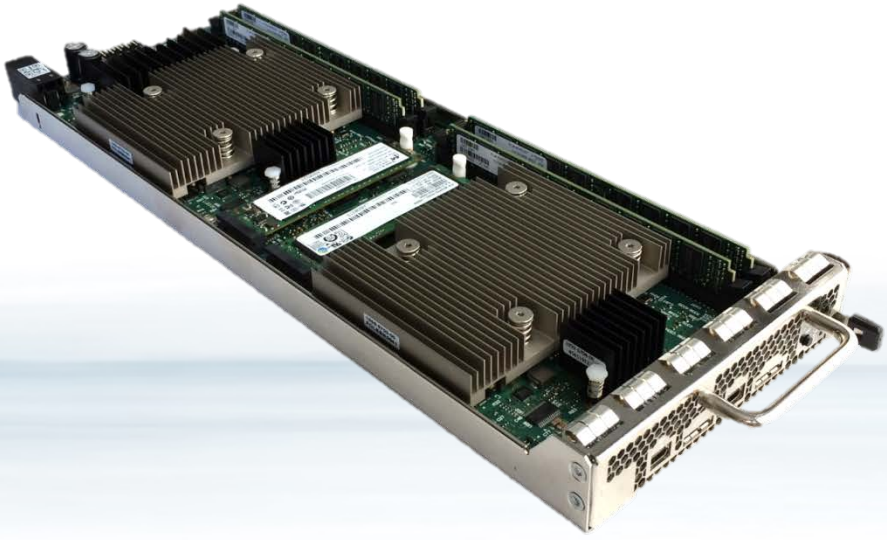
USER GUIDE



MSP805x series

Doc. Rev. 1.1

POSSIBILITIES START HERE kontron

MSP805X SERIES - USER GUIDE

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Revision History

Revision	Brief Description of Changes	Date of Issue
1.0	Initial issue	2016-Dec-15
1.1	Corrected Figure 7.	2017-Apr-24

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Thank you.

Symbols

The following symbols may be used in this manual

⚠DANGER	DANGER indicates a hazardous situation which, if not avoided will result in death or serious injury.
⚠WARNING	WARNING indicates a hazardous situation which, if not avoided could result in death or serious injury.
⚠CAUTION	CAUTION indicates a hazardous situation which, if not avoided may result in minor or moderate injury.
NOTICE	NOTICE indicates a property damage message.
	Electric Shock! This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger life/health and/or result in damage to material. Please refer also to the "High-Voltage Safety Instructions" portion below in this section.
	ESD Sensitive Device! This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.
	HOT Surface! Do NOT touch! Allow to cool before servicing.
	This symbol indicates general information about the product and the user manual. This symbol also indicates detail information about the specific product configuration.
	This symbol precedes helpful hints and tips for daily use.

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List of Acronyms

API	Application Programming Interface
BMC	Base Management Controller
CLI	Command-Line Interface
ECC	Error Checking and Correction
EIST	Enhanced Intel SpeedStep Technology
FRU	Field Replaceable Unit
GPU	Graphics Processing Unit
IOL	IPMI-Over-LAN
IPMI	Intelligent Platform Management Interface
KCS	Keyboard Controller Style
NCSI	Network Communications Services Interface
PCIe	PCI-Express
PL1	Power Limit 1
PL2	Power Limit 2
SEL	System Event Log

ShMC	Shelf Management Controller
SM	System Monitor Web Interface
SOL	Serial Over LAN
SSH	Secure Shell
TPM	Trusted Platform Module
UISI	Universal Intelligent Sensor Interface
ULP	Ultra-Low Profile
VLP	Very Low Profile

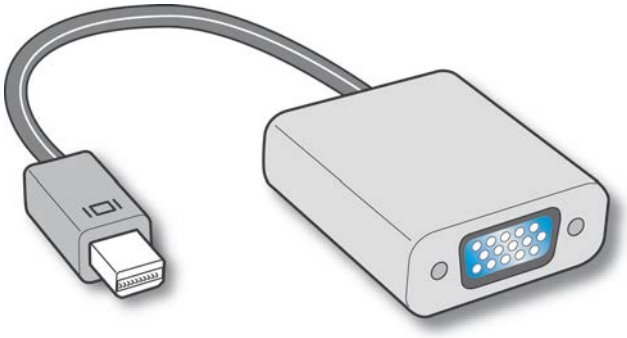
Electrostatic Discharge

⚠CAUTION MSP805x series nodes are sensitive to electrostatic discharge (ESD). Users must take the appropriate precautions when handling ESD-sensitive devices.

Adapters

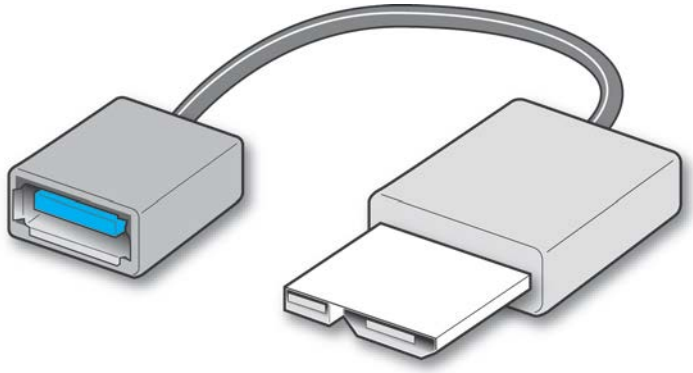
To connect a physical screen to a CPU engine of MSP805x series nodes, use a Mini DisplayPort to VGA adapter (Figure 1).

Figure 1: Mini DisplayPort to VGA adapter cable



To connect USB devices such as a mouse, keyboard or DVD drive to a CPU engine, a Micro USB 3.0 to USB OTG adapter can be used (Figure 2).

Figure 2: Micro USB 3.0 to USB OTG



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1/ Product Description

1.1. Product Overview

MSP805x series nodes are processor nodes designed for the SYMKLOUD MS2910 platform. Nine nodes can be installed in each MS2910, and each node has two CPU engines. When used with two MSH8911 hubs, each CPU engine supports one 1GbE port and two 10GbE ports.

MSH89xx references through this guide refer to any variants of the SYMKLOUD Hub Series (e.g., MSH8900, MSH8910 series), unless specified otherwise.

An OS must be loaded on the CPU engines for the system to be operational.

