Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade™ X6450 Server Module

Sun Microsystems, Inc.
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Contents

Preface

The *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade X6450 Server Module* contains information about Integrated Lights Out Manager (ILOM) 2.0 that is specific to the Sun Blade™ X6450 server module.

For a complete discussion of ILOM 2.0 and its capabilities along with user procedures, see the *Sun Integrated Lights Out Manager 2.0 User's Guide*, the *Addendum to the Sun Integrated Lights Out Manager 2.0 User's Guide*, and the *Sun Blade X6450 Server Module Product Notes*.

Related Documentation

The document set for the Sun Blade X6450 server module is described in the *Where To Find Sun Blade X6450 Server Module Server Documentation* sheet that is packed with your system. You can also find the documentation at `http://docs.sun.com`.

Translated versions of some of these documents are available at `http://docs.sun.com`. Select a language from the drop-down list and navigate to your document collection using the Product category link. Available translations include Simplified Chinese, French, and Japanese.

English documentation is revised more frequently and might be more up-to-date than the translated documentation. For all Sun documentation, go to `http://docs.sun.com`.

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Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade X6450 Server Module, part number 820-5834-11.

CHAPTER 1

Introduction

This supplement provides platform-specific information related to ILOM 2.0 running on the Sun Blade X6450 server module.

The following topics are covered in this supplement:

- Chapter 2, Firmware Update Procedures
- Chapter 3, Sensor Definitions

ILOM 2.0 Features Supported

The Sun Blade X6450 server module supports the entire ILOM 2.0 feature set except for the delayed BIOS upgrade.

The *Addendum to the Sun Integrated Lights Out Manager 2.0 User's Guide* describes a method of recovering from a corrupt ILOM using the SP U-boot environment. Do not use this method on the Sun Blade X6450. Instead, follow the instructions in "Recovering the ILOM Firmware" on page 14.

CHAPTER 2

Firmware Update Procedures

Overview

This chapter provides procedures for updating (flashing) the firmware that resides on:

- The server itself (BIOS)
- The server's Service Processor (ILOM)

It also provides procedures for recovering the BIOS or ILOM images.

TABLE 2-1 shows the tasks, the methods used, and the sections that describe them.

TABLE 2-1 Tasks, Methods, and Sections

To Do This Task	Use This Method	Described in This Section
BIOS Upgrade	SP CLI or web interface	"Using the SP to Update Firmware" on page 4
BIOS Recovery	DOS boot with `Afudos` (updates BIOS only)	"Recovering the BIOS Firmware" on page 13 for Afudos
ILOM Upgrade	SP CLI or web interface	"Using the SP to Update Firmware" on page 4
ILOM Recovery	`SOCFLASH`	"Recovering the ILOM Firmware" on page 14

Note – The ILOM is also known as the service processor (SP), and it is sometimes referred to in the user interface as the BMC.

To ensure proper operation, it is recommended that you synchronize your firmware updates, so that if you update one, you should update the others as well.

- Using the SP (ILOM) updates both the ILOM and BIOS firmware, and the CPLD.
- If you recover the ILOM using `SOCFLASH`, or if you recover the BIOS using `Afudos`, after the recovery, you should run the SP update procedure to synchronize the ILOM and the BIOS firmware.

Using the SP to Update Firmware

This section describes how to use the service processor to update the ILOM and BIOS.

Note – The procedures in this section also update the CPLD.

Use the procedures in this section to update the BIOS and the SP firmware. This section can be used when you need to:

- Recover the BIOS
- Update the BIOS
- Update the ILOM

Use the following sections, in order:

1. Obtain the IP address of the Service Processor. See "Getting the Service Processor's IP Address" on page 5.
2. Log on to the Service Processor ILOM to check the versions of firmware you have. See "Determining Your Current Firmware Versions" on page 6.
3. Use the ILOM to download the new versions of firmware. See "Downloading Firmware File" on page 8.
4. Use the ILOM to install the new firmware. See "Flashing the ILOM/BIOS Firmware" on page 9.

Note – Alternately, you can use the Sun xVM Ops Center.

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5. Reset the Service Processor. See "Resetting the Service Processor" on page 11.

