The new IBM Power 780 system utilizes the latest POWER7 processor technology designed to deliver unprecedented performance, scalability, reliability, and manageability for demanding commercial workloads

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At a glance

The Power® 780 enterprise server is designed to deliver outstanding price/performance, mainframe-inspired reliability and availability features, flexible capacity upgrades, and innovative virtualization technologies. The Power 780 features:

• Up to 64 POWER7 cores with four processor cards per server

- One POWER7 processor card per CEC enclosure: 16-core at 3.86 GHz or 8-core at 4.14 GHz (TurboCore)
- Up to 2.0 TB of DDR3 memory with frequencies up to 1,066 MHz, augmented with the optional Active Memory™ Expansion
- Up to six SAS Small Form Factor drives (disk or SSD) per CEC enclosure
- Eight I/O expansion slots (6 PCIe and 2 GX++) per enclosure (up to 32 slots without using I/O drawers)
- Up to 184 PCIe slots or up to 192 PCI-X DDR per system using I/O drawers
- Logical partitions -- up to 160 per system (optional) increasing to 640 per system per the PowerVM™ SOD

Overview

The new IBM® Power 780 server (9179-MHB) utilizes the latest POWER7 processor technology designed to deliver unprecedented performance, scalability, reliability, and manageability for demanding commercial workloads.

The innovative IBM Power 780 server with POWER7 processors is a symmetric multiprocessing (SMP), rack-mounted server. This modular-built system uses one to four enclosures; each enclosure is four EIA units tall, and is housed in a 19-inch rack. Each of the four system enclosures contains one powerful POWER7 processor card, comprised of two single-chip module processors. Each of the POWER7 processors in this server has 64-bit architecture and includes up to eight cores on a single-chip module (SCM), and contains 2 MB of L2 cache (256 KB per core) and 32 MB of L3 cache (4 MB per core). Each POWER7 SCM processor is available at frequencies of 3.86 GHz with eight cores and 4.14 GHz with four cores. This new model server is available starting as low as four active cores and incrementing one core at a time through built-in Capacity on Demand (CoD) functions.

What makes the Power 780 truly unique is the ability to switch between its standard throughput optimized mode and its unique TurboCore mode, where performance per core is boosted with access to both additional cache and additional clock speed. Based on the user's configuration option, any Power 780 system can be booted in standard mode, enabling up to a maximum of 64 processor cores running at 3.86 GHz, or in TurboCore mode, enabling up to 32 processor cores running at 4.14 GHz and twice the cache per core.

The POWER7 DDR3 memory uses a new memory architecture to provide greater bandwidth and capacity. This enables operating at a higher data rate for large memory configurations. Each new POWER7 processor can support up to eight DDR3 DIMMs running at speeds up to 1,066 MHz. A full system can contain up to 2.0 TB of memory (delayed general availability of large DIMMs). Memory can be augmented with the optional Active Memory expansion.

Key prerequisites

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

- AIX 5.3 with the 5300-11 Technology Level and Service Pack 2, or later
- AIX 5.3 with the 5300-10 Technology Level and Service Pack 4, or later, available May 28, 2010
- AIX 5.3 with the 5300-09 Technology Level and Service Pack 7, or later, available May 28, 2010
- AIX 6.1 with the 6100-04 Technology Level and Service Pack 3, or later
- AIX 6.1 with the 6100-03 Technology Level and Service Pack 5, or later, available June 25, 2010
- AIX 6.1 with the 6100-02 Technology Level and Service Pack 8, or later, available June 25, 2010

If installing the IBM i operating system:

- IBM i 6.1 with 6.1.1 machine code, or later

Visit the IBM Prerequisite Web site for compatibility information for hardware features and the corresponding AIX and IBM i Technology Levels

  http://www-912.ibm.com/e_dir/eserverprereq.nsf

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

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

If installing VIOS:

- VIOS 2.1.2.12 with Fix Pack 22.1 and Service Pack 2, or later

If installing Java™ 1.4.2 on POWER7 servers:

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, refer to the following Web site

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

Planned availability date

- March 16, 2010, for IBM Power 780 server and all features, including the following MES orderable features:
  - Processor activation (#5469)
  - Memory activations (#8212, #8213)
  - COD (#7633, #7634, #7635, and #7636)
  - Secondary Operating System (#0265, #0266, and #0267)
- June 4, 2010, for model conversion (9117-MMA to 9179-MHB), upgrades, and all additional MES orderable features
- June 18, 2010, for the Base Customer Specified Placement feature (#8453)
- November 19, 2010, for Hot-node Add, memory upgrade, Hot-node Repair, and 128 GB memory feature (#5602)

Description

Summary of features

The following features are available on the Power 780:

- 4U 19-inch rack-mount system enclosure
- One to four system enclosures: 16U maximum system size
- One processor card feature per enclosure (includes the voltage regulator):
  - 0/16 way, 3.86 GHz or 0/8 way, 4.14 GHz (TurboCore) processor card (#4982)
- POWER7 DDR3 Memory DIMMs (16 DIMM slots per processor card):
  - 0/32 GB (4 X 8 GB), 1,066 MHz (#5600)
  - 0/64 GB (4 X 16 GB), 1,066 MHz (#5601)
  - 0/128 GB (4 X 32 GB), 800 MHz (#5602)

- Six hot-swappable, 2.5-inch, small form factor, SAS disk or SSD bays per enclosure
- One hot-plug, slim-line, SATA media bay per enclosure (optional)
- Redundant hot-swap AC power supplies in each enclosure
- Choice of integrated (HEA) I/O options -- one per enclosure:
  - Quad 1 Gb Ethernet
  - Dual 10 Gb Optical + Dual 1 Gb Ethernet
  - Dual 10 Gb Copper + Dual 1 Gb Ethernet
- One serial port, three USB ports per enclosure (maximum nine per system)
- Two HMC ports per enclosure (maximum four per system)
- Eight I/O expansion slots per enclosure (32 maximum per system):
  - Six PCIe 8x slots plus two GX++ slots per enclosure
- Dynamic LPAR support, Processor and Memory CUoD
- PowerVM (optional):
  - Micro-Partitioning™
  - Virtual I/O Server (VIOS)
  - Automated CPU and memory reconfiguration support for dedicated and shared processor logical partition (LPAR) groups
  - Support for manual provisioning of resources partition migration (PowerVM - Enterprise Edition)
- Optional PowerHA for AIX, IBM i, and Linux
- 12X I/O drawer with PCI slots:
  - Up to 16 PCIe I/O drawers (#5802 or #5877)
  - Up to 32 PCI-X DDR I/O drawers (7314-G30 or feature #5796)
- Disk-only I/O drawers:
  - Up to 110 EXP 12S SAS DASD/SSD I/O drawers on SAS PCI controllers (#5886)
  - Up to 60 EXP24 SCSI DASD Expansion drawers on SCSI PCI controllers (7031-D24 or feature #5786)
- IBM Systems Director Active Energy Manager™

Processors

- SMP and FSP cable features are required when connecting the processors together for two-, three-, and four-drawer CEC enclosures.

```
            SMP cables          FSP cables

Two-drawer   3711, 3712         3671
Three-drawer 3712, 3713         3671, 3672
Four-drawer  3712, 3713, 3714   3671, 3672, 3673
```

- A system can have from one to four CEC enclosures, and each CEC enclosure requires one processor card. Each processor card has two SCM processors.
- The processor card feature must be populated with POWER7 DDR3 Memory DIMMs.
- All processor cards in the system must have the same feature number.
- Each system must have a minimum of four active processors.
- Processor Capacity on Demand activations will activate processor hardware only in the system serial number they are purchased for. If you move processor hardware to another system the processor may not be functional in that system until arrangements are made to move the processor activations or purchase additional processor activations. Contact your IBM representative or IBM Business Partner for more information.
- Processor #4982 can run in standard or TurboCore mode. TurboCore mode restricts the system from utilizing all of the processor cores in the system. A maximum of half of the physical cores can be utilized when in TurboCore mode. To

utilize more than 50% of the processors present in the system, switch the system out of TurboCore mode and reboot the system. The entire system must operate in either standard or TurboCore mode.

Memory

- Each processor card feature must have a minimum of one memory feature (one feature per processor card) installed. This includes inactive processor card features present in the system.
- Memory features include a total of four DIMMs. There is a required plug location for every memory feature attached to a processor.
- All POWER7 memory features must be purchased with sufficient permanent memory activation features so that the system memory is at least 50% active.
- Each system must contain a minimum of 16 GB of active system memory.
- Memory features 5600, 5601, and 5602 can be mixed on the same POWER7 processor module. Frequencies must be the same across the memory controller (four DIMM slots).
- All processor cards have 16 memory DIMM slots (eight per processor) and must be populated with POWER7 DDR3 Memory DIMMs.
- Memory Capacity on Demand activations will activate memory hardware only in the system serial number they are purchased for. If you move memory hardware to another system, the memory may not be functional in that system until arrangements are made to move the memory activations or purchase additional memory activations. Contact your IBM representative or IBM Business Partner for more information.
- It is 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.
- 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.

I/O Drawer availability

- To further reduce possible single points of failure, POWER7 implements enhanced disk storage configuration rules. IBM configuration tools and IBM technical support personnel do not support integrated cached disk controller configurations unless they have a protected write cache. Disk controllers with write cache must protect the cache either by pairing the disk controllers (write cache replication or IOA-level mirroring) or by using an auxiliary write cache IOA. This is true for all partitions in the Power 780 using any operating systems.
- It is recommended that any attached remote I/O drawers be located in the same rack as the Power 780 server for ease of service, but they can be installed in separate racks if the application or other rack content requires it.
- The following is a list of the I/O drawers that are supported or available on the model 780, with the correct interface to use for each of the drawers and the maximum number of attached I/O drawers:

```
         Order                                      Maximum
Feature  description                 Status    Interface number

5786     EXP24 SCSI Disk Drwr        Supported  SCSI     60
5796     PCI-X DDR 12X I/O Drwr      Available  12X      32
5802     PCIe 12X I/O Drwr (disk bays)  Available  12X   16
5877     PCIe 12X I/O Drwr (No disk bays) Available 12X  16
5886     EXP 12S SAS Disk Drwr       Available  SAS      110
7031-    EXP24 SCSI Disk Drawer/Tower Supported  SCSI    60
 D24/T24
7314-G30 PCI-X DDR 12X I/O Drawer    Supported  12X      32
```

The following I/O drawer features are available on the Power 780:

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 #7314 drawer mounting enclosure. The 4 EIA tall enclosure can hold up to two #5796 drawers mounted side by side in the enclosure. The drawer is 31.5 inches deep and can weigh up to 44 pounds. The PCI-X DDR 12X Expansion Drawer has six 64-bit, 3.3V, 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 #5796 drawer: 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. Feature #5796 attaches to a host system CEC enclosure with a 12X adapter in a GX++ slot via SDR and/or DDR cables. A maximum of four feature 5796 drawers can be placed on the same 12X loop. Mixing features 5802/5877 and 5796 on the same loop is not supported. Mixing #5796 and 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), two AC power cables, and two SPCN cables is required to ensure proper redundancy.

PCIe 12X I/O Drawer (#5802 and #5877)

The PCIe 12X I/O drawer is a 19-inch I/O and storage drawer. It provides a 4 EIA unit tall drawer containing ten PCIe-based I/O adapter slots and eighteen SAS hot-swap Small Form Factor disk bays, which can be used for either disk drives or SSD, organized into two groups of nine. Each group of disk slots is controlled by one or two PCIe SAS storage adapters located in a PCIe slot in the same #5802 as the SAS drives. A maximum of two #5802 drawers can be placed on the same 12X loop. Mixing #5802 and #5796/7314-G30 on the same loop is not supported. Feature #5877 is the same as #5802 except it does not support any disk bays. Feature #5877 can be on the same loop as #5802. Feature #5877 can not be upgraded to #5802. The physical dimensions of the drawer measure 17.5 inches (444.5 mm) wide by 7.0 inches (177.8 mm) high by 28.0 inches (711.2 mm) deep for use in a 19-inch rack. The adapter slots use blind swap cassettes and support hot plugging of adapter cards. A minimum configuration of two 12X DDR cables, two DC 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 DDR cables available in different cable lengths: 0.6 (#1861), 1.5 (#1862), 3.0 (#1865), or 8 meters (#1864). The 12X SDR cables are not supported.

EXP 12S SAS Drawer (#5886)

The EXP 12S SAS Drawer (#5886) is a 2 EIA tall drawer and mounts in a 19-inch rack. The drawer can hold either SAS disk drives or SSDs. The drawer is 20.12 inches long and can weigh up to 40 pounds, without SAS disks. The EXP 12S SAS Drawer has twelve 3.5-inch SAS 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, or ESM). Each ESM has an independent SCSI Enclosure Services (SES) diagnostic processor.

The SAS disk drives or SSDs contained in the EXP 12S are controlled by one or two PCIe SAS adapters connected to the EXP 12S via SAS cables. The SAS cable will vary depending on the adapter being used, the operating system being used, and the protection desired.

- The large cache PCI-X #5908 uses a SAS Y-cable when a single port is running the EXP 12S. A SAS X-cable is used when a pair of adapters are used for controller redundancy.
- The medium cache PCI-X #5902 and PCIe #5903 adapters are always paired and use a SAS X-cable to attach the #5886 I/O drawer.
- The zero cache PCI-X #5912 and PCIe #5901 use a SAS Y-cable when a single port is running the EXP 12S. 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 EXP 12S 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 #5886 can also be directly attached to the SAS port on the rear of the Power 780, providing a very-low-cost disk storage solution. When used this way, the embedded SAS RAID controllers augmented by the 175 MB Cache RAID (#5662) in the system unit control the disk drives in EXP 12S. A second unit can not be cascaded to a #5886 attached in this way.

12X I/O Drawer Cables

- I/O drawers are connected to the adapters in the CEC enclosure with the following cables: data transfer cables (12X DDR cables for the #5802 and #5877 I/O drawers and 12X SDR and/or DDR cables for the #5796 and 7314-G30 I/O drawers) and power control cables.
- 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.
- PCIe 12X cable choices: The PCIe 12X drawer attaches to the host CEC enclosure with a 12X adapter in a GX++ slot via 12X DDR cables available in different cable lengths: 1.5 (#1862), 3.0 (#1865), or 8 meters (#1864).
- PCI-X DDR 12X cable choices: Each 5796 drawer requires one Dual-Port PCI-X DDR 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 Range adapter can be mixed in a single loop with I/O drawers containing the Long Range 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.

PCI-X DDR 12X cable options

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

```
5796 with 12X Long Run
adapter (#6457) to
system unit            No          Yes         Yes         Yes
```

[1] The PCI-X DDR 12X cable (#1829 or #1861 or #1862) is limited to connecting two drawers or server to drawer if in the same rack and within 20 EIA; It has very limited use due to its short length. It cannot be used to connect to a system drawer because of the short length. It is intended for use between two feature #5796 or G30 drawers mounted side by side in the same enclosure (#7314). It can also be used to connect two modules located one beneath the other in a 7014 rack.

[2] The PCI-X DDR 12X cable (#1840 or #1865) is limited to connecting CEC to drawer if in the same rack and further than 20 EIA; 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).

[3] The PCI-X DDR 12X cable (#1834 or #1864) is limited to connecting CEC to drawer if in different racks. It is intended for use when connecting two modules that are located in adjacent racks. This cable may not be connected to the 12X Short Run adapter (#6446).

19-inch Racks

The 9179-MHB and its I/O drawer features are designed to mount in the 7014-T00, -T42, #0551, and #0553 racks. These are built to the 19-inch EIA standard. When ordering a new 9179 system the appropriate 7014 rack model can be ordered with the system hardware on the same initial order. IBM also makes the racks available as features of the 9179-MHB when you order additional I/O drawer hardware for an existing system (MES order). The rack feature #0551 and #0553 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.

