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Revision History

Fourth Edition Updated system power requirements information in Chapter 2. October 2006.
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1 Introduction

The Server Expansion Unit is a member of the HP business-critical computing platform family: a mid-range, mid-volume I/O expansion cabinet. It provides additional I/O performance with the inclusion of 16 PCI-X slots, two additional core I/O cards, four more hard disk drives, and two removable media drives. There are not any cell boards installed in the Server Expansion Unit. The Server Expansion Unit connects to both the HP 9000 rp8400 server and the HP Integrity rx8620 server providing additional I/O slots to these servers.
Server Expansion Unit Overview

The Server Expansion Unit is a 9U tall cabinet that provides 16 additional PCI-X I/O slots and internal peripherals including hard disk drives and DVD drives or DDS-4 tape drives. Its high-availability features include N+1 hot-plug fans and power, redundant power cords, and hot-plug PCI cards and internal hard disk drives.

Figure 1-1 Server Expansion Unit (Front View)
Features include:

- Better availability and up time
- Depth optimized (shallower, fewer racking issues)
- Increased performance density
- Increased PCI performance
- Internal removable media
- More internal disks
- Optimal power cord quantity (One minimum, two maximum)
- PCI-X slots (up to 16)
- Core I/O functionality
- Up to an additional two partitions for the server connected to the Server Expansion Unit
Server Expansion Unit System Backplane

The backplane board provides inter-connection between the PCI-X backplane and the core I/O backplane. The backplane also provides a connection point for the system bus adapter (SBA) link cables and routes the SBA link cable signals to and from the PCI-X backplane board. The backplane receives primary (48V) and standby (12V) power from the bulk power supplies and distributes this power to loads on the backplane and to the other boards connected to it. Besides providing interconnect, the backplane also contains clock generation circuits, manageability circuits, DC-to-DC converters, power monitor logic, and fan control.

Core I/O Backplane Module

The core I/O backplane is housed in a separate sheet metal module holding the backplane and the core I/O boards. This module can be removed from the rear of the chassis for easy access to the core I/O backplane.

This module adapts the core I/O sockets in a horizontal mounting position to the system backplane, which is mounted vertically. It contains the lower bus adapter (LBA) PCI bridges that convert the ropes links from the PCI backplane to the PCI bus interface where the core I/O card is inserted.

It also drives the PCI clocks and voltage regulators that provide domain power to the core I/O cards.

Core I/O PCA

There are two core I/O boards plugged into the Server Expansion Unit system when shipped. The core I/O boards are oriented horizontally and are accessed from the back of the Server Expansion Unit. They are not a standard PCI form factor. Each core I/O contains the required core functions to support a partition in a server. Each also contains a manageability processor (MP).

Neither of the MPs on the core I/O cards installed in the Server Expansion Unit can become the master MP for the server and Server Expansion Unit combination. The master MP for the server and Server Expansion Unit will always be one of the core I/O cards installed in the server.

When a server with a Server Expansion Unit is attached and configured for four partitions, there must be four core I/O boards, one for each partition. For this configuration, one core I/O card in the server is the master MP and will provide all of the server management functions. The second core I/O in the server is the slave MP. The third and fourth core I/O cards located in the Server Expansion Unit have similar master and slave characteristics but only within the Server Expansion Unit itself. Overall system management for the combination of the server and the Server Expansion Unit is managed by the master core I/O in the server. Console data from the Server Expansion Unit is directed to the server.

The core I/O cards in the Server Expansion Unit support the mass storage and removable media devices and make them available to the server in the same manner as the servers internal devices. The core I/O card in the upper slot is the slave core I/O card in the Server Expansion Unit and is associated with cell 3 in the main server cabinet. The core I/O card in the lower slot is the master core I/O card in the Server Expansion Unit and is associated with cell 2 in the main server cabinet.
Core I/O Boot Paths

The Server Expansion Unit internal I/O devices are located on the core I/O. The following table outlines the paths assigned to the hard disk and removable media disk bays located on the front of the Server Expansion Unit cabinet. Core I/O card 2 refers to the core I/O located in the bottom slot at the rear of the system. Core I/O card 3 refers to the core I/O card located in the top slot at the rear of the system. Core I/O cards 0 and 1 are located in the server.

<table>
<thead>
<tr>
<th>Core I/O card</th>
<th>Device</th>
<th>Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Console</td>
<td>2/0/0/0/1</td>
<td>Connected to the MP. User access is through the MP port.</td>
</tr>
<tr>
<td>2</td>
<td>1Gb LAN</td>
<td>2/0/0/1/0</td>
<td>The SYS LAN connector located on core I/O 2.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/2/0.6.0</td>
<td>Hard drive located in the top left disk bay.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/2/1.X.0</td>
<td>Removable media DVD (X = 2) or DDS-4 (X = 3) tape drive located in the upper disk bay.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/3/0.6.0</td>
<td>Hard drive located in the top right disk bay.</td>
</tr>
<tr>
<td>2</td>
<td>SCSI drive</td>
<td>2/0/0/3/1</td>
<td>SCSI drive connected to the external SCSI Ultra3 connector on the core I/O card.</td>
</tr>
<tr>
<td>3</td>
<td>Console</td>
<td>3/0/0/0/1</td>
<td>Connected to the MP. User access is through the MP port.</td>
</tr>
<tr>
<td>3</td>
<td>1Gb LAN</td>
<td>3/0/0/1/0</td>
<td>The SYS LAN connector located on core I/O 3.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/2/0.6.0</td>
<td>Hard drive located in the bottom left disk bay.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/2/1.X.0</td>
<td>Removable media DVD (X = 2) or DDS-4 (X = 3) tape drive located in the upper disk bay.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/3/0.6.0</td>
<td>Hard drive located in the bottom right disk bay.</td>
</tr>
<tr>
<td>3</td>
<td>SCSI drive</td>
<td>3/0/0/3/1</td>
<td>SCSI drive connected to the external SCSI Ultra3 connector on the core I/O card.</td>
</tr>
</tbody>
</table>

PCI-X Backplane

The PCI-X board provides sixteen 64-bit, hot-swappable PCI-X slots. The application specific integrated circuit (ASIC) on each cell board in the server chassis has SBA link connections to communicate with one SBA controller. The ASIC in cell locations zero and one are connected to the SBA ASICs on the PCI board installed in the main server chassis through the printed circuit board routing. External SBA link cables are used to connect the ASICS on cell boards residing in locations two and three of the server to the two SBA ASICS on the PCI-X board in the Server Expansion Unit.

The SBA ASIC converts the SBA link protocol into ropes. Each SBA has 16 ropes that connect to LBA ASICS. The LBA ASICS convert ropes protocol into PCI/PCI-X bus protocol. Each PCI/PCI-X slot is connected to its own dedicated LBA. Of the 16 LBAs (one for each of the 16 slots), 14 LBAs have dual ropes connected from an SBA. The remaining two LBAs have a single rope connected from the SBA. Each of the 16 PCI/PCI-X slots is capable of 66MHz/33MHz PCI or 133MHz/66MHz PCI-X. All 16 PCI/PCI-X slots on the PCI-X backplane are
keyed for 3.3V connectors (accepting both Universal and 3.3V cards). One rope from each of the two SBA ASICs connects to an LBA ASIC on the Core I/O Backplane board. Each of these two LBAs provides a PCI bus that connects to an associated core I/O board.

---

**NOTE**

There is one single rope PCI slot for each cell. Slot 8 has a single rope associated with it so the bandwidth is one-half the bandwidth for PCI cards installed in slots 1–7. Priority in installing PCI cards should be given to slots with double ropes since they have double the bandwidth of a single rope slot. See Table on page 7 for details.

The PCI-X backplane contains an altimeter circuit. This circuit is used to adjust the chassis fan speeds for the operating altitude at power on and during MP initialization. The chassis fans consist of the two front fans, the two rear fans, and the six PCI-X I/O assembly fans. If an altimeter failure is detected, the information is logged as an Event ID then propagated to the OS level to be picked up by monitoring diagnostics.

The altimeter circuit is checked at power on by the MP. If an expected value is returned from the altimeter circuit, the altimeter is determined good. The altimeter reading is then set in non-volatile random access memory (NVRAM) on board the core I/O card. If the value is ever lost like for a core I/O replacement, the NVRAM will be updated at next boot provided the altimeter is functioning normally. If the altimeter has failed, and the stable storage value has been lost because of a core I/O failure or replacement, the MP will adjust the fan speeds for sea level operation.

---

**NOTE**

Fans driven to a high RPM in dense air cannot maintain expected RPM and will be considered bad by the MP leading to a “False Fan Failure” condition.

**Voltage Regulator Modules on PCI-X Backplane**

There are four voltage regulator modules (VRM) located on the PCI-X backplane. All four VRMs are low-voltage modules. VRM 1 and VRM 3 provide power to cell 2 PCI-X slots. VRM 2 and VRM 4 provide power to cell 3 PCI-X slots. The status for the PCI-X VRMs can be viewed by issuing the “ps” command from the MP command prompt.
PCI-X Slot Boot Paths

Table 1-2 lists the mapping of PCI-X slots to ropes and boot paths. Pathing will have to be modified for PCI cards that have different devices and functions. The cell column refers to the cell boards installed in the server in cell slot 2 and in cell slot 3.

Table 1-2  PCI Slot Boot Paths

<table>
<thead>
<tr>
<th>Cell</th>
<th>PCI Slot</th>
<th>Ropes</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>8/9</td>
<td>2/0/8/0/0</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>10/11</td>
<td>2/0/10/0/0</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>12/13</td>
<td>2/0/12/0/0</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>14/15</td>
<td>2/0/14/0/0</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>6/7</td>
<td>2/0/6/0/0</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>4/5</td>
<td>2/0/4/0/0</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>2/3</td>
<td>2/0/2/0/0</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>1</td>
<td>2/0/1/0/0</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>8/9</td>
<td>3/0/8/0/0</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>10/11</td>
<td>3/0/10/0/0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>12/13</td>
<td>3/0/12/0/0</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>14/15</td>
<td>3/0/14/0/0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>6/7</td>
<td>3/0/6/0/0</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>4/5</td>
<td>3/0/4/0/0</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>2/3</td>
<td>3/0/2/0/0</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>1</td>
<td>3/0/1/0/0</td>
</tr>
</tbody>
</table>
Detailed Server Expansion Unit Description

Figure 1-3  Server Expansion Unit Block Diagram
Internal Disk Devices for Server Expansion Unit

As Figure 1-4 shows, in a Server Expansion Unit cabinet, the top internal disk drives connect to cell 2 through the Core I/O for cell 2. The bottom internal disk drives connect to cell 3 through the core I/O for cell 3. The upper removable media drive connects to cell 2 through the core I/O card for cell 2 and the lower removable media drive connects to cell 3 through the core I/O card for cell 3.