Figure 3: SYMKLOUD layers

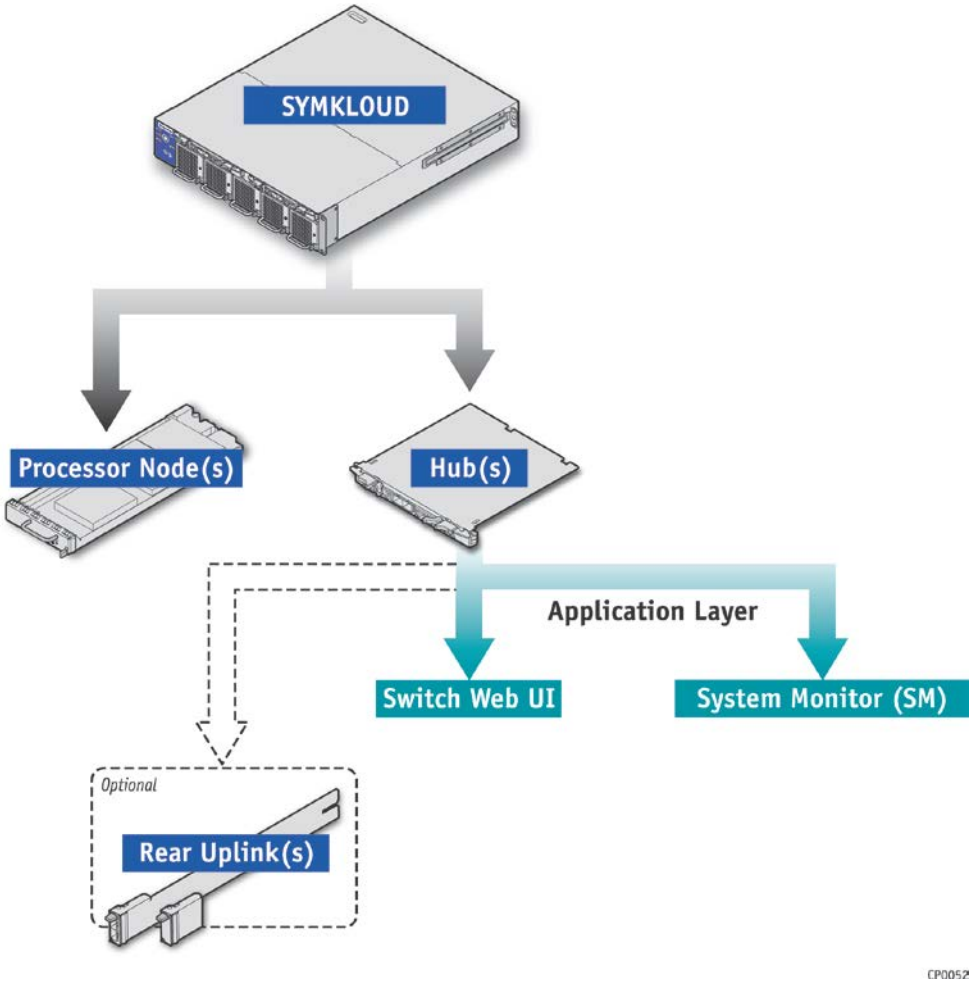
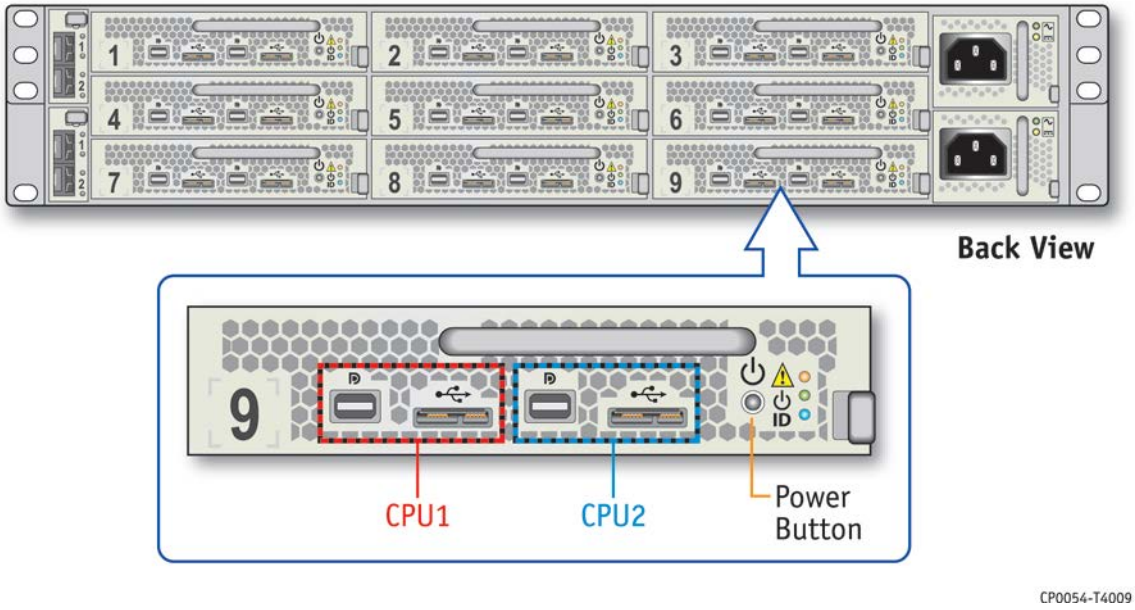


Figure 4: MSP805x series nodes in rear of chassis

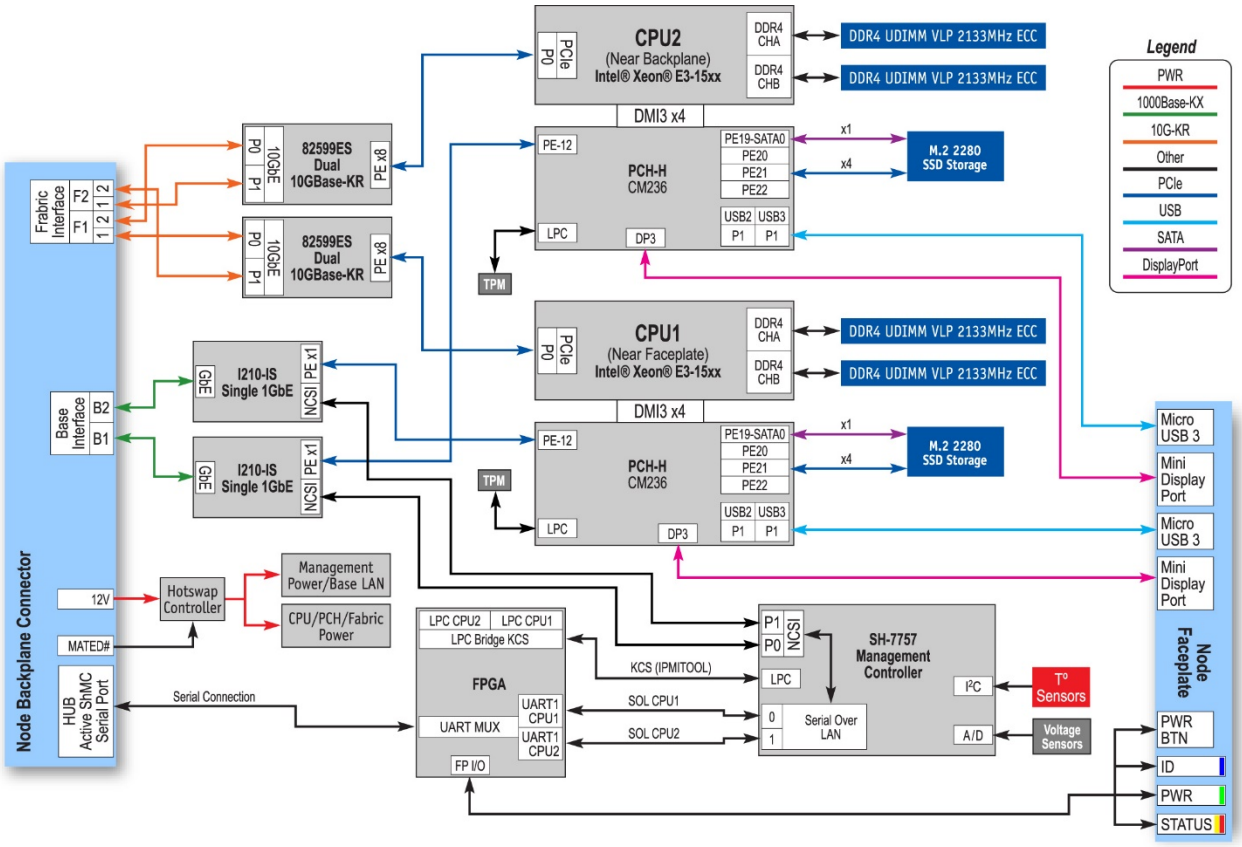


For information on other SYMKLOUD MS2910 components, refer to the specific component's user manual.

To obtain the latest document version or to consult other SYMKLOUD documents, visit the Kontron portal at kontron.com.

1.2. Block Diagram

Figure 5: MSP805x series nodes block diagram



1.3. PCI Mapping

Table 1: PCI mapping

Bus: Device. Function	Device ID	Component	Description
00:00.0	1918	Host bridge	Intel Corporation Sky Lake Host Bridge/DRAM Registers (rev. 0a)
00:01.0	1901	PCI bridge	Intel Corporation Sky Lake PCIe Controller (x16) (rev. 0a)
00:02.0	193d	VGA compatible controller	Intel Corporation Iris Pro Graphics P580 (rev. 09)
00:14.0	a12f	USB controller	Intel Corporation Sunrise Point-H USB 3.0 xHCI Controller (rev. 31)
00:14.2	a131	Signal processing controller	Intel Corporation Sunrise Point-H Thermal subsystem (rev. 31)
00:16.0	a13a	Communication controller	Intel Corporation Sunrise Point-H CSME HECI No. 1 (rev. 31)
00:17.0	a102	SATA controller	Intel Corporation Sunrise Point-H SATA controller [AHCI mode] (rev. 31)
00:1c.0	a110	PCI bridge	Intel Corporation Sunrise Point-H PCI Express Root Port No. 1 (rev. f1)
00:1c.5	a115	PCI bridge	Intel Corporation Sunrise Point-H PCI Express Root Port No. 6 (rev. f1)
00:1f.0	a150	ISA bridge	Intel Corporation Sunrise Point-H LPC Controller (rev. 31)
00:1f.2	a121	Memory controller	Intel Corporation Sunrise Point-H PMC (rev. 31)
00:1f.4	a123	SMBus	Intel Corporation Sunrise Point-H SMBus (rev. 31)
01:00.0	10f8	Ethernet controller	Intel Corporation 82599 10 Gigabit Dual Port Backplane Connection (rev. 01)
01:00.1	10f8	Ethernet controller	Intel Corporation 82599 10 Gigabit Dual Port Backplane Connection (rev. 01)
04:00.0	1537	Ethernet controller	Intel Corporation I210 Gigabit Backplane Connection (rev. 03)

1.4. Node Key Components

Table 2: Node key components per CPU engine

Component[1]	Description
CPU	1 Intel® E3-1578L-v5
Chipset	1 Intel® CM236
System memory	2 DIMM slots for up to 16 GB DDR4, supports ULP/VLP unbuffered 1.35V DDR4 with ECC
Network connections	1 Intel® 1GbE controller I210-IS 1 82599ES Dual 10 Gigabit Ethernet Controller
Storage	1 M.2-2280 SSD
M.2 connectivity	1 SATA 6 Gbps 1 PCIe x4
I/O devices	1 serial port accessible through: ▶ MSH8900 hubs serial RJ45 (refer to Figure 12) ▶ MSH8910 series hubs serial RJ45 (one connection shared by both CPUs) ▶ SOL via the BMC 1 Mini DisplayPort connector on faceplate 1 Micro USB 3.0 AB type connector on faceplate
BIOS	16 MB SPI AMI UEFI BIOS

Refer to the Intel website ark.intel.com for more information on Intel components.