The 9179-MHB has the following rack requirements:

• The Power 780 may be ordered without a rack.

• The Power 780 consists of one to four CEC enclosures. Each enclosure occupies 4U of vertical rack space. The Power 780 is designed to be installed in a 7014-T00 or -T42 rack and shipped from IBM to the client. An existing 7014-T00, -T42, #0551, or #0553 rack can be used for the Power 780 if sufficient space and power are available.

• The 36 EIA unit (1.8 meter) rack (#0551) and the 42 EIA unit (2.0 meter) rack (#0553) are available for order on MES upgrade orders only. For initial system orders, the racks should be ordered as machine type 7014, model T00 or T42.

• For Power 780 configurations with two, three, or four drawers, all drawers must be installed together in the same rack, in a contiguous space of 8U, 12U, or 16U within the rack. The uppermost enclosure in the system is the base enclosure. This enclosure will contain the active Service Processor and the Operator Panel, if an Operator Panel is present in the system. If a second CEC enclosure is part of the system, the backup service processor is contained in the second CEC enclosure. The service processor is a component of the Service Interface Card in these enclosures.

• When a Power 780 server is installed in a 7014-T00 or -T42 rack that has no front door, a Thin Profile Front Trim Kit must be ordered for the rack. The required trim kit for the 7014-T00 rack is feature number 6263. The required trim kit for the 7014-T42 rack is feature number 6272. When upgrading from a 9117-MMA, trim kit 6246 or 6247 may be used for one drawer enclosure only.

• The design of the Power 780 is optimized for use in a 7014-T00, -T42, #0551, or #0553 rack. Both the front cover and the processor flex cables occupy space on the front left and right sides of an IBM 7014 or #055x rack that may not be available in typical non-IBM racks.

• Acoustic Door features are available with the 7014-T00, -T42, #0551, and #0553 racks to meet the lower acoustic levels identified in the specification section of this document. The Acoustic Door feature can be ordered on new T00, T42, #0551,

and #0553 racks or ordered for the T00, T42, #0551, and #0553 racks that clients already own.

- A Power 780 door (#6250) is available on the 7014-T42 rack.

1.8 Meter Rack (#0551)

The 1.8 Meter Rack (#0551) is a 36 EIA unit rack. The rack that is delivered as #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 #0551. Order the #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 rack. The rack that is delivered as #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 #0553. Order the #0553 only when required to support rack integration of MES orders prior to shipment from IBM.

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; the included features may be different.

Integrated I/O

- Although each CEC enclosure is equipped with serial port external connectors, these ports do not function with the attachment of the required HMC.
- Each CEC enclosure must contain one Virtual Ethernet (HEA) Integrated I/O port card (#1803, #1804, or #1813).
- Each system has two HMC ports on the Service Interface Card in each CEC enclosure. If there are two CEC enclosures, the HMC must be connected to both service interface cards.

Disks, media, and boot devices

- A device capable of reading a DVD must be attached to the system and available to perform operating system installation, maintenance, problem determination, and service actions such as maintaining system firmware and I/O microcode at their latest levels. Alternatively, the system must be attached to a network with an AIX NIM server configured to perform these functions.
- System boot is supported via DASD or SSD located in the CEC enclosure, located in a DASD drawer attached to a PCI adapter or located in a 12X I/O drawer attached to a GX++ adapter, or from a network via LAN adapters.
- The minimum system configuration requires at least one SAS disk drive in the system for AIX and Linux and two for IBM i, or if using a Fibre Channel attached SAN (indicated by feature number 0837) a disk drive is not required. Attachment of the SAN using a Fibre Channel over Ethernet connection is also supported.
- Each CEC enclosure can support one media device when the Disk/Media Enclosure and Backplane feature (#5652) is ordered. Any supported DVD-RAM drive can be installed. Each system can support up to four media devices in the CEC enclosure -- a maximum of one in each enclosure.
- The model MHB supports only the SAS SFF DASD hard disks internally. The 3.5-inch DASD hard files can be attached to the model MHB but must be located in a #5886 EXP 12S I/O drawer.
- When ordering feature #1819, you must also order #5662. This applies to MES orders of #1819 unless #5662 is already present in the same CEC drawer. Feature #1815 and #5662 cannot be installed in the same drawer. Feature #1819 must not be installed in a drawer unless #5662 is also installed.

I/O slots and adapters

- Each Power 780 CEC enclosure has six full-length, 8X, PCIe slots and two GX++ slots.
- There is a maximum of eight I/O expansion slots per enclosure (32 maximum per system):

  ```
  Slot ID    Adapter   Type   Slot size

  P2-C1      PCIe      8X     Full length
  P2-C2      PCIe      8X     Full length
  P2-C3      PCIe      8X     Full length
  P2-C4      PCIe      8X     Full length
  P2-C5      PCIe      8X     Full length
  P2-C6      PCIe      8X     Full length
  P1-C2      GX++
  P1-C3      GX++
  ```

- The Power 780 I/O slot population rules are complex. Extensive configuration rules and checking procedures are incorporated into the Marketing Configurator ECFGPWR to help ensure a valid system configuration. Configurations generated without using the ECFGPWR configurator may create orders that cannot be built, resulting in possible order rejection or delayed delivery.
- Feature maximum limits in the feature descriptions of this document for adapters and devices may not provide optimal system performance. These limits are given to assist with connectivity and functional assurance. The maximum values shown here apply to the features installed in the system CEC enclosures. Adding remote I/O drawers will increase these limits.

Power

- Each Power 780 server with two or more CEC enclosures must have one Power Control Cable (#6006 or similar) to connect the Service Interface Card in the first enclosure to the Service Interface Card in the second enclosure.
- Two AC power supplies are required for each CEC enclosure; the second power supply provides redundant power for enhanced system availability. A CEC enclosure will continue to function with one working power supply. A failed power supply can be hot swapped but must remain in the system until the replacement power supply is available for exchange.

Power Distribution Units

For systems installed in IBM 7014 or #055x racks, the following Power Distribution Unit (PDU) rules apply (not all PDUs are available in all models of the 7014 or #055x):

- For PDU features 7188 and 7109 when using power cord feature 6654, 6655, 6656, 6657, or 6658: Each pair of PDUs can power up to three Power 780 CEC enclosures.
- For PDU features 7188 and 7109 when using power cord feature 6489, 6491, 6492, or 6653: Each pair of PDUs can power up to seven Power 780 CEC enclosures.

To provide full redundancy, each server drawer has two power supplies, which must be connected to separate PDUs.

Hot-plug options

- The following options are hot-plug capable:
  - GX++ adapters.
  - System AC power supplies: One functional power supply must remain installed at all times while the system is operating.
  - Disk drives.
  - Most PCIe adapters.

– Media devices.

- Hot-plug procedures are contained in the Customer Information Center on IBM.com.
- If the system boot device or system console is attached using an I/O adapter feature, that adapter may not be hot-plugged.

Logical partitioning

- Without PowerVM, Dynamic LPAR allows one partition per processor.
- Up to 10 partitions per processor are supported when PowerVM (#7942 or #7995) is ordered.
- For Linux partitions, a DVD-RAM and a Media Enclosure and Backplane (#5652) are required.

Available backplane configurations

The Power 780 CEC drawer has an extremely flexible and powerful backplane for supporting disk or Solid State Drives. The six SFF bays can be configured in three different ways to match your business needs. There are two built-in SAS controllers which can be optionally augmented with a 175 MB Cache RAID Battery Card. Two embedded SAS disk/SSD controllers are provided for redundancy or for additional flexibility. The optional 175 MB Cache RAID - Dual IOA Enablement Card (#5662) enables dual 175 MB write cache and provides dual batteries for protection of that write cache.

The backplane can be configured as one set of six bays, two sets of three bays (3/3), or three sets of two bays (2/2/2). Configuration options will vary depending upon the controller options and the operating system selected. The controllers for the six-bay (3/3) configurations are always the two embedded controllers. But if the 2/2/2 configuration is used, the two embedded controllers run the first two sets of bays (2/2) and a #5901 PCIe SAS adapter located in a PCIe slot in a CEC enclosure controls the third set (2). By having three controllers, you can have three boot drives supporting three partitions.

The following SSD/HDD configuration rules apply:

- You can mix SSD and HDD drives when configured as one set of six bays.
- If you want to have both SSD and HDD within a 3/3 split configuration, you must use the same type of drive within each set of three. You can not mix SSD and HDD within a subset of three bays.
- If you want to have both SSD and HDD within a 2/2/2 split configuration, you must use the same type of drive within each set of two. You can not mix SSD and HDD within a subset of two bays. The #5901 PCIe SAS adapter that controls the remaining two bays in a 2/2/2 configuration does not support SSD.

You can configure the two embedded controllers together as a pair for higher redundancy or you can configure them separately. If you configure them separately, they can be owned by different partitions or they could be treated independently within the same partition. If configured as a pair, they provide controller redundancy and can automatically switch over to the other controller should one have problems. Also, if configured as a pair, both can be active at the same time (active/active) assuming there are two or more arrays configured, providing additional performance capability as well as redundancy. If configured as a pair, the pair controls all six SFF bays and both see all six drives. The 3/3 and 2/2/2 configurations are not used with the paired controllers. RAID 0 and RAID 10 are supported and you can also mirror two sets of controller/drives using the operating system.

Adding the optional 175 MB Cache RAID - Dual IOA Enablement Card (#5662) causes the pair of embedded controllers in that CEC drawer to be configured as dual controllers, accessing all six SAS drive bays. Without the #5662, each of the two controllers can access only two or three SAS drive bays. With the 175 MB Cache RAID - Dual IOA Enablement Card, you can get controller redundancy, additional RAID protection options, and additional I/O performance. RAID 5 (a minimum of

three drives required) and RAID 6 (a minimum of four drives required) are available when configured as dual controllers with one set of six bays.

Another expansion option available using the paired embedded controller configuration with the 175 MB Cache RAID - Dual IOA Enablement Card feature is a SAS expansion port. The SAS expansion port can add more SAS bays to the six bays in the system unit. A #5886 SAS disk drawer is attached using a SAS port on the rear of the processor drawer and its twelve SAS bays are run by the pair of embedded controllers. The pair of embedded controllers are now running 18 SAS bays (six SFF bays in the system unit and twelve 3.5-inch bays in the drawer). The disk drawer is attached to the SAS port with a SAS YI cable and the embedded controllers are connected to the port using a #1819 cable assembly. In this 18-bay configuration all drives must be HDD.

IBM i supports configurations using one set of six bays but does not support logically splitting the backplane into 3/3 or 2/2/2. Thus, the 175 MB Cache RAID - Dual IOA Enablement Card (#5662) is required if IBM i is to access any of the SAS bays in that CEC drawer. AIX and Linux support configurations using two sets of three bays (3/3) or three sets of two bays (2/2/2) without #5662. With #5662, they support dual controllers running one set of six bays.

The system backplane also includes a third embedded controller for running the DVD-RAM drive in the CEC drawer. Since the controller is independent from the two SAS disk/SSD controllers, it allows the DVD to be switched between multiple partitions without impacting the assignment of disk or SSD in the CEC drawer.

Capacity on Demand

Several types of Capacity on Demand (CoD) are optionally available on the Power 780 server to help meet changing resource requirements in an on demand environment by using resources installed on the system but not activated.

Capacity Upgrade On Demand

Capacity Upgrade on Demand (CUoD) allows you to purchase additional permanent processor or memory capacity and dynamically activate it when needed.

On/Off Capacity on Demand

On/Off CoD enables processors or memory to be temporarily activated in full-day increments as needed. Charges are based on usage reporting collected monthly. Processors and memory may be activated and turned off an unlimited number of times, whenever you want additional processing resources. This offering provides a system administrator an interface at the HMC to manage the activation and deactivation of resources. A monitor that resides on the server logs the usage activity. You must send this usage data to IBM monthly. A bill is then generated based on the total amount of processor and memory resources utilized, in increments of Processor and Memory (1 GB) Days. Before using temporary capacity on your server, you must enable your server. To do this, order an enablement feature (MES only) and sign the required contracts.

If a Power 780 server uses the IBM i operating system in addition to any other supported operating system on the same server, you must inform the sales team placing the billing feature order which operating system caused the temporary On/Off CoD processor use so that the correct feature can be used for billing.

The following features are used to order enablement codes and support billing charges on the Power 780:

```
IBM i
                     On/Off CoD  On/Off CoD  On/Off CoD
                     Processor   Processor   Processor
          Processor  Enablement  Billing     Billing
Model     Feature    Feature     Feature     Feature

MHB       4982       7951        7635        7636
```

Model	Memory Features	On/off CoD Memory Enablement Feature	On/off CoD Memory Billing Feature
MHB	5600	7954	7377
MHB	5601	7954	7377
MHB	5602	7954	7377

The On/Off CoD process consists of three steps: Enablement, Activation, and Billing.

1. On/Off CoD Enablement: Description

   Before requesting temporary capacity on a server, you must "enable" it for On/Off CoD. To do this, order an enablement feature (MES only) and sign the required contracts. IBM will generate an enablement code, mail it to you, and post it on the Web for you to retrieve and enter on your server. A processor enablement code lets you request up to 360 processor days of temporary capacity. If you have reached the limit of 360 processor days, place an order for another processor enablement code to reset the number of days you can request to 360. A memory enablement code lets you request up to 999 memory days of temporary capacity. If you have reached the limit of 999 memory days, place an order for another memory enablement code to reset the number of days you can request to 999.

   On/Off CoD Enablement: Step-by-Step

   Prerequisite 1: The sales channel (IBM Business Partner) must sign one of the following contracts, if applicable:

   – IBM Business Partner Agreement, Distributor Attachment for On/Off Capacity On Demand
   – IBM Business Partner Agreement for Solution Providers -- Attachment for On/Off Capacity On Demand
   – IBM Business Partner Agreement -- Attachment for On/Off Capacity On Demand

   Prerequisite 2: The sales channel (IBM Business Partner or IBM Direct) must register at the following Web site

   http://www.ibm.com/servers/eserver/iseries/ondemand/cod

   – Step 1: The client initiates the request for On/Off CoD use by asking the sales channel to enable the machine for temporary capacity.
   – Step 2: The client must complete and sign the following contracts. It is the sales channel's responsibility to return the signed contract to the responsible CSO organization and fax a copy to IBM at 507-253-4553 or e-mail a copy to tcod@us.ibm.com.

     -- Required: IBM Customer Agreement, Attachment for On/Off Capacity On Demand; IBM Supplement for On/Off Capacity On Demand
     -- Optional: IBM Addendum for On/Off Capacity On Demand Alternative Reporting

   – Step 3: The sales channel places an order for processor or memory enablement features.
   – Step 4: The sales channel updates the Web site registration data (see prerequisite 2 above) with information about the customer machine being enabled for temporary capacity. **Note:** The order for an enablement feature will not be fulfilled until this step is completed.
   – Step 5: IBM generates an enablement code, mails it, and posts it.
   – Step 6: The customer retrieves the enablement code and applies it to the server.

2. On/Off Activation Requests: Description

   When On/Off CoD temporary capacity is needed, simply use the HMC menu for On/Off CoD and specify how many of the inactive processors or how many GB of memory you would like temporarily activated for some number of days. You will be billed for the days requested, whether the capacity is assigned to partitions or left in the shared processor pool. At the end of the temporary period (days you

requested), you must ensure the temporarily activated capacity is available to be reclaimed by the server (not assigned to partitions), or you will be billed for any unreturned processor days (per the contract you signed).