**Table 1-3 Removable DVD Media Drive Path**

<table>
<thead>
<tr>
<th>DVD Media</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot 0 Media</td>
<td>2/0/0/2/1.2.0</td>
</tr>
<tr>
<td>Slot 1 Media</td>
<td>3/0/0/2/1.2.0</td>
</tr>
</tbody>
</table>

**Table 1-4 Removable DDS-4 Media Drive Path**

<table>
<thead>
<tr>
<th>DDS-4 Media</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot 0 Media</td>
<td>2/0/0/2/1.3.0</td>
</tr>
<tr>
<td>Slot 1 Media</td>
<td>3/0/0/2/1.3.0</td>
</tr>
</tbody>
</table>

**Table 1-5 Hard Disk Drive Path**

<table>
<thead>
<tr>
<th>Hard Drive</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot 0 Drive</td>
<td>2/0/0/2/0.6.0</td>
</tr>
<tr>
<td>Slot 1 Drive</td>
<td>2/0/0/3/0.6.0</td>
</tr>
<tr>
<td>Slot 2 Drive</td>
<td>3/0/0/2/0.6.0</td>
</tr>
<tr>
<td>Slot 3 Drive</td>
<td>3/0/0/3/0.6.0</td>
</tr>
</tbody>
</table>
System Backplane

The Server Expansion Unit system backplane provides inter-connection between the PCI-X backplane and the core I/O backplane. The Server Expansion Unit backplane also provides a connection point for the SBA link cables and routes the SBA link cable signals to and from the PCI-X backplane. The backplane receives primary (48V) and standby (12V) power from the bulk power supplies and distributes this power to loads on the Server Expansion Unit backplane and to the other boards connected to it. Besides providing interconnect, the Server Expansion Unit backplane contains clock generation circuits.

Figure 1-5 System Backplane (Side View in Chassis)

The backplane includes the connections for the PCI-X backplane and power. It also has manageability circuits for monitoring and running the Server Expansion Unit chassis. PCI-X clock distribution is done on this board. The voltage regulator modules (VRMs) that provide 3.3V and 3.3V standby are located on this backplane. The backplane also has the connectors to provide a hardware interface to the Server Expansion Unit chassis.

Clocks and Reset

The system backplane contains reset and clock circuitry that propagates through the whole system. The system backplane central clocks drive all major chip set clocks.

I/O Subsystem

The cell board to the PCI-X board path runs from the cell controller (CC) to the SBA, from the SBA to the ropes, from the ropes to the LBA, and from the LBA to the PCI slots as seen in Figure 1-6 on page 11. The CC on cell board 2 and cell board 3 communicates with each SBA over the SBA link. The SBA link consists of both an inbound and an outbound link with an effective bandwidth of approximately 1 GB/sec. The SBA converts the SBA link protocol into “ropes.” A rope is defined as a high-speed, point-to-point data bus. The SBA can support up to 16 of these high-speed bi-directional rope links for a total aggregate bandwidth of approximately 4 GB/sec. Each LBA acts as a bus bridge, supporting either one or two ropes and capable of driving 33 MHz or 66 MHz for PCI cards. The LBAs can also drive at 66 MHz or 133 MHz for PCI-X cards.
The Server Expansion Unit supports two internal SBAs. The SBAs generate 32 rope buses (16 per SBA). The 32 available internal rope buses are divided in the following manner:

- Two ropes are routed as single rope bundles to support the core I/O boards through LBAs located on the core I/O backplane.
- Two ropes are routed as single rope bundles to two LBAs to support two slots for PCI and PCI-X cards.
- Twenty-eight ropes are bundled in two rope pairs to 14 LBAs to support 14 slots for PCI and PCI-X cards.

The PCI-X backplane is the primary I/O interface for Server Expansion Unit systems. It provides 16 64-bit, hot-plug PCI/PCI-X slots. Fourteen of the slots have dual ropes connected to the LBA chips. The remaining two slots have a single rope connected to each LBA chip. Each of the 16 slots is capable of 66MHz/33MHz PCI or 133MHz/66MHz PCI-X. All 16 PCI slots are keyed for 3.3V connectors (accepting both Universal and 3.3V cards). The PCI-X backplane does not provide any 5V slots for the I/O cards.

The external link for the Server Expansion Unit attaches the cell controller on cell board 2 to SBA 0 and attaches the cell controller on cell board 3 to SBA 1 of the PCI-X board in the Server Expansion Unit cabinet.

The PCI-X backplane is physically one board but behaves like two independent partitions. SBA 0 and its associated LBAs and eight PCI-X slots form one I/O partition. SBA 1 and its associated LBAs and eight PCI-X slots form the other I/O partition. One I/O partition can be powered down separate from the other I/O partition.
**Table 1-6 PCI-X Slot Types**

<table>
<thead>
<tr>
<th>I/O Partition</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>2</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>2</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>2</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>2</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>2</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>2</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>3</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>3</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>3</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>3</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>3</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
<tr>
<td>3</td>
<td>PCI (33 or 66 MHz) / PCI-X (66 or 133 MHz) 64-bit, 3.3V connector, Hot Plug Slot.</td>
</tr>
</tbody>
</table>

**MP Core I/O Board**

The Server Expansion Unit core I/O card is the same one used in the server chassis. Up to two core I/O cards plugged into the Server Expansion Unit. Two core I/O cards allows for two additional I/O partitions to be added to the number of partitions that exist in the server attached to the Server Expansion Unit. Since the server can have up to two partitions, the total number of partitions possible in a server with the Server Expansion Unit attached is four partitions.

The core I/O card is can be replaced with standby power applied. The system power to the core I/O is handled in the hardware the same way a hot-plug PCI/PCI-X card is handled. Standby power to core I/O is handled by power manager devices to limit inrush current during insertion.

**Mass Storage (Disk) Backplane**

Internal mass storage connections to disks are routed on the mass storage backplane, having connectors and termination logic. All hard disks are hot-plug while removable media drives are not hot-plug. The Server Expansion Unit accommodates two internal, removable media devices. Therefore, power connectors for a removable media drive are required on the mass storage backplane. The Server Expansion Unit chassis will have to be powered off to remove or replace removable media drives.
Server Expansion Unit Description

Dimensions
The dimensions of the Server Expansion Unit are as follows:

- Width: 17.5 inches, constrained by electronic industries alliance (EIA) standard 19-inch racks.
- Depth: Defined by cable management constraints to fit into a standard 36-inch deep rack:
  * 25.5 inches from front rack column to PCI connector surface.
  * 26.7 inches from front rack column to core I/O connector surface.
  * 30 inches overall package dimension, including 2.7 inches protruding in front of the front rack columns.
- Height: 9U (15.75 inches) constrained by package density.

System Chassis
Refer to Figure 1-7 on page 14 during the following discussion.

The mass storage section located in the front allows access to removable mass storage devices without removal of the bezel (not shown.) The mass storage bay accommodates two 5.25-inch removable media devices and up to four 3.5-inch hard drives. The front panel display board, containing LEDs and the system power switch, is located directly above the hard drive media bays.

Below the mass storage section and behind a removable bezel are two PCI DC-to-DC power supplies. Each power supply powers only one I/O partition.

The bulk power supply (BPS) section is partitioned by a sealed metallic enclosure located in the bottom of the package. This enclosure houses the two fully redundant BPSs.
The PCI on-line replacement (OLR) fan modules are located in front of the PCI cards. These six fans are housed in plastic carriers. They are configured in two rows of three fans.

Four OLR system fan modules, externally attached to the chassis, are 120-mm (4.7-inch) fans. Two fans are mounted on the front surface of the chassis and two are mounted on the rear surface.

A cable harness that connects from the rear of the BPSs to the system backplane provides DC power distribution.

The mass storage backplane obtains power from a cable connected to the PCI-X backplane.
The PCI-X I/O card section, located toward the rear, is accessed by removing the top cover.

The core I/O cards are positioned horizontally at the rear of the chassis. One core I/O card is positioned directly above or below the other core I/O card. The Server Expansion Unit ships with both core I/O cards installed in the chassis.

The PCI card bulkhead connectors are located in the top rear portion of the chassis.

Access to the system backplane is accomplished by removing the left side cover. The system backplane inserts by a guide or insertion mechanism using a single large jack screw assembly.

Redundant line cords attach to the AC connector module at the bottom rear. One 20-amp cord is required to supply power to the Server Expansion Unit. One additional line cord provides power source redundancy.

Four OLR system fan modules, externally attached to the chassis, are 120-mm (4.7-inch) fans. Two fans are mounted on the front surface of the chassis and two are mounted on the rear surface.

There is an I/O manageability link connector to the right of the upper core I/O card. An external RS-485 cable is used to connect between the Server Expansion Unit and the server.
2 Site Preparation

This chapter describes the basic configuration and its physical specifications and requirements.
Dimensions and Weights

This section provides dimensions and weights of the system components.

Table 2-1  Server Expansion Unit Dimensions and Weights

<table>
<thead>
<tr>
<th></th>
<th>Standalone</th>
<th>Packaged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height—Inches (cm)</td>
<td>15.8 (40.0)</td>
<td>28.0 (71.1)</td>
</tr>
<tr>
<td>Width—Inches (cm)</td>
<td>17.5 (44.5)</td>
<td>28.38 (72.1)</td>
</tr>
<tr>
<td>Depth—Inches (cm)</td>
<td>30.0 (76.2)</td>
<td>35.75 (90.8)</td>
</tr>
<tr>
<td>Weighta—Pounds (kg)</td>
<td>165 (74.8)</td>
<td>210.6 (95.53)</td>
</tr>
</tbody>
</table>

a. Shipping box, pallet, and container adds approximately 45.6 lb to the total system weight when shipped. The size and number of miscellaneous pallets will be determined by the equipment ordered by the customer.

Table 2-2  Server Expansion Unit Component Weights

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>Weight (lb/kg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Value added chassis</td>
<td>77.0 (34.93)</td>
</tr>
<tr>
<td>1</td>
<td>System backplane</td>
<td>3.7 (1.68)</td>
</tr>
<tr>
<td>1</td>
<td>PCI-X card cage assembly</td>
<td>20.4 (9.25)</td>
</tr>
<tr>
<td>2</td>
<td>PCI-X power supply</td>
<td>5.0 (2.27) each</td>
</tr>
<tr>
<td>2</td>
<td>Bulk power supply</td>
<td>12.0 (5.44) each</td>
</tr>
<tr>
<td>1</td>
<td>Mass storage backplane</td>
<td>1.0 (0.45)</td>
</tr>
<tr>
<td>1</td>
<td>Core I/O backplane assembly</td>
<td>6.3 (2.86)</td>
</tr>
<tr>
<td>1–4</td>
<td>Hard disk drive</td>
<td>1.6 (0.73) each</td>
</tr>
<tr>
<td>1–2</td>
<td>Removable media disk drive</td>
<td>2.2 (1.0) each</td>
</tr>
</tbody>
</table>
Electrical Specifications

This section provides electrical specifications for the Server Expansion Unit.

Grounding

The site building shall provide a safety ground/protective earth for each AC service entrance to all cabinets. Install a PE (protective earthing) conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor described is to be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.

Circuit Breaker

The Marked Electrical for the Server Expansion Unit is 7A per line cord. The recommended circuit breaker size is 20A for North America. For countries outside North America, consult your local electrical authority that has jurisdiction for the recommended circuit breaker size.

