



IBM Power 560 Express eases management challenges through its SMP building block technology

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At a glance

The Power 560 Express server is designed to deliver outstanding price/performance, mainframe-inspired reliability and availability features, and innovative virtualization technologies. The Power 560 Express features:

- IBM® POWER6™ 3.6 GHz processors
- 4-, 8-, and 16-core configurations
- Up to 384 GB of DDR2 memory
- Memory frequencies of up to 667 MHz
- Up to six SAS DASD drives per CEC enclosure (12 maximum in CEC enclosures)
- Up to 5.4 TB of internal CEC enclosure disk storage
- Modular rack mount design with one or two CEC enclosures
- Seven I/O expansion slots per enclosure (14 maximum in CEC enclosures)
- Dynamic logical partitions -- up to 160 per system (optional)
- Integrated Virtual Ethernet ports -- select from 1 Gb and 10 Gb options
- Can be ordered with the AIX®, IBM i, or Linux® operating systems, individually or in any combination

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: YE001).

Overview

The new IBM Power 560 Express with POWER6 processors is a 4- to 16-core SMP, rack-mounted server. The new POWER6 processors in this server are 64-bit features. The feature uses two processor modules, each with two cores. The processor card feature has 32 MB of L3 cache per module, 64 MB L3 per feature; 8 MB of L2 cache per module, 16 MB L2 per feature; and 12 DDR2 memory DIMM slots. The new POWER6 processor is available at a frequency of 3.6 GHz.

The Power 560 Express uses the new POWER6 DDR2 memory architecture to provide greater bandwidth and capacity. This enables operating at a higher data rate for large memory configurations. Each new POWER6 processor card can support up to 12 DDR2 DIMMs running at speeds up to 667 MHz. A full system can contain up to 384 GB of memory in a 16-core system. This new model server is available in 4-, 8-, and 16-core configurations. This modular-built system uses one or two enclosures; each enclosure is four EIA units tall and is housed in

a 19-inch rack. Each of the system enclosures have two processor slots and can contain two POWER6 processor card features.

The Power 560 Express offers a choice of 1 Gb or 10 Gb integrated host Ethernet adapters (HEA). These native ports are selected at the time of initial order. The model EMA supports virtualization of these integrated Ethernet adapters, also called Integrated Virtual Ethernet (IVE).

Key prerequisites

Refer to the [Hardware requirements](#) and [Software requirements](#) sections.

Planned availability dates

November 21, 2008, except as noted below:

- October 14, 2008, for feature number 5922
- January 30, 2009, for:
 - Feature number 2728
 - AIX 5.3 with 5300-07 Technology Level and Service Pack 7
 - AIX 5.3 with 5300-06 Technology Level and Service Pack 10
 - AIX 6.1 with 6100-00 Technology Level and Service Pack 7

Description

Summary of available features:

- 4U 19-inch rack-mount system enclosure
- One or two enclosures per system (8U maximum)
- Six hot-swappable, 3.5-inch SAS disk bays per enclosure
- One hot-plug, slim-line media bay per enclosure (optional)
- Redundant hot-swap ac power supplies (N+1) in each enclosure
- Redundant hot-swap processor power regulation (2N+1) in each enclosure
- Choice of integrated I/O options -- one per enclosure
 - 2-port 1 Gigabit Virtual Ethernet
 - 4-port 1 Gigabit Virtual Ethernet
 - 2-port 10 Gigabit Virtual Ethernet (SR)
- Two USB ports per enclosure
- Four HMC ports per system (two per CEC enclosure) to support the attachment of two HMCs
- POWER6, 64-bit, 3.6 GHz, two dual-core modules on one processor card (#7537)
 - 12 DDR2 Memory DIMM sockets per processor card
 - Four-, eight-, or sixteen-core configurations
 - L2 cache: 4 MB per core, 8 MB per dual core, 16 MB per feature
 - L3 cache: 32 MB per dual core, 64 MB per feature
 - 8 GB to 384 GB of DDR2 system memory
- POWER6 DDR2 Memory DIMMs
 - 0/8 GB (4 x 2 GB) DDR2 System Memory, 667 MHz (#1921)
 - 0/16 GB (4 x 4 GB) DDR2 System Memory, 533 MHz (#1922)
 - 0/32 GB (4 x 8 GB) DDR2 System Memory, 400 MHz (#1923)
- Seven I/O expansion slots per enclosure (14 max per system)

slot ID	Adapter type	Slot size
P1-C1	PCIe 8X	Full length
P1-C2	PCIe 8X	Full length
P1-C3	PCIe 8X	Full length

P1-C4	PCI-X 2.0 DDR	Full length
P1-C5	PCI-X 2.0 DDR	Full length
P1-C6/P1-C8	PCIe 8X / GX+	Short form factor
P1-C9	GX+	Short form factor

up to 8 PCIe 8X adapters
up to 3 GX+ Adapters
up to 4 PCI-X DDR Adapters

- Three available operating systems (AIX, i, or Linux) that can be ordered individually or mixed in any combination
- Dynamic LPAR support
- PowerVM™ (optional)
 - Micro-Partitioning (up to 10 partitions per processor, 160 per system)
 - 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 HACMP™ for AIX 5L™ support for nearly continuous operation
- Optional Cluster 1600 support with Cluster Systems Management software
- Remote I/O drawer and tower support
 - Up to 18 I/O drawers on a RIO-2 interface (7311-D20)
 - Up to 12 I/O drawers on a 12X Channel interface (#5796 or 7314-G30)
 - Up to 110 SAS DASD I/O drawers on SAS PCI controllers (#5886)
 - Up to 26 DASD Expansion drawers (#5786 or 7031-D24 or -T24)

Remote I/O drawer availability

The following feature number I/O drawers are available for order on the Power 560 Express.

TotalStorage® EXP24 Disk Drawer (#5786) (IBM i partition only)

The TotalStorage EXP24 is a 4 EIA unit drawer and mounts in a 19-inch rack. The drawer is 27 inches long and can weigh up to 120 lb. The front of the IBM TotalStorage EXP24 Ultra320 SCSI Expandable Storage Disk Enclosure has slots for up to 12 disk drives organized in two SCSI groups of up to six drives. The rear also has slots for up to 12 disk drives organized in two additional SCSI groups of up to six drives plus slots for the four SCSI interface cards. Each SCSI drive group can be connected by either a Single Bus Ultra320 SCSI Repeater Card (#5741) or a Dual Bus Ultra320 SCSI Repeater Card (#5742), allowing a maximum of eight SCSI connections per TotalStorage EXP24. Feature 5786 is delivered with three cooling fans and two power supplies to provide redundant power and cooling. Feature 5786 attaches to a host system CEC enclosure or to a remote I/O drawer with an Ultra320 SCSI adapter.

PCI DDR 12X Expansion Drawer (#5796)

The PCI-DDR 12X Expansion Drawer is a 4 EIA unit tall drawer and mounts in a 19-inch rack. Feature 5796 is 8.8 inches wide and takes up half the width of the 4 EIA rack space. Feature 5796 requires the use of a feature 7314 drawer mounting enclosure. The 4 EIA tall enclosure can hold up to two feature 5796 drawers mounted side by side in the enclosure. The drawer is 31.5 inches deep and can weigh up to 44 lb. The PCI-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 feature 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.

EXP 12S SAS Drawer (#5886)

The EXP 12S SAS Drawer is a 2 EIA unit tall drawer and mounts in a 19-inch rack. The drawer is 20.12 inches long and can weigh up to 40 lb without SAS disks. The EXP 12S SAS Drawer

has twelve 3.5-inch SAS disk slots with redundant data paths to each slot. The drawer supports redundant hot-plug power and cooling and redundant hot-swap SAS expanders (Enclosure Services Manager-ESM). Each ESM has an independent SCSI Enclosure Services (SES) diagnostic processor. Feature 5886 attaches to a host system CEC enclosure or a remote I/O drawer with a SAS adapter in a PCI-X or PCIe slot.

7311-D20 Rack Mounted High Density Expansion Drawer (AIX/Linux Partitions only)

The 7311-D20 Expansion Drawer is a 4 EIA unit drawer and mounts in a 19-inch rack. It is 24 inches long and can weigh up to 101 lb. The high-density expansion drawer provides additional adapter slots and SCSI disk slots as remote I/O. There are seven hot-swap PCI-X 64-bit, 133 MHz, 3.3 volt I/O slots and 12 optional hot-swap disk drive bays. The drawer includes redundant power and cooling. The fans, power supplies, and PCI adapters are top-accessible while the disk drives are front-accessible for easy service and maintenance. The D20 attaches to a host system CEC enclosure with a RIO-2 adapter.