On/Off CoD Activation Requests: Step-by-Step

When there is a need for temporary capacity, use the On/Off CoD temporary capacity HMC menu for the server and specify how many of the inactive processors or how many GB of memory you would like temporarily activated for some number of days. The user must assign the temporary capacity to a partition (whether or not the machine is configured for LPAR) to begin using temporary capacity.

3. **On/Off CoD Billing: Description**

The contract, signed by the client before receiving the enablement code, requires the On/Off CoD user to report billing data at least once a month (whether there is activity or not). This data is used to determine the proper amount to bill at the end of each billing period (calendar quarter). Failure to report billing data for use of temporary processor or memory capacity during a billing quarter will result in default billing equivalent to 90 processor days of temporary capacity. The sales channel will be notified of customer requests for temporary capacity. As a result, the sales channel must order a quantity of billing features (one feature for each billable processor and memory day reported).

On/Off CoD Billing: Step-by-step

The client must report billing data (requested and unreturned processor and memory days) at a minimum of once per month either electronically or via fax (stated requirement in the signed contract). At the end of each billing period (calendar quarter), IBM will process the accumulated data reported and notify the sales channel for proper billing. The sales channel places an order for the appropriate quantity of billing features (one processor billing feature ordered for each processor day used, or one memory day for each memory day utilized). IBM will ship a billing notice (notifies customer of billing actions) to the ship-to address on the order as part of the fulfillment process. The customer pays the sales channel and the sales channel pays IBM for the fulfillment of the billing features.

For more information regarding registration, enablement, and usage of On/Off CoD, visit

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

Utility CoD

Utility CoD autonomically provides additional processor performance on a temporary basis within the shared processor pool. Utility CoD enables you to place a quantity of inactive processors into the server's shared processor pool, which then becomes available to the pool's resource manager. When the server recognizes that the combined processor utilization within the shared pool exceeds 100% of the level of base (purchased/active) processors assigned across uncapped partitions, then a Utility CoD Processor Minute is charged and this level of performance is available for the next minute of use. If additional workload requires a higher level of performance, the system will automatically allow the additional Utility CoD processors to be used and the system automatically and continuously monitors and charges for the performance needed above the base (permanent) level. Registration and usage reporting for Utility CoD is made using a public Web site and payment is based on reported usage. Utility CoD requires PowerVM Standard Edition (#7942) or PowerVM Enterprise Edition (#7995) to be active on the 9179-MHB.

If a Power 780 server uses the IBM i operating system in addition to any other supported operating system on the same server, the client must inform the sales team placing the billing feature order which operating system caused the temporary Utility CoD processor use so that the correct feature can be used for billing.

```
           Utility
           Billing
           Processor
Model   Feature    Utility CoD Feature Description


MHB     7633       100 Processor Minutes for #4982
MHB     7634       100 Processor Minutes for #4982, IBM i
```

For more information regarding registration, enablement, and use of Utility CoD, visit

http://www-947.ibm.com/systems/support/planning/capacity/index.html

Trial Capacity on Demand (Trial CoD)

Clients can request either a Standard or an Exception Trial by visiting

https://www-912.ibm.com/tcod_reg.nsf/TrialCod?OpenForm

Software licensing

For software licensing considerations with the various CoD offerings, refer to the latest revision of the *Capacity on Demand Planning Guide* at

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

Services

IBM Server Product Services offer implementation and migration services to help you put your IBM Power System server quickly into your production environment in order to support your business applications. These services include in-depth planning sessions to help ensure the end result is in line with your requirements. A variety of product services are available to suit your needs. Our goal is to continually enhance these offers to provide you with a comprehensive selection of services. To see what IBM can do for you, visit

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

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 and software installation
  - Customer-specified placement
- Asset tagging: Standard tagging Radio Frequency Item Device (RFID)
- Special packaging: Box consolidation
- System customization: Remote access partitioning of customized operating system or firmware

For more information on Deployment-ready Services, visit

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

PowerCare service

Included with Power 780 systems is a PowerCare services option, which entitles you to choose one of several high-value technical service offerings from IBM to complement and assist in the deployment of a new Power 780 system. This option is provided at no additional charge. By leveraging the skills, experiences, and proven methodology of IBM Services professionals, you can potentially increase the efficiency and quality of your complex data center operations.

The PowerCare option is included with new Power 780 systems and MES upgrades into a Power 780. PowerCare options are reviewed during the Power 780 Technical and Delivery Assessment (formerly known as the Systems Assurance Review). The customer has up to 90 days from the install date of the Power 780 to select a PowerCare service. Delivery of the selected service must be completed within nine months of the install date of the Power 780 system.

For more details on available PowerCare services options, visit

http://www-03.ibm.com/systems/power/support/powercare/

Model upgrades

You can upgrade the 9117-MMA with IBM POWER6™ or POWER6+™ processors to the IBM Power 780 with POWER7 processors. For upgrades from POWER6 or POWER6+ processor-based systems IBM will install new CEC enclosures to replace the enclosures you currently have. Your current CEC enclosures will be returned to IBM in exchange for the financial considerations that are identified under the applicable feature conversions for each upgrade.

Clients taking advantage of the model upgrade offer from a POWER6 or POWER6+ processor-based system are required to return all components of the serialized MT-model that were not ordered via feature numbers. Any feature for which a feature conversion is used to obtain a new part must be returned to IBM also. Clients may keep and reuse any features from the CEC enclosures that were not involved in a feature conversion transaction.

Upgrade considerations

Feature conversions have been set up for the following:

- POWER6 and POWER6+ processors to POWER7 processors
- DDR2 memory DIMMs to DDR3 memory DIMMs
- Trim kits (a new trim kit is needed when upgrading to a two-, three-, or four-drawer system)
- Enterprise enablement

The following features present on the current system can be moved to the new system:

- PCIe adapters with cables
- Line cords, keyboards, and displays
- PowerVM (#7942 and #7995)
- I/O drawers (#5786, #5796, #5802, #5877, and #5886)
- Racks (#0551, #0553, and #0555)
- Doors (#6068, #6069, #6248, #6249, and #6858)
- Trim kits (#6246 and #6247) - for one-drawer configurations only or for racks holding only I/O and no 780 processor enclosures
- SATA DVD-RAM (#5762)

The Power 780 can support the following drawers:

- #5802 and #5877 PCIe 12X I/O drawers
- #5797 and 7413-G30 PCI-X, 12X I/O Drawer
- #5786 and 7031-D24 TotalStorage® EXP24 SCSI Disk Drawer
- #5886 EXP 12S SAS Disk Drawer

The model MHB supports only the SAS DASD SFF hard disks internally. The older 3.5-inch DASD hard disks can be attached to the model MHB but must be located in an I/O drawer.

For POWER6 or POWER6+ processor-based servers that have the On/Off CoD function enabled, you must reorder the On/Off enablement features (#7951 and 7954) when placing the upgrade MES order for the new Power 780 server to keep the On/Off CoD function active. The On/Off enablement features should be removed from the configuration file before the MES order is started to initiate the model upgrade. Any temporary use of processors or memory owed to IBM on the existing system must be paid before installing the new Power 780 model MHB.

Feature number 8018 is available to support migration of the PowerVM feature 7942 during the initial order and build of the upgrade MES MHB order. Customers may add 8018 to their upgrade orders in a quantity not to exceed the quantity of feature 7942 obtained for the system being upgraded. The 7942 feature number should be migrated to the new configuration report in a quantity that equals 8018. Additional 7942 features can be ordered during the upgrade.

PowerVM

PowerVM is available on the 9179-MHB:

- PowerVM Editions are available as a hardware feature (#7942 for Standard Edition, #7995 for Enterprise Edition). Clients select the feature that provides the level of virtualization appropriate for their workloads.
- Micro-Partitioning allows a single processor core to be shared by up to 10 logical partitions.
- Virtual I/O Server (VIOS) is a single-function appliance that resides in an IBM POWER5™, POWER6, or POWER7 processor-based partition. It facilitates the sharing of physical I/O resources between client partitions (AIX V5.3 or later, IBM i V6.1, or Linux) within the server. VIOS provides virtual SCSI targets and shared Ethernet adapter (SEA) virtual I/O to client LPARs.
- Virtual SCSI (VSCSI) enables the sharing of physical storage adapters (SCSI and Fibre Channel) and storage devices (disk and optical) between logical partitions.
- With virtual networking, a shared Ethernet adapter enables connectivity between internal and external virtual LANs (VLANs); virtual Ethernet provides high-speed connections between partitions.
- PowerVM Lx86 supports running most x86 Linux applications within Linux partitions.
- Live Partition Mobility, available only with PowerVM Enterprise Edition, will allow you to move a running AIX or Linux LPAR from one physical server to another with no downtime if both servers are using POWER6 or POWER7 processors. This capability can be used to evacuate workloads from a system before performing scheduled maintenance, to move workloads across a pool of different physical resources as business needs shift, and to move workloads away from underutilized machines so that they can be powered off to save on energy and cooling costs.
- Active Memory Sharing allows memory to be dynamically moved between running partitions for optimal resource usage.

PowerVM Editions:

- PowerVM Standard Edition (#7942) supports up to 10 partitions per core, VIOS, PowerVM Lx86, and multiple shared processor pools.
- PowerVM Enterprise Edition (#7995) adds support for Live Partition Mobility and Active Memory Sharing.

Other PowerVM technologies include:

- Workload Partitions (WPARs): Provide isolated instances on top of a single AIX 6.1 image.
- Live Application Mobility (available with WPAR Manager): Provides the movement of a running AIX application from one server to another.
- System Planning Tool: Simplifies the process of planning and deploying Power Systems LPARs and virtual I/O.

Capacity BackUp Offering (applies to IBM i only)

The Power 780 server's Capacity BackUp (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 #4891 is available only as part of a new server purchase or during an MES upgrade from an existing system to a 9179-MHB. 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 fail-over 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 780 server can be:

- 9119-FHA
- 9406-595
- 9179-MHB

These systems have IBM i software licenses with an IBM i P50 software tier or higher. 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 may 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. Such messages that arise 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 may 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 an eight-core Power 780 as your primary system with four IBM i processor license entitlements (three above the minimum) and two 5250 Enterprise Enablement entitlements (one above the minimum), you can temporarily transfer up to three IBM i entitlements 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

Active Memory Expansion

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 based 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 Technology Level 4 allowing you to sample actual workloads and estimate both how expandable the partition's memory is and how much CPU resource is needed. Any model Power System 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, #4791, 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 that 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 can not 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.

IBM i operating system

For customers loading the IBM i operating system, the four-digit numeric QPRCFEAT value used on the 9179-MHB is the same as the four-digit numeric feature number for the processors used in the system. For example, if the processor feature number in a system is 4982, the QPRCFEAT value for the system would be 4982.

- The QPRCFEAT value in a Power 780 server does not change with the addition of more processors or additional CEC enclosures.
- The QPRCFEAT value in a Power 780 server would change only if the feature number of the processors was changed due to a processor upgrade.

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 the first half of 2010. For additional questions on the availability of this release, contact Red Hat.

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

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.

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice. Any reliance on these statements of general direction is at the relying party's sole risk and will not create liability or obligation for IBM.

Reference information

Refer to Hardware Announcement LG10-0030, dated February 09, 2010, for IBM Power 770 Server.