[1] Some of the components are optional.

1.5. Node Features

Table 3: Node features

Feature	Description
Remote management	IPMI 2.0 IOL SOL Comprehensive sensor network and event monitoring
Validated OS	CentOS Linux, 64-bit, release 7
Hot swap	Supported Refer to the user guide of the hub used in the platform for information on system behavior upon hot swap.
Power consumption	140 W typical max 172.5 W absolute max (while Turbo mode is active) Tests were conducted with 2x E3-1575Lv5 CPUs, 4x 16GB 2133MHz DDR4 UDIMMs (32GB per CPU engine), 2x GEN3 PCIe and x4 M.2 SSD (1 per CPU engine) running a combination of CPU, memory, storage and network stress test applications. Power consumption profile and tuning can differ based on the application, please contact Kontron specialists for more information about this topic. Note: PL1 (Power Limit 1) and PL2 (Power Limit 2) are power management features of Intel® CPUs with Turbo Boost Technology 2.0 (see section 1.6 for more information).

1.6. Intel® Turbo Boost Technology

The CPUs of MSP805x series nodes include the Intel® Turbo Boost Technology 2.0. This functionality allows processor cores to run at a higher frequency than rated (PL1)—up to the upper frequency limit (PL2)—for up to 30 seconds maximizing performance. For this functionality to be activated, the following conditions must be present concurrently: short burst or continuous workload, as well as power, current and temperature below the limit specified.

When Turbo mode is activated, the CPU/GPU will draw up to 56.25 W for a maximum of 30 seconds, while the workload is applied. After the 30 seconds, the maximum power consumption of the package will drop back to 45 W.

By default, Turbo mode is enabled in the BIOS on the CPUs of MSP805x series nodes. The OS must support P-States (that is EIST or DBS), which must also be enabled for Turbo Boost Technology to work. When settings are changed, a system reboot is required.

The Configurable TDP option can be used to limit the maximum power consumption during Turbo mode to 45 W for the first 30 seconds and/or to 35 W during normal operation (see section 4.4 for BIOS configuration).

Turbo mode can be disabled (see section 4.5 for procedure). When disabled, the CPU draws up to 30 W and the 15 W remaining is reserved for the GPU.

1.7. Node Module LEDs and Buttons

Figure 6: MSP805x series nodes LEDs and buttons

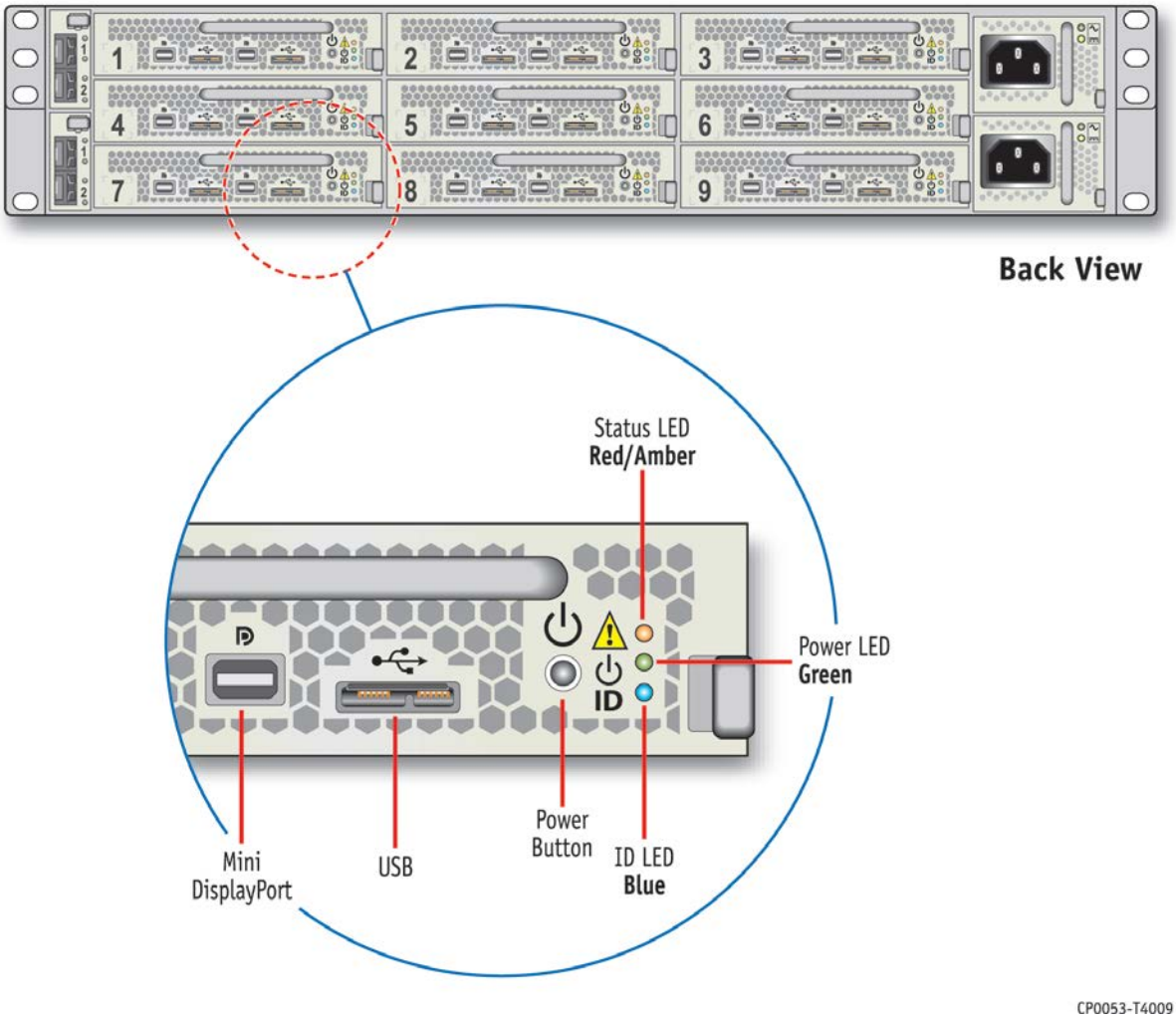


Table 4: LED status description and button behavior

MSP805x series			
State	**ID (blue)**	**Power (green)**	**Status (amber)**
Identify command in progress	Blinking	Not affected	Not affected
Payload power ON for at least one CPU engine	OFF	ON	ON: not healthy OFF: healthy
Payload power OFF	ON	OFF	ON: not healthy OFF: healthy

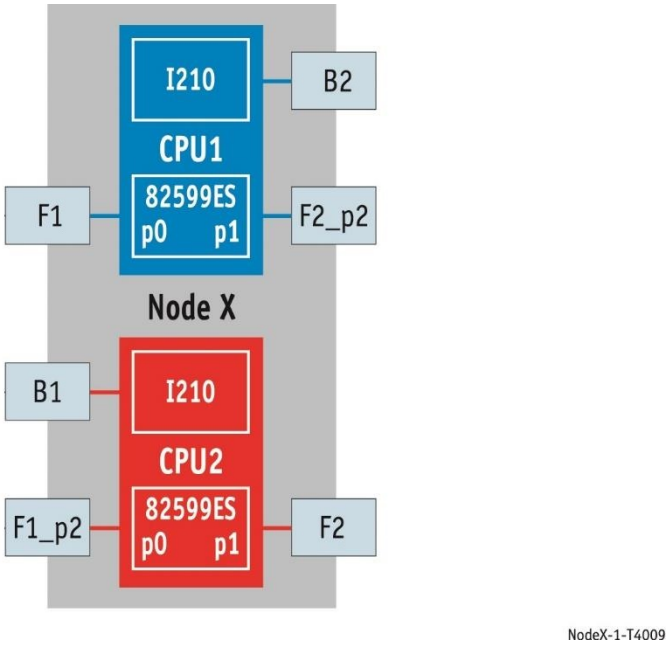
Power button		
State	**Short press**	**Long press (4 seconds)**
Power OFF for both CPU engines	Powers the node	Nothing happens
Power ON for only one of the CPU engines	Performs a clean shutdown of both CPUs	Turns node off immediately
Power ON for both CPU engines	Performs a clean shutdown of the node	Turns node off immediately

1.8. Interfacing

Three types of connections can be established with node components: a networking connection, a serial console connection and a physical connection.

Refer to the user guide of the MSH89xx hub used in the platform for information on how to access the SM and for the locations of the management uplink and serial console ports.