The Server Expansion Unit contains two C20 power receptacles located at the bottom rear bulkhead. A minimum of one power cord must be used to maintain normal operation of the Server Expansion Unit. A second cord can be added to improve system availability by protecting, for example, against power source failures or accidentally tripped circuit breakers. The Server Expansion Unit can receive AC input from two different AC power sources.

System AC Power Specifications

Power Cords

Table 2-3 lists the various power cables available for use with a Server Expansion Unit system. Each power cord is 15 feet (4.5 meters) in length with a IEC 60320-1 C19 female connector attached to one end.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Where Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>8120-6895</td>
<td>Stripped end, 240V</td>
<td>International—Other</td>
</tr>
<tr>
<td>8120-6897</td>
<td>Male IEC309, 240V</td>
<td>International</td>
</tr>
<tr>
<td>8121-0070</td>
<td>Male GB-1002, 240V</td>
<td>China</td>
</tr>
<tr>
<td>8120-6903</td>
<td>Male NEMA L6-20, 240V</td>
<td>North America/Japan</td>
</tr>
</tbody>
</table>
System Power Specifications

Table 2-4 and Table 2-5 list the AC power requirements for a Server Expansion Unit. These tables provide information to help determine the amount of AC power needed for your computer room.

**Table 2-4  AC Power Specifications**

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Value</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal input voltage</td>
<td>200 - 240 VAC</td>
<td></td>
</tr>
<tr>
<td>Minimum Operating Voltage</td>
<td>180 VAC</td>
<td></td>
</tr>
<tr>
<td>Maximum Operating Voltage</td>
<td>269 VAC</td>
<td></td>
</tr>
<tr>
<td>Frequency range (minimum–maximum)</td>
<td>50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>Number of phases</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rated line current</td>
<td>7 A</td>
<td>Per line cord</td>
</tr>
<tr>
<td>Maximum inrush current</td>
<td>36 A peak for 20 ms</td>
<td>Per line cord</td>
</tr>
<tr>
<td>Dropout carry-through time at minimum line voltage</td>
<td>20 ms</td>
<td></td>
</tr>
<tr>
<td>Circuit breaker rating</td>
<td>20 A</td>
<td>Per line cord</td>
</tr>
<tr>
<td>Power factor correction</td>
<td>&gt;0.98</td>
<td>At all loads at 50–100% of supply rating</td>
</tr>
<tr>
<td></td>
<td>&gt;0.95</td>
<td>At all loads at 25–50% of supply rating</td>
</tr>
<tr>
<td>Ground leakage current (mA)</td>
<td>&lt; 3 mA</td>
<td>Per line cord</td>
</tr>
</tbody>
</table>

**Table 2-5  System Power Requirements**

<table>
<thead>
<tr>
<th>Power Required (50 - 60 Hz)</th>
<th>Watts</th>
<th>VA</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Theoretical Power</td>
<td>1000</td>
<td>1020</td>
<td>See #1 below</td>
</tr>
<tr>
<td>Marked Electrical Power</td>
<td>---</td>
<td>1300</td>
<td>7.2A @ 180 VAC, see note #2</td>
</tr>
<tr>
<td>Typical Maximum Power</td>
<td>649</td>
<td>662</td>
<td>See note #3</td>
</tr>
</tbody>
</table>

1. “Maximum theoretical power” is used to describe input power at the AC input. It is expressed in Watts and Volt-Amps to take into account power factor correction. The calculated sum is the maximum worst case power consumption for every subsystem in the server. This number will not be exceeded by a properly functioning server for any combination of hardware and software.

2. “Marked electrical power” is the input power measured at the AC input expressed in Volt-Amps. The marked electrical power is the rating given on the chassis label and represents the input power required for facility AC power planning and wiring requirements. This number represents the expected maximum power consumption for the server based on the power rating of the bulk power supplies. This number can safely be used to size AC circuits and breakers for the system.
3. “Typical maximum power” is the input power measured at the AC input expressed in Watts and Volt-Amps, and the measured maximum worst case power consumption. This number represents the largest power consumption for the server under laboratory conditions, using aggressive software applications designed specifically to work the system at maximum loads and power consumption.
Environmental Specifications

This section provides the environmental, power dissipation, noise emission, and air flow specifications for the Server Expansion Unit.

Temperature and Humidity

The cabinet is actively cooled using forced convection in a Class C1-modified environment. The recommended humidity level for Class C1 is 40 to 55% relative humidity (RH).

Operating Environment

The system is designed to run continuously and meet reliability goals in an ambient temperature of 5°C–35°C at sea level. The maximum allowable temperature is derated 1°C per 1000 feet of elevation above 5000 feet above sea level up to 30°C at 10,000 feet. For optimum reliability and performance, the recommended operating range is from 20°C to 25°C. This meets or exceeds the requirements for Class 2 in the corporate and ASHRAE standard.

Environmental Temperature Sensor

To ensure that the system is operating within the published limits, the ambient operating temperature is measured using a sensor placed near the chassis inlet, between the cell boards. Data from the sensor is used to control the fan speed and also to initiate system overtemp shutdown.

Non-Operating Environment

The system is designed to withstand ambient temperatures between -40°C and 70°C under non-operating conditions.

Cooling

Internal Chassis Cooling

The cabinet incorporates front-to-back airflow across the system backplane. Two 120-mm fans, mounted externally on the front chassis wall behind the cosmetic front bezel, push air into the unit; and two 120-mm fans housed in cosmetic plastic fan carriers and mounted externally to the rear chassis wall, pull air through the unit.

Each fan is controlled by a smart fan control board, embedded in the fan module plastic housing. The smart fan control board receives fan control input from the system fan controller on the system backplane and returns fan status information to the system fan controller. The smart fan control board also controls the power and the pulse width modulated control signal to the fan and monitors the speed indicator back from the fan. The fan status LED is driven by the smart fan control board.

Bulk Power Supply Cooling

Cooling for the bulk power supplies is provided by two 60-mm fans contained within each BPS. Air flows into the front of the BPS and is exhausted out of the top of the power supply though upward facing vents near the rear of the supply. The air is then ducted out of the rear of the chassis.
PCI/Mass Storage Section Cooling

Six 92-mm fans located between the mass storage devices and the PCI card cage provide airflow through these devices. The PCI fans are powered off of housekeeping power and run at full speed at all times. The air is pulled through the mass storage devices and pushed through the PCI card cage. Perforation is provided between the PCI bulkheads to allow adequate exhaust ventilation and to help reduce the localized airflow dead spots that typically occur at the faceplate tail of each PCI card.

Standby Cooling

Several components within the chassis consume significant amounts of power while the system is in standby mode. The system fans are run at a portion of full speed during standby to remove the resulting heat from the cabinet. The fans within the power supply operate at full speed during standby.

Typical Power Dissipation and Cooling

Table 2-6 provides calculations for configurations exactly as described in the table.

### Table 2-6 Typical Server Expansion Unit Power Dissipation and Cooling

<table>
<thead>
<tr>
<th>PCI Cards (Maximum 25W)</th>
<th>DVDs</th>
<th>Hard Disk Drives</th>
<th>Core I/O</th>
<th>Bulk Power Supplies</th>
<th>Typical Power</th>
<th>Typical Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qty</td>
<td>Qty</td>
<td>Qty</td>
<td>Qty</td>
<td>Qty</td>
<td>Watts</td>
<td>BTUs/Hour</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>662</td>
<td>2259</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>532</td>
<td>1816</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>454</td>
<td>1550</td>
</tr>
</tbody>
</table>

The air conditioning data in Table 2-6 is derived using the following equations:

- Watts x (0.860) = kcal/hour
- Watts x (3.414) = Btu/hour
- BTU/hour divided by 12,000 = tons of refrigeration required

**NOTE**

When determining power requirements, you must consider any peripheral equipment that will be installed during initial installation or as a later update. Refer to the applicable documentation for such devices to determine the power and air-conditioning that is required to support these devices.
Acoustic Noise Specification

The acoustic noise specification for the Server Expansion Unit is 57.1 db (sound pressure level at bystander position) when connected to the HP 9000 rp8400 server as the host system. It is appropriate for dedicated computer room environments, not office environments. The LwA is 7.4 Bels. Care should be taken to understand the acoustic noise specifications relative to operator positions within the computer room or when adding servers to computer rooms with existing noise sources.

Air Flow

The Server Expansion Unit requires that the cabinet air intake temperature be between 68° F and 77° F (20° C and 25° C) at 150 CFM.

Figure 2-1 illustrates the location of the inlet and outlet airducts on a single cabinet. Air is drawn into the front of the Server Expansion Unit and forced out the rear.

Figure 2-1 Airflow Diagram
3 Installation

The following instructions are included for unpacking a racked Server Expansion Unit. There are also instructions for unpacking a non-racked Server Expansion Unit.
Unpacking the Server Expansion Unit

HP shipping containers are designed to protect their contents under normal shipping conditions. After the equipment arrives, carefully inspect each carton for signs of shipping damage. A tilt indicator is installed on each carton shipped. The beads in the indicator roll to the upper position if the container has been tilted to an angle that could cause equipment damage. The tilt indicator itself has two windows and each window, under normal conditions, shows four beads present. If a carton has been mishandled, accidentally dropped, or knocked against something, the tilt indicator will indicate missing beads. If damage is found, document the damage with photographs and contact the transport carrier immediately.

Examine the Server Expansion Unit cabinet for visible shipping damage. After unpacking the cabinet, check for damage that may have been obscured by the shipping container. If damage is found after visual inspection, document the damage with photographs and contact the transport carrier immediately.

If the equipment has any damage, a damage claim form must be obtained by the customer from the shipping representative. The customer should complete the form and return it to the shipping representative.

NOTE The Server Expansion Unit may come already racked or ready for rack installation.

Unpacking a Racked Server Expansion Unit

This section contains information about unpacking the cabinet.

WARNING Wear protective glasses while cutting the plastic bands around the shipping container. These bands are under tension. When cut, they can spring back and cause serious eye injury.

NOTE Position the pallet to allow for enough space to roll the cabinet off the pallet before unpacking.

Remove the cabinet using the following procedure:

Step 1. Cut the polystrap bands around the shipping container.

Step 2. Lift the cardboard top cap from the shipping box. See Figure 3-1.

Step 3. Remove the corrugated wrap from the pallet.

Step 4. Remove the packing materials.
CAUTION  The plastic wrapping material should be cut off rather than pulled off. Pulling the plastic covering off represents an electrostatic discharge (ESD) hazard.

Figure 3-1 Removing the Polystraps and Cardboard
Step 5. Remove the four bolts securing the ramps to the pallet and remove the ramps. See Figure 3-2.

Figure 3-2 Removing the Shipping Bolts and Plastic Cover
Step 6. Remove the six bolts from the base attaching the rack to the pallet. See Figure 3-3.

Figure 3-3 Preparing to Roll Off the Pallet

**WARNING** Be sure that the leveling feet on the rack are raised before you roll the rack down the ramp and any time you roll the rack on the casters. Use caution when rolling the cabinet off the ramp. A single server in the cabinet weighs several hundred pounds. HP strongly recommends that two people roll the cabinet off the pallet.
Securing the Cabinet

When in position, secure and stabilize the cabinet, using the leveling feet at the corners of the base. Install the anti-tip mechanisms on the bottom front and rear of the rack.

