IBM Power 750 Express server offers IBM POWER7 technology and large enterprise compute capability in small form factor

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At a glance

The Power® 750 Express® server is a powerful 1- to 4-socket server that supports up to 32 cores with the configuration flexibility to meet today's growth and tomorrow's processing needs. The server features:

- Powerful POWER7™ processors that offer 6-core to 32-core configuration options

  – 6-, 12-, 18-, and 24-core 3.3 GHz configurations (6-core processor card)

  – 8-, 16-, 24-, and 32-core 3.0 or 3.3 GHz configurations (8-core processor card)

  – 32-core 3.55 GHz configuration

- Up to 512 GB of memory with four processor cards installed, optionally augmented with Active Memory™ Expansion
- Up to four optional PCIe I/O drawers or up to eight optional PCI-X I/O drawers, with up to 41 PCIe slots or up to 50 PCI-X slots
- Rich I/O options in the system unit

  – Five PCI slots in the system unit

  – Eight disk/solid-state disk (SSD) SAS SFF (small form factor) bays -- up to 2.4 TB

  – Slimline DVD-RAM

  – Half-high bay for tape or removable drive

  – Integrated SAS/SATA controller for disk/SSD/DVD

  – Optional 175 MB RAID write cache for disk/SSD

  – Integrated Virtual Ethernet ports (four 1 Gb or two 10 Gb)

- Rack-mount configuration
- EnergyScale™ technology

Overview

The Power 750 Express server (8233-E8B) supports up to four 3.3 GHz 6-core or four 8-core 3.0, 3.3, and 3.55 GHz POWER7 processor cards in a rack-mount drawer configuration. The POWER7 processors in this server are 64-bit, 6-core and 8-core modules packaged on dedicated processor cards with 4 MB of L3 cache/core and 256 KB of L2 cache/core.

The Power 750 Express server supports a maximum of 32 DDR3 DIMM slots, eight per processor card. Memory features (two memory DIMMs per feature) supported are 8 GB, 16 GB, and 32 GB and run at speeds of 1066 MHz. A system with four processor cards installed has a maximum memory of 512 GB. Also, the optional Active Memory Expansion can allow the effective maximum memory capacity to be much larger than the true physical memory. Innovative compression/decompression of memory content using processor cycles can allow memory expansion up to 100%. A server with a maximum of 512 GB can effectively be expanded up to 1 TB. This can enhance virtualization and server consolidation by allowing a partition to do significantly more work with the same physical amount of memory or a server to run more partitions and do more work with the same physical amount of memory.

The Power 750 Express server provides great I/O expandability. For example, with 12X-attached I/O drawers, you can have up to 50 PCI-X slots or up to 41 PCIe slots. This combination can provide over 100 LAN ports or over 72 WAN ports, or up to 576 disk drives (over 240 TB disk storage). Extensive quantities of externally attached storage and tape drives and libraries can also be attached.

The Power 750 Express system unit without I/O drawers can contain a maximum of either eight SFF SAS disks or eight SFF SAS SSDs, providing up to 2.4 TB. All disks and SSDs are direct dock and hot pluggable. The eight SAS bays can be split into two sets of four bays for additional AIX/Linux configuration flexibility. The system unit also contains a slimline DVD-RAM, plus a half-high media bay for an optional tape drive or removable disk drive.

Also available in the Power 750 system unit is a choice of quad gigabit or dual 10 Gb integrated host Ethernet adapters. These native ports can be selected at the time of initial order. Virtualization of these integrated Ethernet adapters is supported.

Other integrated features include:

- Five expansion slots
  - Three PCIe x8 (two short-length, one full-length)
  - Two PCI-X DDR (full length)
  - Two GX slots for 12X I/O loop or 4X connections
- Service Processor
- Integrated SAS/SATA controller for disk/SSD/DVD in system unit
  - Optional 175 MB RAID write cache to augment disk/SSD performance and function
- EnergyScale technology
- Two system ports and three USB ports
- Two hardware management console (HMC) ports and two SPCN ports
- Redundant and hot-swap power
- Redundant and hot-swap cooling

Key prerequisites

If installing the AIX® operating system (one of these):

- AIX Version 6.1 with the 6100-04 Technology Level and Service Pack 2, or later

- AIX Version 6.1 with the 6100-03 Technology Level and Service Pack 5, or later (planned availability: June 25, 2010)
- AIX Version 6.1 with the 6100-02 Technology Level and Service Pack 8, or later (planned availability: June 25, 2010)
- AIX Version 5.3 with the 5300-11 Technology Level and Service Pack 2, or later (planned availability: March 16, 2010)
- AIX Version 5.3 with the 5300-10 Technology Level and Service Pack 4, or later (planned availability: May 28, 2010)
- AIX Version 5.3 with the 5300-09 Technology Level and Service Pack 7, or later (planned availability: May 28, 2010)

If installing the IBM® i operating system:

- IBM i 6.1 with i 6.1.1 machine code, or later (planned availability: March 16, 2010)

If installing the Linux® operating system (one of these):

- SUSE Linux Enterprise Server 11 for the Power 750 Express Server, or later, with current maintenance updates available from Novell to enable all planned functionality
- SUSE Linux Enterprise Server 10 Service Pack 3 for the Power 750 Express Server, with current maintenance updates available from Novell to enable all planned functionality

  Users should also update their systems with the latest Linux for Power service and productivity tools available at

  http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html

If installing VIOS:

- VIOS 2.1.2.11 with Fix Pack 22.1 and Service Pack 1, or later

Java™ 1.4.2 on POWER7:

There are unique considerations when running Java 1.4.2 on POWER7. For best exploitation of the outstanding performance capabilities and most recent improvements of POWER7 technology, IBM recommends upgrading Java-based applications to Java 6 or Java 5 whenever possible.

For more information, visit

  http://www.ibm.com/developerworks/java/jdk/aix/service.html

Planned availability date

February 19, 2010, except for feature 4526, which is planned to be available on March 16, 2010.

Description

Power 750

Summary of standard features:

- Rack-mount (4U) configuration
- 6-, 12-, 18-, and 24-core design with one, two, three, or four 3.3 GHz processor cards; 8-, 16-, 24-, and 32-core design with one, two, three or four 3.0 or 3.3 GHz processor cards; or 32-core design with four 3.55 GHz processor cards
- 8 GB of PC3-8500 1066 MHz ECC memory (error checking and correcting) memory, expandable to 128 GB per processor card (512 GB system maximum)

Note: The 8 GB memory feature (#4526) is planned to be available on March 15, 2010.

- 8 x 2.5-inch DASD/SSD/Media backplane with an external SAS port
  - 1 to 8 SFF DASD or SSDs (mixing allowed)
- Choice of two integrated virtual Ethernet daughter cards:
  - Quad-port 1 Gb IVE
  - Dual-port 10 Gb IVE
- Two media bays:
  - One slim bay for a DVD-RAM (required)
  - One half-high bay for an optional tape drive or removable disk
- A maximum of five hot-swap slots:
  - Two PCIe x8 slots, short card length (slots 1 and 2)
  - One PCIe x8 slot, full card length (slot 3)
  - Two PCIX DDR slots, full card length (slots 4 and 5)
  - One GX+ slot (shares same space as PCIe x8 slot 2)
  - One GX++ slot (shares same space as PCIe x8 slot 1)
- Integrated:
  - Service Processor
  - Quad-port 10/100/1000 Mb Ethernet
  - EnergyScale technology
  - Hot-swap and redundant cooling
  - Three USB ports; two system ports
  - Two HMC ports; two SPCN ports
- Two Power Supplies, 1725 Watt AC, Hot-swap

The minimum Power 750 configuration must include a processor, processor activations, memory, two power supplies and power cords, one or two DASD, a DASD/SSD/Media backplanes, an operator panel cable, an Ethernet daughter card, a DVD-RAM, an operating system indicator, and a Language Group Specify.

The minimum defined configuration, if no choice is made, when AIX or Linux is the primary operating system is:

```
Feature number    Description

8335              0/6 core 3.3 GHz POWER7 Processor
6 x 7717          6 Processor Activations
4526              8 GB (2 x 4096 MB) Memory
1883              73.4 GB 15k SFF DASD
1878              Operator Panel Cable, Rack-mount drawer with
                  2.5-inch DASD Backplane
8340              DASD/Media Backplane for 2.5-inch DASD/SATA
                  DVD/Tape with External SAS Port
5624              Quad-port 1 Gb Integrated Ethernet Daughter Card
2 x 7740          Two Power Supplies, 1725 Watt AC, Base
5762              SATA DVD-RAM
9300/97xx)        Language Group Specify
2146 or 2147      Primary Operating System Indicator - IBMAIX (2146)
                  or Linux (2147)
2 x 6xxx          Two Power Cords
```

Notes:

- The 8 GB memory feature (#4526) is planned to be available on March 16, 2010.
- No internal DASD is required if feature 0837 (Boot from SAN) is selected. A Fibre Channel adapter must be ordered if feature 0837 is selected.

The minimum defined configuration, if no choice is made, when IBM i is the primary operating system is:

```
Feature number    Description

8335              0/6 core 3.3 GHz POWER7 Processor
6 x 7717          6 Processor Activations
4526              8 GB (2 x 4096 MB) Memory
2 x 1884          69.7 GB 15K RPM SAS SFF Disk Drive
1878              Operator Panel Cable, Rack-mount drawer with
                  2.5-inch DASD Backplane
8340              DASD/Media Backplane for 2.5-inch DASD/SATA
                  DVD/Tape with External SAS Port
5624              Quad-port 1 Gb Integrated Ethernet Daughter Card
2 x 7740          Power Supply, 1725 Watt AC, Base
5762              SATA DVD-RAM
9300/97xx)        Language Group Specify
2145              Primary Operating System Indicator - IBM i
0040              Mirrored System Disk Level Specify Code
0566              IBM i 6.1 with 6.1.1 Machine Code Specify Code
2 x 6xxx          Two Power Cords
```

Notes:

- The 8 GB memory feature (#4526) is planned to be available on March 16, 2010.
- No internal DASD is required if feature 0837 (Boot from SAN) is selected. A Fibre Channel adapter must be ordered if feature 0837 is selected.

IBM Editions

IBM Editions are available only as initial order.

If you order a Power 750 Express server IBM Edition as defined below, you can qualify for half the initial configuration's processor core activations at no addition charge.

The total memory (based on the number of cores) and the quantity/size of disk, SSD, Fibre Channel adapters, or Fibre Channel over Ethernet (FCoE) adapters shipped with the server are the only features that determine if a customer is entitled to a processor activation at no additional charge.

Specifically, with an IBM Edition, processor activations for the processor card options are:

- 3.3 GHz 6-core processor cards
  - 3 x #7717 (chargeable) and 3 x #2327 (no-charge) with 6-core (1 x #8335) configuration
  - 6 x #7717 (chargeable) and 6 x #2327 (no-charge) with 12-core (2 x #8335) configuration
  - 9 x #7717 (chargeable) and 9 x #2327 (no-charge) with 18-core (3 x #8335) configuration
  - 12 x #7717 (chargeable) and 12 x #2327 (no-charge) with 24-core (4 x #8335) configuration
- 3.0 GHz 8-core processor cards
  - 4 x #7714 (chargeable) and 4 x #2324 (no-charge) with 8-core (1 x #8334) configuration
  - 8 x #7714 (chargeable) and 8 x #2324 (no-charge) with 16-core (2 x #8334) configuration
  - 12 x #7714 (chargeable) and 12 x #2324 (no-charge) with 24-core (3 x #8334) configuration
  - 16 x #7714 (chargeable) and 16 x #2324 (no-charge) with 32-core (4 x #8334) configuration
- 3.3 GHz 8-core processor cards

- 4 x #7715 (chargeable) and 4 x #2325 (no-charge) with 8-core (1 x #8332) configuration
- 8 x #7715 (chargeable) and 8 x #2325 (no-charge) with 16-core (2 x #8332) configuration
- 12 x #7715 (chargeable) and 12 x #2325 (no-charge) with 24-core (3 x #8332) configuration
- 16 x #7715 (chargeable) and 16 x #2325 (no-charge) with 32-core (4 x #8332) configuration
- 3.55 GHz 8-core processor cards
  - 16 x #7716 (chargeable) and 16 x #2326 (no-charge) with 32-core (4 x #8336) configuration

When you purchase an IBM Edition, you can purchase an AIX, IBM i, or Linux operating system license, or you may choose to purchase the system with no operating system. The AIX, IBM i, or Linux operating system is processed via a feature number on AIX 5.3 or 6.1, IBM i 6.1.1, and SUSE Linux Enterprise Server. If you choose AIX 5.3 or 6.1 for your primary operating system, you can also order IBM i 6.1.1 and SUSE Linux Enterprise Server. The converse is true if you choose an IBM i or Linux subscription as your primary operating system.

These sample configurations can be changed as needed and still qualify for processor entitlements at no additional charge. However, selection of total memory or DASD/SSD/Fibre Channel/FCoE adapter quantities smaller than the totals defined as the minimums disqualifies the order as an IBM Edition and the no-charge processor activations are then removed.

Processor activations are only available to Solution Delivery Integration (SDIs) as MES orders.

Processor cards ordered separately after the initial order are not eligible for no-charge processor activations.

Edition minimum memory definition details:

A minimum of 4 GB memory per core is needed to qualify for the IBM Edition, except on the 6-core IBM Edition where there is a 32 GB minimum memory requirement. For example, a 6-core minimum is 32 GB, an 8-core minimum is 32 GB, and a 12-core minimum is 48 GB. There can be many different valid memory configurations that meet the minimum 4 GB per core requirement. For example:

- 6-core (32 GB minimum) -- 4 x 8 GB (2 x 4 GB DIMMs) Memory (#4526)

   Also, 2 x 16 GB (2 x 8 GB DIMMs) Memory (#4527)
   Also, 1 x 32 GB (2 x 16 GB DIMMs) Memory (#4528)
- 8-core (32 GB minimum) -- 4 x 8 GB (2 x 4 GB DIMMs) Memory (#4526)

   Also, 2 x 16 GB (2 x 8 GB DIMMs) Memory (#4527)
   Also, 1 x 32 GB (2 x 16 GB DIMMs) Memory (#4528)
- 12-core (48 GB minimum) -- 6 x 8 GB (2 x 4 GB DIMMs) Memory (#4526)

   Also, 3 x 16 GB (2 x 8 GB DIMMs) Memory (#4527)
   Also, 2 x 32 GB (2 x 16 GB DIMMs) Memory (#4528)
- 16-core (64 GB minimum) -- 8 x 8 GB (2 x 4 GB DIMMs) Memory (#4526)

   Also, 4 x 16 GB (2 x 8 GB DIMMs) Memory (#4527)
   Also, 2 x 32 GB (2 x 16 GB DIMMs) Memory (#4528)
- 18-core (72 GB minimum) -- 9 x 8 GB (2 x 4 GB DIMMs) Memory (#4526)

   Also, 5 x 16 GB (2 x 8 GB DIMMs) Memory (#4527)
   Also, 3 x 32 GB (2 x 16 GB DIMMs) Memory (#4528)
- 24-core (96 GB minimum) -- 12 x 8 GB (2 x 4 GB DIMMs) Memory (#4526)

   Also, 6 x 16 GB (2 x 8 GB DIMMs) Memory (#4527)
   Also, 3 x 32 GB (2 x 16 GB DIMMs) Memory (#4528)
- 32-core (128 GB minimum) -- 16 x 8 GB (2 x 4 GB DIMMs) Memory (#4526)

Also, 8 x 16 GB (2 x 8 GB DIMMs) Memory (#4527)
Also, 4 x 32 GB (2 x 16 GB DIMMs) Memory (#4528)

Note: The 8 GB memory feature (#4526) is planned to be available on March 16, 2010.