Figure 7: Node connections to hubs



For a complete port mapping and network topology of the system as well as link speeds, refer to the user guide of the MSH89xx hub installed in the system.

1.8.1. Management Networking Connection

The SYMKLOUD platform comes with a System Monitor (SM). The SM includes a web user interface and a programmatic API to monitor and control system components, including its ShMC and nodes.

The IOL IP address of the specific component to connect to may be required when using certain paths. The IP address of external entities must be in the same subnet as that of the SYMKLOUD components as no default gateway is configured. The default IOL IP addresses are shown in Figure 10.

Figure 8: Default IP addresses

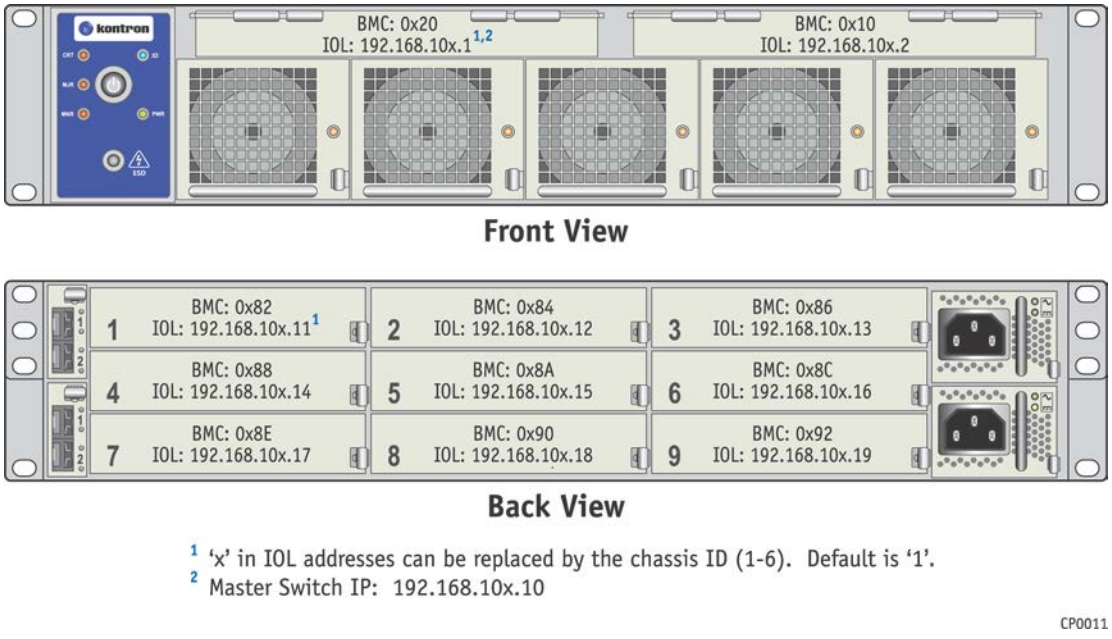
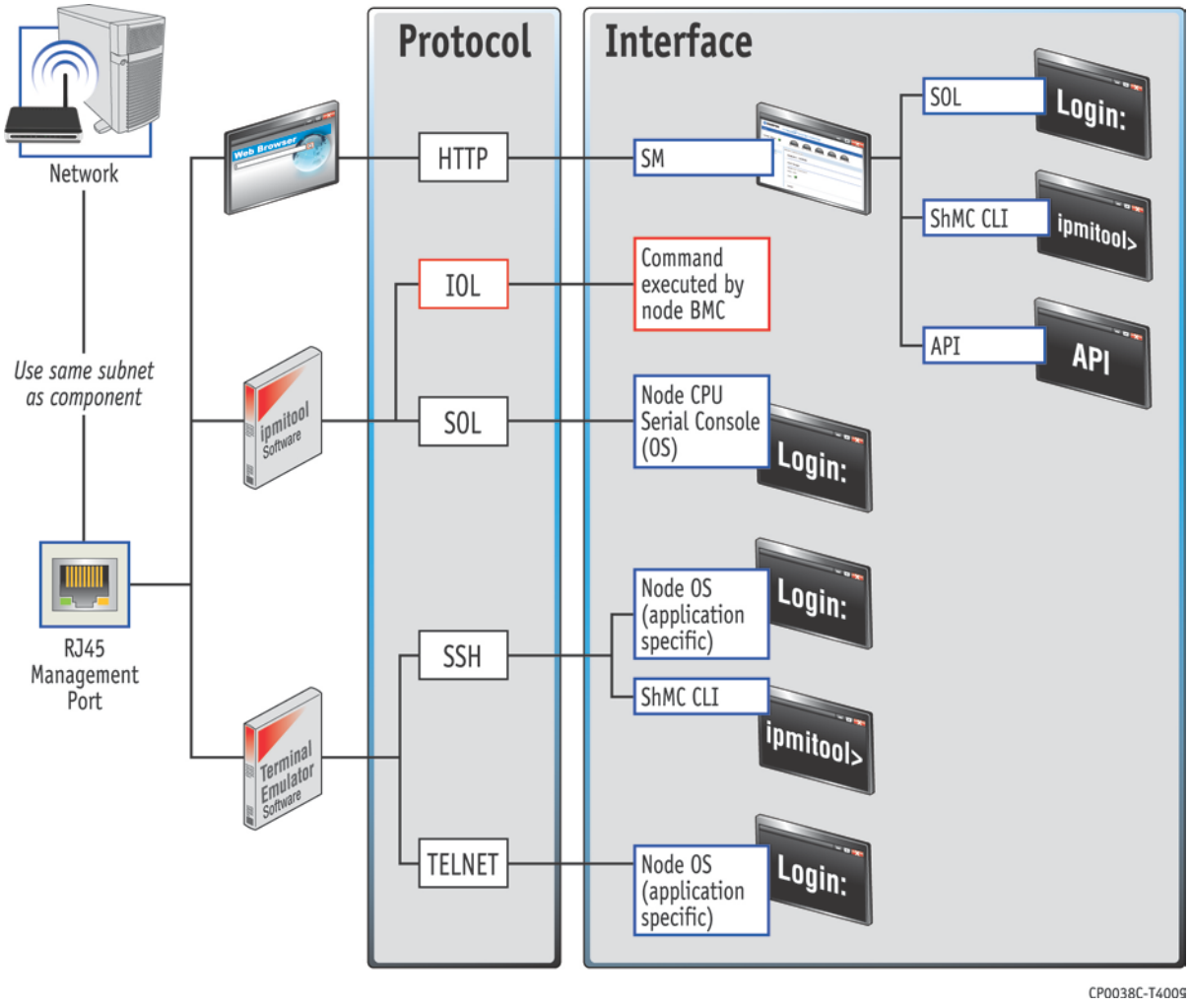


Figure 11 shows the possible network paths to access the various interfaces of the system components.

Figure 9: Diagram of interface paths with a management networking connection



- Terminal emulator software such as PuTTY can be used.
- The Kontron ipmitool package can be downloaded from kontron.com, in the "Tools" section of the SYMKLOUD platform page.
- Ensure the protocol is enabled for the interface to be accessed (SSH, TELNET, etc.).
- API calls can be made using a tool such as cURL. The configuration sections of this document detail the availability of such calls for specific configurations. For more details, refer to the API documentation (available from the SM).
- To access SOL from the SM dashboard Console Access:
    - Log in to the SM;
    - From the Console Access dropdown list of the Dashboard screen, select a platform;
    - Log in with username "console" and password "admin";
    - When prompted, enter the number of the node to connect to;
    - When prompted, enter the payload number (the number is always 1).
- An IOL connection allows users to send ipmitool commands over the LAN for immediate execution by the addressed node BMC.

Example of SOL connection to the node CPU serial console (OS):

1. Connect to the management port with a cable or via a network.
2. Establish an SOL connection using ipmitool: ipmitool –H <node BMC ip address> -U admin –P admin –I lanplus sol activate <CPU number>.
3. The OS specific prompt is displayed, e.g. Login.