Figure 3-4  Securing the Cabinet
Unpacking a Non-Racked Server Expansion Unit

HP recommends the use of a lifter shown in Figure 3-5 such as a RonI Company model 17000 SP 400 lifting device when moving a non-racked system.

Unloading with a Lifter

Use the following procedure to unload the Server Expansion Unit from the pallet using a lifter.

---

**WARNING**

Use caution when using a lifter. Because of the weight of the Server Expansion Unit, it must be centered on the lifter forks before raising it off the pallet to avoid injury.

Never extend more than one server from the same cabinet while installing or servicing either an Server Expansion Unit or another server product. Failure to follow these instructions could result in the cabinet tipping over.

---

**Figure 3-5** RonI Lifter

---

**IMPORTANT**

The Server Expansion Unit must be mounted in the same rack as the server to which it will be connected. The unit must also be mounted directly above the server in the same rack cabinet.
Unpacking the Server Expansion Unit

Any Server Expansion Unit installed into a rack is shipped with equipment slides. With every set of slides comes an installation guide: *installation guide, hp J1530B, rack integration kit (lower case intended)*. Follow the steps in this installation guide to determine where and how to place the Server Expansion Unit into the rack before proceeding with Step 1 on page 24. The installation guide may also be found on the Web at http://www.hp.com/racksolutions

**Step 1.** Follow the instructions on the outside of the server packaging to remove the banding and carton top from the server pallet.

**Figure 3-6 Server Expansion Unit with Shipping Box Removed**

**Step 2.** Remove all cartons from the pallet, leaving only the Server Expansion Unit.
Step 3. Position the RonI lifter as shown in Figure 3-7.

**Figure 3-7 Positioning RonI Lifter with the Server Expansion Unit Pallet**

Step 4. Insert the lifter forks under the Server Expansion Unit.

Step 5. Carefully roll the lift forward until it is fully positioned against the side of the Server Expansion Unit.

Step 6. Slowly raise the Server Expansion Unit off the pallet until it clears the pallet cushions.
Step 7. Roll the lifter and Server Expansion Unit away from the pallet. Do not raise the Server Expansion Unit any higher than necessary when moving it over to the rack.

Figure 3-8 Lifting the Server Expansion Unit into Position for Rack Installation

Installing the Cable Management Arm

After the Server Expansion Unit is installed in the rack, the cable management arm (CMA) must be installed on the rear of the Server Expansion Unit. Follow the instructions for installing the CMA in the installation guide, hp J1530B, rack integration kit (lower case intended). The CMA is attached to the rack using screws supplied in the kit. The other end of the CMA is attached to the Server Expansion Unit using custom nuts supplied in the kit. The installation guide is on the Web at http://www.hp.com/racksolutions

Installing the Rack Interlock Device Assembly

Once the CMA is installed on the rear of the Server Expansion Unit then the interlock device assembly must be installed. Follow the instructions for installing the interlock device assembly in the installation guide, hp J1530B, rack integration kit (lower case intended). The installation guide is on the Web at http://www.hp.com/racksolutions
Installing Server Expansion Unit without a Mechanical Lift

Use this procedure only if an HP approved lift is not available.

This procedure should only be performed by two qualified HP Service technicians utilizing proper lifting techniques and procedures.

System damage can occur through improper removal and re-installation of devices. This task must be performed by trained personnel only. Instructions for removing and re-installing these components can be found in the Removal & Replacement chapter of the Service Guide.

---

**CAUTION**

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.

Any hp Server Expansion Unit installed into a rack is shipped with equipment slides. With every set of slides comes an installation guide: *installation guide, hp J1530B, rack integration kit* (lower case intended). Follow the steps in this installation guide to determine where and how to place the Server Expansion Unit into the rack before proceeding with Step 1. on page 27. The installation guide may also be found on the Web at [http://www.hp.com/racksolutions](http://www.hp.com/racksolutions)

**Step 1.** Reduce the weight by removing both bulk power supplies.

**Step 2.** Locate the four positioning handles on the sides of the system. They are color coded blue and are located close to each base corner of the unit.

**Step 3.** Unfold the handles so they extend out from the unit. The unit is now ready for manual lifting by two qualified HP Service technicians.

**Step 4.** After the Server Expansion Unit is secured in the rack cabinet, re-install the previously removed bulk power supplies.

---

**Installing the Cable Management Arm**

After the Server Expansion Unit is installed in the rack, the CMA must be installed on the rear of the Server Expansion Unit. Follow the instructions for installing the CMA in the *installation guide, hp J1530B, rack integration kit* (lower case intended). The CMA is attached to the rack using screws supplied in the kit. The other end of the CMA is attached to the Server Expansion Unit using custom nuts supplied in the kit. The installation guide is on the Web at [http://www.hp.com/racksolutions](http://www.hp.com/racksolutions)

---

**Installing the Rack Interlock Device Assembly**

After the cable management arm (CMA) is installed on the rear of the Server Expansion Unit then the interlock device assembly must be installed. Follow the instructions for installing the interlock device assembly in the *installation guide, hp J1530B, rack integration kit* (lower case intended). The installation guide is on the Web at [http://www.hp.com/racksolutions](http://www.hp.com/racksolutions)
Installation

Unpacking the Server Expansion Unit
4 Troubleshooting

The following sections contain general procedures to help you locate installation problems.
Troubleshooting
Common Installation Problems

CAUTION  Do not operate the server with the top cover removed for extended period of time. Otherwise, overheating can damage chips, boards, and mass storage devices. However, you can safely remove the top cover while the server is running to remove and replace PCI hot-plug cards.

Most problems are the result of incorrect system and SCSI subsystem configurations.

To troubleshoot an installation problem, perform the following checks in the order given:

1. Check all cable and power connections, including those in the rack, and so on.
2. Ensure the Server Expansion Unit is configured properly.
3. Verify all cables and boards are securely plugged into the appropriate connectors or slots.
4. Remove all extra options, such as disk drives, one at a time, checking its effect on the Server Expansion Unit.
5. Unplug the power cord, wait 20 seconds, plug the power cord in again, and restart the Server Expansion Unit.
6. If you suspect a hardware error:
   a. Log users off the LAN and power down the Server Expansion Unit.
   b. To remove PCI cards, extend the Server Expansion Unit out of the rack and remove the top cover.
   c. Simplify the server to the minimum configuration.
      The minimum configuration consists of the following:
      • One core I/O card installed in the lower slot of the core I/O backplane

NOTE  The Server Expansion Unit will work without the top (slave) core I/O card installed but it will not operate without the bottom (master) core I/O card installed.

• System backplane
• PCI-X backplane
• One BPS (A0)
• Two PCI power modules
• One power cord (A0)

7. Remove all third-party options, and reinstall each one, one at a time, checking the Server Expansion Unit after each installation.
8. Replace the top cover and reconnect the power cord and other cables.
9. Boot up the Server Expansion Unit and if it does not function properly, refer to the following procedures.
The Server Does Not Power On

To check for power related problems:

1. Check each LED of the bulk power supply (BPS).
   The LED is located on the BPS at the front of the Server Expansion Unit. Remove the front bezel to see
   the BPS LED. Table 4-2 shows the states of the LEDs.
2. Check that the BPS and power cords are plugged into the chassis.

The Server Expansion Unit Powers On But Then Shuts Down with a Fault Light

To check for the following problems when the Server Expansion Unit powers on and then off:

1. Check for fault LEDs and check the MP logs for errors.
2. Check that a conductive item has not been dropped or left inside the Server Expansion Unit chassis.
3. Check the connections on all boards.
4. Check the system backplane for bent pins.
5. Minimize configuration to isolate a potential bad device.
Server Expansion Unit LED Indicators

The Server Expansion Unit has LEDs that indicate system health. This section defines those LEDs.

Front Panel LEDs

There are seven LEDs located on the front panel.

**Figure 4-1** Front Panel with LED Indicators

<table>
<thead>
<tr>
<th>Table 4-1 Front Panel LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED</strong></td>
</tr>
<tr>
<td>Power</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Standby Power</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>MP Present</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Remote</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Attention</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Run</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Fault</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

---

<sup>a</sup> GPM stands for global power monitor.
<sup>b</sup> PDC stands for processor dependent code.
<sup>c</sup> MP stands for manageability processor.
BPS LEDs
There is a single three-color LED located on each BPS.

Figure 4-2  BPS LED Location

Table 4-2  BPS LED Indicators

<table>
<thead>
<tr>
<th>LED Indication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blink Green</td>
<td>BPS in standby state and no faults or warnings</td>
</tr>
<tr>
<td>Green</td>
<td>BPS in run state (48V output enabled) and no faults or warnings</td>
</tr>
<tr>
<td>Blink Yellow</td>
<td>BPS in standby or run state and warnings present but no faults</td>
</tr>
<tr>
<td>Yellow</td>
<td>BPS in standby state and recoverable faults present but no non-recoverable faults</td>
</tr>
<tr>
<td>Blink RED</td>
<td>BPS state may be unknown, non-recoverable faults present</td>
</tr>
<tr>
<td>Red</td>
<td>This LED state is not used</td>
</tr>
<tr>
<td>Off</td>
<td>BPS fault or failure, no power cords installed or no power to chassis</td>
</tr>
</tbody>
</table>
PCI Power Supply LEDs

There are three LEDs on the PCI power supply. The green power LED reports overall power status for the PCI power supply. The yellow attention LED is not currently used for status. The multi-colored fault LED reports faults and warnings.

**Figure 4-3 PCI Power Supply LED Locations**

<table>
<thead>
<tr>
<th>LED</th>
<th>Driven By</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Each supply</td>
<td>On Green</td>
<td>All output voltages generated by the power supply are within limits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Power to entire system has been removed.</td>
</tr>
<tr>
<td>Attention</td>
<td>MP through PCI LPM(^a)</td>
<td>Yellow</td>
<td>Not currently used for status.</td>
</tr>
<tr>
<td>Fault</td>
<td>Each supply</td>
<td>Flash Yellow</td>
<td>The temperature within the power supply is above the lower threshold.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On Yellow</td>
<td>The temperature of the power supply is approaching the thermal limit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flash Red</td>
<td>Power supply has shut down because of an over temperature condition, a failure to regulate the power within expected limits, or a current-limit condition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>Normal operation.</td>
</tr>
</tbody>
</table>

\(^a\) LPM stands for local power monitor.
System and I/O Fan LEDs
There is a single three-color LED located on the front OLR fan, the rear OLR fan and the PCI I/O fan.

**Figure 4-4 Fan LED Locations**

Table 4-4 contains the LED states for the front, rear, and PCI I/O fans.

**Table 4-4 Front, Rear and I/O Fan LED States**

<table>
<thead>
<tr>
<th>LED</th>
<th>Driven By</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan Status</td>
<td>Fan</td>
<td>Solid Green</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flash Yellow</td>
<td>Predictive failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flash Red</td>
<td>Failed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No Power</td>
</tr>
</tbody>
</table>
OL* LEDs

Cell Board LEDs

There is one green power LED located next to each ejector on the cell board in the server that indicates the power is good. When the LED is illuminated green, power is being supplied to the cell board and it is unsafe to remove the cell board from the server.

