 300 019-2-1, class 1.2 5 Hz to 200 Hz @ 0.2g This product meets transportation and storage random vibration Test profile based on GR-63, clause 5.4.3, and ETSI EN 300 019-2-2, class 2.3 5 Hz to 20 Hz @ 1m2/s3 (0.01 g22/Hz) (flat) 20 Hz to 200 Hz @ -3 dB/oct (slope down) 30 minutes per each of three axes
Shock, operating	This product meets operational shock standards Test profile based on ETSI EN 300 019-2-3, class 3.2 11 ms half sine, 3g, three shocks in each direction
Shock, non-operating	This product meets transportation and storage half sine shock Test profile based on ETSI EN 300 019-2-2, class 3.2 6 ms half sine, 18g, 100 shocks in each direction
Drop/free fall	This product meets Bellcore GR-63, section 5.3 Packaged = 1,000 mm, six surfaces, three edges, and four corners Unpackaged = 100 mm, two sides and two bottom corners
Electrostatic discharge (ESD)	This product meets 8kV Contact, 15 kV Air Discharge using IEC61000-4-2 Test Method.
Acoustic	Designed to meet GR-63 and EN 300 753
RoHS	This product is designed to meet China RoHS Phase 1 (self-declaration and labeling) This product complies with EU directive 2002/96/EC (WEEE) This product complies with RoHS directive 2011/65/EU

4.5.5 Regulatory Specifications

The MS2900 platform meets the following regulatory tests and standards:

Safety Compliance

USA/Canada	This product meets all requirements of UL/CSA 60950-1
Europe	This product complies with the Low Voltage Directive, EC Council Directive 2006/95/EC and EN 60590-1
International	This product meets IEC 60950-1

Electromagnetic Compatibility

USA/Canada	This product meets all requirements of FCC Part 15 and GR-1089.
Europe	This product complies with the Electromagnetic Compatibility Directive, EC Council Directive 2004/108/EC and ETSI EN 300 386, EN 55022, and EN 55024.
International	CISPR 22 Class A and CISPR 24

4.5.6 CE Mark

The CE marking on this product indicates that it is in compliance with the European Union safety, EMC and RoHS requirements.

4.5.7 Waste Electrical and Electronic Equipment Directive (WEEE Directive)

This product contains electrical or electronic materials. If not disposed of properly, these materials may have potential adverse effects on the environment and human health. The presence of this logo on the product means it should not be disposed of as unsorted waste and must be collected separately.

To find out how to properly dispose of this product, please contact your customer service representative.

5 Platform Management

This chapter covers the MS2900 software/firmware that enables monitoring and upgrading the subsystem components.

5.1 System Manager & System Monitor

The SYMKLOUD Shelf Manager hosts a monitoring, management and maintenance application called System Manager. The functions of the System Manager are available through an API or a web interface. The System Monitor is the web interface also hosted by the Shelf Manager. It provides a graphical representation of the features provided by System Manager's API.

The key features of the System Monitor are:

» Monitor system health

» System Maintenance (One-Click firmware upgrades)

» Access to switch configuration page

» Access to node KVM

NOTE: See the *Kontron System Monitor User's Guide* on the Kontron web site (www.kontron.com) for detailed information about this application.

Figure 17: Main Page Overview
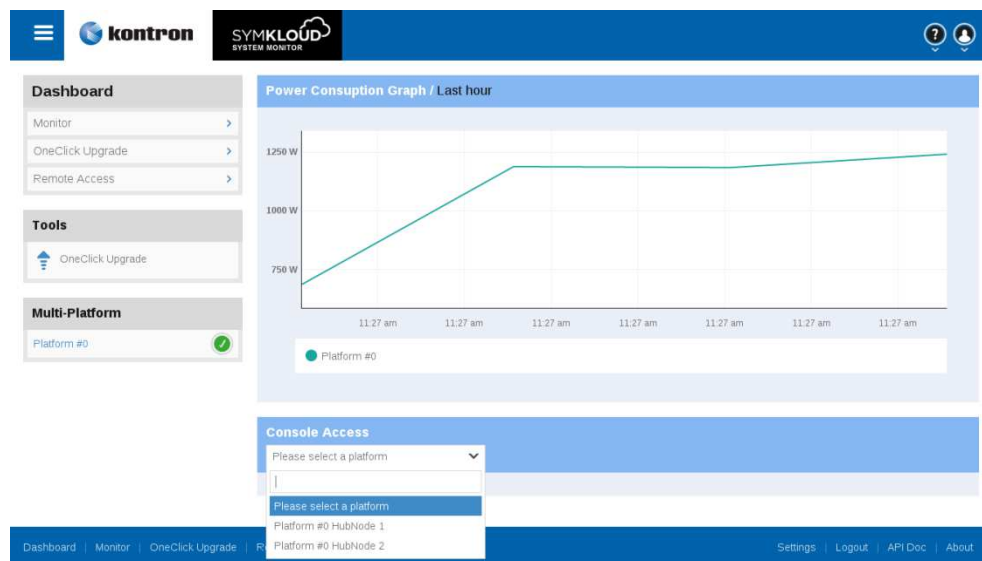
5.1.1   Platform Health Monitoring