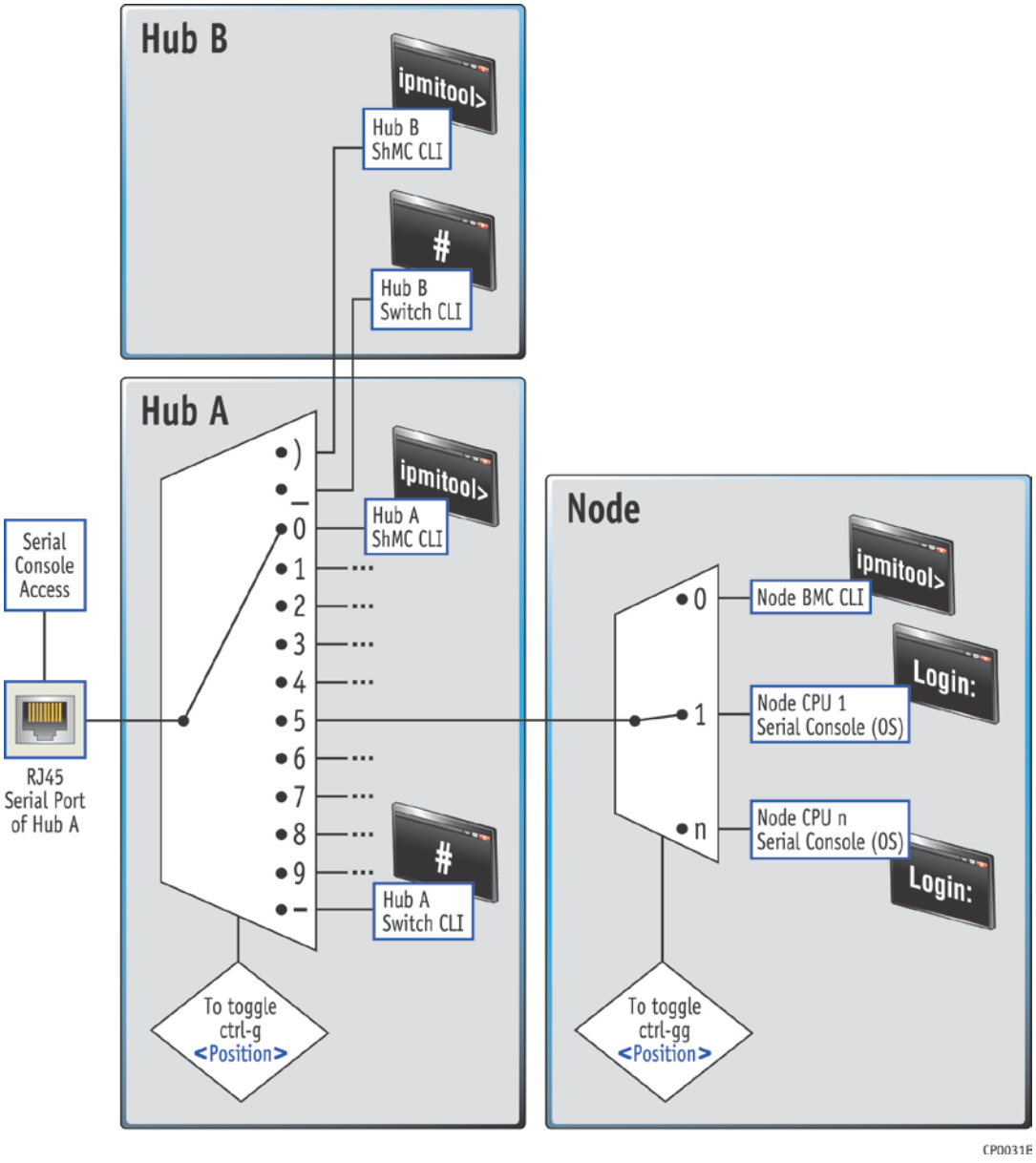
* When an SOL session is activated on a node, the serial connection via the hub is no longer available until the session is deactivated.

1.8.2. Serial Console Connection

The serial interface of the hubs includes a multiplexing functionality that can establish a link with each component through a series of hotkeys (Figure 12).

The console port of MSH8910-series hubs have a serial-port redundancy feature between partner hubs. This means that the console port of either hub installed in a SYMKLOUD chassis can be used to communicate with any hub(ShMC/switch) or node in the chassis. The ports are mirror images of each other: any output or user input is reflected in both.

Figure 10: Diagram of interface paths with a serial console connection



The serial port communication parameters are 115200 baud, no parity, 8 data bits and backspace key set to "Ctrl-h". BIOS POST and configuration menu redirection is VT100+. Serial console support and configuration are OS-specific.

The ASCII control code for “Ctrl-g” is 7. To type “Ctrl-gg”, use the “Ctrl-g” ASCII control code twice in a row.

Example of a serial connection to the node CPU serial console (OS):

1. Connect a PC's serial port to the active hub's console port.
2. Establish a connection using the PC terminal emulator with parameters 115200 8n1.
3. To configure the hub console port MUX, type Ctrl-g <Node No. (1-9)>, then Ctrl-gg 1.

1.8.3. Physical Connection

Each CPU engine of MSP805x series nodes is equipped with a Mini DisplayPort to connect a physical monitor and a mini USB port to connect USB devices such as a mouse, keyboard and DVD drive. Refer to Figure 4 for the location of the ports of each CPU engine.

1.8.4. Default User Names and Passwords

Table 5: Default usernames and passwords

Configuration interface	Username and password	Used for access via
SM (UI)	admin admin	WebUI API
Hub ShMC CLI	admin admin	Serial port Shell-in-a-box IOL
Node BMC CLI	admin admin	Serial port IOL
Node CPU serial console (OS)	Installation-specific	Serial port Shell-in-a-box SOL etc. (Installation-specific)

2/ Extracting and Inserting a Node Module

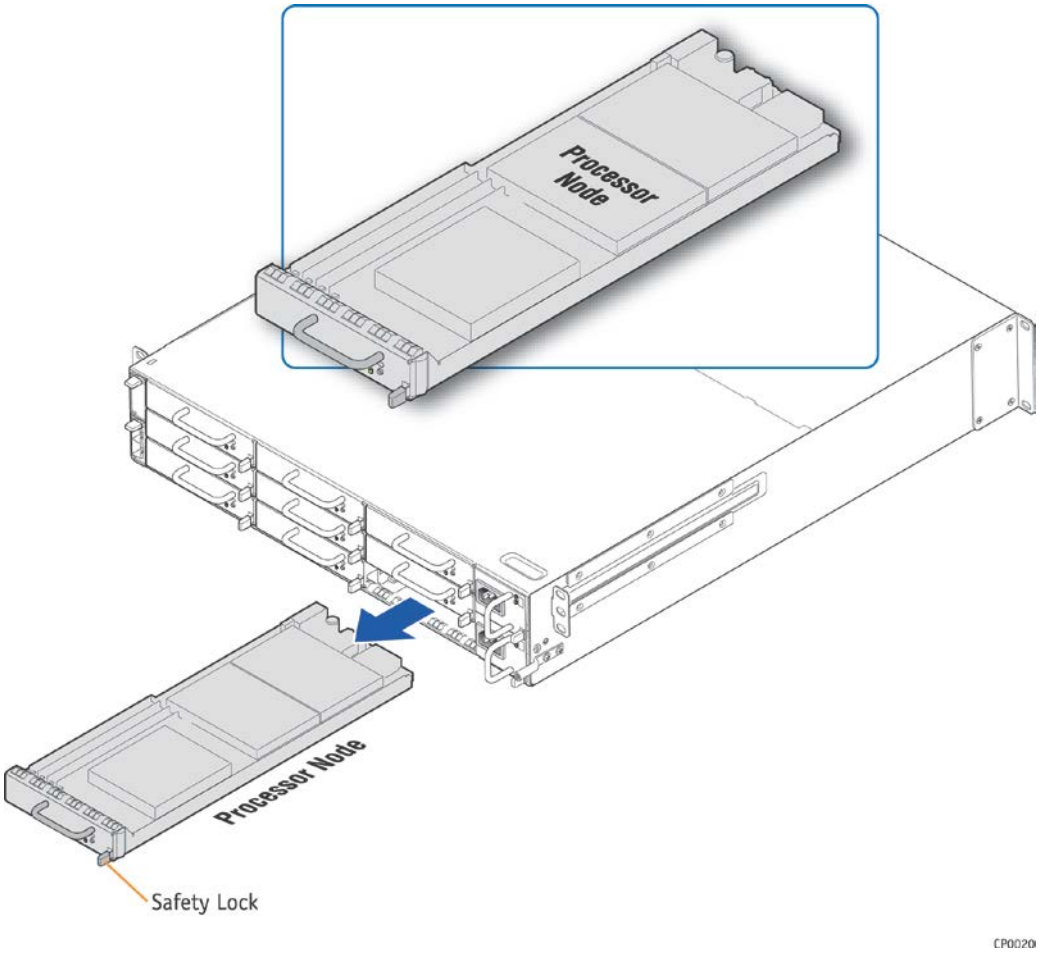
2.1. Extracting a Node Module

ESD-Sensitive Device!
Take all necessary ESD protection measures.

Steps in blue apply only to hot swap procedures.

1. Press the power button of the node to be extracted. (The power button should be configured in the operating system so it performs a clean shutdown when pressed.)
2. The ID LED of the node becomes steady blue: the node is ready to be extracted.
3. To extract the node module from the slot, pull on the handle while pressing the safety lock (Figure 13) towards the left.

Figure 11: Processor node module extraction and safety lock location



2.2. Inserting a Node Module

ESD-Sensitive Device!
Take all necessary ESD protection measures.

1. Holding the handle, insert a node module.
2. Push it in until the safety lock clicks in place.
3. Wait for the power LED of the processor node module to become steady green (30 to 120 seconds): the node is powered on and ready to use.

2.3. System Hot-Swap Behavior

The system is electrically designed to support a surprise extraction. However, this type of extraction is not recommended and could affect system performance and functionalities.