Getting the Service Processor's IP Address

You use the Service Processor (SP) on your server for various firmware update tasks and you must use its IP address to access it. If you do not already know the Service Processor's IP address, you must determine it.

There are several different methods you can use to locate ILOM SPs and their IP addresses.

1. **DHCP server.** Refer to the ILOM documentation for your ILOM version for instructions on how to determine the IP address of an SP.
2. **Linux and Solaris open-source `nmap` command.** The open-source `nmap` command provides a `-p` port option to scan for port 623, which can be used to quickly detect IPMI-enabled devices (such as your server's SP) on a network. For example:

```
nmap -p 623 10.6.154.1/24
Interesting ports on net.address (623 10.6.154.1/24):
PORT    STATE  SERVICE
623/tcp closed unknown
```

3. **Chassis Monitoring Module (CMM)**. See "To Display the Service Processor's IP Address Using the CMM" on page 5.

▼ To Display the Service Processor's IP Address Using the CMM

Note – This procedure can be used for ELOM as well as ILOM 2.0 and ILOM 3.0.

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1. **Log in to the CMM ILOM CLI.**
2. **Type the command:**

   `show /CH/BL`*n*`/SP/network`

   where *n* is the server module number or chassis slot ID.

   The CMM ILOM displays information about the server module, including its IP address and MAC address. For example:

```
-> show /CH/BL0/SP/network
 /CH/BL0/SP/network
    Targets:
    Properties:
        type = Network Configuration
```

```
          commitpending = (Cannot show property)
          ipaddress = IPaddress
          ipdiscovery = dhcp
          ipgateway = IPgateway
          ipnetmask = 255.255.252.0
          macaddress = Macaddress
          pendingipaddress = IPaddress
          pendingipdiscovery = dhcp
          pendingipgateway = IPgateway
          pendingipnetmask = 255.255.252.0
      Commands:
          cd
          set
          show
->
```

Determining Your Current Firmware Versions

There are three alternate procedures in this section that you can use:

- "Using the CLI Through the Management Ethernet Port" on page 6
- "Using the CLI Through the Serial Port" on page 7
- "Using the Web Interface" on page 8

Using the CLI Through the Management Ethernet Port

See the *Sun Blade X6450 Embedded Lights Out Manager Administration Guide* for more detailed information on this procedure.

1. **Connect an RJ-45 Ethernet cable to the NET MGT Ethernet port on the chassis CMM.**

   Establish an SSH connection using the following command:

   `# ssh -l root sp_ip`

   where *sp_ip* is the IP address of the server's Service Processor.

   Enter the default password when you are prompted:

   `changeme`

   After you have successfully logged in, the SP displays its default command prompt:

   `->`

2. **Type the version command, which returns output similar to the following:**

```
-> version
SP firmware version: 2.0.3.6
SP firmware build number: 36472
SP firmware date: Tue Sep 2 13:47:18 PDT 2008
SP filesystem version: 0.1.17
```

The ILOM (SP) firmware version and build number are listed above.

Using the CLI Through the Serial Port

1. **Configure your terminal device or the terminal emulation software running on a laptop or PC to the following settings:**

```
8N1: eight data bits, no parity, one stop bit
9600 baud
Disable hardware flow control (CTS/RTS)
Disable software flow control (XON/XOFF)
```

2. **Connect a dongle cable to the server module.**
3. **Connect a serial cable from the RJ-45 SER MGT port on the server module dongle to your terminal device or PC.**
4. **Press `Enter` on the terminal device to establish a connection between that terminal device and the server's SP.**

   The SP displays a login prompt.

   ```
   SUNSP0003BA84D777 login:
   ```

   Here, `0003BA84D777` is the Ethernet MAC address of the SP. This will be different for each server.

5. **Log in to the ILOM SP and type the default user name (`root`) with the default password (`changeme`).**

   After you have successfully logged in, the SP displays its default command prompt:

   ```
   ->
   ```

6. **Type the version command, which returns output similar to the following:**

```
-> version
SP firmware version: 2.0.3.6
SP firmware build number: 36472
SP firmware date: Tue Sep 2 13:47:18 PDT 2008
SP filesystem version: 0.1.17
```

The ILOM firmware version and build number are listed above.