Note: You can also mix different size memory features on the same server and meet the minimum memory requirements for the IBM Edition benefit as long as at least 4 GB per core is attained. For example, the 1 x 16 GB memory feature (#4527) can replace the 2 x 8 GB feature (#4526). However, all memory features on an individual processor card must be identical.

Edition minimum Disk/SSD/Fibre Channel/FCoE definition details:

- Minimum of: Two DASD, or two SSD, or two Fibre Channel adapters, or two FCoE adapters. You only need to meet one of this disk/SSD/FC/FCoE criteria. Partial criteria cannot be combined.
  - Two SAS disk drives -- Any capacity drives located in the system unit, feature 5802 I/O drawer, or feature 5886 disk drawer qualify.
  - Two SAS SSDs -- Drives located in the system unit, feature 5802 I/O drawer, or feature 5886 disk drawer qualify.
  - Two Fibre Channel adapters -- Either PCI-X or PCI-E adapters located in the system unit or 12X-attached I/O drawer.
  - Two Fibre Channel over Ethernet adapters -- Either PCI-X or PCI-E adapters located in the system unit or 12X-attached I/O drawer.

Multiple sample POWER7 IBM Edition configurations are provided in the IBM internal configurator tool, including:

- Four 3.3 GHz 6-core processor card configurations (6-core, 12-core, 18-core, and 24-core)
- Four 3.0 GHz 8-core processor card configurations (8-core, 16-core, 24-core, and 32-core)
- Four 3.3 GHz 8-core processor card configurations (8-core, 16-core, 24-core, and 32-core)
- Four 3.5 GHz 8-core processor card configurations (32-core)

Dynamic logical partitioning

The dynamic logical partitioning (LPAR) function provides enhanced resource management for the Power 750 Express server. Dynamic LPAR allows available system resources to be quickly and easily configured across multiple logical partitions to meet the rapidly changing needs of your business.

Dynamic LPAR also allows you to add new system resources such as new hot-plug PCI adapters into your system's configuration without requiring a reboot. Without the optional PowerVM™ Standard Edition (#7794) or PowerVM Enterprise Edition (#7795) feature, as many as 32 LPARs are supported in a 32-core Power 750. If the PowerVM Standard or Enterprise Edition feature is installed in the system, a maximum of 10 dynamic LPARs for each physical processor can be defined, with a system maximum of 160 dynamic LPARs.

An HMC or IVM is required to manage POWER7 processor-based servers implementing partitioning. Multiple POWER7 processor-based servers can be supported by a single HMC.

If an HMC is used to manage any POWER7 processor-based server, the HMC must be a CR3, or later, model rack-mount HMC or C05, or later, deskside HMC.

When IBM Systems Director is used to manage an HMC or if the HMC manages more than 254 partitions, the HMC should have 3 GB of RAM minimum and be CR3 model, or later, rack-mount or C06, or later, deskside.

PowerVM Editions (optional)

Three optional PowerVM Edition features are now available on the Power 750: PowerVM Express Edition, PowerVM Standard Edition, and PowerVM Enterprise Edition. These are managed using built-in Integrated Virtualization Manager (IVM) software or optionally through use of an HMC.

PowerVM Standard Edition (#7794) and PowerVM Enterprise Edition (#7795) allow customers to create partitions in units of less than 1 CPU (sub-CPU LPARs) and allow the same system I/O to be virtually added to these partitions. The optional features, available for a fee, also include a software component that provides cross-partition workload management.

PowerVM Standard and Enterprise Editions offer:

- Micro-Partitioning™ (up to 10 partitions per processor, 160 per system)
- Virtualized disk and optical devices (VIOS)
- Automated CPU reconfiguration
- Real-time partition configuration and load statistics
- Support for dedicated and shared processor LPAR groups
- Support for manual provisioning of resources

At initial order entry, selecting feature number 7994 or 7995 will result in Micro-Partitioning to be enabled during manufacture and the enabling software media and publications to be shipped to the customer. When ordering feature number 7994 or 7995 as an MES, an activation key will be posted on an IBM Web site, and the customer must retrieve it and install it on the system.

The IBM Web site is

http://www-912.ibm.com/pod/pod

Other features of PowerVM Editions:

- If any processors in a system have the Virtualization feature, all active processors must have it.
- Once the Virtualization feature is installed in a system, it cannot be removed.
- Virtual Ethernet and Virtual Storage are part of PowerVM Editions.

PowerVM Enterprise Edition also includes Live Partition Mobility, which allows for the movement of a logical partition from one POWER6™ or POWER7 server to another with no application downtime, and Active Memory Sharing, which dynamically reallocates memory between running logical partitions on a server. Also available is PowerVM Express (#7793), designed for users looking for an introduction to more advanced virtualization features at a highly affordable price. With PowerVM Express and IVM, users can create up to three partitions on the server, leverage (VIOS), utilize Shared Dedicated Capacity to help optimize use of processor cycles, and even try out the Shared Processor Pool. With its intuitive browser-based interface, IVM is easy to use and helps reduce the time and effort required to manage virtual devices, processors, and partitions. An HMC is not required.

Notes:

- PowerVM 2.1.2.11 with Fix Pack 22.1 and Service Pack 1, or later, and a supported AIX or Linux operating system level are minimum requirements for performing Live Partition Mobility functions on POWER7. Refer to the Software requirements section for more information on minimum AIX and Linux OS levels.
- Active Memory Sharing is planned to be supported with the availability of SLES 11 SP1.

Customers can upgrade from PowerVM Express to either PowerVM Standard or PowerVM Enterprise, or they can upgrade from PowerVM Standard to PowerVM Enterprise.

By upgrading to PowerVM Standard or PowerVM Enterprise, users gain the ability to create up to 160 logical partitions on the Power 750. Users also gain the ability to manage their PowerVM enabled machine with either an HMC or the Integrated Virtualization Manager.

By upgrading to PowerVM Enterprise, users can leverage Live Partition Mobility and Active Memory Sharing.

Active Memory Expansion (optional)

Active Memory Expansion is an innovative POWER7 technology that allows the effective maximum memory capacity to be much larger than the true physical memory maximum. Sophisticated compression/decompression of memory content can allow memory expansion up to 100%. This can allow a partition to do significantly more work or support more users with the same physical amount of memory. Similarly, it can allow a server to run more partitions and do more work for the same physical amount of memory.

Active Memory Expansion is available for partitions running AIX 6.1, or later. Technology Level 4 with SP2 is needed.

Active Memory Expansion uses CPU resource to compress/decompress the memory contents. The trade-off of memory capacity for processor cycles can be an excellent choice, but the degree of expansion varies, depending on how compressible the memory content is, and it also depends on having adequate spare CPU capacity available for this compression/decompression. Tests in IBM laboratories using sample workloads showed excellent results for many workloads in terms of memory expansion per additional CPU utilized. Other test workloads had more modest results.

Clients have a great deal of control over Active Memory Expansion usage. Each individual AIX partition can turn on or turn off Active Memory Expansion. Control parameters set the amount of expansion desired in each partition to help control the amount of CPU used by the Active Memory Expansion function. An IPL is required for the specific partition that is turning memory expansion on or off. Once turned on, there are monitoring capabilities in standard AIX performance tools such as lparstat, vmstat, topas, and svmon.

A planning tool is included with AIX 6.1 TL4, allowing you to sample actual workloads and estimate both how expandable the partition's memory is and how much CPU resource is needed. Any Power Systems™ model can run the planning tool. In addition, a one-time, 60-day trial of Active Memory Expansion is available to provide more exact memory expansion and CPU measurements. The trial can be requested using the Capacity on Demand Web page

http://www.ibm.com/systems/power/hardware/cod/

Active Memory Expansion is enabled by a chargeable hardware feature (#4792), which can be ordered with the initial order of the server or as an MES order. A software key is provided when the enablement feature is ordered, which is applied to the server. An IPL is not required to enable the server. The key is specific to an individual server and is permanent. It cannot be moved to a different server.

The additional CPU resource used to expand memory is part of the CPU resource assigned to the AIX partition running Active Memory Expansion. Normal licensing requirements apply.

Power 750 Capacity BackUp (CBU) capability

(Applies to IBM i only)

The Power 750 systems' CBU designation can help meet your requirements for a second system to use for backup, high availability, and disaster recovery. It enables you to temporarily transfer IBM i processor license entitlements and 5250 Enterprise Enablement entitlements purchased for a primary machine to a secondary CBU-designated system. Temporarily transferring these resources instead of purchasing them for your secondary system may result in significant savings. Processor activations cannot be transferred.

The CBU specify feature 0444 is available only as part of a new server purchase. Certain system prerequisites must be met and system registration and approval are required before the CBU specify feature can be applied on a new server. Standard IBM i terms and conditions do not allow either IBM i processor license entitlements or 5250 OLTP (Enterprise Enablement) entitlements to be transferred permanently or temporarily. These entitlements remain with the machine they were ordered for. When you register the association between your primary and on-order CBU system, you must agree to certain terms and conditions regarding the temporary transfer.

After a CBU system designation is approved and the system is installed, you can temporarily move your optional IBM i processor license entitlement and 5250 Enterprise Enablement entitlements from the primary system to the CBU system when the primary system is down or while the primary system processors are inactive. The CBU system can then better support failover and role swapping for a full range of test, disaster recovery, and high availability scenarios. Temporary entitlement transfer means that the entitlement is a property transferred from the primary system to the CBU system and may remain in use on the CBU system as long as the registered primary and CBU system are in deployment for the high availability or disaster recovery operation.

The primary system for a Power 750 (8233-E8B) server can be:

    9179-MHB
    9117-MMB
    8233-E8B
    9117-MMA
    9406-MMA
    9406-570
    8234-EMA
    8204-E8A
    9409-M50
    9406-550

These systems have IBM i software licenses with an IBM i P20 or P30 software tier. The primary machine must be in the same enterprise as the CBU system.

Before you can temporarily transfer IBM i processor license entitlements from the registered primary system, you must have more than one IBM i processor license on the primary machine and at least one IBM i processor license on the CBU server. An activated processor must be available on the CBU server to use the transferred entitlement. You can then transfer any IBM i processor entitlements above the minimum one, assuming the total IBM i workload on the primary system does not require the IBM i entitlement you would like to transfer during the time of the transfer. During this temporary transfer, the CBU system's internal records of its total number of IBM i processor license entitlements are not updated, and you may see IBM i license noncompliance warning messages from the CBU system. These warning messages in this situation do not mean you are not in compliance. Before you can temporarily transfer 5250 entitlements, you must have more than one 5250 Enterprise Enablement entitlement on the primary server and at least one 5250 Enterprise Enablement entitlement on the CBU system. You can then transfer the

entitlements that are not required on the primary server during the time of transfer and that are above the minimum of one entitlement.

For example, if you have a 6-core Power 750 as your primary system with two IBM i processor license entitlements (one above the minimum) and two 5250 Enterprise Enablement entitlements (one above the minimum), you can temporarily transfer only one IBM i entitlement and one 5250 Enterprise Enablement entitlement. During the temporary transfer, the CBU system's internal records of its total number of IBM i processor entitlements is not updated, and you may see IBM i license noncompliance warning messages from the CBU system.

If your primary or CBU machine is sold or discontinued from use, any temporary entitlement transfers must be returned to the machine on which they were originally acquired. For CBU registration and further information, visit

   http://www.ibm.com/systems/power/hardware/cbu

I/O drawer availability

Four 12X attached I/O drawers are supported on the Power 750, providing extensive capability to expand the overall server expandability and connectivity.

- Feature 5802 provides PCIe slots and SSF SAS disk slots.
- Feature 5877 provides PCIe slots.
- Feature 5796 provides PCI-X slots.
- The 7314-G30 provides PCI-X slots (supported but not orderable).

Three disk-only I/O drawers are also supported, providing large storage capacity and multiple partition support:

- Feature 5886 EXP12S holds 3.5-inch SAS disk or SSD.
- Feature 5786 EXP24 holds 3.5-inch SCSI disk (used for migrating existing SCSI drives).
- The 7031-D24 holds 3.5-inch SCSI disk (supported but not orderable).

TotalStorage® EXP24 Disk Drawer (#5786)(supported only -- not orderable)

The TotalStorage EXP24 (#5786) is a 4 EIA unit drawer and mounts in a 19-inch rack. The front of the IBMTotalStorage EXP24 Ultra320 SCSI Expandable Storage Disk Enclosure has bays for up to 12 disk drives organized in two SCSI groups of up to six drives. The rear also has bays for up to 12 disk drives organized in two additional SCSI groups of up to six drives plus slots for the four SCSI interface cards. Each SCSI drive group can be connected by either a Single Bus Ultra320 SCSI Repeater Card (#5741) or a Dual Bus Ultra320 SCSI Repeater Card (#5742). This allows the EXP24 to be configured as four sets of six bays, two sets of 12 bays, or two sets of six bays plus one set of 12 bays.

The EXP24 feature 5786 has three cooling fans and two power supplies to provide redundant power and cooling. The SCSI disk drives contained in the EXP24 are controlled by PCI-X SCSI adapters connected to the EXP24 SCSI repeater cards via SCSI cables. The PCI-X adapters are located in the Power 750 system unit or in an attached I/O drawer with PCI-X slots.

The EXP24S SCSI Disk Drawer is an earlier technology drawer compared to the later SAS EXP12S drawer. It is used to house the older SCSI disk drives that are supported but no longer orderable.

The following feature number I/O drawers are available for order on the Power 750.

PCI-X DDR 12X Expansion Drawer (#5796)

The PCI-X DDR 12X Expansion Drawer (#5796) is a 4 EIA unit tall drawer and mounts in a 19-inch rack. Feature 5796 is 8.8 inches wide and takes up half the

width of the 4 EIA rack space. Feature 5796 requires the use of a feature 7314 drawer-mounting enclosure. The 4 EIA tall enclosure can hold up to two feature 5796 drawers mounted side by side in the enclosure. The PCI-DDR 12X Expansion Drawer has six 64-bit, 3.3 V, PCI-X DDR slots running at 266 MHz that use blind-swap cassettes and support hot plugging of adapter cards. The drawer includes redundant hot-plug power and cooling. The client must select one of the two available interface adapters for use in the feature 5796 drawer, either the Dual-Port 12X Channel Attach Adapter -- Long Run (#6457) or the Dual-Port 12X Channel Attach Adapter Short Run (#6446). The adapter selection is based on how close the host system or the next I/O drawer in the loop is physically located.

A maximum of four feature 5796 drawers can be placed on the same 12X loop. Mixing features 5802 or 5877 and 5796 on the same loop is not supported. Mixing feature 5796 and the 7314-G30 on the same loop is supported with a maximum of four drawers total per loop. A minimum configuration of two 12X cables (either SDR or DDR) and two ac power cables and two SPCN cables is required to ensure proper redundancy. The drawer attaches to the host CEC enclosure with a 12X adapter in a GX slot via 12X SDR or DDR cables.

The Power 750 uses GX Dual-port 12X Channel Attach (#5609) or GX Dual- port 12X Channel Attach (#5616) to attach a feature 5796 12X I/O Drawer using SDR speed, no matter which GX adapter is used.

PCI-X DDR 12X Expansion Drawer (7314-G30) (supported, not orderable)

The 7314-G30 is equivalent to the feature 5796 described above with one key difference -- IBM i does not support this I/O drawer. Otherwise, it provides the same six PCI-X DDR slots per unit and has the same configuration rules/considerations as feature 5796.