When a hot-swap procedure is performed on MSP805x series nodes, the systems and functionalities could be affected.

3/ Software Configurations and Conventions

Before configuring node modules, review the following list of mandatory tasks. Refer to the list below to ensure the basic tasks required for proper system operation have been completed. Note that some of these tasks may have already been completed.

Mandatory tasks:

- Booting from LAN, USB storage in faceplate, or on-board SSD
- Installing an OS

Conventions:

- Elements between < > in blue are variables. The value shown is an example or an indication of what to enter.
- Items between () show a value range for the variable spelled out, e.g. <Switch No. (1-5)> means the switch number is to be entered, and that its value can be between 1 and 5.
- The | symbol indicates a choice between two or more alternatives, e.g. x|y|z reads "x or y or z".
- Elements in **black bold** are selectable menu items or button names.
- Elements in *blue italics* are configuration options or types.
- The > symbol separates a series of operations required to access a specific element.

☐Refer to the user guide of the hub used for the IPMI mapping of the system.

Configuration command tables:

Sections 4/ and 5/ contain tables with two columns. The first column describes steps that can be performed in the web-type interface(s) named in the header. The second column describes steps that can be performed in the CLI-type interface(s) specified in the header. See Figure 11 and Figure 12 to find out how to access the specified web-type or CLI-type interface.

IPMI command convention:

In the following sections, "From IPMITOOL", means that any of the three options below can be used. The generic "PROMPT" will be used to identify the access command or path (e.g., PROMPT <IPMI command>):

From the ShMC CLI

ipmitool> set targetaddr <node ipmi address>

ipmitool> <IPMI command>

From an IOL remote PC

> ipmitool –H <node BMC ip address> -U admin –P admin –I lanplus <IPMI command>

From an IOL remote PC via ShMC

> ipmitool –H <ShMC ip address > -U admin –P admin –t <node ipmi address> <IPMI command>

4/ Configuring Node Modules

4.1. Node Reset

To reset both CPUs on a node:

SM	Node CPU serial console, IPMITOOL
Dashboard > Monitor Select the platform Click on the node to reset In section Power Commands, click on **RESET**	*From the Node CPU serial console* Send a break sequence *From IPMITOOL* PROMPT **power reset**
Notes	
	For the node CPU serial console connection, the method is terminal emulator specific, e.g. with a putty–type terminal use Ctrl-break or use menu **Special command** and select **Break.**

4.2. Boot Order

To choose the boot order of a processor node:

Physical interface (monitor + keyboard)	Node CPU serial console
Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Boot** tab to display the current boot order *To choose the Boot Option Priority* Use the up or down arrow key to select a boot device Press **Enter** to select the device to position Select the **Save & Exit** tab Select **Save Changes and Reset**	Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Boot** tab to display the current boot order *To choose the Boot Option Priority* Use the up or down arrow key to select a boot device Press **Enter** to select the device to position Select the **Save & Exit** tab Select **Save Changes and Reset**
Notes	
Each CPU can boot from LAN, from a USB device connected to the external USB port or from onboard storage. The default Boot Priority Order is: hard drive (if installed), base interface LAN and shell UISI.	

To change the boot order of a processor node temporarily:

Physical interface (monitor + keyboard)	Node CPU serial console, IPMITOOL
Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Save & Exit** tab Bootable devices are listed under Boot Override *To choose the Boot Override* Use the up or down arrow key to select a boot device Press **Enter** *OR* For a one time boot Press **[F7]** when prompted to enter the Boot Menu Select the device to boot from	*From the Node CPU serial console* Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Save & Exit** tab Bootable devices are listed under Boot Override *To choose the Boot Override* Use the up or down arrow key to select a boot device Press **Enter** *OR* For a one time boot Press **[F7]** when prompted to enter the Boot Menu Select the device to boot from *From IPMITOOL* PROMPT chassis bootdev <device> *Within 30 seconds, issue the following command to reset the payload:* PROMPT power reset The possible values for <device> are: none: Do not change boot device order pxe: Force PXE boot cdrom: Force boot from CD/DVD bios: Force boot into BIOS Setup floppy: Force boot from Floppy/primary removable media
Notes	
Each CPU can boot from LAN, from a USB device connected to the external USB port or from onboard storage.	

4.3. OS Installation

To install an OS:

Physical interface (monitor + keyboard + USB DVD-ROM)	Node CPU serial console, IPMITOOL SOL
Boot from LAN or from a USB device connected to the external USB port (see section 4.2) Select the **CD/DVD** option Proceed with installation	Boot from LAN or from a USB device connected to the external USB port (see section 4.2) Select the **CD/DVD** option Proceed with installation

4.4. Turbo Mode Configuration

To set the Configurable TDP parameter for Turbo mode:

Physical interface (monitor + keyboard)	Node CPU serial interface, IPMITOOL SOL
Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Advanced** menu Select the **CPU Configuration** menu Press **Enter** Select **Configurable TDP** Press **Enter** Select **Low** (45 W max) or **Nominal** (56.25 W max)	Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Advanced** menu Select the **CPU Configuration** menu Press **Enter** Select **Configurable TDP** Press **Enter** Select **Low** (45 W max) or **Nominal** (56.25 W max)
Notes	
To configure this parameter from within an OS, refer to Intel and OS vendor documentation.	

4.5. Turbo Mode Disabling and Enabling

To disable and enable Turbo mode:

Physical interface (monitor + keyboard)	Node CPU serial interface, IPMITOOL SOL
To disable Turbo mode Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Advanced** menu Select the **CPU Configuration** menu Press **Enter** Select **Turbo Mode** Press **Enter** Select **Disabled** *To enable Turbo mode* Same procedure as above Select **Enabled**	*To disable Turbo mode* Perform a node reset (see section 4.1) Press **[Del]** or **[F2]** when prompted to enter the BIOS setup menu Select the **Advanced** menu Select the **CPU Configuration** menu Press **Enter** Select **Turbo Mode** Press **Enter** Select **Disabled** *To enable Turbo mode* Same procedure as above Select **Enabled**
Notes	
To configure this parameter from within an OS, refer to Intel and OS vendor documentation. When trying to enable Turbo mode, if Turbo Mode menu is not available, ensure Intel® SpeedStep™ is enabled as it is a prerequisite for Turbo mode to be functional: BIOS > Advanced > CPU Configuration > Intel ® SpeedStep™ > Enabled. Turbo mode can be disabled in two ways: 1. Disabling DBS or Turbo mode in the BIOS (reboot required). 2. Disabling Turbo mode from the OS (no reboot required).	

5/ Performing Updates

A ZIP file provided by Kontron contains firmware updates for node components.

5.1. Update a specific Processor Node

To update the firmware of a specific node's BMC, BIOS and FPGA:

SM	Not possible from a CLI-type interface
Dashboard > OneClick Upgrade Click on **advanced settings** Select the platform from the dropdown list Select the node to update from the dropdown list Click on **bundle settings** Click on **CHANGE BUNDLE FILE** Select the proper .zip file Click on **Open** Wait for the transfer to finish Click on **START UPGRADE**	
API calls available to update a node	
Notes	
This operation must be repeated for each node to be upgraded.	

5.2. One Click Upgrade to Update all Nodes

To update the firmware of the node BMC, BIOS and FPGA of all nodes sequentially:

SM	Not possible from a CLI-type interface
Dashboard > OneClick Upgrade Click on **bundle settings** Click on **CHANGE BUNDLE FILE** Select the proper .zip file Click on **Open** Wait for the transfer to finish Click on **START UPGRADE**	
API calls available to update all nodes	
Notes	
The update will be performed only on the components for which firmware files are included in the uploaded bundle ZIP-file.	

Appendix A: Sensor Lists

The following tables contain information on the sensors of MSP805x series nodes. Table 8 provides detailed information on the sensors described in blue in Table 6 and Table 7.