Using the Web Interface

1. **Connect to the ILOM Web interface by entering the IP address of the server's SP in your browser's address field. Use** `https://`**. For example:**

   `https://129.146.53.150`

2. **Log in to the ILOM SP and type the default user name (**`root`**) with the default password (**`changeme`**).**

   The `System Information -> Versions` page appears. It includes the firmware version and build number.

FIGURE 2-1 ILOM Versions Page

Downloading Firmware File

Download the flash image `.pkg` file using these steps:

1. **Browse to** `http://www.sun.com/download/`
2. **Click View by Category.**
3. **Click X64 Servers and Workstations in the Hardware Drivers area.**
4. **Click the link for the desired server module and software release.**

5. **Click Download.**

6. **Enter your Username and Password.**

   If you do not have a Username and Password, you can register free of charge by clicking **Register Now**.

7. **Click Accept License Agreement.**

8. **Click the appropriate firmware image file name:**

   `ilom.`*`firmware`*`.pkg`

   For example:

   `ilom.X6450-2.0.3.6-r36158.pkg`

Flashing the ILOM/BIOS Firmware

Caution – ILOM enters a special mode to load new firmware. Note the following requirements. 1) The host power must remain off. 2) No other tasks can be performed in ILOM until the firmware upgrade is complete and the ILOM is reset. To ensure a successful update, do *not* attempt to modify the ILOM configuration, or use other ILOM Web, CLI, SNMP, or IPMI interfaces, during the flash update process. Wait until after the update succeeds before making further ILOM configuration changes. The update requires a system server and takes about 20 minutes.

This is the procedure that actually flashes the firmware, replacing the existing images with the new images from the .pkg file you downloaded previously.

During the firmware loading process, the OK to Remove LED remains OFF.

This section describes two methods of flashing the ILOM/BIOS firmware:

- Use the ILOM Web interface
- Use the ILOM CLI `load` command

Note – You can also use the Sun xVM Ops Center if it is available. Online documentation for Sun xVM Ops Center can be found at:
`http://wikis.sun.com/display/xvmOC1dot1/Home`

Note – Due to increased memory use during Web interface operations, you might find that using the ILOM web interface, which is the easiest procedure, will not work satisfactorily. In such a case, you will need to use the ILOM CLI `load` command or the Sun xVM Ops Center to flash the firmware.

Flashing the Firmware with the ILOM Web Interface

1. **Log into the ILOM web interface by pointing your browser at the IP address of the Service Processor. Use `https://`. For example:**

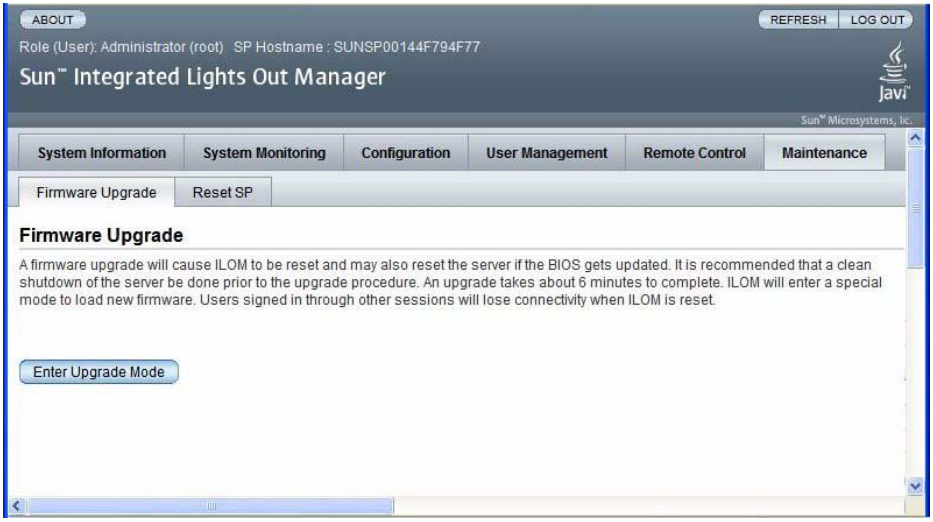
   ```
   https://10.6.78.144
   ```

2. **Select the Maintenance tab.**
3. **Select the Firmware Upgrade tab.**
4. **Click the Enter Upgrade Mode button.**
5. **Browse for the flash image file.**

Caution – Power off the host before proceeding. If the host is powered on when you click the Upload button, the ILOM will shut down the host, and any open files might be corrupted.