There is one yellow attention LED located next to each ejector on the cell board in the server. When the yellow attention LED is flashing, it is safe to remove the cell board from the server.

**Figure 4-5**  Cell Board LED Locations

<table>
<thead>
<tr>
<th>Location (located in the server cabinet)</th>
<th>LED</th>
<th>Driven by</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>On cell board</td>
<td>Power</td>
<td>Cell LPM</td>
<td>On Green</td>
<td>3.3V Standby and Cell_Power_Good</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td></td>
<td></td>
<td>3.3V Standby off, or 3.3V Standby on and no Cell_Power_Good</td>
</tr>
<tr>
<td>Attention</td>
<td>MP through GPM</td>
<td>Flash Yellow</td>
<td>Safe to remove the cell board from the system</td>
<td></td>
</tr>
</tbody>
</table>

Table 4-5  Cell Board OL* LED Indicators
PCI OL* Card Divider LEDs

The PCI OL* card LEDs are located on each of the 16 PCI slot dividers in the PCI-X card cage assembly area. The green power LED indicates whether power is supplied to the card slot. The yellow attention LED states are defined in Table 4-6 in combination with whether power is being supplied to the card or not.

**Table 4-6 OL* LED States**

<table>
<thead>
<tr>
<th>State</th>
<th>Power (Green)</th>
<th>Attention (Yellow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation, slot power on</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Slot selected, slot power on</td>
<td>On</td>
<td>Flashing</td>
</tr>
<tr>
<td>Slot needs attention, slot power on</td>
<td>On</td>
<td>On</td>
</tr>
<tr>
<td>Slot available, slot power off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Ready for OL*, slot power off</td>
<td>Off</td>
<td>Flashing</td>
</tr>
<tr>
<td>Fault detected, slot power off</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>Slot powering down or up</td>
<td>Flashing</td>
<td>Off</td>
</tr>
</tbody>
</table>
Core I/O LEDs

The core I/O LEDs in Table 4-7 on page 31 are located on the bulkhead of the installed core I/O PCA. There is a DIP switch on the core I/O card that is used to select which MP firmware set (indicated by the MP SEL LED) is selected for loading. The DIP switch is only visible when the core I/O card is removed from the system and is located in the center of the PCA.

Figure 4-7 Core I/O Card Bulkhead LEDs
### Table 4-7 Core I/O LEDs

<table>
<thead>
<tr>
<th>LED (as silk-screened on the bulkhead)</th>
<th>Driven by</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP PWR</td>
<td>3.3V standby power rail</td>
<td>On Green</td>
<td>Indicates standby power is on</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>Management processor</td>
<td>On Green</td>
<td>This core I/O is managing the system</td>
</tr>
<tr>
<td>MP SEL</td>
<td></td>
<td>On Green</td>
<td>Both switches are in position F1 (silk-screened on the core I/O board) for systems other than the rp8400. Off</td>
</tr>
<tr>
<td>MP FAULT</td>
<td></td>
<td>On Yellow</td>
<td>Core I/O not fully seated or the MP processor is being reset</td>
</tr>
<tr>
<td>MP LAN ACT</td>
<td>MP LAN controller</td>
<td>On Green</td>
<td>Indicates MP LAN activity</td>
</tr>
<tr>
<td>MP LAN 10 BT</td>
<td>MP firmware controlled</td>
<td>On Green</td>
<td>MP LAN in 10 BT mode</td>
</tr>
<tr>
<td>MP LAN 100 BT</td>
<td>MP firmware controlled</td>
<td>On Green</td>
<td>MP LAN in 100 BT mode</td>
</tr>
<tr>
<td>MP LAN LINK</td>
<td>MP LAN controller</td>
<td>On Green</td>
<td>MP LAN link is ok</td>
</tr>
<tr>
<td>SYS LAN ACT</td>
<td>System LAN controller</td>
<td>On Green</td>
<td>Indicates SYS LAN activity</td>
</tr>
<tr>
<td>SYS LAN 10 BT</td>
<td>System LAN controller</td>
<td>On Green</td>
<td>SYS LAN in 10 BT mode</td>
</tr>
<tr>
<td>SYS LAN 100 BT</td>
<td>System LAN controller</td>
<td>On Green</td>
<td>SYS LAN in 100 BT mode</td>
</tr>
<tr>
<td>SYS LAN 1Gb</td>
<td>System LAN controller</td>
<td>On Green</td>
<td>SYS LAN in 1Gb mode</td>
</tr>
<tr>
<td>SYS LAN FDUP</td>
<td>System LAN controller</td>
<td>On Green</td>
<td>SYS LAN full duplex activity</td>
</tr>
<tr>
<td>SYS LAN LINK</td>
<td>System LAN controller</td>
<td>On Green</td>
<td>SYS LAN link is ok</td>
</tr>
<tr>
<td>SCSI LVD</td>
<td>System SCSI controller</td>
<td>On Green</td>
<td>SCSI LVD mode (on = LVD, off = SE)</td>
</tr>
<tr>
<td>SCSI TRM</td>
<td>System SCSI controller</td>
<td>On Green</td>
<td>SCSI termpower is on</td>
</tr>
<tr>
<td>PWR</td>
<td>LBA on system backplane</td>
<td>On Green</td>
<td>I/O power on</td>
</tr>
<tr>
<td>ATTN</td>
<td>LBA on system backplane</td>
<td>On Yellow</td>
<td>PCI attention</td>
</tr>
</tbody>
</table>
Core I/O Buttons
There are two recessed buttons on the back of the core I/O card, as explained in the following table.

**Figure 4-8 Core I/O Button Location**

![Core I/O Buttons Diagram]

<table>
<thead>
<tr>
<th>Button Identification (as silk-screened on the bulkhead)</th>
<th>Location</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP RESET</td>
<td>To the far left side of the core I/O card</td>
<td>Resets the MP (see following NOTE)</td>
</tr>
<tr>
<td>OLR (Symbol next to button is shown below)</td>
<td>To the far right side of the core I/O card</td>
<td>Request OL* for this core I/O slot</td>
</tr>
</tbody>
</table>

**NOTE:** The OLR function is not enabled for the core I/O card.

---

**Table 4-8 Core I/O Buttons**

If the MP RESET button is held for longer than five seconds, it will clear the MP password and reset the LAN, RS-232 (serial port), and modem port parameters to their default values. The default password for the MP is `Admin` (upper case A intended) when the MP is reset.

**LAN Default Parameters**

- IP Address - 192.168.1.1
- Subnet mask - 255.255.255.0
- Default gateway - 192.168.1.1
- Hostname - gsp0

**RS-232 (Serial Port) Default Parameters**

- 9600 baud
- 8 bits
- No parity

**Remote/Modem Port Parameters**

- Disabled
Interlock Switches

There are three interlock switches located in the Server Expansion Unit. Both side covers and the top cover have an interlock switch located underneath each cover.

- Side Covers - If either side cover is removed while the system is powered on, the system fans on the front and rear will increase in speed to ensure adequate cooling. An event code will be generated to indicate a side cover was removed.
- Top Cover - If the top cover is removed while the system power is on, the PCI-X assembly I/O fan speed will not change. An event code is generated to indicate the top cover was removed.
PDC Code CRU Reporting

The processor dependent code (PDC) interface defines the locations for the customer replaceable unit (CRU). These locations are denoted in the following figures to aid in physically locating the CRU when the diagnostics point to a specific CRU that has failed or may be failing in the near future.

Figure 4-9  Server Expansion Unit Cabinet CRUs (Front View)
NOTE

The slave core I/O card inserted in the upper slot is identified as core I/O 3 and the master core I/O card inserted in the lower slot is identified as core I/O 2.

The Server Expansion Unit will work without the top (slave) core I/O card installed but it will not operate without the bottom (master) core I/O card installed.
Troubleshooting

PDC Code CRU Reporting
5 Removal and Replacement

This chapter provides a detailed description of the Server Expansion Unit (SEU) customer replaceable unit (CRU) removal and replacement procedures.
The sections contained in this chapter are:

- “Electrostatic Discharge”
- “Shutting Down nPartitions and Powering Off Hardware Components”
- “Removing and Replacing the SEU Bezel”
- “Removing and Replacing the Top Cover”
- “Removing and Replacing a Side Cover”
- “Removing and Replacing a DDS-4 or DVD Drive”
- “Removing and Replacing a Disk Drive”
- “Removing and Replacing a Standby/Main Fan (Front) Assembly”
- “Removing and Replacing a Standby/Main Fan (Rear) Assembly”
- “Removing and Replacing a PCI Smart Fan Assembly”
- “Removing and Replacing a Bulk Power Supply (BPS)”
- “Removing and Replacing a PCI Power Supply (Brick)”
- “Removing and Replacing a PCI Card”
- “Installing and Removing the System Bus Adapter (SBA) Cable Assembly”
Electrostatic Discharge

HP systems and peripherals contain assemblies and components that are sensitive to electrostatic discharge (ESD). Carefully observe the precautions and recommended procedures in this manual to prevent component damage from static electricity.

**WARNING**  
Connect to ground with a wrist strap. Connection may be made to any grounded metal assembly in the cabinet. Both you and the electronic devices must be grounded to avoid static discharges that can cause damage.

Take these precautions:

- Prepare an ESD safe work surface large enough to accommodate the various assemblies handled during the upgrade. Use a grounding mat and an anti-static wrist strap, such as those included in the ESD Field Service Kit (A3024-80004).
- The anti-static bag cannot function as a static dissipating mat. Do not use the anti-static bag for any other purpose than to enclose a product.
- Treat all assemblies, components, and interface connections as static-sensitive.
- When unpacking cards, interfaces, and other accessories that are packaged separately from the system, keep the accessories in their conductive plastic bags, until they are ready to be installed.
- Avoid working in carpeted areas, and keep body movement to a minimum while installing accessories.
Shutting Down nPartitions and Powering Off Hardware Components

When you remove and replace hardware you may need to shut down one or more nPartitions on the SEU. In some cases you also will need to power off hardware components as part of the remove and replace procedure. This section gives details on how to ensure that an nPartition is properly shut down, and it also describes how to power off (and power on) hardware components.

Shutting Down an nPartition

This procedure is for checking the boot status of an nPartition and, if needed, shutting down HP-UX on the nPartition.

Step 1. Be advised that the system (one or more nPartitions) must be shut down for repairs.

Ensure that there is a current backup.

Step 2. Log in to the service processor (MP) of the host server.

Step 3. Use the Virtual Front Panel (VFP) to view the current state of the nPartition that you will shut down.

From the MP Main menu, type VFP to access the Virtual Front Panel menu, and select the nPartition whose boot state you want to view.

Enter Control-b (^B) to exit the VFP display.

- If an nPartition has booted HP-UX, or if it is in the process of launching HP-UX, you must shut down HP-UX on the nPartition.

When HP-UX is running on an nPar, its VFP displays “HP-UX heartbeat” with a blinking asterisk (*) to indicate its interactivity.

In this case, proceed with the next step.

- If the nPartition is at its Boot Console Handler (BCH) interface, then HP-UX has already been shut down.

- If the nPartition is booting, then you should wait for it to reach the BCH interface and, if necessary, interrupt auto-boot when you see the “Attempting to boot” and “To discontinue, press any key within 10 seconds” messages.