19-inch racks

The 8234-EMA and its remote I/O drawer features are designed to mount in the 7014-T00, 7014-T42, 7014-B42 or 7014-S25 rack. These are built to the 19-inch EIA standard. When ordering a new 8234 system, the appropriate 7014 rack model can be ordered with the system hardware on the same initial order. IBM is making the racks available as features of the 8234-EMA when you order additional I/O drawer hardware for an existing system (MES order). The rack feature number should be used only if you want IBM to integrate the newly ordered I/O drawer in a 19-inch rack before shipping the MES order.

1.3 Meter Rack (#0555)

The 1.3 Meter Rack is a 25 EIA unit tall 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. Order feature 0555 only when required to support rack integration of MES orders prior to shipment from IBM Manufacturing.

1.8 Meter Rack (#0551)

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

2.0 Meter Rack (#0553)

The 2.0 Meter Rack is a 42 EIA unit tall rack. The rack that is delivered as feature 0553 is the same rack delivered when you order the 7014-T42 or B42 rack; the included features may be different. Some features that are delivered as part of the 7014-T42 or -B42 must be ordered separately with the 0553. Order feature 0553 only when required to support rack integration of MES orders prior to shipment from IBM Manufacturing.

Power 560 Express configuration discount offer

When ordering an Express configuration on the Power 560 Express, you can receive processor activations for use on that configuration at no additional charge and receive a discounted AIX or Linux operating system subscription. The minimum required features to qualify for an Express configuration are shown below.

The requirements to qualify for an Express configuration offer are:

- The system must satisfy all minimum system configuration requirements.
- The system must contain 4 GB of memory for each processor core.
- The system configuration must contain two disk drives (139 GB minimum drive size) or a Fibre Channel adapter that supports SAN attachment.
- Express configuration pricing is only available for initial system orders. MES orders may not include feature 7722.

If the above requirements are met, the client will receive one Processor Activation at no additional charge for each paid Processor Activation on 4-, 8-, or 16-core configurations.

With the purchase of an Express configuration, you will be entitled to a discounted AIX or Linux operating system subscription, or you may choose to purchase the system with IBM i or without an operating system. The lower-priced AIX or Linux operating system is processed via a feature number on AIX 5.3, AIX 6.1, Red Hat Enterprise Linux, or SUSE Linux Enterprise Server. Under this subscription you may purchase one license for each active processor on the Express configuration. Only the first operating system subscription purchased for the Express configuration is discounted. The second and subsequent subscriptions are available at regular price. In the case of multiple operating system subscriptions, it is the client's option as to which one is discounted. There is no discounted IBM i subscription offered with an Express configuration purchase.

You may purchase more than the minimum required features or minimum quantity of features to achieve an Express configuration and still qualify for processor entitlements at no additional charge, and a discounted operating system subscription.

The following table shows the minimum feature requirements to qualify for the Express configuration offer on the Power 560 Express:

Feature	Feature description	System configuration		
		4-Core	8-Core	16-Core
1915	Activation of 8 GB DDR2 Memory (all memory must be active when shipped)	2	4	8
1921	0/8 GB DDR2 Memory (4 x 2 GB) DIMMs (or similar memory), requires 4 GB per core total	2	4	8
7722	One Processor Activation for Proc Feature 7537- Express	2	4	8
7723	One Processor Activation for Proc Feature 7537	2	4	8
DISK	139 GB (or larger) SAS Disk Drive or	2	2	2
	Fiber Channel Adapter that supports SAN attach (1)	1	1	1

(1) Examples of SAN attach I/O adapters that can replace the SAS drives are:

- 5735 - 8Gb 2 Port PCIe Fibre Channel
 - 5749 - 4Gb 2 Port PCIX Fibre Channel
 - 5758 - 4Gb 1 Port PCIX Fibre Channel
 - 5759 - 4Gb 2 Port PCIX Fibre Channel
 - 5773 - 4Gb 1 Port PCIe Fibre Channel
 - 5774 - 4Gb 2 Port PCIe Fibre Channel
- or similar approved Fibre Channel adapter

Express configurations will also be referred to as AIX or Linux Editions, depending on which operating system is purchased with the discounted configuration. For additional information about these Express Editions, visit

- http://www.ibm.com/systems/power/hardware/560/browse_aix.html
- http://www.ibm.com/systems/power/hardware/560/browse_linux.html
- http://www.ibm.com/systems/power/hardware/560/browse_i.html

8234-EMA1

- 4X 3.6 GHz Processor Cores
- 2X 3.6 GHz Processor Activations
- 2X 3.6 GHz Processor Activations - Express
- 1X 16 GB System Memory

- 2X 8 GB Memory Activation
- 2X SAS disk drives
- 1X System enclosure with minimum required content

When purchased with the AIX operating system, this is an AIX Edition.

When purchased with the Linux operating system, this is a Linux Edition.

Express Configurations can be purchased with the IBM i operating system.

8234-EMA2

- 8X 3.6 GHz Processor Cores
- 4X 3.6 GHz Processor Activations
- 4X 3.6 GHz Processor Activations - Express
- 1X 32 GB System Memory
- 4X 8 GB Memory Activation
- 2X SAS disk drives
- 1X System enclosure with minimum required content

When purchased with the AIX operating system, this is an AIX Edition.

When purchased with the Linux operating system, this is a Linux Edition.

Express Configurations can be purchased with the IBM i operating system.

8234-EMA3

- 16X 3.6 GHz Processor Cores
- 8X 3.6 GHz Processor Activations
- 8X 3.6 GHz Processor Activations - Express
- 1X 64 GB System Memory
- 8X 8 GB Memory Activation
- 2X SAS disk drives
- 2X System enclosure with minimum required content

When purchased with the AIX operating system, this is an AIX Edition.

When purchased with the Linux operating system, this is a Linux Edition.

Express Configurations can be purchased with the IBM i operating system.

Services

The IBM Server Product Services offers 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 inline 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>

PowerVM

PowerVM Editions are available as a hardware feature (#7942 for Standard, #7995 for Enterprise). Select the feature that provides the level of virtualization required for your application.

- Partition Mobility, available only with PowerVM-Enterprise (#7995), enables you to move a running AIX or Linux LPAR from one physical server to another with no downtime if both servers are using POWER6 processors. This is a significant advancement in Power Systems virtualization technology and can assist you with performing the following common business needs while keeping the business up and running:
 - Evacuating a system before performing scheduled maintenance
 - Moving workloads across a pool of different physical resources as business needs shift
 - Moving workloads off underutilized machines so that they can be powered off to save on energy and cooling costs
- Micro-Partitioning™ support for a single core being shared by up to 10 logical partitions.
- Virtual I/O Server is a single-function appliance that resides in a POWER5™ or POWER6 processor-based partition. It facilitates the sharing of physical I/O resources between client partitions (AIX 5.3, or later, IBM i 6.1, 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 LPARs.
- Virtual networking: SEA enables connectivity between internal and external virtual LANs (VLANs); virtual Ethernet enables high-speed connections between partitions.
- Lx86 supports running most x86 Linux applications within Linux partitions. For more information, visit

<http://www.ibm.com/systems/power/software/virtualization/editions/lx86/qual.html>

PowerVM Editions:

- PowerVM - Standard (#7942) supports up to 10 partitions per core, HMC management, VIOS, Lx86, and multiple shared processor pools.
- PowerVM - Enterprise (#7995) adds support for Live Partition Mobility for AIX and Linux partitions.

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 System LPARs and virtual I/O.
- HMC provides management of virtualized systems.

Power 560 Express Capacity Backup (CBU) capability (applies to IBM i only)

The Power 560 systems' CBU designation can help meet your requirements for a second system to use for backup, high availability, and disaster recovery. It enables you to temporarily transfer IBM i processor license entitlements and 5250 Enterprise Enablement entitlements purchased for a primary machine to a secondary CBU-designated system. Temporarily transferring these resources instead of purchasing them for your secondary system may result in significant savings. Processor activations cannot be transferred.

The CBU specify feature 0444 is available only as part of a new server purchase. Certain system prerequisites must be met and system registration and approval are required before the CBU specify feature can be applied on a new server.

Standard IBM i terms and conditions do not allow either IBM i processor license entitlements or 5250 OLTP (Enterprise Enablement) entitlements to be transferred permanently or temporarily. These entitlements remain with the machine they were ordered for. When you register the association between your primary and on-order CBU system, you must agree to certain terms and conditions regarding the temporary transfer.