12X I/O Drawer PCIe, SFF disk (#5802)

This feature provides a 4U high 19-inch I/O drawer containing 10 PCIe 8x I/O adapter slots and 18 SAS hot-swap SFF SAS disk bays, which can be used for either disk drives or SSDs. Using 146 GB disk drives, the feature 5802 provides up to 2.6 TB of storage.

The 18 disk bays can be organized either into one group of 18 bays (AIX/Linux), two groups of nine slots (AIX/IBM i/Linux), or four groups of four or five bays AIX/Linux). Selecting either one, two, or four groups of drive bays is done with a mode switch on the drawer.

A maximum of two feature 5802 drawers can be placed on the same 12X loop. Mixing feature 5802 and feature 5796 and the 7314-G30 on the same loop is not supported. Mixing feature 5802 and feature 5877 on the same loop is supported with a maximum of two drawers total per loop. The PCIe adapter slots use Gen 3 blind-swap cassettes and support hot plugging of adapter cards. A minimum configuration of two 12X DDR cables and two ac power cables and two SPCN cables is required to ensure proper redundancy. 12X SDR cables are not supported. The drawer attaches to the host CEC enclosure with a 12X adapter in a GX slot via 12X DDR cables (#1861/#1862/#1864/#1865).

The Power 750 uses GX Dual-port 12X Channel Attach (#5609) or GX Dual-port 12X Channel Attach (#5616) to attach a feature 5802 12X I/O Drawer. The feature 5609 provides the higher capacity bandwidth (DDR).

12X I/O Drawer PCIe, No disk (#5877)

This feature provides a 4U high 19-inch I/O drawer containing 10 PCIe 8x I/O adapter slots.

A maximum of two feature 5877 drawers can be placed on the same 12X loop. Mixing features 5877 and 5796/7314-G30 on the same loop is not supported. Mixing features 5802 and 5877 on the same loop is supported with a maximum of two drawers total per loop. The PCIe adapter slots use Gen 3 blind-swap cassettes and support hot plugging of adapter cards. A minimum configuration of two 12X DDR

cables and two ac power cables and two SPCN cables is required to ensure proper redundancy. 12X SDR cables are not supported. The drawer attaches to the host CEC enclosure with a 12X adapter in a GX slot via 12X DDR cables (#1861/#1862/#1864/#1865).

The Power 750 uses GX Dual-port 12X Channel Attach (#5609) or GX Dual-port 12X Channel Attach (#5616) to attach a feature 5877 12X I/O Drawer. Feature 5609 provides the higher capacity bandwidth (DDR).

Note that conversions between a diskless feature 5877 and a feature 5802 with disk bays are not available.

EXP 12S SAS Drawer (#5886)

The EXP 12S SAS drawer (#5886) is a 2 EIA drawer and mounts in a 19 inch-rack. The drawer can hold either SAS disk drives or SSD. The EXP 12S SAS drawer has twelve 3.5-inch SAS disk bays with redundant data paths to each bay. The drawer supports redundant hot-plug power and cooling and redundant hot-swap SAS expanders (Enclosure Services Manager-ESM). Each ESM has an independent SCSI Enclosure Services (SES) diagnostic processor.

The SAS disk drives or SSD contained in the EXP12S are controlled by one or two PCIe or PCI-X SAS adapters connected to the EXP12S via SAS cables. The SAS cable will vary, depending upon the adapter being used, the operating system being used, and the protection desired.

- The large cache PCI-X feature 5904/5908 uses a SAS Y cable when a single port is running the EXP12S. A SAS X cable is used when a pair of adapters are used for controller redundancy.
- The medium cache PCI-X feature 5902 and PCIe feature 5903 adapters are always paired and use a SAS X cable to attach the feature 5886 I/O drawer.
- The zero cache PCI-X feature 5912 and PCIe feature 5901 use a SAS Y cable when a single port is running the EXP12S. A SAS X cable is used for AIX/Linux environments when a pair of adapters are used for controller redundancy.

In all of the above configurations, all 12 SAS bays are controlled by a single controller or a single pair of controllers.

A second EXP12S drawer can be attached to another drawer using two SAS EE cables, providing 24 SAS bays instead of 12 bays for the same SAS controller port. This is called *cascading.* In this configuration, all 24 SAS bays are controlled by a single controller or a single pair of controllers.

The feature 5886 can also be directly attached to the SAS port on the rear of the Power 750, providing a very low cost disk storage solution. When used this way, the imbedded SAS controllers augmented by the 175 MB write cache RAID enabler feature 5679 in the system unit drive the disk drives in EXP12S. A second unit cannot be cascaded to a feature 5886 attached in this way.

19-inch racks

The Model 8233-E8B and its I/O drawers are designed to mount in the 25U 7014-S25 (#0555), 36U 7014-T00 (#0551), or the 42U 7014-T42 (#0553) rack. These racks are built to the 19-inch EIA standard. When you order a new 8233 system, you can also order the appropriate 7014 rack model with the system hardware on the same initial order. IBM is making the racks available as features of the 8233-E8B when you order additional I/O drawer hardware for an existing system (MES order). The rack feature number should be used if you want IBM to integrate the newly ordered I/O drawer in a 19-inch rack before shipping the MES order.

1.3-Meter Rack (#0555)

The 1.3-Meter Rack (#0555) is a 25 EIA unit rack. The rack that is delivered as feature 0555 is the same rack delivered when you order the 7014-S25 rack. Order

the feature 0555 only when required to support rack integration of MES orders prior to shipment from IBM.

1.8-Meter Rack (#0551)

The 1.8-Meter Rack (#0551) is a 36 EIA unit rack. The rack that is delivered as feature 0551 is the same rack delivered when you order the 7014-T00 rack; the included features may be different. Some features that are delivered as part of the 7014-T00 must be ordered separately with the feature 0551. Order the feature 0551 only when required to support rack integration of MES orders prior to shipment from IBM.

2.0-Meter Rack (#0553)

The 2.0-Meter Rack (#0553) is a 42 EIA unit tall rack. The rack that is delivered as feature 0553 is the same rack delivered when you order the 7014-T42 rack; the included features may be different. Some features that are delivered as part of the 7014-T42 must be ordered separately with the feature 0553. Order the feature 0553 only when required to support rack integration of MES orders prior to shipment from IBM.

IBM Power Systems Deployment-ready Services

IBM offers a portfolio of integration, configuration, and customization services for IBM Power Systems. These Deployment-ready Services are designed to accelerate customer solution deployment and reduce related resources and cost. Offerings include:

- Integration
  - Component integration
  - Rack integration
  - Operating system preinstallation
  - Unit personalization
  - Third-party hardware/software installation
  - Customer Specified Placement
- Asset tagging: Standard tagging Radio Frequency Item Device (RFID)
- Special packaging: Box consolidation
- System customization: Remote access Partitioning Customized operating system/ firmware

For more information on Deployment-ready Services, refer to

http://www.ibm.com/power/deploymentreadyservices/

Reliability, Availability, and Serviceability (RAS) features

Reliability, fault tolerance, and data correction

The reliability of systems starts with components, devices, and subsystems that are designed to be fault-tolerant. POWER7 uses lower voltage technology, improving reliability with stacked latches to reduce soft error (SER) susceptibility. During the design and development process, subsystems go through rigorous verification and integration testing processes. During system manufacturing, systems go through a thorough testing process to help ensure the highest level of product quality.

The system cache and memory offer ECC (error checking and correcting) fault-tolerant features. ECC is designed to correct environmentally induced, single-bit, intermittent memory failures and single-bit hard failures. With ECC, the likelihood of memory failures will be substantially reduced. ECC also provides double-bit memory error detection that helps protect data in the event of a double-bit memory failure.

The AIX and IBM i operating systems provide disk drive mirroring and disk drive controller duplexing. The Linux operating system supports disk drive mirroring (RAID 1) through software, while other RAID protection schemes are provided via hardware RAID adapters.

The Journaled File System, also known as JFS or JFS2, helps maintain file system consistency and reduces the likelihood of data loss when the system is abnormally halted due to a power failure. JFS, the recommended file system for 32-bit kernels, now supports extents on the Linux operating system. This feature is designed to substantially reduce or eliminate fragmentation. Its successor, JFS2, is the recommended file system for 64-bit kernels.

With 64-bit addressing, a maximum file system size of 32 TB and maximum file size of 16 TB, JFS2 is highly recommended for systems running the AIX operating system.

Memory error correction extensions

The memory has single-bit-error correction and double-bit-error detection ECC circuitry. The ECC code is also designed such that the failure of any one specific memory module within an ECC word by itself can be corrected absent any other fault.

Memory protection features include scrubbing to detect errors, a means to call for the deallocation of memory pages for a pattern of correctable errors detected, and signaling deallocation of a logical memory block when an error occurs that cannot be corrected by the ECC code.

Fault monitoring functions

- When a POWER7 processor-based system is powered on, BIST and POST (power-on self-test) check processor, cache, memory, and associated hardware required for proper booting of the operating system. If a noncritical error is detected or if the errors occur in resources that can be removed from the system configuration, the restarting process is designed to proceed to completion. The errors are logged in the system nonvolatile RAM (NVRAM).
- Disk drive fault tracking is designed to alert the system administrator of an impending disk drive failure before it impacts customer operation.

Mutual surveillance

The Service Processor monitors the operation of the firmware during the boot process, and also monitors the Hypervisor™ for termination. The Hypervisor monitors the Service Processor and will perform a reset/reload if it detects the loss of the Service Processor. If the reset/reload does not correct the problem with the Service Processor, the Hypervisor will notify the operating system and the operating system can take appropriate action, including calling for service.

Environmental monitoring functions

POWER7-based servers include a range of environmental monitoring functions:

- Temperature monitoring warns the system administrator of potential environmental-related problems by monitoring the air inlet temperature. When the inlet temperature rises above a warning threshold, the system initiates an orderly shutdown. When the temperature exceeds the critical level or if the temperature remains above the warning level for too long, the system will shut down immediately.
- Fan speed is controlled by monitoring actual temperatures on critical components and adjusting accordingly. If internal component temperatures reach critical levels, the system will shut down immediately, regardless of fan speed. When a redundant fan fails, the system calls out the failing fan and continues running. When a nonredundant fan fails, the system shuts down immediately.

Availability enhancement functions

The POWER7 family of systems continues to offer and introduce significant enhancements designed to increase system availability.

POWER7 processor functions

As in POWER6, the POWER7 processor has the ability to do processor instruction retry and alternate processor recovery for a number of core-related faults. This significantly reduces exposure to both hard (logic) and soft (transient) errors in the processor core. Soft failures in the processor core are transient (intermittent) errors, often due to cosmic rays or other sources of radiation, and generally are not repeatable. When an error is encountered in the core, the POWER7 processor will first automatically retry the instruction. If the source of the error was truly transient, the instruction will succeed and the system will continue as before. On IBM systems prior to POWER6, this error would have caused a checkstop.

Hard failures are more difficult, being true logical errors that will be replicated each time the instruction is repeated. Retrying the instruction will not help in this situation because the instruction will continue to fail. As in POWER6, POWER7 processors have the ability to extract the failing instruction from the faulty core and retry it elsewhere in the system for a number of faults, after which the failing core is dynamically deconfigured and called out for replacement. The entire process is transparent to the partition owning the failing instruction. These systems are designed to avoid a full system outage.

POWER7 single processor checkstopping

As in POWER6, POWER7 provides single processor checkstopping. This significantly reduces the probability of any one processor affecting total system availability.

Partition availability priority

Also available is the ability to assign availability priorities to partitions. If an alternate processor recovery event requires spare processor resources in order to protect a workload, when no other means of obtaining the spare resources is available, the system will determine which partition has the lowest priority and attempt to claim the needed resource. On a properly configured POWER7 processor-based server, this allows that capacity to be first obtained from, for example, a test partition instead of a financial accounting system.

POWER7 cache availability

The POWER® processor-based line of servers continues to be at the forefront of cache availability enhancements. The L3 cache is now integrated on the POWER7 processor. The POWER7 processor provides both L2 and L3 cache line delete functions.

Special uncorrectable error handling

Uncorrectable errors are difficult for any system to tolerate, although there are some situations where they can be shown to be irrelevant. For example, if an uncorrectable error occurs in cached data that will never again be read or where a fresh write of the data is imminent, it would be unwise to "protect" the user by forcing an immediate reboot.

Special Uncorrectable Error (SUE) handling was an IBM innovation introduced for POWER5™ processors, where an uncorrectable error in memory or cache does not immediately cause the system to terminate. Rather, the system tags the data and determines whether it will ever be used again. If the error is irrelevant, it will not force a checkstop.

PCI extended error handling

PCI extended error handling (EEH) enabled adapters respond to a special data packet generated from the affected PCI slot hardware by calling system firmware,

which will examine the affected bus, allow the device driver to reset it, and continue without a system reboot. For Linux, EEH support extends to the majority of frequently used devices, although some third-party PCI devices may not provide native EEH support.

Predictive failure and dynamic component deallocation

Servers with POWER processors have long had the capability to perform predictive failure analysis on certain critical components such as processors and memory. When these components exhibit symptoms that would indicate a failure is imminent, the system can dynamically deallocate and call home about the failing part before the error is propagated system-wide. In many cases, the system will first attempt to reallocate resources in such a way that will avoid unplanned outages. In the event that insufficient resources exist to maintain full system availability, these servers will attempt to maintain partition availability by user-defined priority.

Uncorrectable error recovery

When the auto-restart option is enabled, the system can automatically restart following an unrecoverable software error, hardware failure, or environmentally induced (ac power) failure.

Serviceability

The purpose of serviceability is to repair the system while attempting to minimize or eliminate service cost (within budget objectives), while maintaining high customer satisfaction. Serviceability includes system installation, MES (system upgrades/downgrades), and system maintenance/repair. Depending upon the system and warranty contract, service may be performed by the customer, an IBM representative, or an authorized warranty service provider.

The serviceability features delivered in this system provide a highly efficient service environment by incorporating the following attributes

- Design for Customer Set Up (CSU), Customer Installed Features (CIF), and Customer Replaceable Units (CRU)
- Error detection and Fault Isolation (ED/FI)
- First Failure Data Capture (FFDC)
- Converged service approach across multiple IBM server platforms

Service environments

The HMC is a dedicated server that provides functions for configuring and managing servers for either partitioned or full-system partition using a GUI or command-line interface (CLI). An HMC attached to the system allows support personnel (with client authorization) to remotely log in to review error logs and perform remote maintenance if required.

The POWER7 processor-based platforms support two main service environments:

- Attachment to one or more HMCs is a supported option by the system. This is the default configuration for servers supporting logical partitions with dedicated or virtual I/O. In this case, all servers have at least one logical partition.
- No HMC. There are two service strategies for non-HMC systems

  – Full system partition: A single partition owns all the server resources and only one operating system may be installed.
  – Partitioned system: In this configuration, the system can have more than one partition and can be running more than one operating system. In this environment, partitions are managed by the Integrated Virtualization Manager (IVM), which provides some of the functions provided by the HMC.

Service Interface

The Service Interface allows support personnel to communicate with the service support applications in a server using a console, interface, or terminal. Delivering a clear, concise view of available service applications, the Service Interface allows the support team to manage system resources and service information in an efficient and effective way. Applications available via the Service Interface are carefully configured and placed to give service providers access to important service functions.