6. **Click the Upload button.**

FIGURE 2-2 Firmware Upgrade Screen



Flashing the Firmware With the ILOM CLI

1. **Log onto the ILOM CLI through the Management Ethernet Port (see** "Using the CLI Through the Management Ethernet Port" on page 6**) or the serial port (see** "Using the CLI Through the Serial Port" on page 7**).**

2. **From the ILOM CLI, use the following command:**

   `load -source tftp://`*tftpserver*`/ilom.`*firmware*`.pkg`

   where *tftpserver* is the trivial file-transfer protocol (TFTP) server that contains the update and `ilom.`*firmware*`.pkg` is the firmware image file, for example:

   `ilom.X6450-2.0.3.6-r36158.pkg`

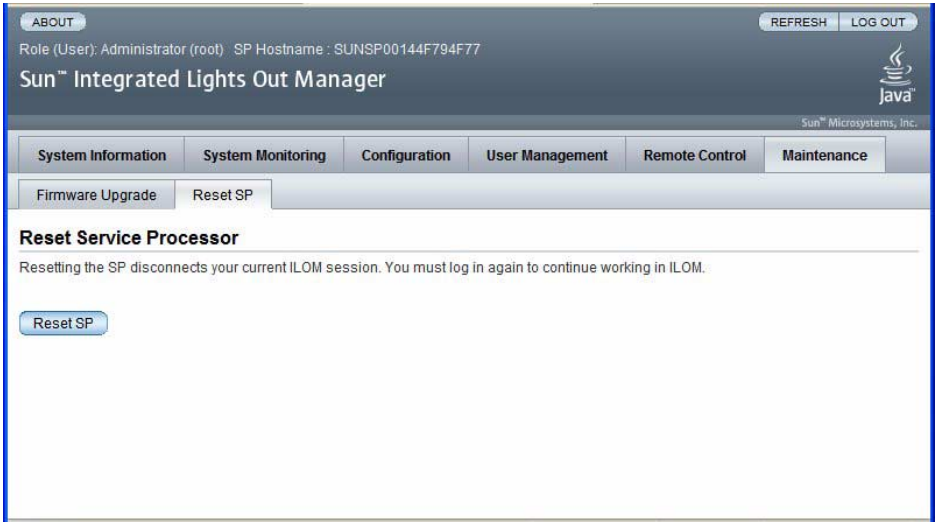
Resetting the Service Processor

After flashing the ILOM/BIOS firmware, you must reset the ILOM SP.

To reset the ILOM SP, you can do any of the following:

- From the ILOM SP graphical Web interface, navigate to the Maintenance tab and the Reset SP tab, and then click the Reset SP button.

FIGURE 2-3 ILOM Reset Service Processor Window



- From the ILOM CLI, use the following command:

  `reset /SP`

- Using IPMItool, use the following command:

  `ipmitool -U root -P password -H` *`SP-IP`* `bmc reset cold`

  where *`SP-IP`* is the IP address of the service processor.

- Reset the ILOM SP by shutting down the host, then removing and restoring AC power cords to the system.

For complete details, see the ILOM documentation for your server.

Clearing CMOS Settings (Optional)

If you cannot get output to your serial console after the flash upgrade, you might have to clear CMOS settings. This is because your default CMOS settings might have been changed by the new BIOS upgrade.

To clear CMOS settings, use the following commands (in this example, the default username, `root`, and the default password, `changeme`, are used):

```
ipmitool -U root -P changeme -H SP-IP chassis power off
ipmitool -U root -P changeme -H SP-IP chassis bootdev disk clear-cmos=yes
```

where *SP-IP* is the IP address of the service processor.