After a CBU system designation is approved and the system is installed, you can temporarily move your optional IBM i processor license entitlement and 5250 Enterprise Enablement entitlements from the primary system to the CBU system when the primary system is down or while the primary system processors are inactive. The CBU system can then better support failover and role swapping for a full range of test, disaster recovery, and high availability

scenarios. Temporary entitlement transfer means that the entitlement is a property transferred from the primary system to the CBU system and may remain in use on the CBU system as long as the registered primary and CBU system are in deployment for the high availability or disaster recovery operation.

The primary system for a Power 560 (8234-EMA) server can be:

- 9117-MMA
- 9406-MMA
- 9406-570
- 8204-E8A
- 9409-M50
- 9406-550

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

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

Before you can temporarily transfer 5250 entitlements, you must have more than one 5250 Enterprise Enablement entitlement on the primary server and at least one 5250 Enterprise Enablement entitlement on the CBU system. You can then transfer the entitlements that are not required on the primary server during the time of transfer and that are above the minimum of one entitlement.

For example, if you have a four-core Power 560 as your primary system with two IBM i processor license entitlements (one above the minimum) and two 5250 Enterprise Enablement entitlements (one above the minimum), you can temporarily transfer only one IBM i entitlement and one 5250 Enterprise Enablement entitlement. During the temporary transfer, the CBU system's internal records of its total number of IBM i processor entitlements is not updated, and you may see IBM i license noncompliance warning messages from the CBU system.

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

For CBU registration and further information, visit

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

Reliability, Availability, and Serviceability (RAS):

The reliability of the Power 560 Express starts with components, devices, and subsystems that are designed to be fault-tolerant. 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 Power 560 Express L3 cache and system memory offers error checking and correcting (ECC) fault-tolerant features. ECC is designed to correct environmentally induced, single-bit, intermittent memory failures and single-bit hard failures. With ECC, the likelihood of memory failures is substantially reduced. ECC also provides double-bit memory error detection that helps protect data integrity in the event of a double-bit memory failure.

The AIX operating system supports disk mirroring and disk controller duplexing while Linux supports DASD mirroring (RAID 1) through software. Additionally, some hardware RAID adapters are supported on Linux.

When using the AIX operating system, the Journaled File System, also known as JFS or JFS2, helps maintain file system consistency and reduces the likelihood of data loss when the system is abnormally halted due to a power failure. JFS, for 32-bit kernels, and JFS2, for 64-bit kernels, are designed to substantially reduce or eliminate fragmentation.

Memory error-correction extensions

System memory has single-error-correct and double-error-detect ECC circuitry designed to correct single-bit memory failures. Double-bit detection is designed to help maintain data integrity by detecting and reporting multiple errors beyond what the ECC circuitry can correct. The memory chips are organized such that the failure of any specific memory module is designed to only affect a single bit within an ECC word (bit scattering), thus allowing for error correction and continued operation in the presence of a complete DRAM chip failure (Chipkill™ recovery).

System memory also uses memory scrubbing and dynamic bit steering, enabling correctable error thresholds to determine when available spare memory modules on each DIMM should be used to replace bit lines that have exceeded their threshold value.

Redundancy for array self-healing

Although the most likely failure event in a processor is a soft single-bit error in one of its caches, other events can occur, and they need to be distinguished from one another. For the L1, L2, and L3 caches and their directories, hardware and firmware keep track of whether permanent errors are being corrected beyond a set threshold. If exceeded, a deferred repair error log is created. Additional runtime availability actions, such as CPU vary off or L3 cache line delete, are also initiated.

L1 and L2 caches and L2 and L3 directories on the POWER6 chip are manufactured with spare bits in their arrays that can be accessed via programmable steering logic to replace faulty bits in the respective arrays. This is similar to the redundant bit steering employed in main storage as a mechanism designed to help avoid physical repair; it is also implemented in systems using the POWER6 processor. The steering logic is activated during processor initialization and is initiated by the built-in system-test (BIST) at power-on time.

When correctable error thresholds in the L3 cache exceed a set threshold, systems using the POWER6 processor invoke a dynamic L3 cache line delete function, which enables them to stop using bad cache and eliminates exposure to greater problems.

Fault monitoring functions

When a system using the POWER6 processor is powered on, BIST and power-on self-test (POST) check processors, L3 cache, memory, and associated hardware required for proper booting of the operating system can be performed. If a noncritical error is detected or if errors occur in resources that can be removed from the system configuration, booting the system is designed to proceed to completion. The errors are subsequently logged in the system nonvolatile RAM.

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

On POWER6 processor-based servers running the AIX or Linux operating systems, hardware and software 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 check stop conditions and 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 pre-emptively bring the most-probable replacement parts when a service call is placed, reducing repair time.

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 performs a reset/reload if it detects the loss of the service processor. If the reset/reload does not correct the problem, the Hypervisor notifies the operating system, and the operating system can take appropriate action, including calling for service.

Environmental monitoring functions

POWER6 processor-based servers include a range of environmental monitoring functions.

Temperature monitoring increases the fan speed rotation when ambient temperature is above the normal operating range or when a redundant fan fails.

Temperature monitoring warns the system administrator of potential environmental-related problems (for example, air conditioning and air circulation around the system) so that appropriate corrective actions can be taken before a critical failure threshold is reached.

It also performs an orderly system shutdown when the operating temperature exceeds the critical level.

Fan speed monitoring provides a warning and increases fan speeds on the redundant fans to compensate for a detected fan failure. It can also initiate an orderly system shutdown if there is an additional cooling failure when the fans are in high-speed mode.

Voltage monitoring includes a warning and an orderly system shutdown when the voltages are out of operational specification.

Availability enhancement functions

The POWER6 line of systems continues to offer and introduce significant enhancements designed to increase system availability.

POWER6 processor availability enhancements

One of the significant mainframe-inspired availability enhancements in systems with the POWER6 processor is the ability to perform processor instruction retry and alternate processor recovery. This significantly reduces exposure to both hard (logic) and soft (transient) errors in the processor core.

Soft failures in the processor core are transient (intermittent) errors, often due to cosmic rays or other sources of radiation, and generally are not repeatable. When an error is encountered in the core, the POWER6 processor will first automatically retry the instruction. If the source of the error is truly transient, the instruction will succeed and the system will continue as before. On previous IBM systems, this error would cause a checkstop.

With hard failures, true logical errors that are replicated each time the instruction is repeated, retrying the instruction does not help. The instruction will continue to fail. Systems with POWER6 processors can extract the failing instruction from the faulty core and retry it elsewhere in the system, 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. Systems with POWER6 processors are designed to avoid what would have been a full system outage on earlier models.

POWER6 single processor check stopping

Another major advancement in POWER6 processors is single processor check stopping. The Power 560 Express can contain most processor checkstops to the partition that was using the processor at the time. This significantly reduces the probability of any one processor affecting total system availability.

POWER6 cache availability

The POWER™ line of servers continues to be at the forefront of cache availability enhancements. While L3 cache line delete was introduced with POWER4™ processors, the

POWER6 processor line pioneers L2 cache line delete. If an uncorrectable error occurs in L2 or L3 cache, the system can dynamically remove the offending line of cache without requiring a reboot. In addition, the POWER6 processor-based server uses an inclusive L1/L2 cache design and a write-through cache policy on all levels. This helps ensure that data is written to main memory as soon as possible. POWER6 processors also continue to offer hardware-assisted memory scrubbing.

Special uncorrectable error handling

Special uncorrectable error handling, an IBM innovation introduced for POWER5 processors, prevents a 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.

PCI extended error handling

In systems using POWER6 processors, I/O drawer hardware, system firmware, and AIX interaction are designed to allow transparent recovery of intermittent PCI bus parity errors and graceful transition to the I/O device available state in the case of a permanent parity error in the PCI bus. This mechanism is called PCI extended error handling (EEH).

EEH-enabled adapters respond to a special data packet generated from the affected PCI slot hardware by calling system firmware, which examines the affected bus, enables the device driver to reset it, and continues without a system reboot. Currently, there is limited support for Linux, depending upon driver availability.

Predictive failure analysis and dynamic component deal location

Servers with POWER processors have long been able 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 becomes systematic. In many cases this is transparent; the system will first attempt to reallocate resources in such a way that will avoid unplanned outages. If insufficient resources exist to maintain full system availability, these servers will attempt to maintain partition availability by user-defined priority.

Uncorrectable error recovery

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

Serviceability

The Power 560 Express 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.