Table 6: BMC sensor list

ID	Sensor Name	Sensor Type Code	Reading Type Code	Description	Event Offset
0	FRU0 Hot Swap	F0h ATCA HotSwap Sensor	6Fh (Sensor Specific)	ATCA HotSwap Sensor	See PICMG 3.0 R3.0 Table 3-22, "FRU Hot Swap event message"
1	FRU1 Hot Swap	F0h ATCA HotSwap Sensor	6Fh (Sensor Specific)	ATCA HotSwap Sensor	See PICMG 3.0 R3.0 Table 3-22, "FRU Hot Swap event message"
2	FRU2 Hot Swap	F0h ATCA HotSwap Sensor	6Fh (Sensor Specific)	ATCA HotSwap Sensor	See PICMG 3.0 R3.0 Table 3-22, "FRU Hot Swap event message"
3	FRU0 Reconfig	12h System Event	6Fh (Sensor Specific)	Sensor population change on carrier	Only offset 0 is used; See IPMI v2.0 table 42-3, Sensor type code 12h for sensor definition See AMC.0 R2.0 REQ 3.123
4	Temp Inlet	01h (Temperature)	01h (Threshold Based)	Board Inlet Temperature	See IPMI v2.0 table 42-2 for threshold based event
5	Temp Outlet	01h (Temperature)	01h (Threshold Based)	Board Outlet Temperature	See IPMI v2.0 table 42-2 for threshold based event
6	Temp Vcore	01h (Temperature)	01h (Threshold Based)	Board Outlet Temperature	See IPMI v2.0 table 42-2 for threshold based event
7	Temp BMC	01h (Temperature)	01h (Threshold Based)	BMC Temperature	See IPMI v2.0 table 42-2 for threshold based event
8	Temp CPU 1	01h (Temperature)	01h (Threshold Based)	CPU1 Temperature	See IPMI v2.0 table 42-2 for threshold based event
9	Temp CPU 2	01h (Temperature)	01h (Threshold Based)	CPU2 Temperature	See IPMI v2.0 table 42-2 for threshold based event
10	Temp DIMM A CPU1	01h (Temperature)	01h (Threshold Based)	DIMM A CPU1 Temperature (from SPD)	See IPMI v2.0 table 42-2 for threshold based event

ID	Sensor Name	Sensor Type Code	Reading Type Code	Description	Event Offset
11	Temp DIMM A CPU2	01h (Temperature)	01h (Threshold Based)	DIMM A CPU2 Temperature (from SPD)	See IPMI v2.0 table 42-2 for threshold based event
12	Temp DIMM B CPU1	01h (Temperature)	01h (Threshold Based)	DIMM B CPU1 Temperature (from SPD)	See IPMI v2.0 table 42-2 for threshold based event
13	Temp DIMM B CPU2	01h (Temperature)	01h (Threshold Based)	DIMM B CPU2 Temperature (from SPD)	See IPMI v2.0 table 42-2 for threshold based event
14	Vcc +12V SUS	02h (Voltage)	01h (Threshold Based)	On-board 12V suspend power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
15	Vcc +5V SUS	02h (Voltage)	01h (Threshold Based)	On-board 5V suspend power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
16	Vcc +2.5V SUS	02h (Voltage)	01h (Threshold Based)	On-board 2.5V suspend power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
17	Vcc +1.8V SUS	02h (Voltage)	01h (Threshold Based)	On-board 1.8V suspend power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
18	Vcc +1.5V SUS	02h (Voltage)	01h (Threshold Based)	On-board 1.5V suspend power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
19	Vcc +1.25V SUS	02h (Voltage)	01h (Threshold Based)	On-board 1.25V suspend power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
20	Vcc +0.75V SUS	02h (Voltage)	01h (Threshold Based)	On-board 0.75V suspend power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
21	Power NODE	0Bh (Watt)	01h (Threshold Based)	Power consumption (watts) of the complete Node module	See IPMI v2.0 table 42-2 for threshold based event
22	Power State	D1h (OEM Power State)	6Fh (Sensor Specific)	Board Power State	See OEM sensor table, Sensor type code D1h for sensor definition

ID	Sensor Name	Sensor Type Code	Reading Type Code	Description	Event Offset
23	Ver Change BMC	2Bh (Version Change)	6Fh (Sensor Specific)	BMC Firmware Change Detection	See IPMI v2.0 table 42-3, Sensor type code 2Bh for sensor definition
24	Ver Change FPGA	2Bh (Version Change)	6Fh (Sensor Specific)	FPGA Firmware Change Detection	See IPMI v2.0 table 42-3, Sensor type code 2B for sensor definition
25	Ver Change BIOS	2Bh (Version Change)	6Fh (Sensor Specific)	BIOS Firmware Change Detection	See IPMI v2.0 table 42-3, Sensor type code 2B for sensor definition
26	IPMI Info-1	C0h (OEM Firmware Info)	70h (OEM Kontron Internal Diagnostic)	Internal Management Controller firmware diagnostic	See OEM table, Sensor type code C0h (Kontron OEM Firmware Info) for sensor definition and Event/Reading type code 70h (Kontron OEM Internal Diagnostic)
27	IPMI Info-2	C0h (OEM Firmware Info)	71h (OEM Kontron Internal Diagnostic)	Internal Management Controller firmware diagnostic	See OEM table, Sensor type code C0h (Kontron OEM Firmware Info) for sensor definition and Event/Reading type code 71h (Kontron OEM Internal Diagnostic)
28	Health Status	24h (Platform Alert)	7Fh (OEM Health Status)	General health status (Aggregation of critical sensors)	See OEM sensor table, Event/Reading type code 7Fh for sensor definition
29	EventRcv ComLost	1Bh Cable/Interconnect	03h (Digital Discrete)	Communication loss with the event receiver (ShMC)	See IPMI v2.0 table 42-3, Sensor type code 1Bh for sensor definition
30	BMC Reboot	24h (Platform Alert)	03h (Digital Discrete)	BMC Reboot detection	Only offset 0,1 are used See IPMI v2.0 table 42-3, Sensor type code 24h for sensor definition
31	BMC Storage Err	28h (Management Subsystem Health)	6Fh (Sensor Specific)	Management sub-system health (non-volatile memory error)	Only offset 1 is used See IPMI v2.0 table 42-3, Sensor type code 28h for sensor definition

ID	Sensor Name	Sensor Type Code	Reading Type Code	Description	Event Offset
32	BMC SEL State	10h (Event Logging Disable)	6Fh (Sensor Specific)	Specify the status of the SEL (Cleared/Almost full/Full)	Only offset 2,4,5 are used See IPMI v2.0 table 42-3, Sensor type code 10h (Event Log Disable) for sensor definition
33	SEL Time Set	12h (System)	6Fh (Sensor Specific)	Specify when SEL time changes	Only offset 5 is used See IPMI v2.0 table 42-3, Sensor type code 12h for sensor definition
34	Jumper Status	D3h (OEM Jumper Status)	6Fh (Sensor Specific)	Reflects on-board jumper presence	Offsets 0 to 14 are used See OEM table, Sensor type code D3h (Kontron OEM Jumper Status) for sensor definition
35	Thermal Error	0Ah (Cooling Device)	03h (Digital Discrete)	Cooling problem	See IPMI v2.0 table 42-3, Sensor type 0Ah (Cooling Device) for sensor definition

Table 7: MMC sensor list

ID	Sensor Name	Sensor Type Code	Reading Type Code	Description	Event Offset
0	Bx:IPMI Info-1	C0h (OEM Firmware Info)	70h (OEM Kontron Internal Diagnostic)	Internal Management Controller firmware diagnostic	See OEM table, Sensor type code C0h (Kontron OEM Firmware Info) for sensor definition and Event/Reading type code 70h (Kontron OEM Internal Diagnostic)
1	Bx:IPMI Info-2	C0h (OEM Firmware Info)	71h (OEM Kontron Internal Diagnostic)	Internal Management Controller firmware diagnostic	See OEM table, Sensor type code C0h (Kontron OEM Firmware Info) for sensor definition and Event/Reading type code 71h (Kontron OEM Internal Diagnostic)
2	Bx:Module HotSwap	F2h Module Hot Swap	6Fh (Sensor Specific)	Module Hot Swap	Only offset 0,1,2,3,4 are used See AMC.0 R2.0 Section 3.6.6 Module Hot Swap Sensor for sensor definition
3	Bx:MMC Stor Err	28h (Management Subsystem Health)	6Fh (Sensor Specific)	Management sub-system health (non-volatile memory error)	Only offset 1 is used See IPMI v2.0 table 42-3, Sensor type code 28h for sensor definition
4	Bx:IPMI Watchdog	23h (Watchdog)	6Fh (Sensor Specific)	IPMI Watchdog (payload watchdog)	Only offset 0,1,2,3,8 are used See IPMI v2.0 table 42-3, Sensor type code 23h (Watchdog 2) for sensor definition
5	Bx:CPU Reset	CFh (Board Reset)	03h (Digital Discrete)	Board reset type and source	Only offset 0,1 are used See OEM sensor table, Sensor type code CFh for sensor definition
6	Bx:Vcc +VPP	02h (Voltage)	01h (Threshold Based)	On-board Vddq payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
7	Bx:Vcc +1.8V OPC	02h (Voltage)	01h (Threshold Based)	On-board 3.3V payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
8	Bx:Vddq	02h (Voltage)	01h (Threshold Based)	On-board 3.3V L payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event