Note – The -P option might not be available on the Windows and Solaris versions of IPMItool. Instead, IPMItool prompts for a password.

Recovering the BIOS Firmware

Use the following procedure to recover the BIOS firmware, for example if the BIOS image becomes corrupt, or if the update process fails..

1. **Copy the following files to a bootable USB flash device.**

   `Afudos.exe`

   `S95-3B16.ROM`

Note – `S90-3B16.ROM` is an example. If you have a later file, use it.

---

2. **Connect the USB flash device to the USB connector on the dongle.**
3. **Reset the server module.**
4. **Press F8 to enter display a list of bootable devices.**
5. **Select the USB flash device from the list.**
6. **Fun the following command from the DOS prompt.**

   `Afudos S95-3B16.ROM /P /B /K /C /X`

   The BIOS is updated and the server module restarts.

Recovering the ILOM Firmware

Use the following procedure to recover the ILOM firmware, for example, if the upgrade fails, or if the firmware image becomes corrupt.

1. **Copy all the files from the Sun Download area, or Tools and Drivers CD, to a bootable USB flash device.**

   The files are located in the `BMCrecovery` directory, on the Tools and Drivers CD. They consist of:

   - `SOCFLASH.EXE`
   - `DOS4GW`
   - `ilom.X6450-`*number*`.bin`

     Where *number* is a build number, for example `2.0.3.6-r36158`.

Note – Use the binary (`.bin`) file, not a `.pkg` file.

---

2. **Set up your server module to respond to POST messages and boot prompts.**
3. **Remove AC power from the system to be flashed.**
4. **Insert the bootable flash drive into the USB port.**
5. **Connect AC power, and power on the system.**

   a. **A message appears stating that the BMC was not found.**

      The system takes up to five minutes to boot.

   b. **Press F8 to get a list of boot devices.**

   c. **Choose the flash device to boot from.**

6. **Once the flash device is booted, run the following commands:**

   `socflash -p 1 -f` *sp-binary-file*

7. **After a successful flash use the -r option to reset the SP:**

   `socflash -r`

8. **Access the BIOS Setup Utility to confirm that the BIOS does not report that the BMC was not found.**

   Notes:

   - If the backup is selected (-b *backup-filename*), sufficient free space to store the SP binary backup file must be present on the USB flash device.

- The BIOS is not upgraded by this emergency recovery procedure. Perform a second ILOM-based flash upgrade to update the BIOS version.
- This emergency flash recovery procedure returns the SP to the default configuration.
- The ILOM `SPBIOS.pkg` file format (for example, `ilom.X6450-2.0.3.6-r36158.pkg`) cannot be used for emergency recovery. Use the `ilom2026.bin` recovery image instead.

CHAPTER 3

Sensor Definitions

This chapter lists and describes the Sun Blade X6450 server module sensors.

Instructions for displaying the sensors are in the *Sun Integrated Lights Out Manager 2.0 User's Guide* or the *Sun Blade X6450 Server Module Embedded Lights Out Manager Administration Guide*.

TABLE 3-1 through TABLE 3-6 list the sensor-related events. TABLE 3-7 provides a list of all of the sensors.

Entity Presence

TABLE 3-1 Entity Presence

Sensor	Event	Description	Action
Entity Presence	Device Present (0x02)	A FRU was installed. Or if SP was rebooted or AC power cycled, FRU was detected as being present	Add to log during normal operation or if SP is rebooted
Entity Presence	Device Absent (0x01)	A FRU was removed.	Add to log during normal operation and FRU was removed

Power

TABLE 3-2 Power

Sensor	Event	Description	Action
Power Supply PS*x*/PWROK*x*	Asserted	Chassis power supply redundant side is now OK.	Nominally this is asserted and only added to the log if it was deasserted when the SP boots. CMM controls chassis power supply and chassis LED behavior.
Power Supply PS*x*/PWROK*x*	DeAsserted	Chassis power supply redundant side is not OK.	Add to log. CMM controls chassis power supply and chassis LED behavior.
Power Supply PS*x*/VINERR*x*	Asserted	Chassis power supply AC input (AC power plug) is not being supplied input voltage. User to check power plug *x* and that it is being supplied voltage.	Nominally this is deasserted and only added to the log if it was deasserted when the SP boots. CMM controls chassis power supply and chassis LED behavior.
Power Supply PS*x*/VINERR*x*	DeAsserted	Chassis power supply AC input (AC power plug) is being supplied input voltage. It is OK.	Add to log. CMM controls chassis power supply and chassis LED behavior.