Different service interfaces are used, depending on the state of the system and its operating environment. The primary service interfaces are:

- LEDs
- Operator Panel
- Service Processor menu
- Operating system service menu
- Service Focal Point on the HMC
- Service Focal Point Lite on IVM

In the light path LED implementation, when a fault condition is detected on the POWER7 system, an amber FRU fault LED will be illuminated, which will be rolled up to the system fault LED. The light path system pinpoints the exact part by turning on the amber FRU fault LED associated with the part to be replaced.

The system can clearly identify components for replacement by using specific component-level LEDs, and can also guide the servicer directly to the component by signaling (turning on solid) the system fault LED, enclosure fault LED, and the component FRU fault LED. The servicer can also use the identify function to blink the FRU-level LED. When this function is activated, a roll-up to the blue enclosure locate and system locate LEDs will occur. These LEDs will turn on solid and can be used to follow the light path from the system to the enclosure and down to the specific FRU.

First Failure Data Capture and Error Data Analysis

First Failure Data Capture (FFDC) is a technique that helps ensure that when a fault is detected in a system, the root cause of the fault will be captured without the need to re-create the problem or run any sort of extending tracing or diagnostics program. For the vast majority of faults, a good FFDC design means that the root cause can also be detected automatically without servicer intervention.

First Failure Data Capture FFDC information, error data analysis, and fault isolation are necessary to implement the advanced serviceability techniques that enable efficient service of the systems and to help determine the failing items.

In the rare absence of FFDC and Error Data Analysis, diagnostics are required to re-create the failure and determine the failing items.

Diagnostics

General diagnostic objectives are to detect and identify problems such that they can be resolved quickly. Elements of IBM's diagnostics strategy include:

- Provide a common error code format equivalent to a system reference code, system reference number, checkpoint, or firmware error code.
- Provide fault detection and problem isolation procedures. Support remote connection ability to be used by the IBM Remote Support Center or IBM Designated Service.
- Provide interactive intelligence within the diagnostics with detailed online failure information while connected to IBM's back-end system.

Automatic diagnostics

Because of the FFDC technology designed into IBM Servers, it is not necessary to perform re-create diagnostics for failures or require user intervention. Solid and intermittent errors are designed to be correctly detected and isolated at the time the failure occurs. Runtime and boot-time diagnostics fall into this category.

Stand-alone diagnostics

As the name implies, stand-alone or user-initiated diagnostics require user intervention. The user must perform manual steps, including:

- Compact disk-based diagnostics
- Keying in commands
- Interactively selecting steps from a list of choices

Concurrent maintenance

The system will continue to support concurrent maintenance of power, cooling, PCI adapters, DASD, DVD, and firmware updates (when possible). The determination of whether a firmware release can be updated concurrently is identified in the readme information file released with the firmware.

Service labels

Service providers use these labels to assist them in performing maintenance actions. Service labels are found in various formats and positions, and are intended to transmit readily available information to the servicer during the repair process. Following are some of these service labels and their purpose:

Location diagrams

Location diagrams are strategically located on the system hardware, relating information regarding the placement of hardware components. Location diagrams may include location codes, drawings of physical locations, concurrent maintenance status, or other data pertinent to a repair. Location diagrams are especially useful when multiple components are installed such as DIMMs, CPUs, processor books, fans, adapter cards, LEDs, and power supplies.

Remove/replace procedures

Service labels that contain remove/replace procedures are often found on a cover of the system or in other spots accessible to the servicer. These labels provide systematic procedures, including diagrams, detailing how to remove/replace certain serviceable hardware components.

Arrows

Numbered arrows are used to indicate the order of operation and serviceability direction of components. Some serviceable parts such as latches, levers, and touch points need to be pulled or pushed in a certain direction and certain order for the mechanical mechanisms to engage or disengage. Arrows generally improve the ease of serviceability.

Packaging for service

The following service enhancements are included in the physical packaging of the systems to facilitate service:

- Color coding (touch points): Terracotta colored touch points indicate that a component (FRU/CRU) can be concurrently maintained. Blue colored touch points delineate components that are not concurrently maintained -- those that require the system to be turned off for removal or repair.

- Tool-less design: Selected IBM systems support tool-less or simple tool designs. These designs require no tools or simple tools such as flathead screwdrivers to service the hardware components.
- Positive retention: Positive retention mechanisms help to assure proper connections between hardware components such as cables to connectors, and between two cards that attach to each other. Without positive retention, hardware components run the risk of becoming loose during shipping or installation, preventing a good electrical connection. Positive retention mechanisms like latches, levers, thumb-screws, pop Nylatches (U-clips), and cables are included to help prevent loose connections and aid in installing (seating) parts correctly. These positive retention items do not require tools.

Error Handling and Reporting

In the unlikely event of system hardware or environmentally induced failure, the system runtime error capture capability systematically analyzes the hardware error signature to determine the cause of failure. The analysis result will be stored in system NVRAM. When the system can be successfully restarted either manually or automatically, the error will be reported to the operating system. Error Log Analysis (ELA) can be used to display the failure cause and the physical location of the failing hardware.

With the integrated Service Processor, the system has the ability to automatically send out an alert via phone line to a pager or call for service in the event of a critical system failure. A hardware fault will also turn on the amber system fault LED located on the system unit to alert the user of an internal hardware problem. The indicator may also be set to blink by the operator as a tool to allow system identification. For identification, the blue locate LED on the enclosure and at the system level will turn on solid. The amber system fault LED will be on solid when an error condition occurs.

On POWER7 processor-based servers, hardware and software failures are recorded in the system log. When an HMC is attached, an ELA routine analyzes the error, forwards the event to the Service Focal Point (SFP) application running on the HMC, and notifies the system administrator that it has isolated a likely cause of the system problem. The Service Processor event log also records unrecoverable checkstop conditions, forwards them to the SFP application, and notifies the system administrator. Once the information is logged in the SFP application, if the system is properly configured, a call home service request will be initiated and the pertinent failure data with service parts information and part locations will be sent to an IBM Service organization. Customer contact information and specific system-related data such as the machine type, model, and serial number, along with error log data related to the failure are sent to IBM Service.

Service Processor

The Service Processor provides the capability to diagnose, check the status of, and sense the operational conditions of a system. It runs on its own power boundary and does not require resources from a system processor to be operational to perform its tasks.

The Service Processor supports surveillance of the connection to the HMC and to the system firmware (Hypervisor). It also provides several remote power control options, environmental monitoring, reset, restart, remote maintenance, and diagnostic functions, including console mirroring. The Service Processors menus (ASMI) can be accessed concurrently with system operation allowing nondisruptive abilities to change system default parameters.

Call Home

Call Home refers to an automatic or manual call from a customer location to IBM support structure with error log data, server status, or other service-related information. Call Home invokes the service organization in order for the appropriate service action to begin. Call Home can be done through HMC or non-HMC managed systems. While configuring Call Home is optional, clients are encouraged to implement this feature in order to obtain service enhancements such as reduced

problem determination and faster and potentially more accurate transmittal of error information. In general, using the Call Home feature can result in increased system availability. The Electronic Service Agent™ application can be configured for automated call home. Refer to the next section for specific details on this application.

IBM Electronics Services

Electronic Service Agent and the IBM Electronic Services Web portal comprise the IBM Electronic Services solution -- dedicated to providing fast, exceptional support to IBM customers. IBMElectronic Service Agent is a no-charge tool that proactively monitors and reports hardware events such as system errors, performance issues, and inventory. Electronic Service Agent can help focus on the customer's company strategic business initiatives, save time, and spend less effort managing day-to-day IT maintenance issues.

Integrated in the operating system in addition to the HMC, Electronic Service Agent is designed to automatically and electronically report system failures and customer-perceived issues to IBM, which can result in faster problem resolution and increased availability. System configuration and inventory information collected by Electronic Service Agent also can be viewed on the secure Electronic Services Web portal and used to improve problem determination and resolution between the customer and the IBM support team. As part of an increased focus to provide even better service to IBM customers, Electronic Service Agent tool configuration and activation comes standard with the system. In support of this effort, a new HMC External Connectivity security whitepaper has been published, which describes data exchanges between the HMC and the IBM Service Delivery Center (SDC) and the methods and protocols for this exchange. To read the whitepaper and prepare for Electronic Service Agent installation, go to the Reference Guide section at

http://www.ibm.com/support/electronic

Select your country.

Click on "IBM Electronic Service Agent Connectivity Guide."

Benefits

Increased uptime: Electronic Service Agent is designed to enhance the warranty and maintenance service by providing faster hardware error reporting and uploading system information to IBM Support. This can optimize the time monitoring the symptoms, diagnosing the error, and manually calling IBM Support to open a problem record. And 24 x 7 monitoring and reporting means no more dependency on human intervention or off-hours customer personnel when errors are encountered in the middle of the night.

Security: Electronic Service Agent is secure in monitoring, reporting, and storing the data at IBM. Electronic Service Agent securely transmits via the Internet (HTTPS or VPN) and can be configured to communicate securely through gateways to provide customers a single point of exit from their site. Communication between the customer and IBM only flows one way; activating Service Agent does not enable IBM to call into a customer's system. System inventory information is stored in a secure database, which is protected behind IBM firewalls. The customer's business applications or business data is never transmitted to IBM.

More accurate reporting: Because system information and error logs are automatically uploaded to the IBM Support Center in conjunction with the service request, customers are not required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM, problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

Customized support: Using the IBM ID entered during activation, customers can view system and support information in the "My Systems" and "Premium Search" sections of the Electronic Services Web site.

The Electronic Services Web portal is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. This Web portal enables you to gain easier access to IBM resources for assistance in resolving technical problems. The newly improved My Systems and Premium Search functions make it even easier for Electronic Service Agent-enabled customers to track system inventory and find pertinent fixes.

My Systems provides valuable reports of installed hardware and software using information collected from the systems by IBMElectronic Service Agent. Reports are available for any system associated with the customer's IBM ID. Premium Search combines the function of search and the value of Electronic Service Agent information, providing advanced search of the technical support knowledgebase. Using Premium Search and the Service Agent information that has been collected from the system, customers are able to see search results that apply specifically to their systems.

For more information on how to utilize the power of IBM Electronic Services, visit the following Web site or contact an IBM Systems Services Representative

http://www.ibm.com/support/electronic

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Statement of general direction

IBM plans for PowerVM to support up to 320 logical partitions on the Power 750 server and up to 640 logical partitions on the Power 770 and 780 servers. For future POWER7 systems, IBM plans for PowerVM to support up to 1,000 logical partitions per server.

IBM is working with Red Hat on POWER7 support. Red Hat plans to support the Power 750, 755, 770, and 780 models in an upcoming release targeted for availability during first half 2010. For additional questions on the availability of this release, contact Red Hat.

IBM plans for PowerVM Lx86 to support POWER7 systems in second quarter 2010.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Any reliance on these Statements of Direction is at the relying party's sole risk and will not create liability or obligation for IBM.

The information on the new product is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information on the new product is for informational purposes only and may not be incorporated into any contract. The information on the new product is not a commitment, promise, or legal obligation to deliver any material, code or functionality. The development, release, and timing of any features or functionality described for our products remains at our sole discretion.

Product number

The following are newly announced features on the specific models of the IBM Power Systems 8233 machine type:

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Description                                      MT    Model Feature

IBM Power 750                                     8233  E8B
EMEA Bulk MES Indicator                          8233  E8B   0004
Specify Code for External High Speed Modem       8233  E8B   0032
Specify Code for Alternate External High Speed
Modem                                            8233  E8B   0034
Mirrored System Disk Level, Specify Code         8233  E8B   0040
Device Parity Protection-All, Specify Code       8233  E8B   0041
Mirrored System Bus Level, Specify Code          8233  E8B   0043
Device Parity RAID-6 All, Specify Code           8233  E8B   0047
Special Manufacturing Operations Indicator       8233  E8B   0098
RISC-to-RISC Data Migration                      8233  E8B   0205
AIX Partition Specify                            8233  E8B   0265
Linux Partition Specify                          8233  E8B   0266
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Modem Cable - Netherlands                          8233   E8B    1022
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USB External Docking Station for Removable Disk
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4.3m 200V/10A Power Cord Denmark                   8233   E8B    1440
4.3m 200V/10A Power Cord S. Africa                 8233   E8B    1441
4.3m 200V/10A Power Cord Swiss                     8233   E8B    1442
4.3m 200V/10A Power Cord UK                        8233   E8B    1443
4.3m 200V/10A Power Cord Israel                    8233   E8B    1445


4.3m 200V/32A Power Cord EU 1-PH                   8233   E8B    1449
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8.0 Meter 12X Cable                                8233   E8B    1834
3.0 Meter 12X Cable                                8233   E8B    1840
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1.5 Meter 12X DDR Cable                            8233   E8B    1862
8.0 Meter 12X DDR Cable                            8233   E8B    1864
3.0 Meter 12X DDR Cable                            8233   E8B    1865
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73.4 GB 15K RPM SAS SFF Disk Drive                 8233   E8B    1883
69.7 GB 15K RPM SAS SFF Disk Drive                 8233   E8B    1884
300GB 10K RPM SFF SAS Disk Drive                   8233   E8B    1885
146GB 15K RPM SFF SAS Disk Drive                   8233   E8B    1886
139GB 15K RPM SFF SAS Disk Drive                   8233   E8B    1888
69GB SFF SAS Solid State Drive                     8233   E8B    1890
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Adapter                                            8233   E8B    1905
69GB SFF SAS Solid State Drive                     8233   E8B    1909
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PCI-X DDR Dual Channel Ultra320 SCSI Adapter       8233   E8B    1912
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73.4 GB 15,000 RPM Ultra320 SCSI Disk Drive
Assembly                                           8233   E8B    1971
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Description	Type	Model	Feature
146.8 GB 15,000 RPM Ultra320 SCSI Disk Drive Assembly	8233	E8B	1972
2 Gigabit Fibre Channel PCI-X Adapter	8233	E8B	1977
IBM Gigabit Ethernet-SX PCI-X Adapter	8233	E8B	1978
IBM 10/100/1000 Base-TX Ethernet PCI-X Adapter	8233	E8B	1979
POWER GXT135P Graphics Accelerator with Digital Support	8233	E8B	1980
IBM 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter	8233	E8B	1983
1 Gigabit iSCSI TOE PCI-X on Copper Media Adapter	8233	E8B	1986
1 Gigabit iSCSI TOE PCI-X on Optical Media Adapter	8233	E8B	1987
Converter Cable, VHDCI to P, Mini-68 pin to 68 pin, 0.3M	8233	E8B	2118
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Ultra 320 SCSI Cable 3 Meter	8233	E8B	2125
Ultra 320 SCSI Cable 5 Meter	8233	E8B	2126
Ultra 320 SCSI Cable 10 Meter	8233	E8B	2127
Ultra 320 SCSI Cable 20 Meter	8233	E8B	2128
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Primary OS - AIX	8233	E8B	2146
Primary OS - Linux	8233	E8B	2147
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Zero-priced Processor Activation for #8332	8233	E8B	2325
Zero-priced Processor Activation for #8336	8233	E8B	2326
Zero-priced Processor Activation for #8335	8233	E8B	2327
2M LC-SC 50 Micron Fiber Converter Cable	8233	E8B	2456
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ARTIC960Hx 4-Port EIA-232 Cable	8233	E8B	2861
ARTIC960Hx 4-Port X.21 Cable	8233	E8B	2863
ARTIC960Hx 4-Port V.35 (DTE) Cable	8233	E8B	2864
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Asynchronous Cable EIA-232/V.24 3M	8233	E8B	2936
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Cable, V.35	8233	E8B	2952
Cable, V.36 / EIA-499	8233	E8B	2953
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Serial-to-Serial Port Cable for Drawer/Drawer-3.7M	8233	E8B	3124
Serial-to-Serial Port Cable for Rack/Rack- 8M	8233	E8B	3125
73.4 GB 15,000 RPM Ultra320 SCSI Disk Drive Assembly	8233	E8B	3278
146.8 GB 15,000 RPM Ultra320 SCSI Disk Drive Assembly	8233	E8B	3279
300 GB 15K RPM SCSI Disk Drive	8233	E8B	3585
69GB 3.5" SAS Solid State Drive	8233	E8B	3586
69GB 3.5" SAS Solid State Drive	8233	E8B	3587
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IBM T541H /L150p 15" TFT Color Monitor	8233	E8B	3637
IBM ThinkVision® L170p Flat Panel Monitor	8233	E8B	3639
ThinkVision L171p Flat Panel Monitor	8233	E8B	3640
IBM T115 Flat Panel Monitor	8233	E8B	3641
ThinkVision L191p Flat Panel Monitor	8233	E8B	3642
IBM T120 Flat Panel Monitor	8233	E8B	3643
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73GB 15K RPM SAS Disk Drive	8233	E8B	3646
146GB 15K RPM SAS Disk Drive	8233	E8B	3647
300GB 15K RPM SAS Disk Drive	8233	E8B	3648
450GB 15K RPM SAS Disk Drive	8233	E8B	3649
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SAS Cable (EE) Drawer to Drawer 3M	8233	E8B	3653
SAS Cable (EE) Drawer to Drawer 6M	8233	E8B	3654