Product number

The following are newly announced features on the specific models of the IBM Power Systems 9179 machine type:

```
Description                                        MT   Model Feature

IBM Power 780                                      9179  MHB

Specify Code for External High Speed Modem         9179  MHB   0032

Mirrored System Disk Level, Specify Code           9179  MHB   0040
Device Parity Protection-All, Specify Code         9179  MHB   0041
Mirrored System IOP Level Specify Code             9179  MHB   0042
Mirrored System Bus Level, Specify Code            9179  MHB   0043
Device Parity RAID-6 All, Specify Code             9179  MHB   0047

RISC-to-RISC Data Migration                        9179  MHB   0205
AIX Partition Specify                              9179  MHB   0265
Linux Partition Specify                            9179  MHB   0266
IBM i Operating System Partition Specify           9179  MHB   0267
CSC Specify                                        9179  MHB   0275
Ext Tape Attached via #5736                        9179  MHB   0290
Specify Custom Data Protection                     9179  MHB   0296
Specify EXP24 Attach via Existing Controller       9179  MHB   0302
Mirrored Level System Specify Code                 9179  MHB   0308
IPCS Extension Cables for NT                       9179  MHB   0325
RAID Hot Spare Specify                             9179  MHB   0347
V.24/EIA232 6.1m (20-Ft) PCI Cable                 9179  MHB   0348
V.24/EIA232 15.2m (50-Ft) PCI Cable                9179  MHB   0349
V.35 6.1m (20-Ft) PCI Cable                        9179  MHB   0353
V.35 15.2m (50-Ft) PCI Cable                       9179  MHB   0354
V.36 6.1m (20-Ft) PCI Cable                        9179  MHB   0356
X.21 6.1m (20-Ft) PCI Cable                        9179  MHB   0359
X.21 15.2m (50-Ft) PCI Cable                       9179  MHB   0360
V.24/EIA232 (80-Ft) PCI Cable                      9179  MHB   0365
V.24/EIA232 6.1M (20-Ft) PCI Cable                 9179  MHB   0367

UPS Factory Integration Specify                    9179  MHB   0373
HMC Factory Integration Specify                    9179  MHB   0374
Display Factory Integration Specify                9179  MHB   0375
Reserve Rack Space for UPS                         9179  MHB   0376
Reserve Rack Space for HMC                         9179  MHB   0377
Reserve Rack Space for Display                     9179  MHB   0378
MTM Upgrade Indicator                              9179  MHB   0395
MMA/MMB/MHB upgrade indicator                      9179  MHB   0397
512MB DDR Server Memory                            9179  MHB   0446
1GB DDR Server Memory                              9179  MHB   0447
Customer Specified Placement                       9179  MHB   0453
SSD Placement Indicator - CEC                      9179  MHB   0462
SSD Placement Indicator (5802/5803)                9179  MHB   0463
SSD Placement Indicator - 5886                     9179  MHB   0464
IBM i 5.4 w/ V5R4M5 Specify Code                   9179  MHB   0533
IBM i 6.1 Specify Code                             9179  MHB   0534
19 inch, 1.8 meter high rack                       9179  MHB   0551
19 inch, 2.0 meter high rack                       9179  MHB   0553
19 inch, 1.3 meter high rack                       9179  MHB   0555
IBM i 6.1 with 6.1.1 Machine Code Specify Code     9179  MHB   0566
PCI-X Expansion Unit in Rack                       9179  MHB   0588
PCI/SCSI Disk Expansion Drawer                     9179  MHB   0595
Rack Filler Panel Kit                              9179  MHB   0599
#5094 Equivalent                                   9179  MHB   0694
#5096 Equivalent                                   9179  MHB   0696
Balanced Warehouse Solution Indicator              9179  MHB   0710
Load Source Not in CEC                             9179  MHB   0719
Load Source in #0595                               9179  MHB   0720
Load Source in #5094/5294                          9179  MHB   0721
Specify Load Source in #5786                       9179  MHB   0725
Specify Load Source in #5802/5803                  9179  MHB   0726
Specify #5886 Load Source placement                9179  MHB   0727
#4319 Load Source Specify                          9179  MHB   0830
#4326 Load Source Specify                          9179  MHB   0834
#4327 Load Source Specify                          9179  MHB   0835
#4328 Load Source Specify                          9179  MHB   0836
SAN Load Source Specify                            9179  MHB   0837
#3676 Load Source Specify                          9179  MHB   0838
#3677 Load Source Specify                          9179  MHB   0839
#3678 Load Source Specify                          9179  MHB   0840
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#4329 Load Source Specify                        9179   MHB    0841
#3658 Load Source Specify                        9179   MHB    0844
#1884 Load Source Specify                        9179   MHB    0851
#1888 Load Source Specify                        9179   MHB    0853
#1909 Load Source Specify                        9179   MHB    0854
#3587 Load Source Specify                        9179   MHB    0855
US TAA Compliance Indicator                      9179   MHB    0983


Modem Cable - US/Canada and General Use          9179   MHB    1025
USB External Docking Station for Removable Disk
Drive                                            9179   MHB    1104
USB 160 GB Removable Disk Drive                  9179   MHB    1106
USB 500 GB Removable Disk Drive                  9179   MHB    1107
Decline Electronic Service Agent™ Install
Indicator                                        9179   MHB    1120
System Unique Identifier                         9179   MHB    1311
4.3m 200V/16A Power Cord Brazil                  9179   MHB    1399
200V 16A 4.3m (14-Ft) TL Line Cord              9179   MHB    1406
4.3m 200V/16A Pwr Cd Italy                       9179   MHB    1408125V 4.3m (14-Ft) Line Cord
200V 1.8m (6-Ft) Locking Line Cord              9179   MHB    1414200V 4.3m (14-Ft) Locking Line Cord
4.3m 200V/16A Power Cord S. Africa               9179   MHB    1418
4.3m 200V/16A Power Cord Israel                  9179   MHB    1419
4.3m 200V/16A Power Cord EU/Asia                 9179   MHB    1420
4.3m 200V/16A Power Cord CH/DK                   9179   MHB    1421


200V 4.3m (14-Ft) Locking Line Cord             9179   MHB    1426
4.3m 200V/10A Power Cord AU/NZ                   9179   MHB    1438
4.3m 200V/10A Power Cord EU/Asia                 9179   MHB    1439
4.3m 200V/10A Power Cord Denmark                 9179   MHB    1440
4.3m 200V/10A Power Cord S. Africa               9179   MHB    1441
4.3m 200V/10A Power Cord Swiss                   9179   MHB    1442
4.3m 200V/10A Power Cord UK                      9179   MHB    1443
4.3m 200V/10A Power Cord Israel                  9179   MHB    1445


4.3m 200V/32A Power Cord EU 1-PH                 9179   MHB    1449
4.3m 200V/16A Power Cord EU 2-PH                 9179   MHB    1450
200V (6-Ft) 1.8m Line Cord                       9179   MHB    1451
200V (14-Ft) 4.3m Line Cord                      9179   MHB    1452
200V (6-Ft) 1.8m Locking Line Cord              9179   MHB    1453
200V 12A (14-Ft) 4.3m TL Line Cord              9179   MHB    1454
3m Copper RIO Cable                              9179   MHB    1460
6m Copper RIO Cable                              9179   MHB    1461
15m RIO Cable                                    9179   MHB    1462
30m SPCN Cable                                   9179   MHB    1466
6m RIO to RIO-2 Cable                            9179   MHB    1474
10m RIO to RIO-2 Cable                           9179   MHB    1475
4.3m 200V/12A Pwr Cd UK                          9179   MHB    1476
4.3m 200V/16A Pwr Cd                             9179   MHB    1477
Remote I/O Cable, 15M                            9179   MHB    1485
3m RIO to RIO-2 Cable                            9179   MHB    1487
IPCS Keyboard/Mouse for NT                       9179   MHB    1700


GX Dual Port- RIO-2 Attach                       9179   MHB    1800
GX Dual Port- 12X Channel Attach                 9179   MHB    1802
Integrated, 4 Port- 1Gb Virtual Ethernet, I/O
ports                                            9179   MHB    1803
Integrated, 4 Port (2x1Gb and 2x10Gb SFP+
Optical ports)                                   9179   MHB    1804
GX++ 12X DDR Adapter, Dual-port                  9179   MHB    1808
Integrated, 4 Port (2x1Gb and 2x10Gb SFP+ Copper
twinax ports)                                    9179   MHB    1813
SAS Cable for triple split DASD backplane        9179   MHB    1815
SAS Cable Assembly for SAS Port                  9179   MHB    1819
System port/UPS Conversion Cable                 9179   MHB    1827
1.5 Meter 12X to 4X Channel Conversion Cable     9179   MHB    1828
0.6 Meter 12X Cable                              9179   MHB    1829
1.5 Meter 12X cable                              9179   MHB    1830
8.0 Meter 12X Cable                              9179   MHB    1834
3.0 Meter 12X Cable                              9179   MHB    1840
3 Meter 12X to 4X Channel Conversion Cable       9179   MHB    1841
10 Meter 12X to 4X Channel Conversion Cable      9179   MHB    1842
Operator Panel                                   9179   MHB    1845
Operator Panel                                   9179   MHB    1846
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Operator Panel	9179	MHB	1853
10 Meter 12X to 4X Enhanced Channel Conversion Cable	9179	MHB	1854
0.6 Meter 12X DDR Cable	9179	MHB	1861
1.5 Meter 12X DDR Cable	9179	MHB	1862
8.0 Meter 12X DDR Cable	9179	MHB	1864
3.0 Meter 12X DDR Cable	9179	MHB	1865
146.8GB 10K RPM SAS SFF Disk Drive	9179	MHB	1882
73.4 GB 15K RPM SAS SFF Disk Drive	9179	MHB	1883
69.7 GB 15K RPM SAS SFF Disk Drive	9179	MHB	1884
300GB 10K RPM SFF SAS Disk Drive	9179	MHB	1885
146GB 15K RPM SFF SAS Disk Drive	9179	MHB	1886
139GB 15K RPM SFF SAS Disk Drive	9179	MHB	1888
69GB SFF SAS Solid State Drive	9179	MHB	1890
Quantity 150 of #1883	9179	MHB	1891
Quantity 150 of #1882	9179	MHB	1899
69GB SFF SAS Solid State Drive	9179	MHB	1909
PCI-X DDR Dual Channel Ultra320 SCSI Adapter	9179	MHB	1912
PCI SCSI Adapter 16-Bit Differential External Y Cable	9179	MHB	2114
Converter Cable, VHDCI to P, Mini-68 pin to 68 pin, 0.3M	9179	MHB	2118
Ultra 320 SCSI Cable 1 Meter	9179	MHB	2124
Ultra 320 SCSI Cable 3 Meter	9179	MHB	2125
Ultra 320 SCSI Cable 5 Meter	9179	MHB	2126
Ultra 320 SCSI Cable 10 Meter	9179	MHB	2127
Ultra 320 SCSI Cable 20 Meter	9179	MHB	2128
0.55 Meter Ultra 320 SCSI Cable	9179	MHB	2138
Primary OS - IBM i	9179	MHB	2145
Primary OS - AIX	9179	MHB	2146
Primary OS - Linux	9179	MHB	2147
0.6M 16-bit SCSI-2 System-to-System Cable	9179	MHB	2424
2.5M 16-bit SCSI-2 System-to-System Cable	9179	MHB	2425
2M LC-SC 50 Micron Fiber Converter Cable	9179	MHB	2456
2M LC-SC 62.5 Micron Fiber Converter Cable	9179	MHB	2459
External USB 1.44 MB Diskette Drive	9179	MHB	2591
4 port USB PCIe Adapter	9179	MHB	2728
2-Port USB PCI Adapter	9179	MHB	2738
PCI Ultra Mag Media Controller	9179	MHB	2749
PCI-X Ultra RAID Disk Controller	9179	MHB	2757
PCI-X Ultra4 RAID Disk Controller	9179	MHB	2780
PCI-X Fibre Chan Disk Controller	9179	MHB	2787
PCI IOP	9179	MHB	2844
PCI IOP for SAN Load Source	9179	MHB	2847
POWER GXT135P Graphics Accelerator with Digital Support	9179	MHB	2849
ARTIC960Hx 4-Port EIA-232 Cable	9179	MHB	2861
ARTIC960Hx 4-Port X.21 Cable	9179	MHB	2863
ARTIC960Hx 4-Port V.35 (DTE) Cable	9179	MHB	2864
PCIe 2-Line WAN w/Modem	9179	MHB	2893
3M Asynchronous Terminal/Printer Cable EIA-232	9179	MHB	2934
Asynchronous Cable EIA-232/V.24 3M	9179	MHB	2936
8-Port Asynchronous Adapter EIA-232/RS-422, PCI bus	9179	MHB	2943
IBM ARTIC960Hx 4-Port Multiprotocol PCI Adapter	9179	MHB	2947
Cable, V.24 / EIA-232	9179	MHB	2951
Cable, V.35	9179	MHB	2952
Cable, V.36 / EIA-499	9179	MHB	2953
Cable, X.21	9179	MHB	2954
2-Port Multiprotocol PCI Adapter	9179	MHB	2962
Serial-to-Serial Port Cable for Drawer/Drawer-3.7M	9179	MHB	3124
Serial-to-Serial Port Cable for Rack/Rack- 8M	9179	MHB	3125
RIO-2(Remote I/O-2)Cbl, 1.2M	9179	MHB	3146
RIO-2(Remote I/O-2)Cbl, 3.5M	9179	MHB	3147
RIO-2 (Remote I/O-2) Cable, 10M	9179	MHB	3148
RIO-2 (Remote I/O-2) Cable, 1.75M	9179	MHB	3156
RIO-2 (Remote I/O-2) Cbl, 2.5M	9179	MHB	3168
36.4 GB 10,000 RPM Ultra320 SCSI Disk Drive Assembly	9179	MHB	3273
73.4 GB 10,000 RPM Ultra320 SCSI Disk Drive Assembly	9179	MHB	3274
146.8 GB 10,000 RPM Ultra320 SCSI Disk Drive			

Assembly 36.4 GB 15,000 RPM Ultra320 SCSI Disk Drive	9179	MHB	3275
Assembly 73.4 GB 15,000 RPM Ultra320 SCSI Disk Drive	9179	MHB	3277
Assembly 146.8 GB 15,000 RPM Ultra320 SCSI Disk Drive	9179	MHB	3278
Assembly 300 GB 10,000 RPM Ultra320 SCSI Disk Drive	9179	MHB	3279
Assembly	9179	MHB	3578
300 GB 15K RPM SCSI Disk Drive	9179	MHB	3585
69GB 3.5" SAS Solid State Drive	9179	MHB	3586
69GB 3.5" SAS Solid State Drive	9179	MHB	3587
Widescreen LCD Monitor	9179	MHB	3632
T210 Flat-Panel Monitor	9179	MHB	3635
L200P Flat Panel Monitor	9179	MHB	3636
IBM T541H /L150p 15" TFT Color Monitor	9179	MHB	3637
IBM ThinkVision® L170p Flat Panel Monitor	9179	MHB	3639
ThinkVision L171p Flat Panel Monitor	9179	MHB	3640
IBM T115 Flat Panel Monitor	9179	MHB	3641
ThinkVision L191p Flat Panel Monitor	9179	MHB	3642
IBM T120 Flat Panel Monitor	9179	MHB	3643
IBM T119 Flat Panel Monitor	9179	MHB	3644
IBM T117 Flat Panel Monitor	9179	MHB	3645
73GB 15K RPM SAS Disk Drive	9179	MHB	3646
146GB 15K RPM SAS Disk Drive	9179	MHB	3647
300GB 15K RPM SAS Disk Drive	9179	MHB	3648
450GB 15K RPM SAS Disk Drive	9179	MHB	3649
External connection for 3 of 6 internal SAS Disk Slots	9179	MHB	3650
External connection for the 6 internal SAS Disk slots.	9179	MHB	3651
SAS Cable (EE) Drawer to Drawer 1M	9179	MHB	3652
SAS Cable (EE) Drawer to Drawer 3M	9179	MHB	3653
SAS Cable (EE) Drawer to Drawer 6M	9179	MHB	3654
428GB 15K RPM SAS Disk Drive	9179	MHB	3658
Processor Fabric Cable, 2 enclosure	9179	MHB	3660
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 3M:	9179	MHB	3661
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 6M:	9179	MHB	3662
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 15M:	9179	MHB	3663
Processor Fabric Cable, 3 enclosure	9179	MHB	3664
Processor Fabric Cable, 4 enclosure	9179	MHB	3665
SAS Cable (YR) -1M	9179	MHB	3667
Serv Interface Cable- 2, 3, and 4 Enclosure	9179	MHB	3671
Serv Interface Cable- 3 and 4 Enclosure	9179	MHB	3672
Serv Interface Cable- 4 Enclosure	9179	MHB	3673
69.7GB 15k rpm SAS Disk Drive	9179	MHB	3676
139.5GB 15k rpm SAS Disk Drive	9179	MHB	3677
283.7GB 15k rpm SAS Disk Drive	9179	MHB	3678
SAS Cable (AI)- Adapter to Internal drive 1M	9179	MHB	3679
3M SAS CABLE, ADPTR TO ADPTR (AA)	9179	MHB	3681
6M SAS CABLE, ADPTR TO ADPTR (AA)	9179	MHB	3682
SAS Cable (AE) Adapter to Enclosure, single controller/single path 3M	9179	MHB	3684
SAS Cable (AE) Adapter to Enclosure, single controller/single path 6M	9179	MHB	3685
SAS Cable (YI) System to SAS Enclosure, Single Controller/Dual Path 1.5M	9179	MHB	3686
SAS Cable (YI) System to SAS Enclosure, Single Controller/Dual Path 3M	9179	MHB	3687
SAS Cable (AT®) 0.6 Meter	9179	MHB	3688
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 1.5 M	9179	MHB	3691
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 3 M	9179	MHB	3692
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 6 M	9179	MHB	3693
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 15 M	9179	MHB	3694
External xSeries® Attach	9179	MHB	3704
PCI IOP	9179	MHB	3705
DVD-ROM	9179	MHB	3706