ACPI

TABLE 3-3 ACPI

Sensor	Event	Description	Action
ACPI	Asserted	Host power has been enabled	Add to log
ACPI	DeAsserted	Host Power has been disabled	Add to log

Power Budget

TABLE 3-4

Sensor	Event	Description	Action
SYS/VPS	UCR Asserted	Server module power is over utilizing chassis power.	Add to log
Power Supply SYS/PWRCTLSTATE	Asserted	This server module exceeds the available power budget for the chassis.	Power on of server module will not work. If server module powers on it may be powered off in 30 seconds during BIOS POST. Add to log
Power Supply SYS/PWRCTLSTATE	DeAsserted	There is enough power budget in the chassis to power on the server module. You can now power it on.	Allow power on of server module Add to log

Fans

TABLE 3-5

Sensor	Event	Description	Action
Fan Fm*x*/FAIL	Predictive Failure Asserted	A fan module has failed or has been removed from the chassis.	No action on server module. CMM handles LED behavior on chassis and fan modules.
Fan Fm*x*/FAIL	Predictive Failure DeAsserted	A fan module failure has cleared or has been inserted from the chassis.	No action on server module. CMM handles LED behavior on chassis and fan modules.

Other Sensors

TABLE 3-6

Sensor	State	Description
SYS/SLOTID	0 - 11	Reflects the server module's chassis slot ID number
MB/THERMOVRD	Asserted	Sever module is requesting 100% fan speed from the chassis to cool itself down. This is not logged.
MB/THERMOVRD	DeAsserted	CMM is controlling fan speed This is not logged.
MB/MCH/D*xy*/PRSNT	Device Present/ Device Absent	Detects DIMM presence.
SYS/VPS	0 – *X* Watts	Shows the actual power being consumed by the server module.
MB/T_VRD1	Degrees Celsius	Is used as an ambient sensor for the server module. If it exceeds the UNR value, the server module host powers down.

Complete List of Sensors

TABLE 3-7 Complete List of Sensors

Sensor	Data
Sensor ID	ACPI (0x21)
Entity ID	7.0
Sensor Type (Discrete)	System ACPI Power State
States Asserted	System ACPI Power State - [S0/G0:working]
Sensor ID	SYS/PWRCTLSTATE (0x30)
Entity ID	7.0
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [State Deasserted]
Sensor ID	NMIBTN (0x22)
Entity ID	7.0
Sensor Type (Discrete)	Critical Interrupt
Sensor ID	SYS/SLOTID (0x23)
Entity ID	7.0
Sensor Type (Discrete)	OEM reserved #c0
Sensor ID	MB/THERMOVRD (0x8d)
Entity ID	7.0
Sensor Type (Discrete)	OEM reserved #c0
States Asserted	Digital State - [State Deasserted]
Sensor ID	MB/P*n*/PRSNT where *n* is the power supply number
Entity ID	3.*n*
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State [Device Present]

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor ID	**MB/P*n*/TCCAT** **where *n* is the power supply number**
Entity ID	3.*n*
Sensor Type (Discrete)	OEM reserved #c0
Sensor ID	MB/T_VRD*n* where *n* = 0-3
Entity ID	7.0
Sensor Type (Analog)	Temperature
Sensor Reading	28 (+/- 0) degrees C
Status	ok
Lower Non-Recoverable	na
Lower Critical	na
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	na
Upper Non-Recoverable	na
Assertions Enabled	
Sensor ID	MB/T_DIMM0 (0x1b)
Entity ID	7.0
Sensor Type (Analog)	Temperature
Sensor Reading	30 (+/- 0) degrees C
Status	ok
Lower Non-Recoverable	na
Lower Critical	na
Lower Non-Critical	na
Upper Non-Critical	72.000