SAS SFF Cable	8233	E8B	3656
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SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 6M:	8233	E8B	3662
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 15M:	8233	E8B	3663
SAS Cable, DASD Backplane to Rear Bulkhead	8233	E8B	3668
SAS Cable, DASD Backplane (Split) to Rear Bulkhead)	8233	E8B	3669
69.7GB 15k rpm SAS Disk Drive	8233	E8B	3676
139.5GB 15k rpm SAS Disk Drive	8233	E8B	3677
283.7GB 15k rpm SAS Disk Drive	8233	E8B	3678
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SAS Cable (AE) Adapter to Enclosure, single controller/single path 6M	8233	E8B	3685
SAS Cable (YI) System to SAS Enclosure, Single Controller/Dual Path 1.5M	8233	E8B	3686
SAS Cable (YI) System to SAS Enclosure, Single Controller/Dual Path 3M	8233	E8B	3687
SAS Cable (AT) 0.6 Meter	8233	E8B	3688
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 1.5 M	8233	E8B	3691
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 3 M	8233	E8B	3692
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 6 M	8233	E8B	3693
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 15 M	8233	E8B	3694
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Asynch Printer/Terminal Cable, 9-pin to 25-pin, 4M	8233	E8B	3926
Serial Port Null Modem Cable, 9-pin to 9-pin, 3.7M	8233	E8B	3927
Serial Port Null Modem Cable, 9-pin to 9-pin, 10M	8233	E8B	3928
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70.56GB 15k rpm Disk Unit	8233	E8B	4327
141.12GB 15k rpm Disk Unit	8233	E8B	4328
282.25GB 15k rpm Disk Unit	8233	E8B	4329
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16GB (2x8GB) Memory DIMMs, 1066 MHz, 2Gb DDR3 DRAM	8233	E8B	4527
32GB (2x16GB) Memory DIMMs, 1066 MHz, 2Gb DDR3 DRAM	8233	E8B	4528
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Sys Console On HMC	8233	E8B	5550
Sys Console-Ethernet No IOP	8233	E8B	5553
GX Dual-port 12X Channel Attach	8233	E8B	5609
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DAT160 Data Cartridge	8233	E8B	5689
IBM Gigabit Ethernet-SX PCI-X Adapter	8233	E8B	5700
IBM 10/100/1000 Base-TX Ethernet PCI-X Adapter	8233	E8B	5701
IBM 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter	8233	E8B	5706
10Gb FCoE PCIe Dual Port Adapter	8233	E8B	5708
1 Gigabit iSCSI TOE PCI-X on Copper Media Adapter	8233	E8B	5713
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10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter	8233	E8B	5721
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10 Gigabit Ethernet-CX4 PCI Express Adapter	8233	E8B	5732
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IBM Dual Bus Ultra 320 SCSI Repeater Card	8233	E8B	5742
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IBM LTO Ultrium 4 800 GB Data Cartridge	8233	E8B	5747
POWER GXT145 PCI Express Graphics Accelerator	8233	E8B	5748
4Gbps Fibre Channel (2-Port)	8233	E8B	5749
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SATA Slimline DVD-RAM Drive	8233	E8B	5762
2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter	8233	E8B	5767
2-Port Gigabit Ethernet-SX PCI Express Adapter	8233	E8B	5768
10 Gigabit Ethernet-SR PCI Express Adapter	8233	E8B	5769
10 Gigabit Ethernet-LR PCI Express Adapter	8233	E8B	5772
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TotalStorage EXP24 Disk Twr	8233	E8B	5787
PCI-DDR 12X Expansion Drawer	8233	E8B	5796
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12X I/O Drawer PCIe, No Disk	8233	E8B	5877
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PCI-X DDR Dual -x4 SAS Adapter                        8233   E8B   5900
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PCI-X DDR Dual - x4 3Gb SAS RAID Adapter             8233   E8B   5902
PCIe 380MB Cache Dual - x4 3Gb SAS RAID Adapter      8233   E8B   5903
PCI-X DDR 1.5GB Cache SAS RAID Adapter               8233   E8B   5904
PCI-X DDR 1.5GB Cache SAS RAID Adapter (BSC)         8233   E8B   5908
PCI-X DDR Dual - x4 SAS Adapter                      8233   E8B   5912
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Non-paired PCIe SAS RAID Indicator                   8233   E8B   5923
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Full Width Keyboard -- USB, French, #189             8233   E8B   5952
Full Width Keyboard -- USB, Italian, #142            8233   E8B   5953
Full Width Keyboard -- USB, German/Austrian, #129    8233   E8B   5954
Full Width Keyboard -- USB, UK English, #166P        8233   E8B   5955
Full Width Keyboard -- USB, Spanish, #172            8233   E8B   5956
Full Width Keyboard -- USB, Japanese, #194           8233   E8B   5957
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Portuguese, #275                                     8233   E8B   5958
Full Width Keyboard -- USB, Hungarian, #208          8233   E8B   5959
Full Width Keyboard -- USB, Korean, #413             8233   E8B   5960
Full Width Keyboard -- USB, Chinese, #467            8233   E8B   5961
Full Width Keyboard -- USB, French Canadian, #445    8233   E8B   5962
Full Width Keyboard -- USB, Belgian/UK, #120         8233   E8B   5964
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Full Width Keyboard -- USB, Danish, #159             8233   E8B   5966
Full Width Keyboard -- USB, Bulgarian, #442          8233   E8B   5967
Full Width Keyboard -- USB, Swiss/French/German,
#150                                                 8233   E8B   5968
Full Width Keyboard -- USB, Norwegian,#155           8233   E8B   5969
Full Width Keyboard -- USB, Dutch, #143              8233   E8B   5970
Full Width Keyboard -- USB, Portuguese, #163         8233   E8B   5971
Full Width Keyboard -- USB, Greek, #319              8233   E8B   5972
Full Width Keyboard -- USB, Hebrew, #212             8233   E8B   5973
Full Width Keyboard -- USB, Polish, #214             8233   E8B   5974
Full Width Keyboard -- USB, Slovakian, #245          8233   E8B   5975
Full Width Keyboard -- USB, Czech, #243              8233   E8B   5976
Full Width Keyboard -- USB, Turkish, #179            8233   E8B   5977
Full Width Keyboard -- USB, LA Spanish, #171         8233   E8B   5978
Full Width Keyboard -- USB, Arabic, #253             8233   E8B   5979
Full Width Keyboard -- USB, Thai, #191               8233   E8B   5980
Full Width Keyboard -- USB, Russian, #443            8233   E8B   5981
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Power Control Cable (SPCN) - 2 meter                 8233   E8B   6001
Power Control Cable (SPCN) - 3 meter                 8233   E8B   6006
Power Control Cable (SPCN) - 15 meter                8233   E8B   6007
Power Control Cable (SPCN) - 6 meter                 8233   E8B   6008
Power Control Cable (SPCN) - 30 meter                8233   E8B   6029
Opt Front Door for 1.8m Rack                         8233   E8B   6068
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1.8m Rack Acoustic Doors                             8233   E8B   6248
2.0m Rack Acoustic Doors                             8233   E8B   6249
1.8m Rack Trim Kit                                   8233   E8B   6263
2.0m Rack Trim Kit                                   8233   E8B   6272
Dual-port 12X Channel Attach- Short Run              8233   E8B   6446
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(250V, 15A), U. S.                                   8233   E8B   6469
Power Cord 1.8m(6-foot), To Wall (125V, 15A)         8233   E8B   6470
Power Cord 2.7m (9-foot), To Wall/OEM PDU,
(125V, 15A)                                          8233   E8B   6471
Power Cord 2.7m (9-foot), To Wall/OEM PDU,
(250V, 16A)                                          8233   E8B   6472
Power Cord 2.7m (9-foot), To Wall/OEM PDU,
(250V, 10A)                                          8233   E8B   6473
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 13A)                                          8233   E8B   6474
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 16A)                                          8233   E8B   6475
```

```
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                          8233   E8B    6476
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 16A)                                          8233   E8B    6477
Power Cord 2.7 M(9-foot), To Wall/OEM PDU,
(250V, 16A)                                          8233   E8B    6478
Power Cord (9-foot) , To Wall/OEM PDU, (250V,
10A)                                                 8233   E8B    6479
Power Cord 1.8M (6-foot),To Wall, (250V, 15A),
United States                                        8233   E8B    6487
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(125V, 15A or 250V, 10A )                            8233   E8B    6488
4.3m (14-Ft) 3PH/24A Power Cord                      8233   E8B    6489
4.3m (14-Ft) 1PH/48A Pwr Cord                        8233   E8B    6491

Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                          8233   E8B    6493
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                          8233   E8B    6494
Power Cord (9-foot), To Wall/OEM PDU, (250V, 10A) 8233   E8B    6495
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                          8233   E8B    6496
Power Cord (6-foot), To Wall/OEM PDU, (250V, 10A) 8233   E8B    6497
Power Cord (6-foot), To Wall/OEM PDU, (250V, 15A) 8233   E8B    6498
Power Cable - Drawer to IBM PDU, 200-240V/10A       8233   E8B    6577
Optional Rack Security Kit                          8233   E8B    6580
Modem Tray for 19-Inch Rack                         8233   E8B    6586
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(125V, 15A)                                          8233   E8B    6651
4.3m (14-Ft) 3PH/16A Power Cord                      8233   E8B    6653
4.3m (14-Ft) 1PH/24-30A Pwr Cord                     8233   E8B    6654
4.3m (14-Ft) 1PH/24-30A WR Pwr Cord                  8233   E8B    6655
4.3m (14-Ft)1PH/24A Power Cord                       8233   E8B    6656

Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 15A)                                          8233   E8B    6659
Power Cord (14-foot), Drawer To OEM PDU (125V,
15A)                                                 8233   E8B    6660

Power Cord 3 M (10 ft), Drawer to IBM PDU, 250V/
10A                                                  8233   E8B    6665
Power Cord 4.3M (14-foot), Drawer to OEM PDU,
(250V, 15A)                                          8233   E8B    6669
Power Cord (6-foot), To Wall (125V, 15A),           8233   E8B    6670
Power Cord 2.7M (9-foot), Drawer to IBM PDU,
250V/10A                                             8233   E8B    6671
Power Cord 1.5M (5-foot), Drawer to IBM PDU,
250V/10A                                             8233   E8B    6672
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                          8233   E8B    6680

Power Cord (6-foot), To Wall, (250V, 15A)           8233   E8B    6687


PCI 2-Line WAN IOA No IOP                            8233   E8B    6805
PCI 4-Modem WAN IOA No IOP                           8233   E8B    6808

PCI 2-Line WAN w/Modem NoIOP                         8233   E8B    6833

Intelligent PDU+, 1 EIA Unit, Universal UTG0247
Connector                                            8233   E8B    7109
Environmental Monitoring Probe                       8233   E8B    7118
Power Distribution Unit                             8233   E8B    7188
Quantity 150 of #2124                               8233   E8B    7204
Quantity 150 of #2125                               8233   E8B    7205
Quantity 150 of #2126                               8233   E8B    7206
Quantity 150 of #2127                               8233   E8B    7207
Quantity 150 of #2128                               8233   E8B    7208
Quantity 150 of #2138                               8233   E8B    7213

Dual I/O Unit Enclosure                             8233   E8B    7307
I/O Drawer Mounting Enclosure                       8233   E8B    7314
Quantity 150 of #4327                               8233   E8B    7509
Quantity 150 of #4328                               8233   E8B    7510
```

Quantity 150 of #4329	8233	E8B	7511
Quantity 150 of #3676	8233	E8B	7517
Quantity 150 of #3677	8233	E8B	7518
Quantity 150 of #3678	8233	E8B	7519
Quantity 150 of #3586	8233	E8B	7535
Quantity 150 of #3587	8233	E8B	7536
Quantity 150 of #3658	8233	E8B	7538
Quantity 150 of #3647	8233	E8B	7549
Quantity 150 of #3648	8233	E8B	7564
Quantity 150 of #3649	8233	E8B	7565
One Processor Activation for Processor Feature #8334	8233	E8B	7714
One Processor Activation for Processor Feature #8332	8233	E8B	7715
One Processor Activation for Processor Feature #8336	8233	E8B	7716
One Processor Activation for Processor Feature #8335	8233	E8B	7717
Power Supply, 1725 Watt AC, Hot-swap, Base or Redundant	8233	E8B	7740
2.0m Rack Side Attach Kit	8233	E8B	7780
PowerVM Express	8233	E8B	7793
PowerVM Standard	8233	E8B	7794
PowerVM Enterprise	8233	E8B	7795
Ethernet Cable, 6M, Hardware Management Console to System Unit	8233	E8B	7801
Ethernet Cable, 15m, Hardware Management Console to System Unit	8233	E8B	7802
Side-by-Side for 1.8m Racks	8233	E8B	7840
Ruggedize Rack Kit	8233	E8B	7841
PCI Blind Swap Cassette Kit, Double Wide Adapters, Type II	8233	E8B	7863
Linux Software Preinstall	8233	E8B	8143
Linux Software Preinstall (Business Partners)	8233	E8B	8144
8-core 3.3 GHz POWER7 Processor Card	8233	E8B	8332
8-core 3.0 GHz POWER7 Processor Card	8233	E8B	8334
6-core 3.3 GHz POWER7 Processor Card	8233	E8B	8335
8-core 3.55 GHz POWER7 Processor Card	8233	E8B	8336
Enhanced DASD/Media Backplane for 2.5" DASD/SATA DVD/Tape with External SAS Port	8233	E8B	8340
Mouse - USB, with Keyboard Attachment Cable	8233	E8B	8841
USB Mouse	8233	E8B	8845
Order Routing Indicator- System Plant	8233	E8B	9169
Language Group Specify - US English	8233	E8B	9300
New AIX License Core Counter	8233	E8B	9440
New IBM i License Core Counter	8233	E8B	9441
New Red Hat License Core Counter	8233	E8B	9442
New SUSE License Core Counter	8233	E8B	9443
Other AIX License Core Counter	8233	E8B	9444
Other Linux License Core Counter	8233	E8B	9445
3rd Party Linux License Core Counter	8233	E8B	9446
VIOS Core Counter	8233	E8B	9447
Month Indicator	8233	E8B	9461
Day Indicator	8233	E8B	9462
Hour Indicator	8233	E8B	9463
Minute Indicator	8233	E8B	9464
Qty Indicator	8233	E8B	9465
Countable Member Indicator	8233	E8B	9466
Language Group Specify - Dutch	8233	E8B	9700
Language Group Specify - French	8233	E8B	9703
Language Group Specify - German	8233	E8B	9704
Language Group Specify - Polish	8233	E8B	9705
Language Group Specify - Norwegian	8233	E8B	9706
Language Group Specify - Portuguese	8233	E8B	9707
Language Group Specify - Spanish	8233	E8B	9708
Language Group Specify - Italian	8233	E8B	9711
Language Group Specify - Canadian French	8233	E8B	9712
Language Group Specify - Japanese	8233	E8B	9714
Language Group Specify - Traditional Chinese (Taiwan)	8233	E8B	9715
Language Group Specify - Korean	8233	E8B	9716
Language Group Specify - Turkish	8233	E8B	9718
Language Group Specify - Hungarian	8233	E8B	9719