An HMC attached to the Power 560 Express 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 that are loaded from the DVD-ROM 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 8234-EMA system has an optional DVD-ROM or DVD-RAM, alternative methods for maintaining and servicing the system need to be available if the DVD-ROM or 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. The Power 560 Express service procedures will be released through the following Web site, under System Hardware, Power Systems Information

<http://publib.boulder.ibm.com/infocenter/systems/index.jsp>

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.

CEC and power and cooling subsystem events are analyzed concurrently with system operation by the processor runtime diagnostics (PRD) or by Hypervisor code. Results of these analyses are logged on the service processor and forwarded to both the operating system partitions and the SFP application on the HMC.

The SFP application contains logs of all detected and analyzed errors, detected either by the device drivers on the operating system for I/O-based events or by PRD or Hypervisor for runtime-detected errors in the remainder of the system.

With the call home function on the HMC, the system can automatically send out an alert via phone line to a pager or initiate a call for service when a service action point is reached.

A hardware fault also turns on the two attention indicators (one located on the front of the system unit and the other on the rear) to alert the user of an internal hardware problem. The indicator can also be turned on by the operator as a tool for system identification. The indicators will flash to signify identification and will be ON to signify an error condition.

Service processor

The Power 560 Express service processor enables you 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 includes several remote power control options, environmental monitoring (but only critical errors are supported under Linux), reset and boot features, and remote maintenance and diagnostic functions, including console mirroring. The service processors menus (ASMI) can be accessed concurrently with system operation allowing nondisruptive abilities to change system default parameters.

Call Home

The Call Home application is available at no additional charge and is installed on every HMC. When it is properly configured, it helps IBM deliver the best maintenance service for your system.

Concurrent Maintenance

The Power 560 Express supports concurrent repair of power, cooling, PCI adapters, media devices, and the operator panel. In addition, it supports concurrent firmware updates when possible. The determination of whether a firmware release can be updated concurrently is identified in the readme file released with the firmware.

IBM Electronic Services

Increase system availability and automatically manage system support.

IBM Electronic Service Agent™ and IBM Electronic Services Web Portal comprise the IBM Electronic Services solution. IBM is dedicated to providing fast, exceptional support to clients who use IBM servers.

Electronic Service Agent automatically reports hardware events, such as system errors and performance issues. Systems enabled with this tool "call home" to IBM Support, 24 hours a day, 7 days a week -- at no additional cost.

As part of an increased focus on better service, Electronic Service Agent is configured at installation time for every Power 560 Express. IBM systems support representatives configure the tool when the system is installed, at no charge. In support of this program, a new security white paper describes the secure data exchange between the HMC and the IBM Service Delivery Center (SDC) and the methods and protocols for this exchange. To read the white paper and prepare for Electronic Service Agent installation, visit the Reference Guide section at

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

Integrated with the HMC, and part of the AIX and IBM i operating systems, Electronic Service Agent is designed to automatically and electronically report system failures and utilization issues to IBM, resulting in faster problem resolution and increased availability for your systems. System configuration and inventory information collected by Electronic Service Agent can also be viewed by IBM Support for faster problem resolution.

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

Benefits

Higher availability:

Electronic Service Agent is designed to enhance your Warranty or Maintenance Agreement by offering faster hardware error reporting and uploading system information to IBM Support. This can translate to less wasted time monitoring the symptoms, diagnosing the error, and manually calling IBM Support to open a problem record. Around-the-clock monitoring and reporting means no more dependence on human intervention or off-hours customer personnel when errors are encountered in the middle of the night.

Security:

Electronic Service Agent is secure -- monitoring, reporting, and storing the data at IBM. Electronic Service Agent securely transmits data either via the Internet or modem, and can be configured to communicate securely through gateways to give you a single point of exit from your site. Communication is one way -- IBM cannot call into your system. System inventory information is stored in a secure database that is protected behind IBM firewalls. Your business applications or business data is never transmitted to IBM.

More accurate reporting:

Better reporting and automatic problem routing mean higher system availability and fix confidence. Because system information and error logs are automatically uploaded to the IBM Support Center in conjunction with the service request, you do not need to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM, problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

Customized support:

Using the IBM ID you entered during activation, you can view system and support information in the My Systems and My Search sections of the Electronic Services Web Portal at

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

My Systems offers formatted reports of hardware and software installed using information collected from the systems by Electronic Service Agent. Reports are available for any system associated with your IBM ID. My Search combines the function of search and system information collected by Electronic Service Agent to deliver advanced searching of the IBM technical support knowledgebase, with results customized to your unique system.

For more information on how to take advantage the power of Electronic Services, and for information about Electronic Service Agent for all you platforms, contact your IBM Systems Services representative or visit

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

Product number

The following are newly announced features on the specific models of the IBM System p® 8234 machine type:

Description	MT	Model	Feature
IBM 8234-EMA	8234	EMA	
Solution Delivery Integration (SDI) Indicator	8234	EMA	0002
Solution Delivery Integration (SDI) Bulk MES Order Indicator	8234	EMA	0003SDI Billing Adjustment Indicator
OEM Light Manufacturing Order Indicator - EMPTY	8234	EMA	0006
Solution Delivery Integration (SDI) Order Indicator - DO NOT BUILD	8234	EMA	0009
Specify Code for External High Speed Modem	8234	EMA	0032
Mirrored System Disk Level, Specify Code	8234	EMA	0040
Device Parity Protection-All, Specify Code	8234	EMA	0041
Mirrored System Bus Level, Specify Code	8234	EMA	0043
Device Parity RAID-6 All, Specify Code	8234	EMA	0047
RISC-to-RISC Data Migration	8234	EMA	0205
AIX Partition Specify	8234	EMA	0265
Linux Partition Specify	8234	EMA	0266
IBM i Operating System Partition Specify	8234	EMA	0267
CSC Specify	8234	EMA	0275
Ext Tape Attached via #5736	8234	EMA	0290
Specify Custom Data Protection	8234	EMA	0296
Specify EXP24 Attach via Existing Controller	8234	EMA	0302
Mirrored Level System Specify Code	8234	EMA	0308
RAID Hot Spare Specify	8234	EMA	0347
V.24/EIA232 6.1m (20-Ft) PCI Cable	8234	EMA	0348
V.35 6.1m (20-Ft) PCI Cable	8234	EMA	0353
X.21 6.1m (20-Ft) PCI Cable	8234	EMA	0359
V.24/EIA232 24.4m (80-Ft) PCI Cable	8234	EMA	0367
UPS Factory Integration Specify	8234	EMA	0373
HMC Factory Integration Specify	8234	EMA	0374
Display Factory Integration Specify	8234	EMA	0375
Reserve Rack Space for UPS	8234	EMA	0376
Reserve Rack Space for HMC	8234	EMA	0377
Reserve Rack Space for Display	8234	EMA	0378
CBU SPECIFY	8234	EMA	0444
Customer Specified Placement	8234	EMA	0453
IBM i 6.1 Specify Code	8234	EMA	0534
19 inch, 1.8 meter high rack	8234	EMA	0551
19 inch, 2.0 meter high rack	8234	EMA	0553
19 inch, 1.3 meter high rack	8234	EMA	0555
Rack Filler Panel Kit	8234	EMA	0599
Balanced Warehouse Solution Indicator	8234	EMA	0710
Load Source Not in CEC	8234	EMA	0719
Specify Load Source in #5786	8234	EMA	0725
Specify #5886 Load Source placement	8234	EMA	0727
#4328 Load Source Specify	8234	EMA	0836
SAN Load Source Specify	8234	EMA	0837
#3677 Load Source Specify	8234	EMA	0839
#3678 Load Source Specify	8234	EMA	0840
#3658 Load Source Specify	8234	EMA	0844
US TAA Compliance Indicator	8234	EMA	0983
Modem Cable - US/Canada and General Use	8234	EMA	1025
Decline Electronic Service Agent Install Indicator	8234	EMA	1120