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Upper Critical	75.000
Upper Non-Recoverable	na
Assertions Enabled	unc+ ucr+
Deassertions Enabled	unc+ ucr+
Sensor ID	MB/T_DIMM1 (0x1c)
Entity ID	7.0
Sensor Type (Analog)	Temperature
Sensor Reading	27 (+/- 0) degrees C
Status	ok
Lower Non-Recoverable	na
Lower Critical	na
Lower Non-Critical	na
Upper Non-Critical	72.000
Upper Critical	75.000
Upper Non-Recoverable	na
Assertions Enabled	unc+ ucr+
Deassertions Enabled	unc+ ucr+
Sensor ID	MB/P*n*/V_VCC where *n* is 0-3
Entity ID	3.*n*
Sensor Type (Analog)	Voltage
Sensor Reading	1.317 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	na
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	na
Upper Non-Recoverable	na

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Assertions Enabled	
Sensor ID	MB/V_VTT (0xe)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.197 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.027
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.386
Upper Non-Recoverable	1.449
Assertions Enabled	lcr- ucr+ unr+
Deassertions Enabled	lcr- ucr+ unr+
Sensor ID	MB/V_+1V5 (0xf)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.498 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.349
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.646
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor ID	MB/V_+1V8B0 (0x16)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.802 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.617
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.978
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+1V8STBY (0x6c)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.782 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.617
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.978
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+1V2NIC (0x12)

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.238 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.074
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.312
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+12VCPU*n* where *n* is the cpu number
Entity ID	7.*n*
Sensor Type (Analog)	Voltage
Sensor Reading	12.222 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	10.773
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	13.167
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+12V (0xd)
Entity ID	7.0
Sensor Type (Analog)	Voltage

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor Reading	12.222 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	9.513
Lower Critical	10.773
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	13.167
Upper Non-Recoverable	14.427
Assertions Enabled	lcr- lnr- ucr+ unr+
Deassertions Enabled	lcr- lnr- ucr+ unr+
Sensor ID	MB/V_+3V3STBY0 (0x6d)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	3.287 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	2.993
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	3.667
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+3V3STBY1 (0x6e)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	3.249 (+/- 0) Volts
Status	ok

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Lower Non-Recoverable	na
Lower Critical	2.975
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	3.642
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+3V3 (0x10)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	3.287 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	2.958
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	3.616
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+5V (0x11)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	4.921 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	4.488

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	5.482
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+1V25STBY (0x6f)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.260 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.096
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.373
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+1V5B0 (0x70)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.490 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.349
Lower Non-Critical	na
Upper Non-Critical	na

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Upper Critical	1.646
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+1V5B1 (0x71)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.365 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.349
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.646
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+2V5STBY (0x14)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	2.496 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	2.249
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	2.743
Upper Non-Recoverable	na

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+1V8B1 (0x6b)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.802 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.617
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	1.978
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+0V9B0 (0x72)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	0.893 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	0.806
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	0.989
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor ID	MB/V_+0V9B1 (0x73)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	0.887 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	0.806
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	0.989
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	MB/V_+1V9NIC (0x74)
Entity ID	7.0
Sensor Type (Analog)	Voltage
Sensor Reading	1.930 (+/- 0) Volts
Status	ok
Lower Non-Recoverable	na
Lower Critical	1.709
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	2.083
Upper Non-Recoverable	na
Assertions Enabled	lcr- ucr+
Deassertions Enabled	lcr- ucr+
Sensor ID	SYS/VPS (0x8e)

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Entity ID	7.0
Sensor Type (Analog)	Power Unit
Sensor Reading	284 (+/- 0) Watts
Status	ok
Lower Non-Recoverable	na
Lower Critical	na
Lower Non-Critical	na
Upper Non-Critical	na
Upper Critical	708.000
Upper Non-Recoverable	na
Assertions Enabled	ucr+
Deassertions Enabled	ucr+
Sensor ID	MB/MCH/DA0/PRSNT (0x75)
Entity ID	32.0
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DA1/PRSNT (0x76)
Entity ID	32.1
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DA2/PRSNT (0x77)
Entity ID	32.2
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DA3/PRSNT (0x78)
Entity ID	32.3