```
Language Group Specify - Slovakian                    8233  E8B   9720
Language Group Specify - Russian                      8233  E8B   9721
Language Group Specify - Simplified Chinese (PRC) 8233  E8B   9722
Language Group Specify - Czech                        8233  E8B   9724
Language Group Specify -- Romanian                    8233  E8B   9725
Language Group Specify - Croatian                     8233  E8B   9726
Language Group Specify -- Slovenian                   8233  E8B   9727
Language Group Specify - Brazilian Portuguese         8233  E8B   9728
Language Group Specify - Thai                         8233  E8B   9729
```

The following are newly announced features on the specific models of the IBM Power Systems 7014 machine type:

```
Description                                        MT   Model Feature

Rack Content Specify: 8233-E8B - 4U                7014  B42    0297
                                                         S25
                                                         T00
                                                         T42
```

Feature conversions

The existing components being replaced during a model or feature conversion become the property of IBM and must be returned.

Feature conversions are always implemented on a "quantity of one for quantity of one" basis. Multiple existing features may not be converted to a single new feature. Single existing features may not be converted to multiple new features.

The following conversions are available to customers:

Feature conversions for 8233-E8B virtualization engine features

```
                                                  Return
From FC:                  To FC:                  parts


7793 - PowerVM Express    7794 - PowerVM Standard    No
7793 - PowerVM Express    7795 - PowerVM Enterprise  No
7794 - PowerVM Standard   7795 - PowerVM Enterprise  No
```

Publications

IBM Power Systems hardware documentation provides you with the following topical information:

System overview
Planning for the system
Installing and configuring the system
Working with consoles, terminals, and interfaces
Managing system resources
Working with operating systems and software applications
Troubleshooting, service, and support

You can access the product documentation at

http://publib.boulder.ibm.com/infocenter/systems/scope/hw/index.jsp

Product documentation is also available on DVD, SK5T-7087.

The following information is shipped with the 8233-E8B.

```
        8233-E8B Service DVD         SK5T-7087-04
        Installation Road Map
        Safety Information
```

Hardware documentation such as installation instructions, user's information, and service information is available to download or view at

http://www.ibm.com/systems/support

AIX documentation can be found at the IBMAIX Information Center:

http://publib.boulder.ibm.com/infocenter/pseries/index.jsp

Visit the IBM System Support Site, which contains the documentation for the hardware

http://www.ibm.com/systems/support

The IBM Systems Information Center provides you with a single information center where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. The IBM Systems Information Center

http://publib14.boulder.ibm.com/infocenter/systems

IBM Publications Center Portal

http://www.ibm.com/shop/publications/order

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided, as well as payment options via credit card. A large number of publications are available online in various file formats, which can currently be downloaded free of charge.

Publications:

IBM Power Systems hardware documentation provides you with the following topical information: system overview; planning for the system; installing and configuring the system; working with consoles, terminals, and interfaces; managing system resources; working with operating systems and software applications; and troubleshooting, service, and support.

You can access the product documentation at

http://publib.boulder.ibm.com/infocenter/systems/scope/hw/index.jsp

Product documentation is also available on DVD, SK5T-7087.

The following information is shipped with the 8233-E8B:

```
8233-E8B Service DVD      SK5T-7087-04
Installation Road Map
Safety Information
Statement of Warranty
```

Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

   http://www.ibm.com/services/

For details on available IBM Business Continuity and Recovery Services, contact your
IBM representative or visit

   http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit

   http://www.ibm.com/services/learning/index.html

Select your country, and then select the product as the category.

Technical information

Specified operating environment

Physical specifications

```
Rack-Mount:
  Width: 440 mm (17.3 in)
  Depth: 730 mm (28.7 in)
  Height: 173 mm (6.81 in)
  Weight: 48.7 kg (107.4 lb)
```

Operating environment

- Temperature: (nonoperating) 5° - 45°C (41° - 113°F); recommended temperature
  (operating) 18° - 27°C (64° - 80°F); allowable operating temperature 5° - 35°C
  (41° - 95°F)
- Relative humidity: Nonoperating 8% to 80%; recommended 5.5°C (42°F) dew
  point to 60% RH and 15°C (59°F) dew point
- Maximum dew point: 28°C (84°F)(operating)
- Operating voltage: 200 to 240 V ac
- Operating frequency: 47/63 Hz
- Maximum measured power consumption: 1950 watts (maximum)
- Power factor: 0.98
- Thermal output: 6,655 Btu/hour (maximum)
- Power-source loading

  – 2.0 kVa (maximum configuration)
  – Maximum altitude: 3,050 m (10,000 ft)

Noise level and sound power

  – Two 3.3 GHz 6-core processors, sixteen 8 GB DIMMs, two power supplies, eight
    SFF disks, one DVD, three PCI adapters: 6.4 bels idle/6.2 bels operating
  – Two 3.3 GHz 6-core processors, sixteen 8 GB DIMMs, two power supplies, eight
    SFF disks, one DVD, three PCI adapters with acoustical doors: 5.8 bels idle/5.6
    bels operating
  – Four 3.3 GHz 6-core processors, thirty-two 8 GB DIMMs, two power supplies,
    eight SFF disks, one DVD, three PCI adapters: 7.1 bels idle/7.1 bels operating
  – Four 3.3 GHz 6-core processors, thirty-two 8 GB DIMMs, two power supplies,
    eight SFF disks, one DVD, three PCI adapters with acoustical doors: 6.5 bels
    idle/6.5 bels operating

EMC conformance classification: This equipment is subject to FCC rules and shall
comply with the appropriate FCC rules before final delivery to the buyer or centers of
distribution.

- U.S.: FCC Class A
- Europe: CISPR 22 Class A
- Japan: VCCI-A
- Korea: Korean Requirement Class A
- China: People's Republic of China commodity inspection law Class A

Homologation -- Telecom environmental testing (Safety and EMC):
Homologation approval for specific countries has been initiated with the IBM
Homologation and Type Approval (HT&A) organization in LaGaude, France. This
Power Systems model and applicable features meet the environmental testing
requirements of the country telecom and have been designed and tested in
compliance with the Full Quality Assurance Approval (FQAA) process as delivered
by the British Approval Board for Telecom (BABT), the U.K. Telecom regulatory
authority.

Product safety/Country testing/Certification

- UL 60950 Underwriters Laboratory, Safety Information
- CSA C22.2 No. 60950-00, Canadian Standards Association
- EN60950 European Norm
- IEC 60950, Edition 1, International Electrotechnical Commission, Safety
  Information
- GS Mark (Safety, TUV, EN60950)- Germany, Europe
- Nordic deviations to IEC 60950-1 1st Edition

General requirements: The product is in compliance with IBM Corporate Bulletin
C-B 0-2594-000 Statement of Conformity of IBM Product to External Standard
(Suppliers Declaration).

Hardware requirements

Power 750 minimum system configuration: The Power 750 has four processor
slots, each of which can contain a 6-core or 8-core processor. The system can
contain up to 512 GB of system memory (128 GB maximum per processor card),
five PCI adapters, and multiple media devices, as desired. This flexibility is made
available through the many optional features for the Power 750.

Each Power 750 order must include a minimum of the following items:

- One system Central Electronics Complex (CEC) enclosure with the following items:
  - Two power cords (#6470-#6478, #6487-#6494, #6496, #6497, #6577,
    #6580, #6586, #6651, #6653-#6660, #6662, #6665, #6669, #6671, #6672,
    #6680)
  - One Language Group, Specify (#9300 or #97xx)
- Choose one processor card from:
  - 6-core 3.3 GHz POWER7 processor card (#8335)
  - 8-core 3.0 GHz POWER7 processor card (#8334)
  - 8-core 3.3 GHz POWER7 processor card (#8332)
  - 4 x 8-core 3.55 GHz POWER7 processor card (#8336)
- Choose six or eight processor activations from:
  - 6 x #7717, or 3 x #7717 and 3 x #2327 with processor card #8335
  - 8 x #7714, or 4 x #7714 and 4 x #2324 with processor card #8334
  - 32 x #7716, or 16 x #7716 and 16 x #2326 with 4x processor card #8336
  - 8 x #7715, or 4 x #7715 and 4 x #2325 with processor card #8332
- Choose 8 GB minimum memory from:
  - 8 GB (2 x 4 GB) Memory DIMMs, 1066 MHz, 2 Gb (#4526)

- 16 GB (2 x 8 GB) Memory DIMMs, 1066 MHz, 2 Gb (#4527)
- 32 GB (2 x 16 GB) Memory DIMMs, 1066 MHz, 2 Gb (#4528)

Note: The 8 GB memory feature (#4526) is planned to be available on March 16, 2010.

- DASD/Media Backplane with external SAS port, 8 x 2.5-inch DASD (#8340)
- Choose Ethernet daughter card from:
  - 4-port 1 Gb Integrated Virtual Ethernet Daughter Card (#5624)
  - Dual-port 10 Gb Integrated Virtual Ethernet Daughter Card (#5613)
- Choose DASD from:
  - 73.4 GB SAS 2.5-inch 15,000 RPM (#1883) (AIX/Linux/VIOS)
  - 146.8 GB SAS 2.5-inch 10,000 RPM (#1882) (AIX/Linux/VIOS)
  - 300 GB SAS 2.5-inch 15,000 RPM (#1885) (AIX/Linux/VIOS)
  - 69.7 GB SAS 2.5-inch 15,000 RPM (#1884) (IBM i)
  - 139.5 GB SAS 2.5-inch 15,000 RPM (#1888) (IBM i)
  - 69 GB SAS 2.5-inch Solid State Drive (#1890) (AIX/Linux/VIOS)
  - 69 GB SAS 2.5-inch Solid State Drive (#1909) (IBM i)

Notes:

  - When feature 2145, IBM i operating system, is selected, a minimum of two DASD is required.
  - No internal DASD is required if feature 0837 (Boot from SAN) is selected. In this case, a Fibre Channel or Fibre Channel over Ethernet adapter must also be ordered.
- Cable for rack-mount drawer with 2.5-inch DASD Backplane (#1878)
- SATA DVD-RAM (#5762)
- 2 x 1725 watt AC power supply, Hot-swap (2 x #7740)
- Choose Primary Operating System Indicator from:
  - IBM i (#2145 -- requires #0566 and #0040)
  - AIX (#2146)
  - Linux (#2147)

RAID

There are multiple protection options for disk/SSD drives in the SAS SFF bays in Power 750 system unit or drives in 12X attached I/O drawers or drives in disk-only I/O drawers. Although protecting drives is always recommended, AIX/Linux users may choose to leave some or all drives unprotected at their own risk and IBM supports these configurations. IBM i configuration rules differ in this regard, and IBM supports IBM i partition configurations only when disk/SSD drives are protected.

This disk/SSD drive protection can be provided by AIX/IBM i/Linux software or by the disk/SSD hardware controllers. Mirroring of drives is provided by AIX/IBM i/Linux software. In addition, AIX/Linux supports controllers providing RAID 0, 5, 6, or 10. IBM i integrated storage management already provides striping so IBM i also supports controllers providing RAID 5 or 6. To further augment disk/SSD protection, hot spare capability can be used for protected drives. Specific hot spare prerequisites apply.

An integrated SAS Disk/SSD controller is provided in the Power 750 system unit. It is optionally augmented by a 175 MB write cache and RAID 5 and RAID 6 capability when feature 5679 is added to the configuration. Without feature 5679, the integrated controller supports system mirroring protection for AIX/IBM i/Linux and supports RAID 0 or 10 protection for AIX/Linux. Other disk/SSD controllers are provided as PCI adapters. PCI-X SCSI, PCI-X SAS, and PCIe SAS adapters are

supported. PCI Controllers with and without write cache are supported. RAID 5 and RAID 6 on controllers with write cache are supported.

AIX/Linux can use disk drives formatted with 512 byte blocks when being mirrored by the operating system. These disk drives must be reformatted to 528 byte sectors when used in RAID arrays. Although a small percentage of the drive's capacity is lost, additional data protection such as ECC and bad block detection is gained in this reformatting. For example, a 300 GB disk drive when reformatted provides around 283 GB. IBM i always uses drives formatted to 528 byte. IBM Power SSDs are formatted to 528 byte.

RAID 0 (minimum two drives) provides striping without parity for performance, but does not offer any fault tolerance. In data striping, data is broken down into several smaller, equally sized pieces. Each piece is then written to or read from multiple drives. This process increases I/O bandwidth by simultaneously accessing multiple data paths. Because RAID 0 does not offer any redundancy, a single drive failure can result in the loss of all data in a striped set. This means that all of the data on all the drives could be lost if even a single drive fails.

Note that RAID 0 drives can be mirrored by software to provide protection.

RAID 5 (minimum three drives) uses block-level data striping with distributed parity. RAID 5 stripes both data and parity information across three or more drives. Fault tolerance is maintained by ensuring that the parity information for any given block of data is placed on a drive separate from those used to store the data itself. RAID 5 requires N+1 drives to accommodate this parity data, thus the available storage capacity for each array is reduced by one drive to provide protection.

RAID 6 (minimum four drives) uses block-level data striping with dual distributed parity, the same as RAID 5 except RAID 6 uses a second level of independently calculated and distributed parity information for additional fault tolerance. This extra fault tolerance provides data security in the event two drives fail before a drive can be replaced. RAID 6 requires N+2 drives to accommodate the additional parity data.

RAID 10 is RAID 0 plus redundancy. In this type of implementation, an array with an even number of drives is created with mirrored pairs of drives within the array. A RAID 0 stripe set of data is created across the mirrored pairs for performance and for redundancy.

If a protected drive fails, the failing drive can be removed from its hot-plug bay and the drive replaced while the server and partition continue to run. The contents can then be re-created while the system continues to run. Note that until the drive is both replaced and its contents re-created, the protection provided using just mirroring or RAID 10 is absent for that drive's now unmirrored paired drive. Similarly, the entire RAID 5 array is unprotected until the failed drive is replaced and re-created. RAID 6 and hot spare were designed to provide additional protection.

Software requirements

If installing the AIX operating system (one of these):

- AIX Version 6.1 with the 6100-04 Technology Level and Service Pack 2, or later
- AIX Version 6.1 with the 6100-03 Technology Level and Service Pack 5, or later (planned availability: June 25, 2010)
- AIX Version 6.1 with the 6100-02 Technology Level and Service Pack 8, or later (planned availability: June 25, 2010)
- AIX Version 5.3 with the 5300-11 Technology Level and Service Pack 2, or later (planned availability: March 16, 2010)
- AIX Version 5.3 with the 5300-10 Technology Level and Service Pack 4, or later (planned availability: May 28, 2010)
- AIX Version 5.3 with the 5300-09 Technology Level and Service Pack 7, or later (planned availability: May 28, 2010)

If installing the IBM i operating system:

- IBM i 6.1 with i 6.1.1 machine code, or later (planned availability: March 16, 2010)

If installing the Linux operating system (one of these):

- SUSE Linux Enterprise Server 11 for the POWER 750 Express Server, or later, with current maintenance updates available from Novell to enable all planned functionality
- SUSE Linux Enterprise Server 10 Service Pack 3 for the Power 750 Express Server, with current maintenance updates available from Novell to enable all planned functionality

  Users should also update their systems with the latest Linux for Power service and productivity tools available at

  http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html

If installing VIOS:

- VIOS 2.1.2.11 with Fix Pack 22.1 and Service Pack 1, or later

Java 1.4.2 on POWER7

There are unique considerations when running Java 1.4.2 on POWER7. For best exploitation of the outstanding performance capabilities and most recent improvements of POWER7, IBM recommends upgrading Java-based applications to Java 6 or Java 5 whenever possible.

For more information, visit

  http://www.ibm.com/developerworks/java/jdk/aix/service.html

Limitations

System

- When an HMC is connected to the system, the integrated system ports are rendered nonfunctional. In this case, the customer must install an asynchronous adapter for serial port usage.
- Integrated system ports are not supported under AIX or Linux when the HMC ports are connected to an HMC. Either the HMC ports or the integrated system ports can be used, but not both.
- The integrated system ports are supported for modem and async terminal connections. Any other application using serial ports requires a serial port adapter to be installed in a PCI slot. The integrated system ports do not support HACMP™ configurations.

Hardware management console (HMC) machine code

If attaching an HMC to a new server or adding function to an existing server that requires a firmware update, the HMC machine code may need to be updated.

To determine the HMC machine code level required for the firmware level on any server, go to the following Web page to access the Fix Level Recommendation Tool (FLRT) on or after the planned availability date for this product. FLRT will identify the correct HMC machine code for the selected system firmware level

  http://www14.software.ibm.com/webapp/set2/flrt/home

If a single HMC is attached to multiple servers, the HMC machine code level must be updated to the server with the most recent firmware level. All prior levels of server firmware are supported with the latest HMC machine code level.

Boot requirements

- Selection of feature 0837 will indicate boot from SAN.

- If IBM i (#2145) is selected as the primary operating system and SAN boot is not selected (#0837), one of the following Load/Source specify codes must be specified:
  - #0835 -- #4327 (70.56 GB 15K RPM HDD) Load Source Specify
  - #0836 -- #4328 (141.12 GB 15K RPM HDD) Load Source Specify
  - #0838 -- #3676 (69.7 GB 15K RPM HDD) Load Source Specify
  - #0839 -- #3677 (139.5 GB 15K RPM HDD) Load Source Specify
  - #0840 -- #3678 (283.7 GB 15K RPM HDD) Load Source Specify
  - #0841 -- #4329 (282.25 GB 15K RPM HDD) Load Source Specify
  - #0844 -- #3658 (428 GB 15K RPM HDD) Load Source Specify
  - #0851 -- #1884 (69.7 GB 15K RPM SFF HDD) Load Source Specify
  - #0853 -- #1888 (138 GB 15K RPM SFF HDD) Load Source Specify
  - #0854 -- #1890 (69 GB SFF SSD) Load Source Specify
  - #0855 -- #3586 (69 GB SSD) Load Source Specify
- If IBM i (#2145) is selected and the load source disk unit is not in the CEC (system unit), one of the following specify codes must also be selected:
  - #0725 -- Remote Load Source in #5786 or #5787 TotalStorage EXP24 Expansion Drawer/Tower
  - #0726 -- Remote Load Source in #5802 12X I/O Drawer PCIe, SFF Disk
  - #0727 -- Remote Load Source in #5886 EXP 12S Expansion Drawer
  - #0837 -- SAN Load Source Specify (Boot from SAN)
- If IBM i (#2145) is selected, one of the following system console specify codes must be selected:
  - #5550 -- System Console on HMC
  - #5553 -- System Console - Internal LAN

Processor cards

- A minimum of one processor card is required on an order with a maximum of 32 processor cores on four processor cards.
- One, two, three, or four 6-core 3.3 GHz (#8335), or 8-core 3.0 GHz (#8332)/3.3 GHz (#8334) processor cards may be installed in a system. Four 8-core 3.55 GHz (#8336) processor cards may be installed in a system.
- Processor cards (#8332, #8334, #8335, and #8336) may not be mixed in the system.
- All processors must be activated.
  - The 6-core 3.3 GHz processor card (#8335) requires that six processor activation codes be ordered. A maximum of six processor activation code features (6 x #7717, or 3 x #7717 and 3 x #2327) are allowed per processor card.
  - The 8-core 3.0 GHz processor card (#8334) requires that eight processor activation codes be ordered. A maximum of eight processor activation code features (8 x #7714, or 4 x #7714 and 4 x #2324) are allowed per processor card.
  - The 8-core 3.55 GHz processor card (#8336) requires that eight processor activation codes be ordered. A maximum of eight processor activation code features (8 x #7716, or 4 x #7716 and 4 x #2326) are allowed per processor card. Thirty-two processor activations are required.
  - The 8-core 3.3 GHz processor card (#8332) requires that eight processor activation codes be ordered. A maximum of eight processor activation code features (8 x #7715, or 4 x #7715 and 4 x #2325) are allowed per processor card.

Power supply

- The base machine contains two ac (#7740) power supplies.

Redundant fans

- Redundant fans standard

Power cords

Two power cords are required.

The Power 750 requires 200-240 V for all configurations.

System memory

- A minimum 8 GB or two DIMMs of memory is required on the Power 750 system.
- Eight memory DIMM slots are on a processor card. The maximum system memory with one processor card is 128 GB. The maximum system memory is 512 GB with four processor cards.
- Different system memory feature numbers may not be mixed on the same processor card. However, a system with more than one processor card may used different memory feature numbers on the same system.
- Memory must be installed in groups of one feature (two DIMMs), two features (four DIMMs), or four features (eight DIMMs) per processor card. Installation of three features (six DIMMs) is not permitted.
- It is generally recommended that memory be installed evenly across all processor cards in the system. Balancing memory across the installed processor cards allows memory access in a consistent manner and typically results in the best possible performance for your configuration. However, balancing memory fairly evenly across multiple processor cards, compared to balancing memory exactly evenly typically has a very small performance difference.

Plans for future memory upgrades should be taken into account when deciding which memory feature size to use at the time of initial system order.