System Unique Identifier	8234	EMA	1311
System Bezel	8234	EMA	1715
GX Dual Port- RIO-2 Attach	8234	EMA	1800
GX Dual Port- 12X Channel Attach	8234	EMA	1802
System port/UPS Conversion Cable	8234	EMA	1827
1.5 Meter 12X to 4X Channel Conversion Cable	8234	EMA	1828
0.6 Meter 12X Cable	8234	EMA	1829
1.5 Meter 12X cable	8234	EMA	1830
8.0 Meter 12X Cable	8234	EMA	1834
3.0 Meter 12X Cable	8234	EMA	1840
3 Meter 12X to 4X Channel Conversion Cable	8234	EMA	1841
10 Meter 12X to 4X Channel Conversion Cable	8234	EMA	1842
Operator Panel	8234	EMA	1845
Activation of 8 GB DDR2 System Memory	8234	EMA	1915
0/8GB DDR2 Memory (4X2GB) DIMMs- 667 MHZ- System Memory	8234	EMA	1921
0/16GB DDR2 Memory (4X4GB) DIMMs- 533 MHZ- System Memory	8234	EMA	1922
0/32GB DDR2 Memory (4X8GB) DIMMs- 400 MHZ- System Memory	8234	EMA	1923
Ultra 320 SCSI Cable 1 Meter	8234	EMA	2124
Ultra 320 SCSI Cable 3 Meter	8234	EMA	2125
Ultra 320 SCSI Cable 5 Meter	8234	EMA	2126
Ultra 320 SCSI Cable 10 Meter	8234	EMA	2127
Ultra 320 SCSI Cable 20 Meter	8234	EMA	2128
0.55 Meter Ultra 320 SCSI Cable	8234	EMA	2138
Primary OS - IBM i	8234	EMA	2145
Primary OS - AIX	8234	EMA	2146
Primary OS - Linux	8234	EMA	2147
2M LC-SC 50 Micron Fiber Converter Cable	8234	EMA	2456
2M LC-SC 62.5 Micron Fiber Converter Cable	8234	EMA	2459
4 port USB PCIe Adapter	8234	EMA	2728
2-Port USB PCI Adapter	8234	EMA	2738
POWER GXT135P Graphics Accelerator with Digital Support	8234	EMA	2849
PCIe 2-Line WAN w/Modem	8234	EMA	2893
3M Asynchronous Terminal/Printer Cable EIA-232	8234	EMA	2934
Asynchronous Cable EIA-232/V.24 3M	8234	EMA	2936
8-Port Asynchronous Adapter EIA-232/RS-422, PCI bus	8234	EMA	2943
Serial-to-Serial Port Cable for Drawer/Drawer- 3.7M	8234	EMA	3124
Serial-to-Serial Port Cable for Rack/Rack- 8M	8234	EMA	3125
RIO-2(Remote I/O-2)Cbl, 3.5M	8234	EMA	3147
RIO-2 (Remote I/O-2) Cable, 10M	8234	EMA	3148
IBM T117 Flat Panel Monitor	8234	EMA	3645
146GB 15K RPM SAS Disk Drive	8234	EMA	3647
300GB 15K RPM SAS Disk Drive	8234	EMA	3648
450GB 15K RPM SAS Disk Drive	8234	EMA	3649
External connection for the 6 internal SAS Disk slots.	8234	EMA	3651
SAS Cable (EE) Drawer to Drawer 1M	8234	EMA	3652
SAS Cable (EE) Drawer to Drawer 3M	8234	EMA	3653
SAS Cable (EE) Drawer to Drawer 6M	8234	EMA	3654
428GB 15K RPM SAS Disk Drive	8234	EMA	3658
Processor Fabric Cable, 2 enclosure	8234	EMA	3660
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 3M	8234	EMA	3661
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 6M	8234	EMA	3662
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 15M	8234	EMA	3663
SAS Cable (YR) -1M	8234	EMA	3667
139.5GB 15k rpm SAS Disk Drive	8234	EMA	3677
283.7GB 15k rpm SAS Disk Drive	8234	EMA	3678
SAS Cable (AI)- Adapter to Internal drive 1M	8234	EMA	3679
SAS Cable (AE) Adapter to Enclosure, single controller/single path 3M	8234	EMA	3684
SAS Cable (AE) Adapter to Enclosure, single controller/single path 6M	8234	EMA	3685
SAS Cable (YO) Adapter to SAS Enclosure, single			

Controller/Dual Path 1.5 M	8234	EMA	3691
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 3 M	8234	EMA	3692
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 6 M	8234	EMA	3693
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 15 M	8234	EMA	3694
0.3M Serial Port Converter Cable, 9-Pin to 25-Pin	8234	EMA	3925
Asynch Printer/Terminal Cable, 9-pin to 25-pin, 4M	8234	EMA	3926
Serial Port Null Modem Cable, 9-pin to 9-pin, 3.7M	8234	EMA	3927
Serial Port Null Modem Cable, 9-pin to 9-pin, 10M	8234	EMA	3928
1.8 M (6-ft) Extender Cable for Displays (15-pin D-shell to 15-pin D-shell)	8234	EMA	4242
Extender Cable - USB Keyboards, 2M	8234	EMA	4256
VGA to DVI Connection Converter	8234	EMA	4276
141.12GB 15k rpm Disk Unit	8234	EMA	4328
Rack Indicator- Not Factory Integrated	8234	EMA	4650
Rack Indicator, Rack #1	8234	EMA	4651
Rack Indicator, Rack #2	8234	EMA	4652
Rack Indicator, Rack #3	8234	EMA	4653
Rack Indicator, Rack #4	8234	EMA	4654
Rack Indicator, Rack #5	8234	EMA	4655
Rack Indicator, Rack #6	8234	EMA	4656
Rack Indicator, Rack #7	8234	EMA	4657
Rack Indicator, Rack #8	8234	EMA	4658
Rack Indicator, Rack #9	8234	EMA	4659
Rack Indicator, Rack #10	8234	EMA	4660
Rack Indicator, Rack #11	8234	EMA	4661
Rack Indicator, Rack #12	8234	EMA	4662
Rack Indicator, Rack #13	8234	EMA	4663
Rack Indicator, Rack #14	8234	EMA	4664
Rack Indicator, Rack #15	8234	EMA	4665
Rack Indicator, Rack #16	8234	EMA	4666
PCI-X Cryptographic Coprocessor (FIPS 4)	8234	EMA	4764
Single 5250 Enterprise Enablement	8234	EMA	4990
Full 5250 Enterprise Enablement	8234	EMA	4991
Software Preload Required	8234	EMA	5000
Custom Service Specify, Off-Site	8234	EMA	5001Customer Solution Center - Rochester Mfg
Sys Console on OP Console	8234	EMA	5544
Sys Console On HMC	8234	EMA	5550
Sys Console-Ethernet No IOP	8234	EMA	5553
Processor Power Regulator	8234	EMA	5617
System CEC Enclosure with OEM Bezel + Labels	8234	EMA	5627
Sys AC Power Supply, 1600 w	8234	EMA	5628
Media Enclosure and Backplane	8234	EMA	5629
Integrated, 2 Port- 1Gb Virtual Ethernet, I/O ports	8234	EMA	5636
Integrated, 2 Port- 10Gb (SR) Virtual Ethernet, I/O ports	8234	EMA	5637
Integrated, 4 Port- 1Gb Virtual Ethernet, I/O ports	8234	EMA	5639
Generic IBM Drawer Indicator for Bulk Orders	8234	EMA	5642
Generic OEM Drawer Indicator for Bulk Orders	8234	EMA	5643
Blind Swap Type III Cassette- PCIe, Short Slot	8234	EMA	5646
Blind Swap Type III Cassette- PCI-X or PCIe, Standard Slot	8234	EMA	5647
Service Interface Card	8234	EMA	5648
Serv Interface Cable- 2 Enclosure	8234	EMA	5657
I/O Backplane	8234	EMA	5666
System Midplane	8234	EMA	5667
SAS Disk Backplane -6 slot	8234	EMA	5668
0/4 Core Processor Enclosure and Backplane	8234	EMA	5675
System Chassis - 4 EIA	8234	EMA	5683
System Ship Group	8234	EMA	5699
IBM Gigabit Ethernet-SX PCI-X Adapter	8234	EMA	5700
IBM 10/100/1000 Base-TX Ethernet PCI-X Adapter	8234	EMA	5701
IBM 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter	8234	EMA	5706
IBM 2-Port Gigabit Ethernet-SX PCI-X Adapter	8234	EMA	5707
1 Gigabit iSCSI TOE PCI-X on Copper Media Adapter	8234	EMA	5713
4-Port 10/100/1000 Base-TX PCI Express Adapter	8234	EMA	5717
10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter	8234	EMA	5721