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30GB 1/4-inch Cartridge Tape                        9179  MHB  3707
50GB 1/4-inch Cartridge Tape                        9179  MHB  3708
PCI 100/10Mbps Ethernet IOA                         9179  MHB  3709
Processor Cable, Two-Drawer System                  9179  MHB  3711
Processor Cable, Two, Three or Four Drawer System   9179  MHB  3712
Processor Cable, Three or Four Drawer System        9179  MHB  3713
Processor Cable, Four-Drawer System                 9179  MHB  3714
0.3M Serial Port Converter Cable, 9-Pin to 25-Pin   9179  MHB  3925
Asynch Printer/Terminal Cable, 9-pin to 25-pin,
4M                                                  9179  MHB  3926
Serial Port Null Modem Cable, 9-pin to 9-pin,
3.7M                                                9179  MHB  3927
Serial Port Null Modem Cable, 9-pin to 9-pin, 10M   9179  MHB  3928
1.8 M (6-ft) Extender Cable for Displays (15-pin
D-shell to 15-pin D-shell)                          9179  MHB  4242
Extender Cable - USB Keyboards, 2M                  9179  MHB  4256
VGA to DVI Connection Converter                     9179  MHB  4276
35.16GB 10k rpm Disk Unit                           9179  MHB  4319
35.16GB 15k rpm Disk Unit                           9179  MHB  4326
70.56GB 15k rpm Disk Unit                           9179  MHB  4327
141.12GB 15k rpm Disk Unit                          9179  MHB  4328
282.25GB 15k rpm Disk Unit                          9179  MHB  4329
DVD-RAM                                             9179  MHB  4430
50GB 1/4-inch Cartridge Tape                        9179  MHB  4487
4/8GB (4X2GB) DIMMs, 276 PIN 533 MHz, DDR2 SDRAM    9179  MHB  4495
8/16GB (4X4GB) DIMMs, 276 PIN, 533 MHz DDR2 SDRAM   9179  MHB  4496
16GB (4X4GB) DIMMs, 276 PIN, 533 MHz, DDR2 SDRAM    9179  MHB  4497
16GB (4X4GB) DIMMs, 276 pin, 400MHz DDR2 SDRAM      9179  MHB  4499
DVD-RAM                                             9179  MHB  4630
DVD-RAM                                             9179  MHB  4633
Rack Indicator- Not Factory Integrated              9179  MHB  4650
Rack Indicator, Rack #1                             9179  MHB  4651
Rack Indicator, Rack #2                             9179  MHB  4652
Rack Indicator, Rack #3                             9179  MHB  4653
Rack Indicator, Rack #4                             9179  MHB  4654
Rack Indicator, Rack #5                             9179  MHB  4655
Rack Indicator, Rack #6                             9179  MHB  4656
Rack Indicator, Rack #7                             9179  MHB  4657
Rack Indicator, Rack #8                             9179  MHB  4658
Rack Indicator, Rack #9                             9179  MHB  4659
Rack Indicator, Rack #10                            9179  MHB  4660
Rack Indicator, Rack #11                            9179  MHB  4661
Rack Indicator, Rack #12                            9179  MHB  4662
Rack Indicator, Rack #13                            9179  MHB  4663
Rack Indicator, Rack #14                            9179  MHB  4664
Rack Indicator, Rack #15                            9179  MHB  4665
Rack Indicator, Rack #16                            9179  MHB  4666
PCI Twinaxial Workstn IOA                           9179  MHB  4746
PCI-X Cryptographic Coprocessor (FIPS 4)            9179  MHB  4764
ACTIVE MEMORY EXPANSION ENABLEMENT                  9179  MHB  4791
PCI Crypto Coprocessor                              9179  MHB  4801
PCI Crypto Accelerator                              9179  MHB  4805
PCI Integ xSeries Server                            9179  MHB  4812
PCI Integ xSeries Server                            9179  MHB  4813
CBU SPECIFY                                         9179  MHB  4891
3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16
Core POWER7, 16 DDR3 Memory Slots                   9179  MHB  4982
Single 5250 Enterprise Enablement                   9179  MHB  4990
Full 5250 Enterprise Enablement                     9179  MHB  4991
Single 5250 Enterprise Enablement                   9179  MHB  4992
Full 5250 Enterprise Enablement                     9179  MHB  4997
Software Preload Required                           9179  MHB  5000

Software Preinstall                                 9179  MHB  5005
PCI-X Expansion Unit                                9179  MHB  5088
PCI-X Expansion Tower                               9179  MHB  5094
PCI-X Exp Tower (no disk)                           9179  MHB  5096
30-Disk Expansion Feature                           9179  MHB  5108
Dual Line Cords - Tower                             9179  MHB  5115
Dual Line Cords - 5294 Tower                        9179  MHB  5116
Redundant Power and Cooling                         9179  MHB  5138
Power Dist Unit 1 Phase NEMA                        9179  MHB  5160
Power Dist Unit 1 Phase IEC                         9179  MHB  5161
Power Dist Unit 2 of 3 Phase                        9179  MHB  5162
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Power Dist Unit - 3 Phase	9179	MHB	5163
1.8m I/O Tower	9179	MHB	5294
1.8m I/O Tower (no disk)	9179	MHB	5296
One Processor Activation for Processor Feature #7380	9179	MHB	5403
Utility Billing for FC# 7380- 100 processor minutes	9179	MHB	5404
One Processor Activation for Processor Feature #4982	9179	MHB	5469
Utility Billing for FC# 7380 with IBM i - 100 processor minutes	9179	MHB	5480
Utility Billing for FC# 5620 with IBM i - 100 processor minutes	9179	MHB	5481
Utility Billing for FC# 5621 or #5622 with IBM i - 100 processor minutes	9179	MHB	5482
On/Off Processor Billing for FC#5620 with IBM i - 1 processor day	9179	MHB	5483
On/Off Processor Billing for FC#7380 with IBM i - 1 processor day	9179	MHB	5485
RFID TAGS FOR SERVERS, BLADES, BLADECENTERS, RACKS, AND HMCS	9179	MHB	5524
Sys Console on OP Console	9179	MHB	5544
Sys Console 100Mbps Ethernet	9179	MHB	5548
Sys Console On HMC	9179	MHB	5550
Sys Console-Ethernet No IOP	9179	MHB	5553
Mirror 35GB Disk/Controller Pkg	9179	MHB	5554
Mirror 70GB Disk/Controller Pkg	9179	MHB	5555
Mirror 141GB Disk/Controller Pkg	9179	MHB	5556
Mirror 35GB Drawer Package	9179	MHB	5560
Mirror 70GB Drawer Package	9179	MHB	5561
2780 Controller w/Aux Write Cache	9179	MHB	5580
2757 Controller w/Aux Write Cache	9179	MHB	5581
5777 Controller w/Aux Write Cache	9179	MHB	5583
2780 Controller w/Aux Write Cache	9179	MHB	5590
2757 Controller w/Aux Write Cache	9179	MHB	5591
System CEC Enclosure with IBM BEZEL, I/O Backplane, and System Midplane	9179	MHB	5597
System CEC Enclosure with OEM BEZEL, I/O Backplane, and System Midplane	9179	MHB	5598
0/32GB DDR3 Memory (4X8GB) DIMMs - 1066 MHz - POWER7 CoD Memory	9179	MHB	5600
0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	9179	MHB	5601
0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	9179	MHB	5602
Processor Power Regulator	9179	MHB	5617
3.5 GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots	9179	MHB	5620
4.2 GHz Proc Card, 0/2 Core POWER6, 8 DDR2 Memory Slots	9179	MHB	5621
4.2 GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots	9179	MHB	5622
Proc Power Regulator	9179	MHB	5625
System CEC Enclosure with IBM Bezel	9179	MHB	5626
System CEC Enclosure with OEM Bezel + Labels	9179	MHB	5627
Sys AC Power Supply, 1600 W	9179	MHB	5628
Media Enclosure and Backplane	9179	MHB	5629
System AC Power Supply, 1725 W	9179	MHB	5632
Integrated, 2 Port- 1Gb Virtual Ethernet, I/O ports	9179	MHB	5636
Integrated, 2 Port- 10Gb (SR) Virtual Ethernet, I/O ports	9179	MHB	5637
Integrated, 4 Port- 1Gb Virtual Ethernet, I/O ports	9179	MHB	5639
Utility Billing for FC# 5620- 100 processor minutes	9179	MHB	5640
Utility Billing for FC# 5621 or #5622 - 100 processor minutes	9179	MHB	5641
Generic IBM Drawer Indicator for Bulk Orders	9179	MHB	5642
Generic OEM Drawer Indicator for Bulk Orders	9179	MHB	5643
Generic IBM Drawer Indicator for Bulk Orders	9179	MHB	5644
Generic OEM Drawer Indicator for Bulk Orders	9179	MHB	5645
Blind Swap Type III Cassette- PCIe, Short Slot	9179	MHB	5646
Blind Swap Type III Cassette- PCI-X or PCIe,			

Standard Slot	9179	MHB	5647
Service Interface Card	9179	MHB	5648
On/Off Processor Day Billing for Feature #5620	9179	MHB	5650
Disk/Media Backplane	9179	MHB	5652
On/Off Processor Billing for Feature #5621 or #5622 - 1 processor day	9179	MHB	5653
On/Off Processor Day Billing for Feature #7380	9179	MHB	5656
Serv Interface Cable- 2 Enclosure	9179	MHB	5657
Serv Interface Cable- 3 Enclosure	9179	MHB	5658
Serv Interface Cable- 4 Enclosure	9179	MHB	5660
175MB Cache RAID - Dual IOA Enablement Card	9179	MHB	5662
Proc Enclosure and Backplane	9179	MHB	5663
Service Processor	9179	MHB	5664
FSP/Clock Pass Through Card	9179	MHB	5665
I/O Backplane	9179	MHB	5666
System Midplane	9179	MHB	5667
SAS Disk Backplane -6 slot	9179	MHB	5668
One Processor Activation for Processor Feature #5620	9179	MHB	5670
One Processor Activation for Processor Feature #5621	9179	MHB	5671
One Processor Activation for Processor Feature #5622	9179	MHB	5672
SATA Media Enclosure and Backplane	9179	MHB	5674
0/4 Core Processor Enclosure and Backplane	9179	MHB	5675
Activation of 1GB DDR2 POWER6 Memory	9179	MHB	5680
Activation of 256 GB DDR2 POWER6 Memory	9179	MHB	5681
Power 570 System Bezel	9179	MHB	5682
System Chassis - 4 EIA	9179	MHB	5683
Activation of 100 GB DDR2 Memory	9179	MHB	5684
Virtual Processor Power Regulator	9179	MHB	5686
0/32GB DDR2 Memory (4X8GB) DIMMs- 400® MHz- POWER6 CoD Memory	9179	MHB	5690
On/Off, 1GB-1Day, Memory Billing POWER6 Memory	9179	MHB	5691
0/2GB DDR2 Memory (4X0.5GB) DIMMs- 667 MHz- POWER6 Memory	9179	MHB	5692
0/4GB DDR2 Memory (4X1GB) DIMMs- 667 MHz- POWER6 CoD Memory	9179	MHB	5693
0/8GB DDR2 Memory (4X2GB) DIMMs- 667 MHz- POWER6 CoD Memory	9179	MHB	5694
0/32GB DDR2 Memory (4X8GB) DIMMs- 400 MHz- POWER6 CoD Memory	9179	MHB	5696
System Ship Group	9179	MHB	5699
IBM Gigabit Ethernet-SX PCI-X Adapter	9179	MHB	5700
IBM 10/100/1000 Base-TX Ethernet PCI-X Adapter	9179	MHB	5701
PCI-X Ultra Tape Controller	9179	MHB	5702
PCI-X Fibre Channel Tape Controller	9179	MHB	5704
IBM 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter	9179	MHB	5706
IBM 2-Port Gigabit Ethernet-SX PCI-X Adapter	9179	MHB	5707
10Gb FCoE PCIe Dual Port Adapter	9179	MHB	5708
PCI-X Dual Channel Ultra320 SCSI Adapter	9179	MHB	5712
1 Gigabit iSCSI TOE PCI-X on Copper Media Adapter	9179	MHB	5713
1 Gigabit iSCSI TOE PCI-X on Optical Media Adapter	9179	MHB	5714
2 Gigabit Fibre Channel PCI-X Adapter	9179	MHB	5716
4-Port 10/100/1000 Base-TX PCI Express Adapter	9179	MHB	5717
10 Gigabit Ethernet -SR PCI-X Adapter	9179	MHB	5718
IBM 10 Gigabit Ethernet-LR PCI-X Adapter	9179	MHB	5719
10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter	9179	MHB	5721
10 Gb Ethernet-LR PCI-X 2.0 DDR Adapter	9179	MHB	5722
2-Port Asynchronous EIA-232 PCI Adapter	9179	MHB	5723
10 Gigabit Ethernet-CX4 PCI Express Adapter	9179	MHB	5732
8 Gigabit PCI Express Dual Port Fibre Channel Adapter	9179	MHB	5735
PCI-X DDR Dual Channel Ultra320 SCSI Adapter	9179	MHB	5736
4-Port 10/100/1000 Base-TX PCI-X Adapter	9179	MHB	5740
IBM Single Bus Ultra 320 SCSI Repeater Card	9179	MHB	5741
IBM Dual Bus Ultra 320 SCSI Repeater Card	9179	MHB	5742
SATA Slimline DVD-ROM Drive	9179	MHB	5743
POWER GXT145 PCI Express Graphics Accelerator	9179	MHB	5748
4Gbps Fibre Channel (2-Port)	9179	MHB	5749
IDE Slimline DVD-ROM Drive	9179	MHB	5756
IBM 4.7 GB IDE Slimline DVD-RAM Drive	9179	MHB	5757

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4 GB Single-Port Fibre Channel PCI-X 2.0 DDR Adapter	9179	MHB	5758
4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter	9179	MHB	5759
PCI-X Fibre Chan Disk Controller	9179	MHB	5760
PCI-X Fibre Chan Tape Controller	9179	MHB	5761
SATA Slimline DVD-RAM Drive	9179	MHB	5762
2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter	9179	MHB	5767
2-Port Gigabit Ethernet-SX PCI Express Adapter	9179	MHB	5768
10 Gigabit Ethernet-SR PCI Express Adapter	9179	MHB	5769
10 Gigabit Ethernet-LR PCI Express Adapter	9179	MHB	5772
4 Gigabit PCI Express Single Port Fibre Channel Adapter	9179	MHB	5773
4 Gigabit PCI Express Dual Port Fibre Channel Adapter	9179	MHB	5774
PCI-X Disk Controller-90MB No IOP	9179	MHB	5776
PCI-X Disk Controller-1.5GB No IOP	9179	MHB	5777
PCI-X EXP24 Ctl-1.5GB No IOP	9179	MHB	5778
PCI-X EXP24 Ctl-1.5GB No IOP	9179	MHB	5782
4 Port Async EIA-232 PCIe Adapter	9179	MHB	5785
TotalStorage EXP24 Disk Dwr	9179	MHB	5786
PCI Expansion Drawer	9179	MHB	5790
PCI-DDR 12X Expansion Drawer	9179	MHB	5796
12X I/O Drawer PCIe, SFF disk	9179	MHB	5802
PCI-X DDR Dual Channel Ultra320 SCSI Adapter	9179	MHB	5806
12X I/O Drawer PCIe, No Disk	9179	MHB	5877
SAS Disk Backplane -6 slot	9179	MHB	5878
EXP 12S Expansion Drawer	9179	MHB	5886
PCI-X DDR Dual -x4 SAS Adapter	9179	MHB	5900
PCIe Dual-x4 SAS Adapter	9179	MHB	5901
PCI-X DDR Dual - x4 3Gb SAS RAID Adapter	9179	MHB	5902
PCIe 380MB Cache Dual - x4 3Gb SAS RAID Adapter	9179	MHB	5903
PCI-X DDR 1.5GB Cache SAS RAID Adapter	9179	MHB	5904
PCI-X DDR 1.5GB Cache SAS RAID Adapter (BSC)	9179	MHB	5908
Alternate SAS controller for 3 of 6 internal SAS Disk Slots	9179	MHB	5909
SAS adapter for internal Split DASD option	9179	MHB	5911
PCI-X DDR Dual - x4 SAS Adapter	9179	MHB	5912
Non-paired PCIx SAS RAID Indicator	9179	MHB	5921
Non-paired SAS RAID indicator	9179	MHB	5922
Non-paired PCIe SAS RAID Indicator	9179	MHB	5923
Full Width Keyboard -- USB, US English, #103P	9179	MHB	5951
Full Width Keyboard -- USB, French, #189	9179	MHB	5952
Full Width Keyboard -- USB, Italian, #142	9179	MHB	5953
Full Width Keyboard -- USB, German/Austrian, #129	9179	MHB	5954
Full Width Keyboard -- USB, UK English, #166P	9179	MHB	5955
Full Width Keyboard -- USB, Spanish, #172	9179	MHB	5956
Full Width Keyboard -- USB, Japanese, #194	9179	MHB	5957
Full Width Keyboard -- USB, Brazilian Portuguese, #275	9179	MHB	5958
Full Width Keyboard -- USB, Hungarian, #208	9179	MHB	5959
Full Width Keyboard -- USB, Korean, #413	9179	MHB	5960
Full Width Keyboard -- USB, Chinese, #467	9179	MHB	5961
Full Width Keyboard -- USB, French Canadian, #445	9179	MHB	5962
Full Width Keyboard -- USB, Canadian French, #058	9179	MHB	5963
Full Width Keyboard -- USB, Belgian/UK, #120	9179	MHB	5964
Full Width Keyboard -- USB, Swedish/Finnish, #153	9179	MHB	5965
Full Width Keyboard -- USB, Danish, #159	9179	MHB	5966
Full Width Keyboard -- USB, Bulgarian, #442	9179	MHB	5967
Full Width Keyboard -- USB, Swiss/French/German, #150	9179	MHB	5968
Full Width Keyboard -- USB, Norwegian,#155	9179	MHB	5969
Full Width Keyboard -- USB, Dutch, #143	9179	MHB	5970
Full Width Keyboard -- USB, Portuguese, #163	9179	MHB	5971
Full Width Keyboard -- USB, Greek, #319	9179	MHB	5972
Full Width Keyboard -- USB, Hebrew, #212	9179	MHB	5973
Full Width Keyboard -- USB, Polish, #214	9179	MHB	5974
Full Width Keyboard -- USB, Slovakian, #245	9179	MHB	5975
Full Width Keyboard -- USB, Czech, #243	9179	MHB	5976
Full Width Keyboard -- USB, Turkish, #179	9179	MHB	5977
Full Width Keyboard -- USB, LA Spanish, #171	9179	MHB	5978
Full Width Keyboard -- USB, Arabic, #253	9179	MHB	5979
Full Width Keyboard -- USB, Thai, #191	9179	MHB	5980

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Full Width Keyboard -- USB, Russian, #443        9179  MHB  5981
Full Width Keyboard -- USB, Slovenian, #234      9179  MHB  5982
Full Width Keyboard -- USB, US English Euro,
#103P                                            9179  MHB  5983
Power Control Cable (SPCN) - 2 meter             9179  MHB  6001
Power Control Cable (SPCN) - 3 meter             9179  MHB  6006
Power Control Cable (SPCN) - 15 meter            9179  MHB  6007
Power Control Cable (SPCN) - 6 meter             9179  MHB  6008
Power Control Cable (SPCN) - 30 meter            9179  MHB  6029