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DA4/PRSNT (0x79)
Entity ID	32.4
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DA5/PRSNT (0x7a)
Entity ID	32.5
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DB0/PRSNT (0x7b)
Entity ID	32.6
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DB1/PRSNT (0x7c)
Entity ID	32.7
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DB2/PRSNT (0x7d)
Entity ID	32.8
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DB3/PRSNT (0x7e)
Entity ID	32.9

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DB4/PRSNT (0x7f)
Entity ID	32.10
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DB5/PRSNT (0x80)
Entity ID	32.11
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DC0/PRSNT (0x81)
Entity ID	32.12
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DC1/PRSNT (0x82)
Entity ID	32.13
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DC2/PRSNT (0x83)
Entity ID	32.14
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DC3/PRSNT (0x84)
Entity ID	32.15

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DC4/PRSNT (0x85)
Entity ID	32.16
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DC5/PRSNT (0x86)
Entity ID	32.17
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DD0/PRSNT (0x87)
Entity ID	32.18
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DD1/PRSNT (0x88)
Entity ID	32.19
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	MB/MCH/DD2/PRSNT (0x89)
Entity ID	32.20
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DD3/PRSNT (0x8a)
Entity ID	32.21

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DD4/PRSNT (0x8b)
Entity ID	32.22
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/MCH/DD5/PRSNT (0x8c)
Entity ID	32.23
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/FEM/PRSNT (0x8f)
Entity ID	44.0
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	MB/REM/PRSNT (0x90)
Entity ID	44.1
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	CMM/PRSNT (0x68)
Entity ID	6.0
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	NEM0/PRSNT (0x66)
Entity ID	44.2

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	NEM1/PRSNT (0x67)
Entity ID	44.3
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	PEM0/PRSNT (0x64)
Entity ID	44.4
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	PEM1/PRSNT (0x65)
Entity ID	44.5
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Absent]
Sensor ID	BL*n*/PRSNT where *n* is the blade number
Entity ID	41.*n*
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	FM*n*/F*x*/TACH where *n* is the fan module, *x* is the fan
Entity ID	30.*n*
Sensor Type (Analog)	Fan
Sensor Reading	5300 (+/- 0) RPM
Status	ok

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Lower Non-Recoverable	1000.000
Lower Critical	1500.000
Lower Non-Critical	2000.000
Upper Non-Critical	7000.000
Upper Critical	7500.000
Upper Non-Recoverable	8000.000
Assertions Enabled	lnc- lcr- lnr- unc+ ucr+ unr+
Deassertions Enabled	lnc- lcr- lnr- unc+ ucr+ unr+
Sensor ID	FM*n*/FAIL where *n* is the fan module number
Entity ID	29.*n*
Sensor Type (Discrete)	Fan
States Asserted	Digital State - [Predictive Failure Deasserted]
Sensor ID	PS*n*/PRSNT
Entity ID	10.*n*
Sensor Type (Discrete)	Entity Presence
States Asserted	Availability State - [Device Present]
Sensor ID	PS0/PWROK0 (0x5e)
Entity ID	10.0
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [State Asserted]
Sensor ID	PS0/PWROK1 (0x5f)
Entity ID	10.0
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [State Asserted]
Sensor ID	PS1/PWROK0 (0x61)

TABLE 3-7 Complete List of Sensors *(Continued)*

Sensor	Data
Entity ID	10.1
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [State Asserted]
Sensor ID	PS1/PWROK1 (0x62)
Entity ID	10.1
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [State Asserted]
Sensor ID	PS0/VINERR0 (0x2a)
Entity ID	10.0
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [Predictive Failure Deasserted]
Sensor ID	PS0/VINERR1 (0x2b)
Entity ID	10.0
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [Predictive Failure Deasserted]
Sensor ID	PS1/VINERR0 (0x2d)
Entity ID	10.1
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [Predictive Failure Deasserted]
Sensor ID	PS1/VINERR1 (0x2e)
Entity ID	10.1
Sensor Type (Discrete)	Power Supply
States Asserted	Digital State - [Predictive Failure Deasserted]