If the nPartition is at the BCH menu interface, then HP-UX is shut down. Otherwise, proceed with the next step to shut down HP-UX.

Step 4. From the MP Main menu, type CO and select the console for the nPartition you plan to shut down.

You should have access to the HP-UX login prompt (or command line) when using the nPartition console. If you have no interactivity at the console, HP-UX may be halted or hung.

Step 5. At the nPartition console, log in to HP-UX and shut down the operating system.

Issue the shutdown command to shut down and halt HP-UX on the nPartition.

For example, the shutdown -h 240 command will shut down and halt HP-UX on the nPartition after waiting for a grace period of four minutes (240 seconds).
To reboot the nPartition after it is halted, use the MP Command menu, \texttt{RS} command, to restart the nPartition. (This allows the nPartition to reset and boot to the BCH interface; if auto-boot is configured it also boots HP-UX.)

**Powering Off Hardware Components**

This procedure is for powering off and powering on components that are to be removed and replaced.

**Step 1.** Log in to the host server service processor (MP).

**Step 2.** If the component you will power off is assigned to an nPartition, then use the Virtual Front Panel (VFP) to view the current boot state of the nPartition.

HP-UX on the nPartition must be shut down before you power off any of the hardware assigned to the nPartition.

When you are certain that the nPartition is not running HP-UX, you can power off components that pertain to the nPartition.

Refer to the procedure, “Shutting Down an nPartition”, for details on determining the nPartition boot state and shutting down HP-UX.

**Step 3.** Access the MP Command menu.

From the MP Main menu type \texttt{CM} to access the Command menu.

**Step 4.** Use the MP Command menu \texttt{PS} command to check details about the hardware component you plan to power off.

The \texttt{PS} command enables you to check the status of the cabinet, system backplane, MP Core I/O, PCI power domains — or bricks — in the I/O card cage, and cells.

**Step 5.** Use the MP Command menu \texttt{PE} command to power off the hardware component.

Using the \texttt{PE} command, you can power on or off the cabinet (including all cells and I/O in the cabinet), individual cells, or PCI power domains (bricks).

Using the Command menu \texttt{PE} command to manage cabinet power is equivalent to using the front panel power switch.

**Step 6.** If you need to disable all power in the entire cabinet, you also must disconnect all power cords in order to disable all housekeeping power.

**NOTE**

Ensure that all power cords are labeled to indicate which receptacle each cord plugs into. Because of power redundancy capabilities, it is important that each power cord plugs into its proper receptacle.

Also, ensure that the cabinet power has been turned off before disconnecting any power cords.

**Step 7.** Perform the hardware removal and replacement procedure for the powered off component.

**Step 8.** If needed, reconnect all power cords to the receptacles where they belong.

**Step 9.** Use the MP Command menu \texttt{PE} command to power on the hardware component that you powered off.
Step 10. Use the MP Command menu PS command to confirm the status of the newly replaced component.

| NOTE | You may need to allow time for some components to complete power on self tests (POST) before a complete status is available. |
Removing and Replacing the SEU Bezel

The SEU Bezel must be removed to gain access to all front components except the DVD/CD player, the front panel board, and the four disk drives.

CAUTION Observes all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

Figure 5-1 SEU Bezel
Removing the Bezel

Figure 5-2  SEU Bezel Removed

Step 1. From the front of the SEU, grasp both sides of the bezel and pull firmly toward you. The catches will release and the bezel will pull free.

Replacing the Bezel

Step 1. If the bezel is to be replaced, visually inspect the replacement part for proper number and revision.

Step 2. From the front of the SEU, grasp both sides of the bezel and push toward the SEU. The catches will secure the bezel to the chassis.
Removing and Replacing the Top Cover

It is necessary to remove and replace one or more of the covers to access the components within the SEU chassis.

**CAUTION**  Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

**Figure 5-3**  Top Cover

**Removing the Top Cover**

**Step 1.** Loosen the blue retaining screws securing the cover to the rear of the chassis.

**Step 2.** Slide the cover toward the rear of the chassis only until the cover front clears the top front lip under which it is located.
**CAUTION** An intrusion switch is located under the top cover on the chassis directly behind the top front lip. After the front edge of the cover clears the chassis, lift the cover up and away from the chassis top to ensure that the cover does not snag the switch when you remove it.

Failure to clear the intrusion switch with the cover top may break it, thereby breaking the electrical circuit that allows the SEU to operate.

**Figure 5-4 Removing the Top Cover**

---

**Step 3.** Lift the cover up and away from the chassis.

**Replacing the Top Cover**

**Step 1.** If the top cover is to be replaced, visually inspect the replacement part for proper number and revision.

**Step 2.** Angle the rear of the top cover up and set the front down on the chassis directly in front of the chassis lip under which the cover rests. Ensure that the intrusion switch is cleared so that it will not break. Gently lower the cover to engage the intrusion switch and slide the cover into position. A slow, firm pressure forward will be needed to properly seat the cover.

**Step 3.** Tighten the retaining screws securing the cover to the chassis.
Removing and Replacing a Side Cover

It is necessary to remove and replace one or both of the covers to access the components in the SEU chassis.

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

**Figure 5-5** Side Cover Locations

**NOTE** If the system is mounted in a rack, it must be fully extended out the front in order to remove the side panels.
Removing a Side Cover

**Figure 5-6 Side Cover Removal Detail**

**Step 1.** Loosen the blue rear retaining screw that secures the cover to the chassis.

---

**NOTE**

Retaining screws are located at two different positions on the rear of the system:
- a. At the top for the left side cover (facing the rear) and,
- b. At the bottom for the right side cover (facing the rear).
This configuration allows the side covers to fit on either side.

---

**CAUTION**

An intrusion switch is located on the chassis side at the front, directly behind and under the side panel. Pull the cover out just far enough to clear the lip, then angle it away from the chassis side to ensure that the cover does not snag the switch when you remove it.

Failure to clear the intrusion switch with the side cover may break it, thereby breaking the electrical circuit that allows the SEU to operate.
Step 2. Slide the cover back and tilt it away from the chassis.

**Figure 5-7** Side Cover Rear Retaining Screw locations

---

**Replacing a Side Cover**

**Step 1.** If the side cover is to be replaced, visually inspect the replacement part for proper number and revision.

**Step 2.** Hold the cover at a slight angle away from the rear of the unit. Then, after ensuring that the intrusion switch is clear, start the front edge of the cover into its slot. Carefully push the cover against the side of the unit and slide it toward the front, into position. Ensure that the rear cover screw hole aligns with the chassis rear screw hole.

**Step 3.** The cover easily slides into position; however, a slow firm pressure is needed to properly seat it.

**Step 4.** Tighten the blue cover retaining screw on the rear of the chassis.
Removing and Replacing a DDS-4 or DVD Drive

The DDS-4 or DVD drive is located in the front of the chassis. The system power to this component must be removed before attempting to remove or replace it.

**NOTE** When installing or replacing a DDS-4 component, ensure that only DDS-4 components with a replacement part number of C5686-67204, or an exchange part number of C5686-69204, are used.

Refer to the, “Shutting Down nPartitions and Powering Off Hardware Components” section, for more information.

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

**Figure 5-8 DDS-4 or DVD Drive Location**
Removing a DDS-4 or DVD Drive

Figure 5-9 DDS-4 or DVD Drive Detail

NOTE The figure shown above displays two DVD components. Either or both items may be replaced by a DDS-4 component.

Step 1. To remove the DDS-4 or DVD drive, push the front locking tab toward the DDS-4 or DVD drive, then pull the tab out to slide the DDS-4 or DVD drive out of the chassis.

NOTE DDS-4 or DVD drive components include removable rails attached to both sides. If the component is to be replaced, ensure that the replacement component includes the plastic rails. If the rails are not included, extract the pin that holds each rail, remove the rail, and install both rails on the replacement component.

There are two sets of holes on each side of the DDS-4 or DVD drive component. Ensure that the rails are mounted so that the pins fit into the bottom set of holes.

One of the rails has a locking tab attached. Ensure that the rail with the locking tab is mounted on the left side of the DDS-4 or DVD drive component, as shown in Figure 4-9, above.

Step 2. Disconnect the power and SCSI cables from the rear of the DDS-4 or DVD drive.

Step 3. Pull the DDS-4 or DVD drive from the chassis and set aside.

NOTE If the system has only one DDS-4 or DVD drive installed, a tray will be located beneath the DDS-4 or DVD drive as shown in the preceding figure. Follow the same removal procedure to extract the tray, pushing the bottom front locking tab toward the tray then pulling out on the tab to remove it from the chassis.
Replacing a DDS-4 or DVD drive

**NOTE**  If you are replacing a DDS-4 or DVD drive component in the lower tray, the upper DDS-4 or DVD drive component must be removed to have access to the lower DDS-4 or DVD drive cables.

**Step 1.** Visually inspect the replacement part for proper number and revision.

**Step 2.** Verify that the jumpers are set correctly.

**Step 3.** Connect the cables to the rear of the DDS-4 or DVD drive.

**NOTE**  DDS-4 or DVD drive components include removable rails attached to both sides. If the component is to be replaced, ensure that the replacement component includes the plastic rails. If the rails are not included, extract the pin that holds each rail, remove the rail, and install both rails on the replacement component.

There are two sets of holes on each side of the DDS-4 or DVD drive component. Ensure that the rails are mounted so that the pins fit into the bottom set of holes.

One of the rails has a locking tab attached. Ensure that the rail with the locking tab is mounted on the left side of the DDS-4 or DVD drive component, as shown in Figure 4-9, above.

**Step 4.** Slide the drive in the chassis. Fold the cables out of the way.

**Step 5.** The drive easily slides into the chassis; however, a slow firm pressure is needed for proper seating.

**Step 6.** The front locking tab will latch to secure the disk drive in the chassis.
Removing and Replacing a Disk Drive

The disk drives are located in the front of the chassis. Unless mirroring is used, the nPartition must be shut down to remove or replace the drive that serves as the boot disk. Refer to “Shutting Down nPartitions and Powering Off Hardware Components” for more information. The remainder of the internal disk drives are hot-pluggable.

**CAUTION**

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

**Figure 5-10** Disk Drive Location

Removing a Disk Drive

**Figure 5-11** Disk Drive Detail
Step 1. Disengage the front locking latch on the disk drive by pushing the release tab to the right and the latch lever to the left.

Step 2. Pull forward on the front locking latch and carefully slide the disk drive from the chassis.

Replacing a Disk Drive

NOTE Sometimes, the diskinfo and ioscan commands will produce cached data. To resolve this, these commands should be run when the disk drive is removed.

Step 1. Visually inspect the replacement part for proper number and revision.

Step 2. Before installing the disk drive, type the following command:

```bash
#diskinfo -v /dev/rdsk/cxtxdx
```

Where cxtxdx = the device file of the disk removed.

Step 3. Then type the following:

```bash
#ioscan -f
```

The response message after running this command is:

```
NO_HW
```

Step 4. Ensure that the front locking latch is open, then position the disk drive in the chassis.

Step 5. Slide the disk drive into the chassis; apply slow firm pressure to properly seat the connection.