```
Figure 1.  Memory features


                         Feature    Minimum    Maximum
         Feature         number     quantity   quantity

         8 GB 1066 MHz   4526          0          16
           (2 x 4 GB RDIMMs)

         16 GB 1066 MHz  4527          0          16
           (2 x 8 GB RDIMMs)

         32 GB 1066 MHz  4528          0          16
           (2 x 16 GB RDIMMs)
```

Drawer/Tower attachment:

- 7314-G30 (#5796) PCIX Expansion Drawer
  - Maximum of four drawers per GX adapter (#5609, #5616, or follow-ons) or per 12X loop
  - Maximum of two 12X loops per server (maximum of one loop per server with one processor card installed in the system)
  - Maximum of eight drawers per Power 750 system
- 7031-D24/T24 (#5786/#5787) EXP4 SCSI DASD Drawer/Tower
  - EXP24 drawers/towers are attached to a PCI-X SCSI adapter via one or more SCSI cables.
  - The system maximum is 24.
- Feature number 5886 EXP12S SAS DASD Expansion Drawer
  - Feature number 8340 supports one feature number 5886 drawer directly off the system unit's SAS port.
  - EXP12S drawers are attached to a PCI-X or PCIe SAS adapter via SAS cables.
  - The system maximum is 48.

- Feature number 5802 12X I/O Drawer PCIe SFF Disk and feature number 5877 12X I/O Drawer PCIe No Disks

    – A maximum of two per 12X loop is allowed.

    – A maximum of four is supported on the Power 750.

    – No mixing of features 5802 and 5877 is allowed with other drawers on the same loop.

The following list shows I/O drawers that are supported or available on the 8233 machine type and the correct interface to use for each of the drawers.

```
                                              Order
Feature          Description                  Status     Interface

5786             EXP24 SCSI Disk Drawer        Supported  SCSI
5787             EXP24 SCSI Disk Tower         Supported  SCSI
5796             PCI-X DDR 12X Exp Drawer      Available  12X
5802             PCIe 12X I/O Drawer (W/Disk Bays)  Available  12X
5877             PCIe 12X I/O Drawer (No Disk Bays) Available  12X
5886             Exp 12S SAS Disk Drawer       Available  SAS
7031-D24/T24     EXP24 SCSI Disk Drawer/Tower  Supported  SCSI
7214-1U2         Tape and DVD Enclosure        Available  SCSI/SAS
7314-G30         PCI-X DDR 12X I/O Drawer      Supported  12X
```

```
Maximum number of attached I/O drawers per system:

             Power 750
Feature      (32-core)

    O/S  AIX  Linux  IBM i

5786          24    24      24
5787          24    24      24
5796           8     8       8
5802           4     4       4
5877           4     4       4
5886          48    48      48
7031-D24      24    24      24
7031-T24      24    24      24
7214-1U2       1     1       6
7314-G30       8     8       8
```

I/O drawers are connected to the adapters in the CEC with the following cables:

- Data transfer cables:

    – 12X DDR cables for the feature 5802 and 5877 I/O drawers

    – 12X SDR or DDR cables for the feature 5796 and 7314-G30 I/O drawers

- Power control cables

12X I/O drawer cable connections are always made in loops to help protect against a single point-of-failure resulting from an open, missing, or disconnected cable. A system with nonlooped configurations could experience degraded performance and serviceability. If a nonloop connection is detected, a problem is reported.

The first 12X I/O drawer attached in any I/O drawer loop requires two data transfer cables. Each additional drawer in the loop (up to the maximum allowed) requires one additional data transfer cable.

The first 12X I/O drawer attached to a system unit requires two power control cables. Each additional I/O drawer added to a system requires one additional power control cable. Each system has one power control loop. All I/O drawers attached to a system are included in the same power control loop. Power control cable loops are different in this regard from data transfer cable loops.

Dual-Port 12X Adapter Options

Dual-Port 12X Channel Attach Adapter (#6446): Use the short run adapter for feature 5796 or 7314-G30 expansion I/O drawers located in close proximity to the host system or to other drawers in the I/O expansion loop. This adapter does not include signal repeaters.

Dual-Port 12X Channel Attach Adapter (#6457): Use the long run adapter for feature 5796 or 7314-G30 expansion I/O drawers located farther from the host system or other I/O drawers in the I/O expansion loop. This adapter includes signal repeaters to accommodate the longer cable lengths.

12X Cable Choice

Each feature 5796 or 7314-G30 12X drawer requires one Dual-Port 12X Channel Adapter, either Short Run (#6446) or Long Run (#6457). The choice of adapters is dependent on the distance to the next 12X Channel connection in the loop, either to another I/O drawer or the system unit. The following table identifies the supported cable lengths for each 12X Channel adapter. I/O drawers containing the Short Run adapter can be mixed in a single loop with I/O drawers containing the Long Run adapter. In this table, a "Yes" indicates that the 12X cable identified in that column can be used to connect the drawer configuration identified to the left. A "No" means it cannot be used. The 12X DDR or SDR cables can be used with the feature 5796 or 7314-G30.

	12X Cable Options			
	0.6 M	1.5 M	3.0 M	8.0 M
	(#1829)(1)	(#1830)(1)	(#1840)(2)	(#1834)(3)
12X DDR	(#1861)(1)	(#1862)(1)	(#1865)(2)	(#1864)(3)
5796 to 5796 w/12X Short Run adapter (#6446) in both drawers	Yes	Yes	No	No
5796 w/ 12X Short Run adapter (#6446) to 5796 w/ 12X Long Run adapter (#6457)	Yes	Yes	Yes	No
5796 to 5796 w/12X Long Run adapter (#6457) in both drawers	Yes	Yes	Yes	Yes
5796 w/12X Short Run adapter (#6446) to system unit	No	Yes	Yes	No
5796 w/12X Long Run adapter (#6457) to system unit	No	Yes	Yes	Yes

[1] The 0.6M and 1.5M 12X cables (#1829/#1830 or #1861/#1862) have very limited use due to their short length. They cannot be used to connect to a system drawer because of the short length. They are intended for use between two feature 5796 or 7314-G30 drawers mounted side by side in the same enclosure (#7314). They can also be used to connect between two modules located one beneath the other in a 19-inch rack.

[2] It is possible in some limited configurations to use the 3.0 M, 12X cable (#1840 or #1865) to locate 5796 modules in adjacent racks. The cable length requires careful management of each drawer location within the rack. The best choice for connecting a feature 5796 or G30 I/O Drawer in an adjacent rack is the 8.0 M, 12X cable (#1834 or #1864).

The 8M 12X cable (#1834 or #1864) is intended for use when connecting between two modules that are located in adjacent racks. This cable may not be connected to the 12X Short Run adapter (#6446).

PCI card slots

The Power 750 has a maximum of five hot-plug slots.

- Slot 1 is a PCIe x8 short-length slot. A GX++ slot shares this slot.

- Slot 2 is a PCIe x8 short-length slot. A GX+ slot shares this slot.

- Slot 3 is a PCIe x8 full-length slot.

- Slots 4 and 5 are PCI-X DDR 266 MHz full-length slots.

- All slots are hot pluggable except slots 1 and 2 when used as GX slots.

Note: Optional 12X GX+ and GX++ adapters are used for attaching I/O expansion drawers with PCI slots and, optionally, disk/SSD bays.

Graphics adapters

- A graphics adapter, keyboard, and mouse are not required in the minimum configuration.
- The maximum number of graphics adapters supported in the Power 750 is three. Not supported under IBM i.

I/O adapters

- The Integrated Virtual Ethernet feature (#5613, #5623, #5624) and the SAS RAID Enablement feature (#5679) are not plugged into a slot, leaving the slots available for PCI adapters or GX adapters.
- Refer to Figure 2 for additional I/O adapter information.
- The adapter installed in slot 1 or 2 must be short.
- To install a GX++ adapter in the system, two or more processor cards are required.