Opt Front Door for 1.8m Rack                     9179  MHB  6068
Opt Front Door for 2.0m Rack                     9179  MHB  6069
1.8m Rack Trim Kit                               9179  MHB  6246
2.0m Rack Trim Kit                               9179  MHB  6247
1.8m Rack Acoustic Doors                         9179  MHB  6248
2.0m Rack Acoustic Doors                         9179  MHB  6249
1.8m Rack Trim Kit                               9179  MHB  6263
2.0m Rack Trim Kit                               9179  MHB  6272
RIO-2 Bus Adapter                                9179  MHB  6417
RIO-2 Remote I/O Loop Adapter for #5790          9179  MHB  6438
Dual-port 12X Channel Attach- Short Run          9179  MHB  6446
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6451
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  64534.3m (14-Ft) 250V/10A Power Cord
Dual-port 12X Channel Attach- Long Run           9179  MHB  6457
Power Cable -- Drawer to IBM PDU, 14-foot, 250V/
10A                                              9179  MHB  6458
3.7m (12-Ft) 250V/10A RA Pwr Cd                  9179  MHB  6459
Power Cord 4.3m (14-ft), Drawer To OEM PDU
(125V, 15A)                                      9179  MHB  6460
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6461
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6462
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6463
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6464
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6465
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6466
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6467

Power Cord 4.3m (14-foot), Drawer to OEM PDU,
(250V, 15A), U. S.                               9179  MHB  6469
Power Cord 1.8m(6-foot), To Wall (125V, 15A)     9179  MHB  6470
Power Cord 2.7m (9-foot), To Wall/OEM PDU,
(125V, 15A)                                      9179  MHB  6471
Power Cord 2.7m (9-foot), To Wall/OEM PDU,
(250V, 16A)                                      9179  MHB  6472
Power Cord 2.7m (9-foot), To Wall/OEM PDU,
(250V, 10A)                                      9179  MHB  6473
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 13A)                                      9179  MHB  6474
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 16A)                                      9179  MHB  6475
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                      9179  MHB  6476
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 16A)                                      9179  MHB  6477
Power Cord 2.7 M(9-foot), To Wall/OEM PDU,
(250V, 16A)                                      9179  MHB  6478
Power Cord (9-foot) , To Wall/OEM PDU, (250V,
10A)                                             9179  MHB  6479
Power Cord 1.8M (6-foot),To Wall, (250V, 15A),
United States                                    9179  MHB  6487
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(125V, 15A or 250V, 10A )                        9179  MHB  6488
4.3m (14-Ft) 3PH/24A Power Cord                  9179  MHB  6489
4.3m (14-Ft) 1PH/48A Pwr Cord                    9179  MHB  6491
4.3m (14-Ft) 1PH/48-60A Pwr Cord                 9179  MHB  6492
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                      9179  MHB  6493
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                      9179  MHB  6494
Power Cord (9-foot), To Wall/OEM PDU, (250V, 10A) 9179 MHB  6495
Power Cord 2.7M (9-foot), To Wall/OEM PDU,
(250V, 10A)                                      9179  MHB  6496
Power Cord (6-foot), To Wall/OEM PDU, (250V, 10A) 9179 MHB  6497
Power Cord (6-foot), To Wall/OEM PDU, (250V, 15A) 9179 MHB  6498
4.3m (14-Ft) 250V/10A Power Cord                 9179  MHB  6499
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Description			
Power Cable - Drawer to IBM PDU, 200-240V/10A	9179	MHB	6577
Optional Rack Security Kit	9179	MHB	6580
Modem Tray for 19-inch Rack	9179	MHB	6586
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (125V, 15A)	9179	MHB	6651
4.3m (14-Ft) 1PH/24-30A Pwr Cord	9179	MHB	6654
4.3m (14-Ft) 1PH/24-30A WR Pwr Cord	9179	MHB	6655
4.3m (14-Ft)1PH/24A Power Cord	9179	MHB	6656
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 15A)	9179	MHB	6659
Power Cord (14-foot), Drawer To OEM PDU (125V, 15A)	9179	MHB	6660
2.1m (7-Ft) 200V PDU Power Cable	9179	MHB	6664
Power Cord 3 M (10 ft), Drawer to IBM PDU, 250V/ 10A	9179	MHB	6665
Power Cord 4.3M (14-foot), Drawer to OEM PDU, (250V, 15A)	9179	MHB	6669
Power Cord (6-foot), To Wall (125V, 15A),	9179	MHB	6670
Power Cord 2.7M (9-foot), Drawer to IBM PDU, 250V/10A	9179	MHB	6671
Power Cord 1.5M (5-foot), Drawer to IBM PDU, 250V/10A	9179	MHB	6672
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	9179	MHB	6680
Power Cord (6-foot), To Wall, (250V, 15A)	9179	MHB	6687
4.3m (14-Ft) 200-240V/15A Pwr Cord	9179	MHB	6690
RIO-2 Bus Adapter	9179	MHB	6699
PCI 2-Line WAN IOA No IOP	9179	MHB	6805
PCI 4-Modem WAN IOA No IOP	9179	MHB	6808
PCI 2-Line WAN w/Modem NoIOP	9179	MHB	6833
Cable Restraint Hardware- excess Service Interface Cable	9179	MHB	7099
Intelligent PDU+, 1 EIA Unit, Universal UTG0247 Connector	9179	MHB	7109
Environmental Monitoring Probe	9179	MHB	7118
IBM/OEM Rack-mount Drawer Rail Kit- Adjustable Depth	9179	MHB	7164
OEM Rack-mount Drawer Rail Kit	9179	MHB	7165
Power Distribution Unit	9179	MHB	7188
Quantity 150 of #2124	9179	MHB	7204
Quantity 150 of #2125	9179	MHB	7205
Quantity 150 of #2126	9179	MHB	7206
Quantity 150 of #2127	9179	MHB	7207
Quantity 150 of #2128	9179	MHB	7208
Quantity 150 of #2138	9179	MHB	7213
2GB CUoD Memory Activation	9179	MHB	7272
4GB CUoD Memory Activation	9179	MHB	7273
8GB CUoD Memory Activation	9179	MHB	7274
16GB CUoD Memory Activation	9179	MHB	7275
32GB CUoD Memory Activation	9179	MHB	7276
One Processor Activation for Processor Feature #7388	9179	MHB	7306
Dual I/O Unit Enclosure	9179	MHB	7307
Dual I/O Unit Enclosure	9179	MHB	7311
I/O Drawer Mounting Enclosure	9179	MHB	7314
Utility Billing for Processor #7388- 100 processor minutes	9179	MHB	7332
On/Off Processor Day Billing for Processor #7388	9179	MHB	7333
Utility Billing for Processor #7388 with IBM i – 100 processor minutes	9179	MHB	7334
On/Off Processor Billing for Processor #7388 with IBM i – 1 processor day	9179	MHB	7346
On/Off, 1GB-1Day, Memory Billing POWER7	9179	MHB	7377
4.7 GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots	9179	MHB	7380
4.4GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots.	9179	MHB	7387
5.0 GHz Proc Card, 0/2 Core POWER6, 12 DDR2			

Memory Slots	9179	MHB	7388
Quantity 150 of #4319	9179	MHB	7504
Quantity 150 of #4326	9179	MHB	7508
Quantity 150 of #4327	9179	MHB	7509
Quantity 150 of #4328	9179	MHB	7510
Quantity 150 of #4329	9179	MHB	7511
Quantity 150 of #5741	9179	MHB	7514
Quantity 150 of #3676	9179	MHB	7517
Quantity 150 of #3677	9179	MHB	7518
Quantity 150 of #3678	9179	MHB	7519
Quantity 150 of #3586	9179	MHB	7535
Quantity 150 of #3587	9179	MHB	7536
Quantity 150 of #3658	9179	MHB	7538
4.2 GHz Proc Card, 0/4 Core POWER6, 12 DDR2 Memory Slots	9179	MHB	7540
Quantity 150 of #1884	9179	MHB	7543
Quantity 150 of #1888	9179	MHB	7544
Quantity 150 of #1890	9179	MHB	7545
Quantity 150 of #1909	9179	MHB	7546
Quantity 150 of #1885	9179	MHB	7547
Quantity 150 of #1886	9179	MHB	7548
Quantity 150 of #3647	9179	MHB	7549
Quantity 150 of #3648	9179	MHB	7564
Quantity 150 of #3649	9179	MHB	7565
PROC COD UTILITY BILLING FOR FC 4982, 100 PROC-MINS	9179	MHB	7633
PROC COD UTILITY BILLING FOR FC 4982, 100 PROC-MINS, FOR IBMi	9179	MHB	7634
1 PROC-DAY ON/OFF BILLING FOR FC 4982	9179	MHB	7635
1 PROC-DAY ON/OFF BILLING FOR FC 4982, FOR IBMi	9179	MHB	7636
1GB DDR2 Memory Activation	9179	MHB	7663
One Processor Activation for Processor Feature #7540	9179	MHB	7700
Utility Billing for Processor #7540- 100 processor minutes	9179	MHB	7701
On/Off Processor Day Billing for Processor #7540	9179	MHB	7702
Utility Billing for Processor #7540 with IBM i - 100 processor minutes	9179	MHB	7706
On/Off Processor Billing for Processor #7540 with IBM i - 1 processor day	9179	MHB	7709
One Processor Activation for Processor Feature #7387	9179	MHB	7719
Utility Billing for Processor #7387 - 100 processor minutes	9179	MHB	7726
Utility Billing for Processor #7387 with IBM i - 100 processor minutes	9179	MHB	7743
On/Off Processor Billing for Processor #7387 with IBM i - 1 processor day	9179	MHB	7744
On/Off Processor Day Billing for Processor #7387	9179	MHB	7745
2.0m Rack Side Attach Kit	9179	MHB	7780
Ethernet Cable, 6M, Hardware Management Console to System Unit	9179	MHB	7801
Ethernet Cable, 15m, Hardware Management Console to System Unit	9179	MHB	7802
Side-by-Side for 1.8m Racks	9179	MHB	7840
Ruggedize Rack Kit	9179	MHB	7841
PCI Blind Swap Cassette Kit, Single Wide Adapters, Type II	9179	MHB	7862
PCI Blind Swap Cassette Kit, Double Wide Adapters, Type II	9179	MHB	7863
Power Distribution Backplane	9179	MHB	7870
AC Power Supply, 1400 W	9179	MHB	7888
2GB (4x512MB) DIMMs, 276-pin, 533MHz DDR2 SDRAM	9179	MHB	7892
4GB (4x1GB) DIMMs, 276-pin, 533MHz DDR2 SDRAM	9179	MHB	7893
8GB (4x2GB) DIMMs, 276-pin, 533 MHz DDR2 SDRAM	9179	MHB	7894
PowerVM -Standard Edition	9179	MHB	7942
On/Off Processor Enablement	9179	MHB	7951
On/Off Memory Enablement	9179	MHB	7954
PowerVM - Enterprise Edition	9179	MHB	7995
570 to MMA CoD Memory Activation Carry Over Indicator	9179	MHB	8017
570 to MMA Advanced POWER® Virtualization Carry Over Indicator	9179	MHB	8018
0/256GB DDR2 Memory (32X8GB) DIMMs- 400 MHz-			

POWER6 Memory	9179	MHB	8129
RJ-45 to DB-25 Converter Cable	9179	MHB	8133
Linux Software Preinstall	9179	MHB	8143
Linux Software Preinstall (Business Partners)	9179	MHB	8144
Activation of 1 GB DDR3 POWER7 Memory	9179	MHB	8212
Activation of 100 GB DDR3 POWER7 Memory	9179	MHB	8213
Power Cord Carry Over Indicator, #9800, Model Conversion Only	9179	MHB	8430
Power Cord Carry Over Indicator, #9802, Model Conversion Only	9179	MHB	8431
Power Cord Carry Over Indicator, #9820, Model Conversion Only	9179	MHB	8432
Power Cord Carry Over Indicator, #9821, Model Conversion Only	9179	MHB	8433
Power Cord Carry Over Indicator, #9825, Model Conversion Only	9179	MHB	8434
Power Cord Carry Over Indicator, #9827, Model Conversion Only	9179	MHB	8435
Power Cord Carry Over Indicator, #9828, Model Conversion Only	9179	MHB	8436
Power Cord Carry Over Indicator, #9829, Model Conversion Only	9179	MHB	8437
Power Cord Carry Over Indicator, #9830, Model Conversion Only	9179	MHB	8438
Power Cord Carry Over Indicator, #9831, Model Conversion Only	9179	MHB	8439
Power Cord Carry Over Indicator, #9833, Model Conversion Only	9179	MHB	8440
Power Cord Carry Over Indicator, #9834, Model Conversion Only	9179	MHB	8441
Base Customer Spec Plcmnt	9179	MHB	8453
Keyboard - USB, US English, #103P	9179	MHB	8800
Keyboard - USB, French, #189	9179	MHB	8801
Keyboard - USB, Italian, #142	9179	MHB	8802
Keyboard - USB, German/Austrian, #129	9179	MHB	8803
Keyboard - USB, UK English, #166	9179	MHB	8804
Keyboard - USB, Spanish, #172	9179	MHB	8805
Keyboard - USB, Japanese, #194	9179	MHB	8806
Keyboard - USB, Brazilian/Portuguese, #275	9179	MHB	8807
Keyboard - USB, Canadian French, #058	9179	MHB	8808
Keyboard - USB, Belgium/UK, #120	9179	MHB	8810
Keyboard - USB, Swedish/Finnish, #153	9179	MHB	8811
Keyboard - USB, Danish, #159	9179	MHB	8812
Keyboard - USB, Bulgarian, #442	9179	MHB	8813
Keyboard - USB, Swiss/French/German, #150F/G	9179	MHB	8814
Keyboard - USB, Norwegian, #155	9179	MHB	8816
Keyboard - USB, Dutch, #143	9179	MHB	8817
Keyboard - USB, Portuguese, #163	9179	MHB	8818
Keyboard - USB, Greek, #319	9179	MHB	8819
Keyboard - USB, Hebrew, #212	9179	MHB	8820
Keyboard - USB, Hungarian, #208	9179	MHB	8821
Keyboard - USB, Polish, #214	9179	MHB	8823
Keyboard - USB, Slovakian, #245	9179	MHB	8825
Keyboard - USB, Czech, #243	9179	MHB	8826
Keyboard - USB, Turkish, #179	9179	MHB	8827
Keyboard - USB, LA Spanish, #171	9179	MHB	8829
Keyboard - USB, Arabic, #253	9179	MHB	8830
Keyboard - USB, Korean, #413	9179	MHB	8833
Keyboard - USB, Chinese/US, #467	9179	MHB	8834
Keyboard - USB, French Canadian, #445	9179	MHB	8835
Keyboard - USB, Thai, #191	9179	MHB	8836
Keyboard - USB, Russian, #443	9179	MHB	8838
Keyboard - USB, Yugoslavian/Latin, #105	9179	MHB	8839
Keyboard - USB, US English (EMEA), #103P	9179	MHB	8840
Mouse - USB, with Keyboard Attachment Cable	9179	MHB	8841
USB Mouse	9179	MHB	8845
Order Routing Indicator- System Plant	9179	MHB	9169
Language Group Specify - US English	9179	MHB	9300
New AIX License Core Counter	9179	MHB	9440
New IBM i License Core Counter	9179	MHB	9441
New Red Hat License Core Counter	9179	MHB	9442
New SUSE License Core Counter	9179	MHB	9443
Other AIX License Core Counter	9179	MHB	9444
Other Linux License Core Counter	9179	MHB	9445

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3rd Party Linux License Core Counter        9179  MHB   9446
VIOS Core Counter                           9179  MHB   9447
Month Indicator                             9179  MHB   9461
Day Indicator                               9179  MHB   9462
Hour Indicator                              9179  MHB   9463
Minute Indicator                            9179  MHB   9464
Qty Indicator                               9179  MHB   9465
Countable Member Indicator                  9179  MHB   9466
Reserved Rack Space Indicator - 4U          9179  MHB   9570
Language Group Specify - Dutch              9179  MHB   9700
Language Group Specify - French             9179  MHB   9703
Language Group Specify - German             9179  MHB   9704
Language Group Specify - Polish             9179  MHB   9705
Language Group Specify - Norwegian          9179  MHB   9706
Language Group Specify - Portuguese         9179  MHB   9707
Language Group Specify - Spanish            9179  MHB   9708
Language Group Specify - Italian            9179  MHB   9711
Language Group Specify - Canadian French    9179  MHB   9712
Language Group Specify - Japanese           9179  MHB   9714
Language Group Specify - Traditional Chinese
(Taiwan)                                    9179  MHB   9715
Language Group Specify - Korean             9179  MHB   9716
Language Group Specify - Turkish            9179  MHB   9718
Language Group Specify - Hungarian          9179  MHB   9719
Language Group Specify - Slovakian          9179  MHB   9720
Language Group Specify - Russian            9179  MHB   9721
Language Group Specify - Simplified Chinese (PRC) 9179 MHB 9722
Language Group Specify - Czech              9179  MHB   9724
Language Group Specify -- Romanian          9179  MHB   9725
Language Group Specify - Croatian           9179  MHB   9726
Language Group Specify -- Slovenian         9179  MHB   9727
Language Group Specify - Brazilian Portuguese 9179 MHB  9728
Language Group Specify - Thai               9179  MHB   9729
TurboCore Mode Specify Code                 9179  MHB   9982
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The following are newly announced features on the specific models of the IBM Power Systems 7014 machine type:

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Description                                 MT    Model Feature

Rack Content Specify: 9179-MHB, 4U.         7014  T00   0384
                                                  T42
Rack Content Specify: 9179-MHB, 8U.         7014  T00   0385
                                                  T42
Rack Content Specify: 9179-MHB, 12U.        7014  T00   0386
                                                  T42
Rack Content Specify: 9179-MHB, 16U.        7014  T00   0387
                                                  T42
Power 780 Acoustic Rack Doors, 2.0 M        7014  T42   6250
```