Step 6. Press the front locking latch to secure the disk drive in the chassis.

Step 7. Spin up the disk by entering one of the following commands:

```bash
#diskinfo -v /dev/rdsk/cxtxdx
```

Where cxtxdx = the device file of the disk removed.

```bash
#ioscan -f
```
Removing and Replacing a Standby/Main Fan (Front) Assembly

The Front Standby/Main fan Assembly is located in the front of the chassis. The fan assembly is a hot-swap component.

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

**Table 5-1** Front Standby/Main Fan Assembly LED Indications

<table>
<thead>
<tr>
<th>LED State</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Green</td>
<td>Fan is at speed and in sync or not at speed less than 12 seconds</td>
</tr>
<tr>
<td>Flash Yellow</td>
<td>Fan is not keeping up with speed/sync pulse for greater than 12 seconds</td>
</tr>
<tr>
<td>Red</td>
<td>Fan failed or stalled, has run slow, or fast for greater than 12 seconds</td>
</tr>
<tr>
<td>Off</td>
<td>Fan is not present, or no power is applied to fan, or the fan has failed</td>
</tr>
</tbody>
</table>
Removing a Front Standby/Main Fan Assembly

**Step 1.** Remove the bezel.

**Step 2.** Loosen the two blue-colored captive screws (lower left and upper right sides).

---

**NOTE**  The blue captive screws are slotted so that a straight slot screwdriver can be used, if necessary.

**Step 3.** Carefully pull on the fan to detach it from the nine-pin connector.

**Step 4.** Pull the fan away from the chassis.

Replacing a Front Standby/Main Fan Assembly

**Step 1.** Visually inspect the replacement part for proper number and revision.

**Step 2.** Position the fan assembly on the chassis fan guide pins.

**Step 3.** Carefully seat the fan into the nine-pin connector.

**Step 4.** Tighten the two blue-colored captive screws (lower left and upper right sides).

**Step 5.** Replace the bezel.

---

**NOTE**  The fan LED will show that the fan is operational (green).
Removing and Replacing a Standby/Main Fan (Rear) Assembly

The Rear Standby/Main fan Assembly is located in the rear of the chassis. The fan assembly is a hot swap component.

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

Figure 5-13 Rear Standby/Main Fan Assembly Locations

Removing and Replacing the Rear Standby/Main fan Assembly

The rear standby/main fan assembly is located in the rear of the chassis.

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the server.
Removing the Rear Standby/Main Fan Assembly

Step 1. Identify the failed fan assembly. The table below defines the fan LED states.

Table 5-2 Standby/Main Fan Assembly LED Indications

<table>
<thead>
<tr>
<th>LED State</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Green</td>
<td>Fan is at speed and in sync or not at speed less than 12 seconds</td>
</tr>
<tr>
<td>Flash Yellow</td>
<td>Fan is not keeping up with speed/sync pulse for greater than 12 seconds</td>
</tr>
<tr>
<td>Red</td>
<td>Fan failed or stalled, has run slow, or fast for greater than 12 seconds</td>
</tr>
<tr>
<td>Off</td>
<td>Fan is not present, or no power is applied to fan, or the fan has failed</td>
</tr>
</tbody>
</table>

Step 2. Loosen the two blue screws securing the fan to the chassis.

Step 3. Pull the fan from the chassis.

Replacing the Rear Standby/Main Fan Assembly

Step 1. Visually inspect the replacement part for proper number and revision.

Step 2. Position the fan assembly in the chassis.

Step 3. Push the fan into the connector.

Step 4. Tighten the two thumb screws to secure the fan to the chassis.

Step 5. The LED should be GREEN. See the previous table for a listing of LED definitions.
Removing and Replacing a Bulk Power Supply (BPS)

The bulk power supply is located in the front of the chassis. The BPS is a hot swap-component.

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

**Preliminary Procedures**

**Step 1.** Identify the failed power supply.

**Step 2.** Connect to ground with a wrist strap.

**Step 3.** Visually inspect the replacement part for proper number and revision.

**Figure 5-14   **BPS Location

**IMPORTANT** When a BPS is pulled from the SEU and then immediately re-inserted, the SEU may report an overcurrent condition and shut down.
Removing a BPS

Step 1. Remove the bezel.

---

**NOTE**  Bulk Power Supplies are interchangeable. To install the right-hand BPS in the left-side housing, turn the BPS 180 degrees. Ensure that the locking lever is on the inside of the component and slide the BPS into the housing until the locking lever seats.

---

**Step 2.** Grasp the handle and, with your thumb, pull (or squeeze) the extraction lever, located on the front outer portion of the BPS, toward the handle to unlock the component from the chassis.

---

**CAUTION**  The BPS is heavier than it appears. Be prepared to support the component with your free hand to keep it from dropping suddenly and swinging back when it clears the housing. Failure to heed this precaution can result in personal injury and/or damage to the component.

---

**Step 3.** Pull the BPS out of the chassis and set it aside.
Replacing a BPS

**Step 1.** Verify that the locking lever is on the inside of the component, then insert the BPS into the empty slot and slide it all the way in.

| NOTE | The BPS easily slides into the chassis; however, a slow, firm pressure will be needed to properly seat the connection. |

**Step 2.** You will know that the BPS has seated by the clicking sound made by the locking lever.

| NOTE | The BPS LED should show that the BPS is operational and there is no fault. The BPS LED should be GREEN. |
Removing and Replacing a PCI Power Supply (Brick)

The PCI power supply is located in the front of the chassis. The system power must be removed to replace this CRU. See “Shutting down nPartitions and Powering Down Hardware Components.”

CAUTION Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

Preliminary Procedures

Step 1. Identify the failed power supply.
Step 2. Connect to ground with a wrist strap.
Step 3. Visually inspect the replacement part for proper number and revision.
Step 4. Shut down the partition and power off the PCI domain.
Step 5. Remove the Front Bezel.

Figure 5-16 PCI Power Supply Location
Removing a PCI Power Supply (Brick)

**Figure 5-17** PCI Power Supply Detail

<table>
<thead>
<tr>
<th>LED</th>
<th>LED State</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power LED (Green)</td>
<td>Off</td>
<td>Power module failure or the power to the respective I/O chassis is OFF.</td>
</tr>
<tr>
<td></td>
<td>On</td>
<td>Normal operation</td>
</tr>
<tr>
<td>Fault LED (Multi-color)</td>
<td>Off</td>
<td>Normal operation</td>
</tr>
<tr>
<td></td>
<td>Blink amber</td>
<td>Over temperature condition internal to supply</td>
</tr>
<tr>
<td></td>
<td>Amber</td>
<td>Imminent failure detected</td>
</tr>
<tr>
<td></td>
<td>Blink red</td>
<td>Module internal failure</td>
</tr>
</tbody>
</table>

**Step 1.** Remove the bezel.

**Step 2.** Securely grasp the handle on the front of the power supply.

**Step 3.** Slide the blue thumb latch to the right to release the catch.

**Step 4.** Pull the module out of the chassis.
Replacing a PCI Power Supply (Brick)

Step 1. Carefully align and push the power supply in the chassis until the thumb latch catches.

Step 2. The module easily slides into the chassis; however, a slow firm pressure is needed to properly seat the connection.

Step 3. Replace the bezel.

Step 4. Power on the system. Use PE and PS commands to confirm success.

Step 5. Note status of Power Supply LEDs. The green power LED should be ON and the fault amber or red LED should be OFF.
Removing and Replacing a PCI Card

The PCI cards are located in the rear of the chassis in the PCI card cage. PCI cards are hot-plug components.

**CAUTION** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

**Figure 5-18** PCI Cards

Removing and Replacing a PCI Card

You can remove and replace a PCI I/O card, either by using the SAM application (/usr/sbin/sam), or by using the Partition Manager (/opt/parmgr/bin/parmgr).

This procedure describes how to perform an online replacement of a PCI card using SAM, for cards that have drivers support online add or replacement capability.

**IMPORTANT** Some PCI I/O cards cannot be added or replaced online while HP-UX remains running. For these cards, you must shut down HP-UX on the nPartition before performing the card replacement or addition. See “Shutting Down nPartitions and Powering Off Hardware Components”.

**Step 1.** Run SAM (/usr/sbin/sam) and from the main SAM Areas screen select the **Peripheral Devices** area, then select the **Cards** area.
Step 2. From the I/O Cards screen, select the card you will replace and then select the **Actions—>Replace** menu item.

Step 3. Wait for SAM to complete the critical resource analysis for the selected card and then review the analysis results.

If no critical resources will be disabled by taking the selected card offline, click the **OK** button to suspend the card driver and power off the card PCI slot. Proceed with the next step.

If SAM detected that the selected PCI card cannot be taken offline, you will not be able to click the **OK** button and cannot replace the card while HP-UX remains running. In this case, you must shut down HP-UX on the nPartition before replacing the defective card.

Step 4. Locate the PCI slot where the selected card resides.

<table>
<thead>
<tr>
<th>NOTE</th>
<th>On the SEU, you can see the PCI slots and slot LEDs from the rear of the cabinet.</th>
</tr>
</thead>
</table>

The selected slot will be powered off (the green power LED is off), and the attention indicator (an amber LED) will be blinking.

Step 5. Label and remove the cables connected to the PCI card to be removed.

Step 6. Remove the top cover.

Step 7. Rotate the card slot PCI gate to the open position.

**Figure 5-19 PCI Gate Detail**
Figure 5-20 PCI Tab Detail

Step 8. Firmly pull up on the PCI card separator tabs to unseat the card.

Step 9. Remove the card from the PCI slot.

NOTE Mark the card defective for future reference.
Replacing A PCI Card

**NOTE** The PCI I/O card installation process varies depending on which version of the HP-UX operating system you are running on your system. PCI I/O card installation procedures should be downloaded from the http://docs.hp.com/Web site. Background information and procedures for adding a new PCI I/O card using online addition are:

For HP-UX 11.11, consult the HP System Partitions Guide.

For HP-UX 11.23, consult the Interface Card OL* Support Guide.

**Step 1.** Visually inspect the replacement part for proper number and revision.

Consult the appropriate guide for instructions on preparing the operating system for online addition of the PCI I/O card before attempting to insert a PCI I/O card into the PCI-X chassis backplane.

**Step 2.** Position and seat the replacement PCI card in the slot.

**NOTE** A slow, firm pressure is needed to properly seat the card into the connection.

**Step 3.** Rotate the card slot PCI gate to the closed position.

**NOTE** The Server Expansion Unit implements manual retention latch (MRL) hardware for use in online add or replacement (OLAR) operations. If an MRL is left open while the server is booting, HP-UX can incorrectly cache PCI slot power status causing OLAR operations to fail. To prevent this situation, ensure all the MRLs are closed before booting the server.

If OLAR reports that a slot is present and powered off, but no OLAR operations to turn power on to that slot have succeeded even after the MRL is closed, the MRL may have been left open during boot. To clear this condition, close the MRL for the PCI slot then power off the PCI slot using the `rad -o` command. This will allow future OLAR operations to succeed on this PCI slot.