```
Figure 2.  I/O adapter features
```

I/O Adapter	Orderable feature number	Supported feature number	CEC Max qty	Size
4-port USB PCIe	2728		3	Short
2-port USB PCI		2738	2	Short
8-port Asynchronous EIA-232		2943	2	Short
4-port ARTIC960Hx		2947	2	Long
2-port Multiprotocol		2962	2	Short
GXT135P Graphics Accelerator		2849/1980	2	Short
PCIe 2-Line WAN w/Modem	2893		3	Short
PCIe 2-Line WAN w/Modem CIM	2894		3	Short
PCI-X Cryptographic Coprocessor	4764		2	Long
GX Dual-port 12X Channel Attach	5609		1	GX++ slot
2-port 10 Gb IVE Daughter Card	5613		1	N/A
GX Dual-port 12x Channel Attach	5616		1	GX+ slot
2-port 1 Gb IVE Daughter Card		5623	1	N/A
4-port 1 Gb IVE Daughter Card	5624		1	N/A
SAS RAID Enablement Card	5679		1	N/A
Gigabit Ethernet		5700/1978	2	Short
10/100/1000 Ethernet		5701/1979	2	Short
2-port 10/100/1000 Ethernet	5706	1983	2	Short
10 Gigabit FCoE PCIe Dual Port	5708		3	Short
ISCI TOE Gb Ethernet (Copper)	5713	1986	2	Short
ISCI TOE Gb Ethernet (Fiber)		5714/1987	2	Short
2 Gb Fibre Channel PCI-X		5716/1977	2	Short
4-port 1 Gb Ethernet PCI-e 4x	5717		3	Short
10 Gb Ethernet - Short Reach		5721	2	Short

```
10 Gb Ethernet - Long Reach                      5722      2  Short
2-port Asynchronous EIA-232                      5723      2  Short
10 Gigabit Ethernet-CX4 PCI Exp.  5732                     3  Short
8 Gb Dual-port Fibre Channel      5735                     3  Short
PCI-X Ultra320 SCSI DDR           5736      1912           2  Short
4-port 10/100/1000 Ethernet                  5740/1954    2  Short
GXT145 PCIe Graphics Accelerator  5748                     3  Short
2-port 4 Gbps Fibre Channel       5749                     2  Short
1-port 4 Gb Fibre Channel                    5758/1905    2  Short
2-port 4 Gb Fibre Channel         5759      1910           2  Short
2-port 1 Gb Ethernet (UTP) PCIe   5767                     3  Short
2-port 1 Gb Ethernet (Fiber) PCIe 5768                     3  Short
10 Gb Ethernet-SR                 5769                     3  Short
10 Gb Ethernet-LR                 5772                     3  Short
1-port 4 Gb Fibre Channel                    5773         3  Short
2-port 4 Gb Fibre Channel         5774                     3  Short
PCI-X EXP24 Ctl-1.5 GB No IOP                5778         1  Long

4-port Asynch EIA-232 PCIe        5785                     3  Short
SAS Controller PCI-X 2.0                     5900         2  Short
PCIe Dual-x4 SAS                  5901                     3  Short
PCI-X DDR Dual-x4 SAS RAID                   5902         2  Long
PCIe 380MB Cache Dual-x4 SAS RAID 5903                     3  Short
PCI-X DDR Dual-x4 SAS RAID        5904                     1  Long

PCI-X DDR Dual-x4 SAS                        5912         2  Short
PCI 2-line WAN IOA, no IOP                   6805         2  Short
PCI 4-Modem WAN IOA, no IOP       6808                     2  Short
PCI 4-Modem WAN IOA, no IOP, CIM  6809                     2  Short
PCI 2-line WAN w/Modem, no IOP               6833         2  Short
PCI 2-line WAN w/Modem, no IOP, CIM          6834         2  Short
```

Note: Maximums are for CEC only.

Storage devices/bays

- The Power 750 has a slim media bay that contains a mandatory DVD-RAM (#5762 or follow-on) and a half-high bay that can contain a tape drive or removable disk drive.
- Feature number 8340 must be selected and supports only SFF disks or SSD; 3.5-inch drives are not supported with feature 8340:
  - Feature number 1878 must be selected.
  - One of feature numbers 1882, 1883, 1884, 1885, 1886, 1888, 1890, or 1909 must be selected (no disks/SSD are required if feature number 0837 is selected).
  - If connection of a feature 5886 EXP12S drawer is desired using the external SAS port on feature 8340, feature number 3668 or 3669 is required.
  - If tape device feature 5619 is installed in the half-high media bay, feature 3656 must be selected.
  - If a tape device feature 5746 or 5661 is installed in the half-high media bay, feature 3657 must be selected.
- Split DASD backplane support requirements:
  - High-function DASD backplane (#8340, or follow-on).
  - SAS Cable, DASD Backplane (Split) to Rear Bulkhead (#3669). Feature 3669 replaces feature 3668 in this configuration.
  - SAS Adapter (#5900, #5901, #5912, or follow-on).
  - External SAS cable.
  - SAS Cable feature 3669 is not available with feature 2145 (IBM i).
- Solid State Drive (SSDs)(#1890, #1909, #3586, #3587) support restrictions:
  - SFF features 1890 and 1909 are supported in the Power 750 CEC.
  - 3.5-inch features 3586 and 3587 are not supported in the Power 750 CEC.
  - SSDs and disk drives (HDDs) are not allowed to mirror each other.
  - SSDs are not supported by features 5900, 5901, 5902, and 5912.

- – A maximum of eight per feature 5886 drawer is allowed. No mixing of SSDs and HDDs is allowed in a feature 5886. A maximum of one feature 5886 EXP12S drawer containing SSDs attached to a single controller or pair of controllers is allowed. A feature 5886 containing SSD drives cannot be connected to other feature 5886s. A feature 5886 containing SSD drives cannot be attached to the CEC external SAS port on the Power 750.
  - – In a Power 750 with a split backplane, SSDs and HDDs may be placed in either "split" but no mixing of SSDs and HDDs within a split is allowed. IBM i does not support split DASD mode.
  - – In a Power 750 without a split backplane, SSDs and HDDs may be mixed in any combination. However, they cannot be in the same RAID array.
- • DASD/Data Protection -- if IBM i (#2145) is selected, one of the following is required:
  - – Disk mirroring (default) -- requires feature 0040, 0043, or 0308
  - – SAN boot (#0837)
  - – RAID -- requires feature 5679 and either feature 0041 or 0047
  - – Mixed Data Protection (#0296)

```
Figure 3. Storage device features


                                            Orderable Supported
                             Maximum         feature   feature
      Device                 quantity  Bay   number    number

      DVD-ROM (SATA)             1      Slim                      5743
      DVD-RAM (SATA)             1      Slim    5762


       80/160GB DAT160 Tape-SAS  1      Half high  5619
       800GB/1.6TB LTO4 Tape-SAS 1      Half high  5746
       DAT320 160/320GB Tape-SAS 1      Half high  5661
      Internal Docking Station
         for Removable Disk Drive  1    Half high  1103

      Note:  The DAT320 160/320 GB Tape-SAS (#5661) is planned to be
      supported by the IBM i operating system on March 16, 2010.



                                               Orderable
                               Maximum          feature
      Device                   quantity  Bay    number

                        AIX  IBM i  Linux

      146.8 GB 15K,          80     0      80   DASD 1-8,  1882
         SAS, SFF                             72 in 4 x #5802
      73.4 GB 15K,           80     0      80   DASD 1-8,  1883
         SAS, SFF                             72 in 4 x #5802
      69.7 GB 15K,            0    80       0   DASD 1-8,  1884
         SAS, SFF                             72 in 4 x #5802
      300 GB 10K,            80     0      80   DASD 1-8,  1885
         SAS, SFF                             72 in 4 x #5802
      146.8 GB 15K,          80     0      80   DASD 1-8,  1886
         SAS, SFF                             72 in 4 x #5802
      139.5 GB 15K,           0    80       0   DASD 1-8,  1888
         SAS, SFF                             72 in 4 x #5802

      69 GB SAS, SFF,        80     0      80   DASD 1-8,  1890
         Solid-state                          72 in 4 x #5802
      69 GB SAS, SFF,         0    80       0   DASD 1-8,  1909
         Solid-state                          72 in 4 x #5802

      69 GB SAS, SFF,       328     0     328            3586
         Solid-state                       328 in 41 x #5886
      69 GB SAS, SFF,         0   328       0            3587
         Solid-state                       328 in 41 x #5886

      Note: Eight disks or solid-state drives maximum
      can be installed internally; 72 disks or solid-state
```

drives maximum can be installed in 4 x #5802. Features
3586 and 3587 cannot be installed internally. 8 x #3586
or #3587 can be placed in each #5886.

Device	Maximum quantity			Bay	Orderable feature number	Supported feature number
	AIX	IBM i	Linux			
73.4 GB 15K,RPM SAS	576	0	576	48 x #5886		3646
146.8 GB 15K RPM, SAS	576	0	576	48 x #5886	3647	
300 GB 15K RPM, SAS	576	0	576	48 x #5886	3648	
450 GB 15K RPM, SAS	576	0	576	48 x #5886	3649	
69.8 GB 15K RPM, SAS	0	576	0	48 x #5886		3676
139.6 GB 15K RPM, SAS	0	576	0	48 x #5886	3677	
283.8 GB 15K RPM, SAS	0	576	0	48 x #5886	3678	
428.4 GB 15K RPM, SAS	0	576	0	48 x #5886	3658	

Note: 3.5-inch DASD are not supported in the 8233-E8B CEC.

Device	Maximum quantity			Bay	Orderable feature number	Supported feature number
	AIX	IBM i	Linux			
73.4 GB 15K RPM, SCSI	576	0	576	See note		3278/1971
146.8 GB 15K RPM, SCSI	576	0	576	See note		3279/1972
300 GB 15K RPM, SCSI	576	0	576	See note		3585
70.56 GB 15K RPM, SCSI	0	576	0	See note		4327
141.14 GB 15K RPM, SCSI	0	576	0	See note		4328
282.25 GB 15K RPM, SCSI	0	576	0	See note		4329
TotalStorage EXP24 Disk Drawer	24	24	24	See note		5786
TotalStorage EXP24 Disk Tower	24	24	24	See note		5787

Note: SCSI disks are not supported in the 8233-E8B CEC. The 576 system
maximum is achieved with a maximum of 24 disks in a maximum of 24 Total
Storage EXP24 Disk Drawers (#5786) or 24 TotalStorage EXP2 4 Disk Towers
(#5787).

Planning information

Cable orders

No cables required.

Security, auditability, and control

This product uses the security and auditability features of host software and application software.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

Global Technology Services

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings, for the efficient installation, implementation, or integration of this product.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBMElectronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

http://www.ibm.com/support/electronic

Terms and conditions

Volume orders: Contact your IBM representative.

Warranty period

One year. Alternative warranty options are available on a special bid basis from your IBM representative or Business Partner.

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. An IBM technician will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information. This product is covered by the following types of service.

Customer Replaceable Unit Service and On-site for other selected parts.

Customer Replaceable Unit Service: IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 or a Tier 2 CRU.

Tier 1 CRU: Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation. For machines with on-site same-day response service, IBM will replace a Tier 1 CRU at your request, at no additional charge.

Tier 2 CRU: You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRU parts:

- DASD Drive
- DVD Drive
- Dedicated Ethernet
- Fan Air Baffle
- Fan
- All PCI Adapters
- Power Supply
- RAID Base Card
- RAID Auxiliary Card
- RAID Auxiliary card battery
- Thermal Card (TPMD)
- VPD card
- Adapter - GX +
- Line/power cord
- Keyboard
- Mouse
- External cables
- Display
- Operator Panel

- TOD Battery

- DIMMs

On-site Service: IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

- IBM onsite Repair Limited, 9 hours per day, Monday through Friday, excluding public or national holidays, next-business-day response, Latest Call Registration 15:00.

Non-IBM parts support

Warranty service: IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of On-site Service acquired by the customer. Service levels are response time objectives and are not guaranteed.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability.

On-site Service: IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose. The following service selections are available as warranty upgrades for your machine.

- IBM On-site Repair, Same Business Day Onsite Response Time, Latest Call Registration 12:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same Business Day 6 hours average Onsite Response Time, 24 hours per day, Monday through Sunday, 365 days a year

Customer Replaceable Units (CRUs) may be provided as part of the machine's standard warranty CRU Service except that you may install a CRU yourself or request IBM installation, at no additional charge, under one of the On-site Service levels specified above. For additional information on the CRU Service, see warranty information.

Maintenance Services:

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service: IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well-lit, and suitable for the purpose.

- IBM On-site Repair Limited, Next Business Day Onsite Response Time, Latest Call Registration 15:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Next Business Day Onsite Response Time, 9 hours per day, Latest Call Registration 15:00, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same Business Day Onsite Response Time, Latest Call Registration 12:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same Business Day 6 hours average Onsite Response Time, 24 hours per day, Monday through Sunday, 365 days a year

Customer Replaceable Unit Service:

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

Customer Replaceable Unit Service and On-site Service for other selected parts:

On-site and Customer Replaceable Unit Service is available in your geography. Refer to the information above for On-site Service. Below, you will find additional information pertaining to CRU Service available for your product.

CRUs are designated as being either a Tier 1 or a Tier 2 CRU.

Tier 1 CRUs: Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

For machines with On-site Same-day Response Service IBM will replace a Tier 1 CRU part at your request, at no additional charge.

Tier 2 CRUs: You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

The following parts have been designated as Tier 1 CRU parts:

- DASD Drive
- DVD Drive
- Dedicated Ethernet
- Fan Air Baffle
- Fan
- All PCI Adapters
- Power Supply
- RAID Base Card
- RAID Auxiliary Card
- RAID Auxiliary card battery

- Thermal Card (TPMD)
- VPD card
- Adapter - GX +
- Line/power cord
- Keyboard
- Mouse
- External cables
- Display

Feature numbers or models for which there is a maintenance charge:

```
8233-E8B Type/Model

8233-E8B Feature Number 0551
8233-E8B Feature Number 0553
8233-E8B Feature Number 0555
8233-E8B Feature Number 1890
8233-E8B Feature Number 1909
8233-E8B Feature Number 3586
8233-E8B Feature Number 3587
8233-E8B Feature Number 5619
8233-E8B Feature Number 5661
8233-E8B Feature Number 5746
8233-E8B Feature Number 5786
8233-E8B Feature Number 5802
8233-E8B Feature Number 5877
8233-E8B Feature Number 5886
8233-E8B Feature Number 7535
8233-E8B Feature Number 7536
8233-E8B Feature Number 8332
8233-E8B Feature Number 8334
8233-E8B Feature Number 8335
8233-E8B Feature Number 8336
```

Machine Exchange Service: IBM will initiate shipment of a replacement machine to your location. You are responsible for its installation and verification of operation. You must pack the failed machine into the shipping container that contained the replacement machine and return the failed machine to IBM. Transportation charges, both ways, are paid by IBM. You may be charged for the replacement machine if IBM does not receive the failed machine within 15 days of your receipt of the replacement.

Non-IBM parts support

Under certain conditions, IBM repairs selected non-IBM parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

IBM Service provides hardware problem determination on non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines covered under warranty service upgrades or maintenance services and provides the labor to replace the failing parts at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

Warranty service upgrades

Usage plan machine

No

IBM hourly service rate classification

Three

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Maintenance service offerings

This machine is eligible under Terms and Conditions of the IBMServiceSuite, the IBM Enterprise Service Agreement (ESA) or under the IBM Maintenance Agreement. Consult your IBM representative for details.

Field-installable features

Yes

Model conversions

No

Machine installation

Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

Graduated program license charges apply

Yes. The applicable processor tier is Small.

Licensed machine code

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement by contacting your IBM representative or visiting

http://www-1.ibm.com/servers/support/machine_warranties/ machine_code.html

Machine using LMC Type Model -xxx

IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBMpSeries technical support Web site

http://techsupport.services.ibm.com/server/mdownload

If the machine does not function as warranted and your problem can be resolved through your application of downloadable machine code, you are responsible for downloading and installing these designated machine code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged for that service.

Europe Business Partner terms and conditions

EMEA Business Partner Terms and Conditions

For more information, Business Partners should refer to the relevant product exhibits on

https://www.ibm.com/partnerworld/mem/bpal/emea/exhibit/index.jsp

Prices

For all local charges, contact your IBM representative.

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Corrections

(Corrected on March 5, 2010)
The Description and Technical information sections were revised.