Type/model conversions

```
   From      To
Type Model Type Model

9117  MMA  9179  MHB
```

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 9117-MMA to 9179-MHB memory features

From FC:	To FC:	Return parts
4495 – 4/8GB (4X2GB) DIMMs, 276 PIN 533 MHz, DDR2 SDRAM	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4496 – 8/16GB (4X4GB) DIMMs, 276 PIN, 533 MHz DDR2 SDRAM	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4497 – 16GB (4X4GB) DIMMs, 276 PIN, 533 MHz, DDR2 SDRAM	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4499 – 16GB (4X4GB) DIMMs, 276 pin, 400MHz DDR2 SDRAM	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
5693 – 0/4GB DDR2 Memory (4X1GB) DIMMs– 667 MHz– POWER6 CoD Memory	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
5694 – 0/8GB DDR2 Memory (4X2GB) DIMMs– 667 MHz– POWER6 CoD Memory	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
5695 – 0/16GB DDR2 Memory (4X4GB) DIMMs– 533 MHz– POWER6 CoD Memory	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
7892 – 2GB (4x512MB) DIMMs, 276-pin, 533MHz DDR2 SDRAM	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
7893 – 4GB (4x1GB) DIMMs, 276-pin, 533MHz DDR2 SDRAM	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
7894 – 8GB (4x2GB) DIMMs, 276-pin, 533 MHz DDR2 SDRAM	5600 – 0/32GB DDR3 Memory (4X8GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4495 – 4/8GB (4X2GB) DIMMs, 276 PIN 533 MHz, DDR2 SDRAM	5601 – 0/64GB DDR3 Memory (4X16GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4496 – 8/16GB (4X4GB) DIMMs, 276 PIN, 533 MHz DDR2 SDRAM	5601 – 0/64GB DDR3 Memory (4X16GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4497 – 16GB (4X4GB) DIMMs, 276 PIN, 533 MHz, DDR2 SDRAM	5601 – 0/64GB DDR3 Memory (4X16GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4498 – 32GB (4X8GB) DIMMs, 276 pin, 400MHz DDR2 SDRAM	5601 – 0/64GB DDR3 Memory (4X16GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
4499 – 16GB (4X4GB) DIMMs, 276 pin, 400MHz DDR2 SDRAM	5601 – 0/64GB DDR3 Memory (4X16GB) DIMMs – 1066 MHz – POWER7 CoD Memory	Yes
5690 – 0/32GB DDR2 Memory	5601 – 0/64GB DDR3 Memory	Yes

(4X8GB) DIMMs- 400 MHz- POWER6 CoD Memory	(4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	
5693 - 0/4GB DDR2 Memory (4X1GB) DIMMs- 667 MHz- POWER6 CoD Memory	5601 - 0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	Yes
5694 - 0/8GB DDR2 Memory (4X2GB) DIMMs- 667 MHz- POWER6 CoD Memory	5601 - 0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	Yes
5695 - 0/16GB DDR2 Memory (4X4GB) DIMMs- 533 MHz- POWER6 CoD Memory	5601 - 0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	Yes
5696 - 0/32GB DDR2 Memory (4X8GB) DIMMs- 400 MHz- POWER6 CoD Memory	5601 - 0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	Yes
7892 - 2GB (4x512MB) DIMMs, 276-pin, 533MHz DDR2 SDRAM	5601 - 0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	Yes
7893 - 4GB (4x1GB) DIMMs, 276-pin, 533MHz DDR2 SDRAM	5601 - 0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	Yes
7894 - 8GB (4x2GB) DIMMs, 276-pin, 533 MHz DDR2 SDRAM	5601 - 0/64GB DDR3 Memory (4X16GB) DIMMs - 1066 MHz - POWER7 CoD Memory	Yes
4496 - 8/16GB (4X4GB) DIMMs, 276 PIN, 533 MHz DDR2 SDRAM	5602 - 0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	Yes
4497 - 16GB (4X4GB) DIMMs, 276 PIN, 533 MHz, DDR2 SDRAM	5602 - 0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	Yes
4498 - 32GB (4X8GB) DIMMs, 276 pin, 400MHz DDR2 SDRAM	5602 - 0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	Yes
4499 - 16GB (4X4GB) DIMMs, 276 pin, 400MHz DDR2 SDRAM	5602 - 0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	Yes
5690 - 0/32GB DDR2 Memory (4X8GB) DIMMs- 400 MHz- POWER6 CoD Memory	5602 - 0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	Yes
5695 - 0/16GB DDR2 Memory (4X4GB) DIMMs- 533 MHz- POWER6 CoD Memory	5602 - 0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	Yes
5696 - 0/32GB DDR2 Memory (4X8GB) DIMMs- 400 MHz- POWER6 CoD Memory	5602 - 0/128GB DDR3 Memory (4X32GB) DIMMs - 800 MHz - POWER7 CoD Memory	Yes
5680 - Activation of 1GB DDR2 POWER6 Memory	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
7272 - 2GB CUoD Memory Activation	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
7273 - 4GB CUoD Memory Activation	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
7274 - 8GB CUoD Memory Activation	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
7275 - 16GB CUoD Memory Activation	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
7276 - 32GB CUoD Memory Activation	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
7663 - 1GB DDR2 Memory Activation	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
8017 - 570 to MMA CoD Memory Activation Carry Over Indicator	8212 - Activation of 1 GB DDR3 POWER7 Memory	No
5681 - Activation of 256 GB DDR2 POWER6 Memory	8213 - Activation of 100 GB DDR3 POWER7 Memory	No
5684 - Activation of 100 GB DDR2 Memory	8213 - Activation of 100 GB DDR3 POWER7 Memory	No

Feature conversions for 9117-MMA to 9179-MHB processor features

From FC:	To FC:	Return parts
5620 - 3.5 GHz Proc Card, 0/ 2 Core POWER6, 12 DDR2	4982 - 3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16	Yes

From FC	To FC	Return parts
Memory Slots	Core POWER7, 16 DDR3 Memory Slots	
5621 – 4.2 GHz Proc Card, 0/2 Core POWER6, 8 DDR2 Memory Slots	4982 – 3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16 Core POWER7, 16 DDR3 Memory Slots	Yes
5622 – 4.2 GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots	4982 – 3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16 Core POWER7, 16 DDR3 Memory Slots	Yes
7380 – 4.7 GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots	4982 – 3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16 Core POWER7, 16 DDR3 Memory Slots	Yes
7387 – 4.4GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots.	4982 – 3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16 Core POWER7, 16 DDR3 Memory Slots	Yes
7388 – 5.0 GHz Proc Card, 0/2 Core POWER6, 12 DDR2 Memory Slots	4982 – 3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16 Core POWER7, 16 DDR3 Memory Slots	Yes
7540 – 4.2 GHz Proc Card, 0/4 Core POWER6, 12 DDR2 Memory Slots	4982 – 3.86 GHz / 4.14 GHz TurboCore Proc Card, 0/16 Core POWER7, 16 DDR3 Memory Slots	Yes
4990 – Single 5250 Enterprise Enablement	4992 – Single 5250 Enterprise Enablement	No
4991 – Full 5250 Enterprise Enablement	4997 – Full 5250 Enterprise Enablement	No
5403 – One Processor Activation for Processor Feature #7380	5469 – One Processor Activation for Processor Feature #4982	No
5670 – One Processor Activation for Processor Feature #5620	5469 – One Processor Activation for Processor Feature #4982	No
5671 – One Processor Activation for Processor Feature #5621	5469 – One Processor Activation for Processor Feature #4982	No
5672 – One Processor Activation for Processor Feature #5622	5469 – One Processor Activation for Processor Feature #4982	No
7306 – One Processor Activation for Processor Feature #7388	5469 – One Processor Activation for Processor Feature #4982	No
7700 – One Processor Activation for Processor Feature #7540	5469 – One Processor Activation for Processor Feature #4982	No
7719 – One Processor Activation for Processor Feature #7387	5469 – One Processor Activation for Processor Feature #4982	No

Feature conversions for 9117-MMA to 9179-MHB rack-related features

From FC:	To FC:	Return parts
6246 – 1.8m Rack Trim Kit	6263 – 1.8m Rack Trim Kit	No
6247 – 2.0m Rack Trim Kit	6272 – 2.0m Rack Trim Kit	No

Feature conversions for 9179-MHB virtualization engine features

From FC:	To FC:	Return parts
7942 – PowerVM –Standard Edition	7995 – PowerVM – Enterprise Edition	No

Reliability, Availability, and Serviceability (RAS)

The reliability of the IBM Power 780 starts with components, devices, and subsystems that are designed to be fault-tolerant. POWER7 uses lower-voltage technology that improves 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 high product quality levels.

The processor and memory subsystem contains a number of features designed to avoid or correct environmentally induced, single-bit, intermittent failures as well as handle solid faults in components, including selective redundancy to tolerate certain faults without requiring an outage or parts replacement.

The AIX operating system supports disk mirroring (RAID 1) and disk controller duplexing. The Linux operating system supports disk drive mirroring (RAID 1). The adapter provides RAID 0, RAID 5, RAID 6, and RAID 10 for AIX and Linux. Under IBM i OS, mirroring and data spreading are provided by the operating system and RAID 5 and RAID 6 are provided by the adapter.

Memory error-correction extensions

POWER7 memory has error detection and correction code circuitry designed to detect and correct faults that extend across multiple memory modules (DRAMs). This includes tolerating a complete DRAM chip failure (Chipkill™ recovery). POWER7 memory used in the Power 780 server also contains a spare memory (DRAM) per rank of memory which can be substituted for a failed DRAM module (DRAM sparing). The spares can be used when a DRAM fault is detected and provide additional protection beyond that provided by the error detection and correction circuitry. In addition, the POWER7 memory subsystem provides scrubbing of memory to detect and correct intermittent errors.

The bus transferring data between the processor and the memory uses CRC error detection with a failed operation retry mechanism and the ability to dynamically retune bus parameters when a fault occurs. In addition, the memory bus has spare capacity to substitute a spare data bit-line for the one that is determined to be faulty.

Fault monitoring functions

On POWER7 processor-based servers, hardware failures and software detected hardware failures are recorded in the system log. An Error Log Analysis (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.

After the information is logged, if the system is properly configured, a call home service request is initiated and the pertinent failure data with service parts information and part locations is 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 engineering data related to the failure, are sent to IBM service. The call home feature enables IBM service representatives to preemptively bring the most-probable replacement parts when a service call is placed, reducing repair time.

Disk drive fault tracking can alert the system administrator of an impending disk failure before it affects customer operation.

Mutual surveillance

The Service Processor monitors the operation of 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 or initiating a failover operation to the alternate Service Processor, if present.

Environmental monitoring functions

POWER7 processor-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.

POWER7 processor availability enhancements

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. With this function, 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. In a number of cases, systems with 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 for certain faults that can not be handled by the availability enhancements described in the preceding section. This significantly reduces the probability of any one processor affecting total system availability.

POWER7 cache availability

The L2 and L3 caches in the POWER7 processor are protected with double-bit detect, single-bit correct error correction code (ECC). In addition the caches maintain a cache line delete capability. A threshold of correctable errors detected on a cache line can result in the data in the cache line being purged and the cache line removed from further operation without requiring a reboot. An ECC uncorrectable error detected in the cache can also trigger a purge and delete of the cache line. This results in no loss of operation if the cache line contained data unmodified from what was stored in system memory. Modified data would be handled through special

uncorrectable error handling. L1 data and instruction caches also have a retry capability for intermittent error and a cache set delete mechanism for handling solid failures.