ID	Sensor Name	Sensor Type Code	Reading Type Code	Description	Event Offset
9	Bx:Vcc +VCCEOPIO	02h (Voltage)	01h (Threshold Based)	On-board 1.5V payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
10	Bx:Vcc +VCCOPC	02h (Voltage)	01h (Threshold Based)	On-board 1.05V payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
11	Bx:Vcc +1V	02h (Voltage)	01h (Threshold Based)	On-board 1.05V payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
12	Bx:Vcc +VCCIO	02h (Voltage)	01h (Threshold Based)	On-board 1.05V payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
13	Bx:Vcc +VTT_DDR	02h (Voltage)	01h (Threshold Based)	On-board 1.05V payload power supply voltage	See IPMI v2.0 table 42-2 for threshold based event
14	Bx:Power State	D1h (OEM Power State)	6Fh (Sensor Specific)	Board Power State	See OEM sensor table, Sensor type code D1h for sensor definition
15	Bx:Power Good	08h (Power Supply)	77h (OEM)	Power good status	See OEM sensor table, Event/Reading type code 77h for sensor definition
16	Bx:Power Good Evt	08h (Power Supply)	03h (Digital Discrete)	Power good status event that occur since the last power on or reset	See IPMI v2.0 table 42-3, Sensor type code 08h for sensor definition
17	Bx:PWROK Capt. 1	08h (Power Supply)	03h (Digital Discrete)	Latched power rail status	See IPMI v2.0 table 42-3, Sensor type code 08h for sensor definition
18	Bx:PWROK Capt. 2	08h (Power Supply)	03h (Digital Discrete)	Latched power rail status	See IPMI v2.0 table 42-3, Sensor type code 08h for sensor definition
19	Bx:CPU Status	07h (Processor)	6Fh (Sensor Specific)	Processor 0 Status	Only offset 0,1,5 are used See IPMI v2.0 table 42-3, Sensor type code 07h for sensor definition
20	Bx:ACPI State	22h (System ACPI Power State)	6Fh (Sensor Specific)	Advance Configuration and Power Interface State	Only offset 0,4,5,10,11,12,14 are used See IPMI v2.0 table 42-3, Sensor type code 22h (ACPI Power State) for sensor definition

ID	Sensor Name	Sensor Type Code	Reading Type Code	Description	Event Offset
21	Bx:MMC SEL State	10h (Event Logging Disable)	6Fh (Sensor Specific)	Specify the status of the SEL (Cleared/Almost full/Full)	Only offset 2,4,5 are used See IPMI v2.0 table 42-3, Sensor type code 10h (Event Log Disable) for sensor definition
22	Bx:Health Status	24h (Platform Alert)	7Fh (OEM Health Status)	General health status (Aggregation of critical sensors)	See OEM sensor table, Event/Reading type code 7Fh for sensor definition
23	Bx:POST Value	C6h (OEM POST Value)	6Fh (Sensor Specific)	Show current postcode value (No event generated)	Only offset 0 to 7 and 14 are used See OEM sensor table, Sensor type code C6h for sensor definition

Table 8: Detailed information for Kontron-specific sensors

Sensor Name	Event/Reading Type Code	Sensor Type	Sensor Specific Offset	Event Trigger
IPMI Info-1 Bx:IPMI Info-1	70h OEM Kontron Firmware Info 1	C0h OEM Kontron Firmware Info	00h 01h 02h to 0Eh 0Fh	Event Code Assert Trigger Event Overflow Trigger Code Assert Line (Binary Encoded) Unused, Reserved
IPMI Info-2 Bx:IPMI Info-2	75h OEM Kontron Firmware Info 2	C0h OEM Kontron Firmware Info	00h 01h 02h to 0Eh 0Fh	Event Code Assert Trigger Unused Trigger Code Assert File Id (Binary Encoded) Unused, Reserved
Bx:Power Good	77h OEM Kontron Power Good	08h Standard IPMI Power Supply	00h 01h 02h 03h 04h 05h 06h 07h 08h 09h 0Ah 0Bh 0Ch 0Dh 0Eh 0Fh	0.75V SUS 1.5V SUS 1.8V SUS 2.5V SUS 5V SUS Expected1 (1.5V SUS + 1.8V SUS) 3.3V 1.0V VCCOPC VCCEOPIO IMVP VCCIO Vtt DDR Vddq Unused Unused
Jumper Status	6Fh Standard IPMI sensor specific	D3h Kontron OEM Jumper Status Sensor	00h 01h 02h 03h 04h 05h 06h	Jumper 00 Present (JP4: 1-2) Jumper 01 Present (JP4: 3-4) Jumper 02 Present (JP4: 5-6) Jumper 03 Present (JP4: 7-8) Jumper 04 Present (JP4: 9-10) Jumper 05 Present (JP4: 11-12) Jumper 06 Present (JP4: 13-14)
Power State Bx:Power State	6Fh Standard IPMI sensor specific	D1h Kontron OEM Power state sensor	00h 01h 02h 03h 04h	Power ON Power OFF Power ON Request Power OFF Request Full Reset In Progress

Sensor Name	Event/Reading Type Code	Sensor Type	Sensor Specific Offset	Event Trigger
Bx:POST Value	6Fh Standard IPMI sensor specific	C6h OEM Kontron POST Code Value	00h to 07h 14h	POST code LOW byte value, no event generated on these offsets POST Code Error Event Trigger Event Data 2: POST Low Nibble Event Data 3: POST High Nibble

Sensor Name	Event/Reading Type Code	Sensor Type	Sensor Specific Offset	Event Trigger
Bx:CPU Reset	03h Standard IPMI Discrete	CFh OEM Kontron Reset	00h 01h State Asserted / State Deasserted	Event Data 2: Reset Type 00h: Warm reset 01h: Cold reset 02h: Forced Cold [Warm reset reverted to Cold] 03h: Soft reset [Software jump] 04h: Hard Reset 05h: Forced Hard [Warm reset reverted to Hard] Event Data 3: Reset Source 00h: IPMI Watchdog [cold, warm or forced cold] (IPMI Watchdog2 sensors gives additional details) 01h: IPMI commands [cold, warm or forced cold] (chassis control, fru control) 02h: Processor internal check stop 03h: Processor internal reset request 04h: Reset button [warm or forced cold] 05h: Power up [cold] 06h: Legacy Initial Watchdog / Warm Reset Loop Detection * [cold reset] 07h: Legacy Programmable Watchdog [cold, warm or forced cold] 08h: Software Initiated [soft, cold, warm of forced cold] 09h: Setup Reset [Software Initiated Cold] 0Ah: Power Cycle / Full Reset / Global Platform Reset FFh: Unknown

<table>
<tr><th>Sensor Name</th><th>Event/Reading Type Code</th><th>Sensor Type</th><th>Sensor Specific Offset</th><th colspan="2">Event Trigger</th></tr>
<tr><td rowspan="2">Health Status</td><td rowspan="2">7Fh
(OEM Health Status)</td><td rowspan="2">24h
(Platform Alert)</td><td rowspan="2">00h Status not available in current state
01h Healthy
02h Informational fault
03h Minor fault
04h Major fault
05h Critical fault</td><td colspan="2">Event Data 3:
If the sensor is an aggregation sensor, then event data 2 is used to return the ID of the first sensor from the aggregation that caused the fault.

Sensor Aggregation List: FRU0</td></tr>
<tr><td>ID - Sensor Name
04h - Temp Inlet
05h - Temp Outlet
07h - Temp BMC
08h - Temp CPU 1
09h - Temp CPU 2
0Eh - Vcc +12V SUS</td><td>0Fh - Vcc +5V SUS
10h - Vcc +2.5V SUS
11h - Vcc +1.8V SUS
12h - Vcc +1.5V SUS
13h - Vcc +1.25V SUS
14h - Vcc +0.75V SUS</td></tr>
<tr><td rowspan="2">Bx:Health Status</td><td rowspan="2">7Fh
(OEM Health Status)</td><td rowspan="2">24h
(Platform Alert)</td><td rowspan="2">00h Status not available in current state
01h Healthy
02h Informational fault
03h Minor fault
04h Major fault
05h Critical fault</td><td colspan="2">Event Data 3:
If the sensor is an aggregation sensor, then event data 2 is used to return the ID of the first sensor from the aggregation that caused the fault.

Sensor Aggregation List: FRU1/2</td></tr>
<tr><td>ID - Sensor Name
04h - Bx:IPMI Watchdog
06h - Bx:Vcc +VPP
07h - Bx:Vcc +1.8V OPC
08h - Bx:Vddq
09h - Bx:Vcc +VCCEOPIO
0Ah - Bx:Vcc +VCCOPC</td><td>0Bh - Bx:Vcc +1V
0Ch - Bx:Vcc +VCCIO
0Dh - Bx:Vcc +VTT_DDR
11h - Bx:PWROK Capt. 1
12h - Bx:PWROK Capt. 2</td></tr>
</table>

About Kontron

Kontron, a global leader in embedded computing technology and trusted advisor in IoT, works closely with its customers, allowing them to focus on their core competencies by offering a complete and integrated portfolio of hardware, software and services designed to help them make the most of their applications.

With a significant percentage of employees in research and development, Kontron creates many of the standards that drive the world's embedded computing platforms; bringing to life numerous technologies and applications that touch millions of lives. The result is an accelerated time-to-market, reduced total-cost-of-ownership, product longevity and the best possible overall application with leading-edge, highest reliability embedded technology

Kontron is a listed company. Its shares are traded in the Prime Standard segment of the Frankfurt Stock Exchange and on other exchanges under the symbol "KBC". For more information, please visit: http://www.kontron.com/

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