Each node BMC and hub ShMC of the MS2900 platform implements a set of component "Health Status". The "Health Sensor" of each component aggregates the state of local sensors. The list of sensors for the nodes and hubs usually includes critical voltage, temperature and discrete sensors. Please consult the associated User Guide for a detailed list of sensors members of this aggregate for a specific node or hub.

Additionally ShMCs on the hub have a "Chassis Health" sensor. This sensor is an aggregation of all the "Health Status" sensors of each component of the platform. The state of this sensor is replicated on the system control panel CRT, MJR and MNR LEDs. The most critical "Health Status" sensor reading is displayed by the LEDs.

Here are the "Health Status" vs LEDs status reading table:

Table 15: Health Sensor State

"Chassis Health" Sensor State	Alarm Level
01h Healthy	No alarm (all alarm leds off)
02h Informational fault	No alarm (all alarm leds off)
03h Minor fault	Minor (MNR) led on (amber)
04h Major fault	Major (MJR) led on (red)
05h Critical fault	Critical (CRT) led on (red)

5.2   Management Subsystems

The MS2900 management software addresses all major subsystems within the platform, including platform management (IPMI), cooling/thermal management, and power management.

5.2.1   Platform Management

The platform management subsystem is based on features of the Integrated Baseboard Management Controller (iBMC). This subsystem consists of communication buses, sensors, system BIOS, and server management firmware. The platform management subsystem also supports standard IPMI features as well as other features that are not part of IPMI. The supported features are listed below.

IPMI 2.0 Features

- » Baseboard Management Controller (BMC)
- » IPMI Watchdog timer
- » Messaging support, including command bridging and user/session support
- » Chassis device functionality, including power/reset control and BIOS boot flags support
- » Event receiver device: the BMC receives and processes events from other platform subsystems
- » Field Replaceable Unit (FRU) inventory device functionality: the BMC supports access to system FRU devices using IPMI FRU commands
- » System Event Log (SEL) device functionality: the BMC supports and provides access to a SEL
- » Sensor Data Record (SDR) repository device functionality: the BMC supports storage and access of system SDRs

» Sensor device and sensor scanning/monitoring: the BMC provides IPMI management of sensors and polls sensors to monitor and report system health.

» IPMI interfaces: host interfaces include System Management Software (SMS) with receive message queue support and Server Management Mode (SMM)

IPMB Interface

» LAN interface that supports the IPMI-over-LAN protocol (RMCP, RMCP+)

» Serial-over-LAN (SOL)

» ACPI state synchronization: the BMC tracks ACPI state changes that are provided by the BIOS

» BMC self-test: the BMC performs initialization and run-time self-tests and makes results available to external entities

Non-IPMI Features

The integrated BMC also supports the following non-IPMI features:

» Fault Resilient Booting (FRB): FRB2 is supported by the Watchdog timer functionality

» Limited number of system resets for fan speed control

» Platform Environment Control Interface (PECI) thermal management support

» Memory thermal management

» Power supply unit management
Support for the power supply unit sensor: the BMC handles power-good dropout conditions

» Front panel management: the ShMC controls the system status LED and chassis ID LED
The chassis ID LED is turned on using an IPMI command

» Address Resolution Protocol (ARP): the BMC sends and responds to ARPs (supported on embedded NICs)