Special Uncorrectable Error handling

Special Uncorrectable Error (SUE) handling prevents an uncorrectable error in memory or cache from immediately causing 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. If the data is used, termination may be limited to the program/kernel or hypervisor owning the data; or freeze of the I/O adapters controlled by an I/O hub controller if data would be transferred to an I/O device.

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 restart automatically following an unrecoverable software error, hardware failure, or environmentally induced (AC power) failure.

Serviceability

The IBM Power 780 is designed with both IBM and customer serviceability in mind.

Advancements such as Guiding Light LED architecture are used to control a system of integrated LEDs that lead the individual servicing the machine to the correct part as quickly as possible. With the Power 780 you can replace service parts (customer replaceable units). To do this, the Power 780 uses Guiding Light LEDs to indicate the parts that need to be replaced.

An HMC attached to the Power 780 enables support personnel (with your authorization) to remotely log in to review error logs and perform remote maintenance if required.

The I/O device and adapter diagnostics consist of stand-alone diagnostics, which are loaded from the DVD-RAM drive, and online diagnostics. Online diagnostics, when installed, are resident with the AIX operating system on the disk or system. They can be booted in single-user mode (service mode), run in maintenance mode, or run concurrently (concurrent mode) with other applications. They have access to the AIX error log and the AIX configuration data.

- Service mode enables checking of system devices and features.
- Concurrent mode allows the normal system functions to continue while selected resources are being checked.
- Maintenance mode enables checking of devices and adapters.

Note: Because the 9179-MHB system has an optional DVD-RAM (#5762), alternative methods for maintaining and servicing the system need to be available if the DVD-RAM is not ordered; an external Internet connection must be available to maintain or update system microcode to the latest required level.

Concurrent maintenance guided service procedures will continue to be supported by the Repair and Verify (R&V) component of the Service Focal Point application running on the HMC. Repair procedures that are not covered by the guided R&V component will be documented and available for display on any Web-browser-enabled system as well as on the HMC. These procedures are available through the InfoCenter application.

Service environments

The HMC is a dedicated server that provides functions for configuring and managing servers for either partitions or a 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.

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

In the Guiding Light LED implementation, when a fault condition is detected on the POWER7 system, an amber System Fault LED will be illuminated on the Operator Panel. The Guiding Light system pinpoints the exact part by blinking the amber FRU identify LED associated with the part to be replaced when selected by the servicer as part of the repair procedure. This action will roll up to the enclosure locate LED and blue system locate LED on the Operator Panel to provide a path from the system level to the enclosure and down to the individual component to be serviced.

The enclosure and system identify LEDs will turn on solid and can be used to follow the 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 extended 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. 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.

Error handling and reporting

In the unlikely event of system hardware or environmentally induced failure, the system run-time 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.

Concurrent Maintenance

The Power 780 continues to support concurrent add or repair of power, cooling, PCI adapters, media devices, I/O drawers, the GX adapter, and the Operator Panel. In addition, it continues to support concurrent firmware fixpack updates when possible. The determination of whether a firmware fixpack release can be updated concurrently is identified in the readme file released with the firmware.

Hot-node Add, memory upgrade, and Hot-node repair

With the proper configuration and required protective measures, the Power 780 server is designed for node add, memory upgrade, or node repair without powering down the system.

Power 780 servers support the adding of an additional CEC enclosure (node) to a system (Hot-node Add) or adding additional memory (memory upgrade) to an existing node. The additional Power 780 enclosure or memory would be ordered as a system upgrade (MES order) and added to the original system. The additional resources of the newly added CEC enclosure (node) or memory can then be assigned to existing OS partitions or new partitions as required. Hot-node Add and memory upgrade make it possible to upgrade a server by integrating a second, third, or fourth CEC enclosure or additional memory into the server with reduced impact to the system operation.

In an unlikely event that CEC hardware (for example, processor or memory) experienced a failure, the hardware can be repaired by freeing up the processors and memory in the node and its attached I/O resources (node evacuation).

To guard against any potential impact to system operation during Hot-node Add, memory upgrade, or node repair, customers must comply with the following protective measures:

1. For memory upgrade and node repair, ensure the system has sufficient inactive or spare processors and memory. Critical I/O resources must be configured with redundant paths.
2. Schedule upgrades or repairs during "non-peak" operational hours.
3. Move business applications to another server using the Live Partition Mobility feature or quiesce them.
4. Back up critical application and system state information.
5. Checkpoint databases.

Live Partition Mobility

Live Partition Mobility allows you to migrate an AIX partition running on one POWER7 system to another POWER6 or POWER7 system without disrupting services. The migration transfers the entire system environment, including processor state, memory, attached virtual devices, and connected users. It provides continuous operating system and application availability during planned partition outages for repair of hardware and firmware faults, or continuous availability during a concurrent repair that requires freeing up CEC resources.

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

Product documentation is available on a DVD (SK5T-7087), which is shipped with the Power 780, or you can access the product documentation on the Web at

http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/index.jsp

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

IBM Power 780 (9179-MHB) CEC enclosure

- Width: 483 mm (19.0 in)
- Depth: 863 mm (32.0 in)
- Height: 174 mm (6.85 in), 4 EIA units
- Weight: 70.3 kg (155 lb)

Dimensions and specifications shown are for a single drawer. Model MHB servers can have one to four CEC enclosures.

To help assure installability and serviceability in non-IBM, industry-standard racks, review the vendor's installation planning information for any product-specific installation requirements.

Operating environment

- Temperature:
  - 5 to 45 degrees C (41 to 113 F) nonoperating
  - 5 to 35 degrees C (41 to 95 F) operating
- Relative humidity (noncondensing):
  - 8% to 80% nonoperating
  - 20% to 80% operating
- Maximum dew point:
  - 28 degrees C (82 F) nonoperating
  - 29 degrees C (84 F) operating
- Operating voltage: 200 to 240 V ac
- Operating frequency: 50 to 60 +/- 3 Hz
- Power consumption: 1,600 watts maximum (per enclosure with 16 cores active)
- Power source loading: 1.649 kVA maximum (per enclosure with 16 cores active)
- Thermal output: 5,461 Btu/hr maximum (per enclosure with 16 cores active)
- Maximum altitude: 3,048 m (10,000 ft)
- Noise level:
  - One enclosure with 16 active cores:
    -- 6.8 bels (operating/idle)
    -- 6.3 bels (operating/idle) with acoustic rack doors
  - Four enclosures with 64 active cores:
    -- 7.4 bels (operating/idle)
    -- 6.9 bels (operating/idle) with acoustic rack doors

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 CFR, Title 47, Part 15, EMI Class A
- EEA, Turkey: EU Council Directive 2004/108/EC, EMI Class A
- Japan: VCCI Council, EMI Class A
- Korea: KCC, EMI Class A
- China (PRC): CPCS, EMI Class A
- Taiwan (RoC): Taiwan BSMI, EMI Class A
- Australia\New Zealand: ACMA™, EMI Class A
- Canada: ICES-003, EMI Class A
- Russia: GOST R, EMI Class A
- Saudi Arabia: MoCI, EMI Class A
- Vietnam: MPT, EMI 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 60950-1 1st Edition Underwriters Laboratory, Safety Information
- CAN/CSA22.2 No. 60950-1 1st Edition
- EN60950-1:2001 European Norm
- GS Mark (Safety, TUV, EN60950)- Germany, Europe
- IEC 60950-1 1st Edition, International Electrotechnical Commission, Safety Information
- 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

The 9179-MHB can be installed in a 7014-T00 or -T42 rack that provides:

- Proper dimensions
- Mounting surfaces
- Power distribution
- Ventilation
- Stability
- Other functional requirements

The design of the Power 780 is optimized for use in an IBM 7014-T00 or -T42 rack. Both the front cover and the external processor fabric cables occupy space on the front left and right sides of an IBM 7014 rack that may not be available in non-IBM racks. If loading two or more CEC enclosures in a 7014-T42 rack, the CEC enclosures need to be loaded 36U or below to allow space for the flex cables.

Minimum system configuration

Each new model MHB system must include a minimum of the following items:

- One CEC enclosure (4U) with the following:
  - 1X System Enclosure with IBM Bezel (#5597) or OEM Bezel (#5598)
  - 1X Service Processor (#5664)
  - 1X DASD Backplane (#5652)
  - 2X Power Cords (two selected by customer)
  - 2X A/C Power Supply (#5632)
  - 1X Operator Panel (#1853)
  - 1X HEA Adapters (one of these):
    - -- Quad 4 X 1 GB (#1803)
    - -- Quad 2 X 1 GB and 2 X 10 GB Optical (#1804)
    - -- Quad 2 X 1 GB and 2 X 10 GB Copper (#1813)
- 1X Primary Operating System (one of these):
  - AIX (#2146)
  - Linux (#2147)
  - IBM i (#2145) plus IBM i 6.1.1 (#0566)
- 1X Processor Card: 3.86 GHz, 16-Core / 4.14 GHz, 8-Core POWER7 Processor Card, 0-core active (#4982).
- 4X Processor Activations for Processor Feature #4982 (#5469).
- 1X DDR3 Memory DIMMs: 0/32 GB (4 X 8 GB), 1,066 MHz, (#5600 or larger).
- 16X Activation of 1 GB DDR3 - POWER7 Memory (#8212).
- For AIX and Linux, 1X disk drive and for IBM i 2X disk drive: Formatted to match the system Primary O/S indicator selected, or if using a Fibre Channel attached SAN (indicated by #0837) a disk drive is not required.
- 1X Language Group (selected by the customer).
- 1X Removable Media Device (#5762): Optionally orderable, a stand-alone system (not network-attached) would require this feature.
- 1X HMC is required for every 9179-MHB; however, a communal HMC is acceptable.

Note:

- Additional optional features can be added, as desired.
- Feature coded racks are allowed for I/O expansion only.
- A machine type/model rack, if desired, should be ordered as the primary rack.
- A minimum number of four processor activations must be order per system.
- The minimum number of memory activations must enable at least 50% of the ordered memory.

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 site 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.

https://www14.software.ibm.com/webapp/set2/sas/f/hmc/home.html

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.

An HMC 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 a CR3 model, or later rack-mount or C06, or later deskside.

Software requirements

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

- AIX 5.3 with the 5300-11 Technology Level and Service Pack 2, or later
- AIX 5.3 with the 5300-10 Technology Level and Service Pack 4, or later, available May 28, 2010
- AIX 5.3 with the 5300-09 Technology Level and Service Pack 7, or later, available May 28, 2010
- AIX 6.1 with the 6100-04 Technology Level and Service Pack 3, or later
- AIX 6.1 with the 6100-03 Technology Level and Service Pack 5, or later, available June 25, 2010
- AIX 6.1 with the 6100-02 Technology Level and Service Pack 8, or later, available June 25, 2010

If installing the IBM i operating system:

- IBM i 6.1 with 6.1.1 machine code, or later

Visit the IBM Prerequisite Web site for compatibility information for hardware features and the corresponding AIX and IBM i Technology Levels

http://www-912.ibm.com/e_dir/eserverprereq.nsf

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

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

If installing VIOS:

- VIOS 2.1.2.12 with Fix Pack 22.1 and Service Pack 2, or later

If installing Java 1.4.2 on POWER7 servers:

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, refer to the following Web site

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

Limitations

The 9179-MHB has the following limitations:

- The POWER GXT145 PCI Express Graphics Accelerator (#5748) and the POWER GXT135P Graphics Accelerator with Digital Support (#2849) are not hot-plug capable.
- The 3.5-inch DASD disk drives are not supported in the CEC enclosure.
- A number of older I/O devices, adapters, and memory which were supported on the Power 570 (9117-MMA) are not supported on the Power 780 and newer technology and must be used to replace it. These include:
  - HSL-2/RIO-2 interface drawers and towers
  - 10K SCSI disks
  - 15K SCSI drives 35 GB or smaller
  - IDE DVD drives in the CEC enclosure (DVD drives: feature #3706, #4430, #4460, #4633, #5756, and #5757)
  - DDR2 memory
  - SCSI adapters: feature #2749, #2757, #2780, #5580, #5581, #5583, #5590, #5591, #5702, #5712, #5776, #5778, and #5706
  - Fibre Channel adapters: feature #2787, #5704, #5760, and #5761
  - Integrated xSeries servers: feature #4812 and #4813
  - Ethernet adapters: feature #1981, #5718, #1982, #5719, #1984, #5707, and #3709
  - IOPs: feature #2844, #2847, and #3705
  - DTTA (telephony): feature #6312
  - Twinax: feature #4746
  - Cryptographic adapters: feature #4801 and #5805
  - Diskette drives: feature #2591
  - Quarter-Inch Cartridge (QIC) tape drives (neither feature number nor machine type model)
- One-step model upgrades from POWER5 or POWER5+™ are not supported. Only model upgrades from the 9117-MMA are supported. A 9406-MMA must first be converted to a 9117-MMA.
- UPS attachment to the system CEC via the Serial-to-SPCN feature (#1827) is no longer supported. UPS support may be added by using an existing attached #5802 or #5877 drawer, plus the necessary DDR IB cables, SPCN cable, and GX+ + adapter (#1808).

Planning information

Cable orders

No additional cables are 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.

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 IBM Electronic 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

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts. 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.

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.

Service level is:

- 24 hours per day, 7 days a week, 4 hour average, same day response

Non-IBM parts service

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. Service levels are response-time objectives and are not guaranteed. See the Warranty service section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts.

Maintenance service options

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. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts. 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.

Service levels are:

- 24 hours per day, 7 days a week, 4 hour average response
- 24 hours per day, 7 days a week, 2 hour average response

Customer Replaceable Unit (CRU) 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.

CRUs may be provided as part of the machine's standard maintenance service except that you may install a CRU yourself or request IBM installation, at no additional charge, under any of the On-site Service levels specified above.

Non-IBM parts service

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

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines 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.

Usage plan machine

No

IBM hourly service rate classification

Two

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.

Field-installable features

Yes

Model conversions

Yes

Machine installation

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine. Contact the local IBM office.

The *Machine Installation Guide* specifies site preparation, physical requirements, and installation (operating) environment and any cabling included in the installation along with the approximate installation time in hours. Customer requests for installation of items not covered in the installation guide may be performed at IBM's hourly service rate designated for the machine.

Graduated program license charges apply

Yes

The applicable processor tier is: Large.

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.ibm.com/servers/support/machine_warranties/ machine_code.html

Machine using LMC: Type Model 9179-MHB

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

http://www14.software.ibm.com/webapp/set2/firmware

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.

Educational allowance

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 5% for the products in this announcement.

Pricing

Country prices must be obtained from your local pricing function.

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Financing Power Systems solutions from IBM Global Financing can help you acquire more from existing budgets while helping you conserve cash, and provide a comprehensive end-to-end multivendor IT financing solution. This end-to-end approach helps form the foundation of a cohesive technology management strategy that can be superior to ownership. IBM can help reduce costs compared to purchase, increase ROI, lower total cost of ownership, minimize risk, improve accountability, and enable you to focus on your core business strategies while giving you the ability to make flexible equipment decisions throughout the entire technology life cycle.

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hardware, software, services, and consulting. Through our Global Asset Recovery Services' buyback program you can obtain cash for marketable IT assets and dispose of nonmarketable assets in a way that complies with environmental laws and regulations.

In addition for certain mid-range and high-end systems, customers leasing their Power Systems can upgrade to new technology at mid-lease for little or no change in their existing monthly payment. IBM offers options for clients to perform either in-place upgrades or side-by-side, nondisruptive migrations (IBM Power Exchange) to the latest POWER technology.

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