2-Port Asynchronous EIA-232 PCI Adapter	8234	EMA	5723
8 Gigabit PCI Express Dual Port Fibre Channel Adapter	8234	EMA	5735
PCI-X DDR Dual Channel Ultra320 SCSI Adapter	8234	EMA	5736
4-Port 10/100/1000 Base-TX PCI-X Adapter	8234	EMA	5740
IBM Single Bus Ultra 320 SCSI Repeater Card	8234	EMA	5741
IBM Dual Bus Ultra 320 SCSI Repeater Card	8234	EMA	5742
POWER GXT145 PCI Express Graphics Accelerator	8234	EMA	5748
4Gbps Fibre Channel (2-Port)	8234	EMA	5749
IDE Slimline DVD-ROM Drive	8234	EMA	5756
IBM 4.7 GB IDE Slimline DVD-RAM Drive	8234	EMA	5757
4 GB Single-Port Fibre Channel PCI-X 2.0 DDR Adapter	8234	EMA	5758
4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter	8234	EMA	5759
2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter	8234	EMA	5767
2-Port Gigabit Ethernet-SX PCI Express Adapter	8234	EMA	5768
10 Gigabit Ethernet-LR PCI Express Adapter	8234	EMA	5772
4 Gigabit PCI Express Single Port Fibre Channel Adapter	8234	EMA	5773
4 Gigabit PCI Express Dual Port Fibre Channel Adapter	8234	EMA	5774
PCI-X Disk Controller-90MB No IOP	8234	EMA	5776
PCI-X EXP24 Ctl-1.5GB No IOP	8234	EMA	5782
TotalStorage EXP24 Disk Dwr	8234	EMA	5786
PCI-DDR 12X Expansion Drawer	8234	EMA	5796
EXP 12S Expansion Drawer	8234	EMA	5886
PCI-X DDR Dual - x4 3Gb SAS RAID Adapter	8234	EMA	5902
Alternate SAS controller for 3 of 6 internal SAS Disk Slots	8234	EMA	5909
PCI-X DDR Dual - x4 SAS Adapter	8234	EMA	5912
Non-paired SAS RAID indicator	8234	EMA	5922
Full width Keyboard -- USB, US English, #103P	8234	EMA	5951
Full width Keyboard -- USB, French, #189	8234	EMA	5952
Full width Keyboard -- USB, Italian, #142	8234	EMA	5953
Full width Keyboard -- USB, German/Austrian, #129	8234	EMA	5954
Full width Keyboard -- USB, UK English, #166P	8234	EMA	5955
Full width Keyboard -- USB, Spanish, #172	8234	EMA	5956
Full width Keyboard -- USB, Japanese, #194	8234	EMA	5957
Full width Keyboard -- USB, Brazilian Portuguese, #275	8234	EMA	5958
Full width Keyboard -- USB, Hungarian, #208	8234	EMA	5959
Full width Keyboard -- USB, Korean, #413	8234	EMA	5960
Full width Keyboard -- USB, Chinese, #467	8234	EMA	5961
Full width Keyboard -- USB, French Canadian, #445	8234	EMA	5962
Full width Keyboard -- USB, Belgian/UK, #120	8234	EMA	5964
Full width Keyboard -- USB, Swedish/Finnish, #153	8234	EMA	5965
Full width Keyboard -- USB, Danish, #159	8234	EMA	5966
Full width Keyboard -- USB, Bulgarian, #442	8234	EMA	5967
Full width Keyboard -- USB, Swiss/French/German, #150	8234	EMA	5968
Full width Keyboard -- USB, Norwegian, #155	8234	EMA	5969
Full width Keyboard -- USB, Dutch, #143	8234	EMA	5970
Full width Keyboard -- USB, Portuguese, #163	8234	EMA	5971
Full width Keyboard -- USB, Greek, #319	8234	EMA	5972
Full width Keyboard -- USB, Hebrew, #212	8234	EMA	5973
Full width Keyboard -- USB, Polish, #214	8234	EMA	5974
Full width Keyboard -- USB, Slovakian, #245	8234	EMA	5975
Full width Keyboard -- USB, Czech, #243	8234	EMA	5976
Full width Keyboard -- USB, Turkish, #179	8234	EMA	5977
Full width Keyboard -- USB, LA Spanish, #171	8234	EMA	5978
Full width Keyboard -- USB, Arabic, #253	8234	EMA	5979
Full width Keyboard -- USB, Thai, #191	8234	EMA	5980
Full width Keyboard -- USB, Russian, #443	8234	EMA	5981
Full width Keyboard -- USB, Slovenian, #234	8234	EMA	5982
Full width Keyboard -- USB, US English Euro, #103P	8234	EMA	5983
Power Control Cable (SPCN) - 3 meter	8234	EMA	6006
Power Control Cable (SPCN) - 15 meter	8234	EMA	6007
Power Control Cable (SPCN) - 6 meter	8234	EMA	6008
Opt Front Door for 1.8m Rack	8234	EMA	6068
Opt Front Door for 2.0m Rack	8234	EMA	6069
1.8m Rack Trim Kit	8234	EMA	6246

2.0m Rack Trim Kit	8234	EMA	6247
1.8m Rack Acoustic Doors	8234	EMA	6248
2.0m Rack Acoustic Doors	8234	EMA	6249
Dual-port 12X Channel Attach- Short Run	8234	EMA	6446
Dual-port 12X Channel Attach- Long Run	8234	EMA	6457
Power Cable -- Drawer to IBM PDU, 14-foot, 250V/10A	8234	EMA	6458
3.7m (12-Ft) 250V/10A RA Pwr Cd	8234	EMA	6459
Power Cord 4.3m (14-ft), Drawer To OEM PDU (125V, 15A)	8234	EMA	6460
Power Cord 4.3m (14-foot), Drawer to OEM PDU, (250V, 15A), U. S.	8234	EMA	6469
Power Cord 2.7m (9-foot), To Wall/OEM PDU, (125V, 15A)	8234	EMA	6471
Power Cord 2.7m (9-foot), To Wall/OEM PDU, (250V, 16A)	8234	EMA	6472
Power Cord 2.7m (9-foot), To Wall/OEM PDU, (250V, 10A)	8234	EMA	6473
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 13A)	8234	EMA	6474
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 16A)	8234	EMA	6475
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	8234	EMA	6476
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 16A)	8234	EMA	6477
Power Cord 2.7 M(9-foot), To Wall/OEM PDU, (250V, 16A)	8234	EMA	6478
Power Cord 1.8M (6-foot),To Wall, (250V, 15A), United States	8234	EMA	6487
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (125V, 15A or 250V, 10A)	8234	EMA	6488
4.3m (14-Ft) 3PH/24A Power Cord	8234	EMA	6489
4.3m (14-Ft) 1PH/48A Pwr Cord	8234	EMA	6491
4.3m (14-Ft) 1PH/48-60A Pwr Cord	8234	EMA	6492
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	8234	EMA	6493
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	8234	EMA	6494
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	8234	EMA	6496
Optional Rack Security Kit	8234	EMA	6580
Modem Tray for 19-Inch Rack	8234	EMA	6586
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (125V, 15A)	8234	EMA	6651
4.3m (14-Ft) 1PH/24-30A Pwr Cord	8234	EMA	6654
4.3m (14-Ft) 1PH/24-30A WR Pwr Cord	8234	EMA	6655
4.3m (14-Ft)1PH/24A Power Cord	8234	EMA	6656
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 15A)	8234	EMA	6659
Power Cord 3 M (10 ft), Drawer to IBM PDU, 250V/10A	8234	EMA	6665
Power Cord 4.3M (14-foot), Drawer to OEM PDU, (250V, 15A)	8234	EMA	6669
Power Cord 2.7M (9-foot), Drawer to IBM PDU, 250V/10A	8234	EMA	6671
Power Cord 1.5M (5-foot), Drawer to IBM PDU, 250V/10A	8234	EMA	6672
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	8234	EMA	6680
PCI 2-Line WAN IOA No IOP	8234	EMA	6805
PCI 4-Modem WAN IOA No IOP	8234	EMA	6808
PCI 2-Line WAN w/Modem NoIOP	8234	EMA	6833
Intelligent PDU+, 1 EIA Unit, Universal UTG0247 Connector	8234	EMA	7109
IBM/OEM Rack-mount Drawer Rail Kit- Adjustable Depth	8234	EMA	7164
Power Distribution Unit	8234	EMA	7188
SDI Software Pre-Install Indicator	8234	EMA	7305
I/O Drawer Mounting Enclosure	8234	EMA	7314
Quantity 150 of #4328	8234	EMA	7510