» Dynamic Host Configuration Protocol (DHCP): the BMC performs DHCP (supported on embedded NICs)

» Embedded web server

New Manageability Features

The SYMKLOUD MS2900 platform also offers some new features:

» Support for embedded web server UI in Basic Manageability feature set (i.e., fan monitoring, software upgrade, node health/presence)

» Management support for PMBus rev1.2-compliant power supplies

5.2.2   Cooling and Thermal Management

MS2900 Airflow Path

The MS2900 platform cooling scheme is a front-to-back push configuration. Air is pushed into the chassis by the fans at the front. Air then passes through the backplane assembly and is channeled into the node bays where it exits the system through the node carrier grills. Figure 18 shows this air path.

Figure 18: Air Path Through the System
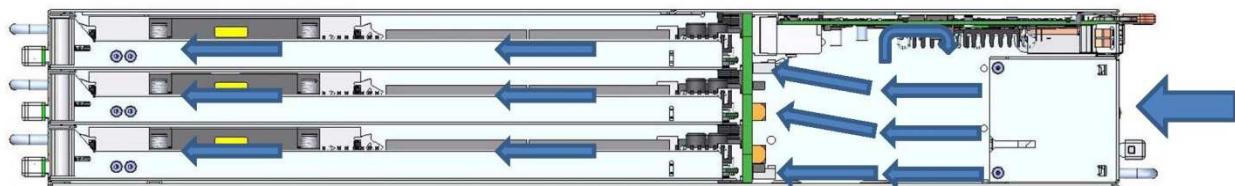
This cooling push configuration pressurizes the system. With this configuration, dust can only enter the system by the fan inlet.

5.2.3   Power

Table 16: Power consumption while running a stressed transcoding application (on MSP8020 Processor Nodes)

Description	Power (W)	Quantity	Subtotal (W)
MSH8900 Hub (without SFP+ modules)	15	2	30
MSU8700 Uplink Module (without SFP+ modules)	4	2	8
SFP+ Optical Module	0.7	2	1.4
60x60x38 Fan Module	33	5	165
MSP8020 Processor Node Module	82	9	738
Total power consumption (W)	943[1]		

[1]Measured with a stressed transcoding application; 25°C ambient temperature
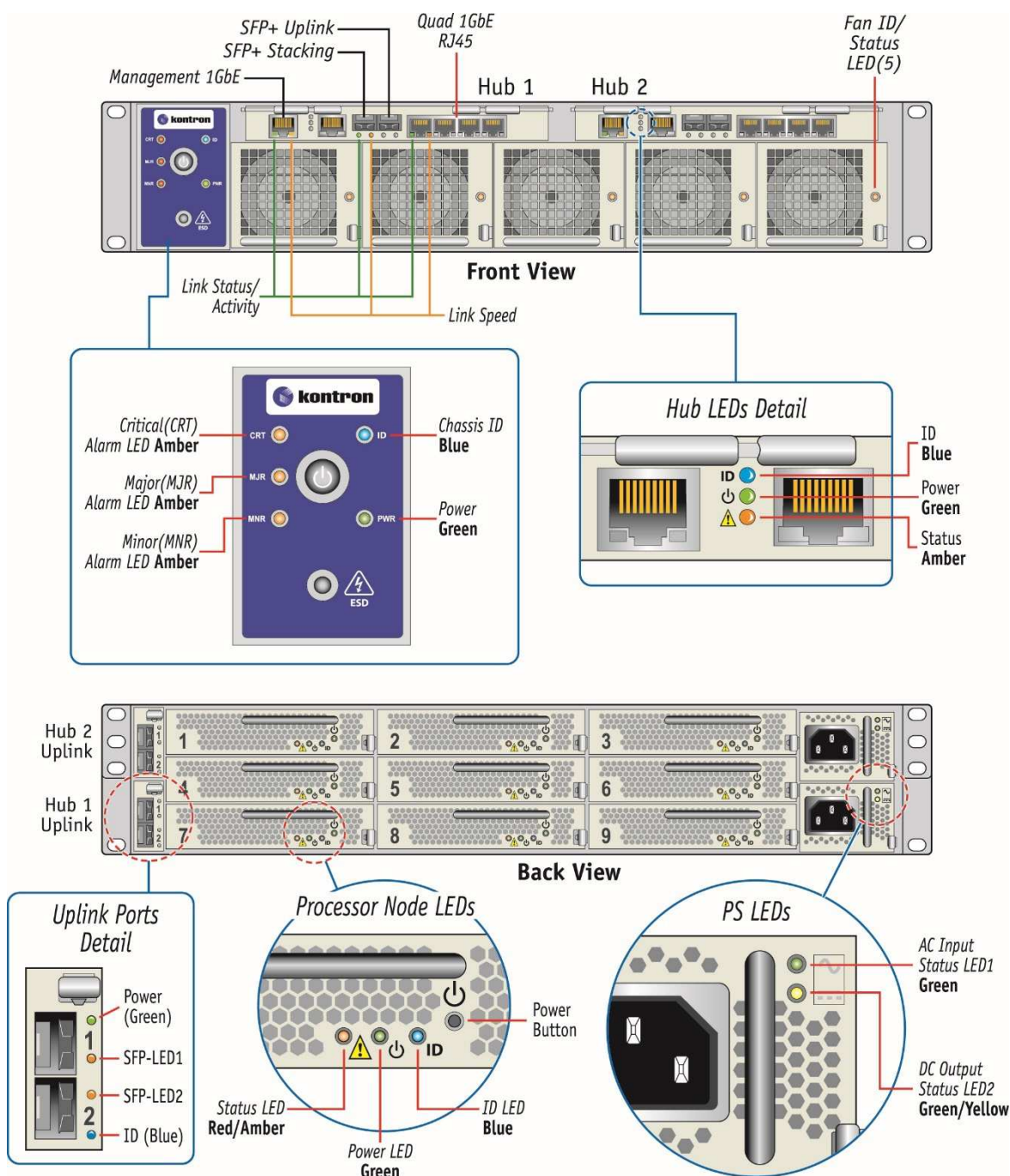
5.3   Buttons, Connectors and LEDs