**Step 4.** Replace the top cover.

**Step 5.** Connect all cables to the replacement PCI card.
Installing and Removing the System Bus Adapter (SBA) Cable Assembly

The SBA Cable Assembly terminates in the SEU on the System Backplane, located in the left side of the chassis, and travels out of the SEU to the host server. All system power must be removed before attempting to install or remove this component.

NOTE

The figures depicting SBA cables, mounting hardware, and receptacles may differ from the appearance of the actual cables and receptacles that you receive. The procedures listed for installation and removal should remain essentially the same, however.

CAUTION

Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions could result in damage to the SEU.

Figure 5-21 SBA Cables and Receptacles

Installing SBA Cables

Step 1. Remove the top and left side covers.

Step 2. Loosen blue captive screws and remove bridge bracket cover from top right corner (facing the rear).

Step 3. Remove four flat, square filler plates under the cable bracket cover to reveal a slot.
Step 4. Insert the four SBA cables, receptacle first, through the top and down the front of the System backplane.

Step 5. Plug the two short cable receptacles into the backplane at the two plug-ins closest to the rear of the SEU.

Step 6. Plug the two long cable receptacles into the backplane at the two plug-ins furthest from the rear of the SEU. Tighten captive screws on the receptacles.

Step 7. Insert the cable bracket in the slot on the rear of the chassis.

Step 8. Attach the bridge bracket cover and tighten the two blue retainer screws.

Step 9. Install the SBA holder bracket on the System backplane.

Step 10. Install side and top covers.

Removing SBA Cables

Step 1. Remove left side cover.

Step 2. Remove top cover.

Step 3. Remove the SBA holder bracket on the System backplane.

Step 4. Loosen the two blue captive screws and remove the bridge bracket cover on the rear of the SEU, upper left (from the front) corner.

Step 5. Loosen the captive screws on all four cable receptacles

Step 6. Loosen the four cable receptacles and carefully slide the cables, one at a time, up the System backplane and lay them on the top of the SEU.

Step 7. Remove the cable bracket from the slot on the rear of the chassis.

Step 8. Lift the four SBA cables away from the top of the SEU.

Step 9. Install the top and side covers.
A Replaceable Parts

The CRU list contains replacement part numbers for the Server Expansion Unit. Where applicable, exchange part numbers are included.
Table A-1  
Server Expansion Unit Customer Replaceable Unit (CRU) List

<table>
<thead>
<tr>
<th>CRU Description</th>
<th>Replacement Part Number</th>
<th>Exchange Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER SUPPLIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulk Power Supply</td>
<td>0950-3794</td>
<td>A6093-69021</td>
</tr>
<tr>
<td>PCI Power Module</td>
<td>0950-3819</td>
<td>A6093-69123</td>
</tr>
<tr>
<td><strong>FANS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front Smart Fan Assembly</td>
<td>A6093-67017</td>
<td>N/A</td>
</tr>
<tr>
<td>Rear Smart Fan Assembly</td>
<td>A6093-67018</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>CABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Cord C19/Unterminated 4.5m, International—Other</td>
<td>8120-6895</td>
<td>N/A</td>
</tr>
<tr>
<td>Power Cord C19/IEC-309 4.5m, International</td>
<td>8120-6897</td>
<td>N/A</td>
</tr>
<tr>
<td>Power Cord C19/L6-20 4.5m, North America/Japan</td>
<td>8120-6903</td>
<td>N/A</td>
</tr>
<tr>
<td>Power Cord C19/GB-1002 4.5m, China</td>
<td>8121-0070</td>
<td>N/A</td>
</tr>
<tr>
<td>RS-485 Interface Cable (external cable)</td>
<td>A6434-63003</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>OTHER COMPONENTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removable Media Rail Replacement Kit</td>
<td>A6752-67011</td>
<td>N/A</td>
</tr>
<tr>
<td>Internal Disk Filler Tray</td>
<td>A6198-60002</td>
<td>N/A</td>
</tr>
<tr>
<td>Power Cord Anchor Bracket</td>
<td>A6434-00041</td>
<td>N/A</td>
</tr>
<tr>
<td>Bezel Assembly, Quartz color</td>
<td>A6434-04013</td>
<td>N/A</td>
</tr>
<tr>
<td>Rear (core I/O) Cable Access Plate</td>
<td>A6434-04029</td>
<td>N/A</td>
</tr>
<tr>
<td>Bezel Assembly, Graphite color</td>
<td>A6434-04036</td>
<td>N/A</td>
</tr>
<tr>
<td>Name Plate, Quartz color</td>
<td>A6434-40002</td>
<td>N/A</td>
</tr>
<tr>
<td>Name Plate, Graphite color</td>
<td>A6434-40009</td>
<td>N/A</td>
</tr>
<tr>
<td>Front Bezel Snap Attachment</td>
<td>C2786-40002</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>MASS STORAGE DRIVES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36GB 15K RPM SCSI Hard Disk Drive</td>
<td>A9896-64001</td>
<td>A9896-69001</td>
</tr>
<tr>
<td>73GB 15K RPM SCSI Hard Disk Drive</td>
<td>A9897-64001</td>
<td>A9897-69001</td>
</tr>
<tr>
<td>146GB 10K RPM SCSI Hard Disk Drive</td>
<td>A9898-64001</td>
<td>A9898-69001</td>
</tr>
<tr>
<td>Removable Media DVD SCSI Disk Drive</td>
<td>A9879-67001</td>
<td>N/A</td>
</tr>
<tr>
<td>Removable Media DDS-4 Tape Drive</td>
<td>C5686-67204</td>
<td>C5686-69204</td>
</tr>
</tbody>
</table>
This appendix contains a list of the Server Management Commands.
Server Management Commands

Table B-1 lists the server management commands.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO</td>
<td>Boot a partition</td>
</tr>
<tr>
<td>DATE</td>
<td>Set the time and date</td>
</tr>
<tr>
<td>DF</td>
<td>Display FRU Information of an entity</td>
</tr>
<tr>
<td>MA</td>
<td>Return to Main Menu</td>
</tr>
<tr>
<td>PE</td>
<td>Power entities on or off</td>
</tr>
<tr>
<td>PWRGRD</td>
<td>Allows user to configure the power grid</td>
</tr>
<tr>
<td>RE</td>
<td>Reset entity</td>
</tr>
<tr>
<td>RR</td>
<td>Reset partition for reconfiguration</td>
</tr>
<tr>
<td>RS</td>
<td>Reset a partition</td>
</tr>
<tr>
<td>SYSREV</td>
<td>Returns all system revisions</td>
</tr>
<tr>
<td>TC</td>
<td>Send a TOC signal to a partition</td>
</tr>
<tr>
<td>TE</td>
<td>Broadcast a message to all users of the MP command handler</td>
</tr>
<tr>
<td>WHO</td>
<td>Display list of MP connected users</td>
</tr>
<tr>
<td>LOC</td>
<td>Display and Set Locator LED status</td>
</tr>
</tbody>
</table>

Table B-2 lists the server status commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP</td>
<td>Display partition cell assignments</td>
</tr>
<tr>
<td>DE</td>
<td>Display entity status</td>
</tr>
<tr>
<td>DU</td>
<td>Display devices on bus</td>
</tr>
<tr>
<td>HE</td>
<td>Display the list of available commands</td>
</tr>
<tr>
<td>LS</td>
<td>Display LAN connected console status</td>
</tr>
<tr>
<td>PS</td>
<td>Display detailed power and hardware configuration status</td>
</tr>
</tbody>
</table>
Table B-3 lists the server system and access config commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>Only displays local rs232 parameters</td>
</tr>
<tr>
<td>CC</td>
<td>Initiate a Complex Configuration</td>
</tr>
<tr>
<td>UPS</td>
<td>Set parameters for ups monitoring via SNMP</td>
</tr>
<tr>
<td>SNMP</td>
<td>Set SNMP daemon parameters</td>
</tr>
<tr>
<td>CP</td>
<td>Display partition cell assignments</td>
</tr>
<tr>
<td>DC</td>
<td>Reset parameters to default configuration</td>
</tr>
<tr>
<td>DI</td>
<td>Disconnect Remote or LAN console</td>
</tr>
<tr>
<td>ID</td>
<td>Change certain stable complex configuration profile fields</td>
</tr>
<tr>
<td>IF</td>
<td>Display network interface information</td>
</tr>
<tr>
<td>IT</td>
<td>Modify command interface inactivity time-out</td>
</tr>
<tr>
<td>LC</td>
<td>Configure LAN connections</td>
</tr>
<tr>
<td>LS</td>
<td>Display LAN connected console status</td>
</tr>
<tr>
<td>PARPERM</td>
<td>Enable/Disable Interpartition Security</td>
</tr>
<tr>
<td>PD</td>
<td>Modify default Partition for this login session</td>
</tr>
<tr>
<td>RL</td>
<td>Re-key complex profile lock</td>
</tr>
<tr>
<td>RU</td>
<td>Reset MP bus device</td>
</tr>
<tr>
<td>SA</td>
<td>Display and set MP remote access</td>
</tr>
<tr>
<td>SO</td>
<td>Configure security options and access control</td>
</tr>
<tr>
<td>XD</td>
<td>MP Diagnostic and reboot</td>
</tr>
</tbody>
</table>
This appendix contains blank floor plan grids and equipment templates. Combine the necessary number of floor plan grid sheets to create a scaled version of the computer room floor plan.
Figure C-1 illustrates the overall dimensions required for a Server Expansion Unit.

**Figure C-1**  Server Expansion Unit Space Requirements
Equipment Footprint Templates

Equipment footprint templates are drawn to the same scale as the floor plan grid (1/4 inch = 1 foot). These templates are provided to show basic equipment dimensions and space requirements for servicing. The service areas shown on the template drawings are lightly shaded.

The equipment templates should be used with the floor plan grid to define the location of the equipment that will be installed in your computer room.

NOTE Photocopying typically changes the scale of drawings copied. If any templates are copied, then all templates and floor plan grids must also be copied.
Computer Room Layout Plan

Use the following procedure to create a computer room layout plan:

**Step 1.** Remove several copies of the floor plan grid.

**Step 2.** Cut and join them together (as necessary) to create a scale model floor plan of your computer room.

**Step 3.** Remove a copy of each applicable equipment footprint template.

**Step 4.** Cut out each template selected in Step 3; then place it on the floor plan grid created in Step 2.

**Step 5.** Position pieces until the desired layout is obtained; then fasten the pieces to the grid. Mark locations of computer room doors, air conditioning floor vents, utility outlets, and so on.
NOTE

Attach a reduced copy of the completed floor plan to the site survey. Hewlett-Packard installation specialists use this floor plan during equipment installation.

Figure C-2 Server Expansion Unit Cabinet Template

NOTE

Attach a reduced copy of the completed floor plan to the site survey. Hewlett-Packard installation specialists use this floor plan during equipment installation.

Figure C-2 Server Expansion Unit Cabinet Template
Figure C-3  Planning Grid

Scale: 1/4 inch = 1 foot
Figure C-4 Planning Grid

Scale: 1/4 inch = 1 foot
Figure C-5 Planning Grid

Scale: 1/4 inch = 1 foot
Figure C-6  Planning Grid

Scale: 1/4 inch = 1 foot
Figure C-7  Planning Grid

Scale: 1/4 inch = 1 foot
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