Quantity 150 of #3677	8234	EMA	7518
Quantity 150 of #3678	8234	EMA	7519
3.6 GHz Proc Card, 0/4 Core POWER6, 12 DDR2 Memory Slots	8234	EMA	7537
One Processor Activation for Processor Feature #7537- Express	8234	EMA	7722
One Processor Activation for Processor Feature #7537	8234	EMA	7723
OEM (Generic) Indicator	8234	EMA	7770
OEM (GROUPE BULL) Indicator	8234	EMA	7773
OEM (Hitachi) Indicator	8234	EMA	7775
OEM Publications for IBM Logo Product	8234	EMA	7779
Ethernet Cable, 6M, Hardware Management Console to System Unit	8234	EMA	7801
Ethernet Cable, 15m, Hardware Management Console to System Unit	8234	EMA	7802
PCI Blind Swap Cassette Kit, Double Wide Adapters, Type II	8234	EMA	7863
Power Distribution Backplane	8234	EMA	7870
PowerVM -Standard Edition	8234	EMA	7942
PowerVM - Enterprise Edition	8234	EMA	7995
Mouse - USB, with Keyboard Attachment Cable	8234	EMA	8841
Order Routing Indicator- System Plant	8234	EMA	9169
Language Group Specify - US English	8234	EMA	9300
Month Indicator	8234	EMA	9461
Day Indicator	8234	EMA	9462
Hour Indicator	8234	EMA	9463
Minute Indicator	8234	EMA	9464
Qty Indicator	8234	EMA	9465
Countable Member Indicator	8234	EMA	9466
Reserved Rack Space Indicator - 4U	8234	EMA	9570
Language Group Specify - Dutch	8234	EMA	9700
Language Group Specify - French	8234	EMA	9703
Language Group Specify - German	8234	EMA	9704
Language Group Specify - Polish	8234	EMA	9705
Language Group Specify - Norwegian	8234	EMA	9706
Language Group Specify - Portuguese	8234	EMA	9707
Language Group Specify - Spanish	8234	EMA	9708
Language Group Specify - Italian	8234	EMA	9711
Language Group Specify - Canadian French	8234	EMA	9712
Language Group Specify - Japanese	8234	EMA	9714
Language Group Specify - Traditional Chinese (Taiwan)	8234	EMA	9715
Language Group Specify - Korean	8234	EMA	9716
Language Group Specify - Turkish	8234	EMA	9718
Language Group Specify - Hungarian	8234	EMA	9719
Language Group Specify - Slovakian	8234	EMA	9720
Language Group Specify - Russian	8234	EMA	9721
Language Group Specify - Simplified Chinese (PRC)	8234	EMA	9722
Language Group Specify - Czech	8234	EMA	9724
Language Group Specify -- Romanian	8234	EMA	9725
Language Group Specify - Croatian	8234	EMA	9726
Language Group Specify -- Slovenian	8234	EMA	9727
Language Group Specify - Brazilian Portuguese	8234	EMA	9728
Language Group Specify - Thai	8234	EMA	9729
Product Renovated by IBM Indicator	8234	EMA	9993

The following are features already announced for the IBM System p 7014 machine type:

Description	MT	Model	Feature
Rack Content Specify: 8234-EMA - 4U	7014	S25	0231
Rack Content Specify: 8234-EMA- 8U	7014	S25	0232

Publications

The following information is shipped with the 8234-EMA. Additional copies are available. To order, contact your IBM representative.

Title	Order number
Safety Notices	G229-9054
Statement of Limited warranty	SA76-0125

Hardware documentation such as planning, installation instructions, user's information, safety inspection, and service information is available through the IBM Systems Information Center, which provides you with a single information center where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. The IBM Systems Information Center is at

<http://www.ibm.com/systems/infocenter>

AIX documentation can be found at the Power System and AIX Information Center

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

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

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

IBM Publications Center Portal

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

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

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

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=108-715>

Technical information

Specified operating environment

Physical specifications

IBM Power 560 model EMA CEC enclosure

width: 483 mm (19.0 in)

Depth: 824 mm (32.4 in) from front of bezel to rear of power supply

674 mm (25.6 in) front rack rail mounting surface to I/O Adapter Bulkhead

793 mm (31.2 in) front rack rail mounting surface to rear of power supply

Height: 174 mm (6.85 in) 4 EIA units

weight: 63.6 kg (140 lb)

Dimensions and specifications shown are for a single CEC enclosure. Model EMA systems can have one or two CEC enclosures.

To help assure installation 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% operating
 - 5% to 100% nonoperating
- Maximum wet bulb:
 - 27 degrees C (80 F) nonoperating
 - 23 degrees C (73 F) operating
- Operating voltage:
 - 200 to 240 V ac
- Operating frequency:
 - 50/60 Hz
- Power consumption:
 - 1200 watts maximum (per enclosure with eight cores active)
- Power source loading:
 - 1.224 kVA maximum (per enclosure with eight cores active)
- Thermal output:
 - 4096 BTU/hr maximum (per enclosure with eight cores active)
- Noise level: (one enclosure with eight active cores)
 - With 3.6 GHz processors (#7537): 8.0 bels (operating/idle)
 - With 3.6 GHz processors (#7537) and acoustic rack doors: 7.5 bels (operating/idle)
- Maximum altitude:
 - 3048 m (10,000 ft)

For system configurations installed above 2400 meters, additional ambient room temperature limits are in effect. Refer to the Site and Hardware Planning Guide for details.

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 CFR47 Part 15 Class A
- Europe: CISPR 22 Class A; "CE" Mark of Conformity
- Japan: VCCI-A
- Korea: Korean Requirement Class A
- China: People's Republic of China commodity inspection law
- Taiwan: BSMI CNS 13438 (Taiwan EMC Standard)
- Australia\New Zealand: ACA C-Tick

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 LaGarde, France. This System p 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
- 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 8234-EMA should be installed in a new or existing 7014-T00, -T42, -B42, or -S25 rack. This provides:

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

The design of the Power System 560 Express is optimized for use in an IBM 7014-T00, -T42, -B42 or S25 rack.

Minimum system configuration

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

- One CEC enclosure (4U) with the following:
 - 1X - System Enclosure (#5683)
 - 1X - System Bezel (#1715)
 - 2X - Power Cords (#6671) or similar power cord

- 1X - Rack-Mount Rail Kit (#7164)
- 1X - Processor Enclosure and Backplane (#5675)
- 1X - I/O Backplane (#5666)
- 1X - System Midplane (#5667)
- 1X - SAS DASD Backplane (#5668)
- 1X - Power Distribution Backplane (#7870)
- 1X - System Port riser card (one of #5636, #5637, or #5639)
- 1X - Service Interface Card (#5648)
- 2X - Power Supplies (#5628)
- 3X - Processor Power Regulator (#5617)
- 1X - HMC - Machine Type 7042 is preferred; Machine Type 7310 is acceptable if upgraded to HMC machine code V7. The HMC may be shared with other systems.
- 1X - Processor Card:
 - 3.6 GHz Processor Card, 0/4-Core POWER6, DDR2 Memory Slots (#7537)
- 4X - Processor Activations:
 - 2X - One Processor Activation for Processor Feature #7537, #7723 with 2X - One Processor Activation for Processor Feature #7537- Express, #7722
 - or
 - 4X - One Processor Activation for Processor Feature #7537, #7723
- 8 GB active memory:
 - 1X - 0/8GB (4 x 2 GB) DIMMs, 667 MHz, DDR2, Memory (#1921) (or any memory feature that results in at least 8 GB of active memory)
 - 1X - Activation of 8 GB DDR2 - Memory (#1915)
- Accessible Storage Device (one of these):
 - One Disk Drive - SAS (requires 2X with #2145)
 - Two SCSI Disk Drives (only with #2145)
 - One Fibre Channel I/O adapter
 - Examples of acceptable adapters:
 - 2 Port PCIe - 8 Gb Fibre Channel (#5735)
 - 2 Port PCI-X - 4 Gb Fibre Channel (#5749)
 - 1 Port PCI-X - 4 Gb Fibre Channel (#5758)
 - 2 Port PCI-X - 4 Gb Fibre Channel (#5759)
 - 1 Port PCIe - 4 Gb Fibre Channel (#5773)
 - 2 Port PCIe - 4 Gb Fibre Channel (#5774)
- Language Group Specify (#9XXX)
- 1X - Primary Operating System indicator (one of these):
 - Primary OS - IBM i (#2145)
 - Primary OS - AIX (#2146)
 - Primary OS - Linux (#2147)
- 1X - Partition Specify (one of these):
 - AIX Partition Specify (#0265)
 - IBM i Partition Specify (#0266)
 - Linux Partition Specify (#0267)
- 1X - System Ship Group (#5699)

For service support, the EMA must have access to a device capable of reading a CD-ROM or must be attached to a network with an AIX NIM server available.

Additional optional features can be added, as desired.