This section covers the user-accessible connectors, cable requirements, and LED definitions.

5.3.1   LED Indicators

Figure 19 shows the locations of all MS2900 platform LEDs and the table explains the LED functions.

Figure 19: Front and Rear Panel LEDs

Table 17: LED States

LED State Definitions		
Front Panel LEDs		
Chassis/Control Panel	**Color(s)**	**Description**
Chassis ID LED	Blue OFF	Whole chassis is ready to be pulled off-line OR All nodes are OFF (No payload) = On, blue All nodes are on, payload power is on = Off
Power LED	Green OFF	All nodes ON, payload power = On, green Power state transition in progress (Power On or Power Off) = Blinking, green All nodes OFF, no payload power = Off
Alarm LEDs (CRT, MJR, MNR)	MNR: Amber MJR: Red CRT: Red OFF	Alarm = On Alarm Description: Minor fault (MNR): The system is not at risk and still runs within its specifications. Major fault (MJR): The system is at risk and requires immediate attention. Major faults can be normal if the system in high stress conditions, but should never be repetitive and permanent. Critical fault (CRT): The system is at risk and requires immediate action. A device might have already failed. See section 5.1.1 for more details. No alarm = Off
Hub 1 and Hub 2	**Color(s)**	**Description**
ID LED	Blue OFF	Only management power is present = On, blue ID command is active = Blinking, blue Payload power is present = Off
Power/Active LED	Green OFF	Payload power is on = On, green Hub hosts active shelf manager = On, green Hub hosts the inactive shelf manager = Blinking green Payload power removed = Off
Status LED	Amber OFF	Hub "not healthy", needs attention = On, amber (default) Hub transitioning when power button pressed (clean shutdown request) = Blinking, amber Hub operating under normal conditions = Off

LED State Definitions		
1Gbe RJ-45 (Quad/Management)	**Color(s)**	**Description**
LED1 Link Status/Activity	Green	Link established = On, green Activity = Blinking, green
	OFF	No link, no activity = Off
LED2 Link Speed	Green	Link speed 1 Gbit = On, green
	Amber	Link speed 10 Mbit, 100 Mbit = On, amber
	OFF	No link = Off
10GbE SFP+ Stacking, 10GbE SFP+ Uplink	**Color(s)**	**Description**
LED1	Green	Link established = On, green Activity = Blinking, green
	OFF	No link, no activity = Off
LED2	Amber	Fault = On, amber
	OFF	Normal conditions, no fault = Off
Fan ID/Status	**Color(s)**	**Description**
LED	Amber	Maintenance needed = On, amber Fan ID command active = Blinking, amber
	OFF	Normal operating condition = Off
Back Panel LEDs		
Hub Uplink	**Color(s)**	**Description**
LED1	Green	Link established = On, green Activity = Blinking, green
	OFF	No link, no activity = Off
LED2	Amber	Fault = On, amber
	OFF	Normal conditions, no fault = Off
Processor Node	**Color(s)**	**Description**
Status LED	Red/Amber	Node not healthy, needs attention = On, red Node in transition, power button pressed = Blinking, amber
	OFF	Node operating normally = Off

LED State Definitions		
Power LED	Green	Node on, payload present = On, green
		Node in standby state (S3/S4 sleep state) = Blinking, green
	OFF	Node is off (no payload) = Off
ID LED	Blue	Management power on, but no payload = On, blue
		Command active = Blinking, blue
	OFF	Node is on or on standby (payload present) = Off

| Power Supply	Color(s)	Description
AC/DC Input Status	Green	Line within range = On, green
	OFF	Line under voltage = Off
DC Output	Yellow	12V or Vsb[1] out of regulation = On, yellow Over temperature shutdown = On, yellow Output over voltage = On, yellow
	Green	Regulation normal operation = On, green
	Both Yellow/Green	Hot-Standby mode = Blinking, yellow 25%, green 75% Over temperature warning = Blinking, yellow 75%, green 25% Minor fan regulation error = Blinking, yellow 50%, green 50%

[1]Vsb – Standby Output (3V3)

5.3.2   Cable Connections

The MS2900 platform provides I/O connections from both the front and rear of the chassis. In the front of the chassis there is a 10GbE SFP+ uplink port, a 10GbE SFP+ stacking port, and four 1GbE RJ-45 LAN ports for each hub. For the location of the front panel ports, see Figure 5, "Front View."
Rear Uplink modules provide the option of redirecting 10GbE/Stacking (per hub) to the rear.

Figure 20 shows the location of the two 10GbE uplink ports and two 10GbE stacking ports (one of each for each switch/ShMC hub).

Figure 20: Rear Uplink Ports
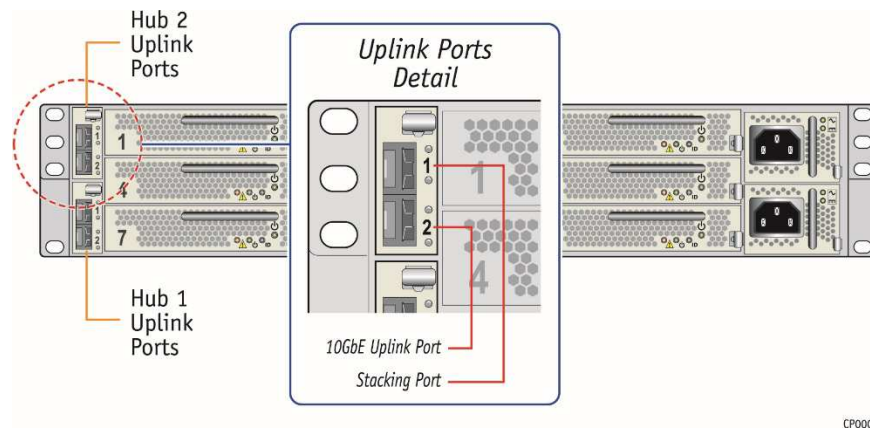
For each hub there is also front panel access to an RJ-45 serial console port and a management RJ-45 Ethernet port. The MS2900 platform ships with an RJ-45 to DB-9 serial adapter (included in the box – see Figure 21). This adapter can be used with an RJ-45 cable to connect devices with a DB-9 serial port to the MS2900 via either hub RJ-45 console port (See Figure 5, "2" or "7").

Figure 21: RJ-45 to DB-9 Console Adapter
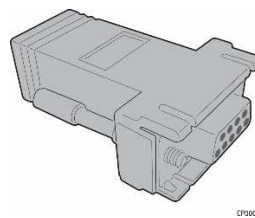
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