Software requirements

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

- AIX 5.3 with 5300-06 Technology Level and Service Pack 10, or later
- AIX 5.3 with 5300-07 Technology Level and Service Pack 7, or later
- AIX 5.3 with 5300-08 Technology Level and Service Pack 5, or later
- AIX 5.3 with 5300-09 Technology Level, or later
- AIX 6.1 with 6100-00 Technology Level and Service Pack 7, or later
- AIX 6.1 with 6100-01 Technology Level and Service Pack 3, or later
- AIX 6.1 with 6100-02 Technology Level, or later

If installing the IBM i operating system:

- IBM i 6.1, or later

Clients who plan to use IBM i should consider ordering the 5722-IVP IBM i Value Pak for one of the IBM i processor license entitlements. This package provides a lower-cost processor entitlement and provides the option for a services voucher, which is available in most countries.

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

- SUSE Linux Enterprise Server 10 SP1 for POWER, or later
- Red Hat Enterprise Linux 4.5 for POWER, or later
- Red Hat Enterprise Linux 5.1 for POWER, or later

Note: Not all system features are available on all operating systems.

Check the specific feature detail in the sales manual to identify which of the available operating systems are supported. For the most current information about required operating system and required firmware level for any feature, check on the IBM Pre-requisite site at

[http://www-912.ibm.com/e_dir/eserverprereq.nsf/UpgradeCategories/Hard ware?opendocument](http://www-912.ibm.com/e_dir/eserverprereq.nsf/UpgradeCategories/Hard%20ware?opendocument)

Limitations

Processors

All processors in the system must be fully active.

A system can have one or two CEC enclosures. Each enclosure has two processor slots; each slot will accept a processor card feature. A system with one enclosure may have one or two processor cards installed. A system with two enclosures must have two processor cards in each enclosure.

When two or more processor cards are installed in a system, all cards must have the same feature number.

All system configurations require three working Processor Power Regulators per CEC enclosure. Enclosures with two Processor Power Regulators do not provide redundancy for any processor configuration. A third Processor Power Regulator is required to provide redundant power support to either one or two processor cards in an enclosure.

Memory

All memory in the system must be fully active.

Each processor card feature must have a minimum of four DIMMs installed.

Memory features include a total of four DIMMs. A minimum of four DIMMs must be placed on the same processor card. There is a required plug location for every memory feature attached to a process or card.

- The first four memory DIMMs must be plugged in DIMM sockets J0A, J0B, J0C, and J0D.
- The second four memory DIMMs must be plugged in DIMM sockets J1A, J1B, J1C, and J1D.
- The third four memory DIMMs must be plugged in DIMM sockets J2A, J2B, J2C, and J2D.

When configuring the memory in a Power 560, placing two memory features (8 DIMMs) on a single processor card will provide the maximum available memory bandwidth. Adding the third memory feature will provide additional memory capacity but will not increase memory bandwidth. System performance that is dependent on memory bandwidth can be improved by purchasing two smaller features per processor card as opposed to one large feature per processor card. To achieve this, when placing an order, ensure the order has 2X memory features for every processor card feature on the order.

Memory features 1921 and 1922 can be mixed on the same POWER6 processor card.

The 32 GB memory feature (#1923) may not be mixed with other memory feature sizes on a single processor card. A processor card with 32 GB memory features can be mixed in the same CEC enclosure with a processor card containing other sizes of memory features.

For all processors and all system configurations, if memory features in a single system have different frequencies, all memory in the system will function according to the lowest frequency present.

Each system must contain a minimum of 8 GB of active system memory.

Memory 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. To move memory activations between systems you own, contact PCOD@us.ibm.com for assistance.

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.

Power

Each Power 560 with two CEC enclosures (16 processor cores) 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.

There are two ac power supplies in each CEC enclosure; the second is required to provide 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.

There are three Processor Power Regulators in each CEC enclosure; the third is required to provide redundant power to the processors for enhanced system availability. The processors will continue to function if there are at least two working Power Regulators in the enclosure. A failed (third) Power Regulator can be hot swapped but must remain in the system until the replacement power regulator is available for exchange.

Two Processor Power Regulators in a single enclosure do not provide redundancy for any processor configuration. A third Processor Power Regulator is required to provide redundant power support to either one or two processor cards in the enclosure.

All CEC enclosures must ship with three Processor Power Regulators.

Power Distribution Units

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

For PDU features 9176, 9177, 7176, and 7177: Each pair of PDUs can power up to three Power 560 CEC enclosures (three drawers per two PDUs). (These features are no longer available for purchase.)

For PDU features 9178 and 7178: Each pair of PDUs can power up to six Power 560 CEC enclosures (six drawers per two PDUs). (These features are no longer available for purchase.)

For PDU features 9188, 7188, 5889, and 7109 when using power cord 6654, 6655, 6656, 6657, or 6658: Each pair of PDUs can power up to three Power 560 CEC enclosures (three drawers per two PDUs).

For PDU features 9188, 7188, 5889, and 7109 when using power cord feature numbers 6489, 6491, 6492, or 6653: Each pair of PDUs can power up to seven Power 560 CEC enclosures (seven drawers per two PDUs).

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

Server power cords should be evenly spread across the available PDU power outlets to distribute the current across multiple circuit breakers.

Racks

The Power 560 consists of one or two CEC enclosures. Each enclosure occupies 4U of vertical rack space. The Power 560 is designed to be installed in a 7014-T00, -T42, -B42, or -S25 rack. An existing -T00, -T42, -B42, or -S25 rack can be used for the Power 560 if sufficient space and power are available.

The 25 EIA unit (1.3 meter) rack (#0555), 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, Models -S25, -T00, -B42, or -T42.

For Power 560 configurations with two drawers, both drawers must be installed together in the same rack, in a contiguous space of 8U. 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 560 system is installed in an 7014-T00, -B42, or -T42 rack or in a feature 0551 or feature 0553 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 or 0551 rack is feature number 6246. The required trim kit for the 7014-T42 or -B42 0553 rack is feature number 6247.

The design of the Power 560 is optimized for use in a 7014-T00, -T42, -B42, or -S25 rack. The front cover occupies space on the front left side of an IBM 7014 rack that may not be available in typical non-IBM racks.

Acoustic Door features are available with the 7014-T00 and 7014-T42 or -B42, 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, -B42, and -T42 racks or ordered for the -T00, -B42, and -T42 racks that clients already own.

I/O drawers

To further reduce possible single points of failure, POWER6 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 by either 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 560 using any operating systems.

The following is a list of the Remote I/O drawers that are supported or available on the 8234 machine type and the correct interface to use for each of the drawers.

Feature	Description	Order status	Interface
5786	EXP24 Disk Drwr	Available	SCSI Ultra320
5796	PCI-DDR 12X Exp Drwr	Available	12XS
5886	Exp 12S SAS Drwr	Available	SAS Ultra320
7031-D24/T24		Supported	SCSI Ultra320
7311-D20		Available	RIO-2
7314-G30		Supported	12X

7311-D20 I/O drawers with RIO Ports: I/O Planer Riser Card (#6413) must be upgraded to RIO-2 Ports, I/O Planer Riser Card (#6417) before they can be attached to a Power 560 server.

Some I/O adapters supported in the 7311-D20 I/O drawers when attached to a POWER5 or POWER5+™ processor-based Power Systems server will not be supported when these same I/O drawers are attached to a Power 560 server with POWER6 processors. For a complete list of supported adapters, refer to the online sales manual for the 7311-D20 I/O drawer.

The maximum number of attached remote I/O drawers depends on the number of CEC enclosures in the system and the I/O attachment type, as follows:

- For the 7311-D20:
 - Systems with one CEC enclosure:
 - With four processors, the enclosure supports up to six I/O drawers.
 - With eight processors, the enclosure supports up to 12 I/O drawers.
 - Systems with two CEC enclosures support up to 18 I/O drawers.
- For 12X Host Channel attached I/O Drawers:
 - Systems with one CEC enclosure:
 - With four processors, the enclosure supports up to four I/O drawers.
 - With eight processors, the enclosure supports up to eight I/O drawers.
 - Systems with two CEC enclosures support up to 12 I/O drawers.

It is recommended that any attached remote I/O drawers be located in the same rack as the Power 560 server for ease of service, but they can be installed in separate racks if the application or other rack content requires it.

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

- Data transfer cables:
 - RIO-2 attach cables for RIO-2 I/O Drawers
 - 12X cables for 12X Channel I/O Drawers
- Power Control cables

RIO-2 I/O Drawers and 12X Channel I/O Drawers may not be mixed in the same remote I/O loop.

Remote I/O drawer cable connections are always made in loops to help protect against a single point-of-failure resulting from an open, missing, or disconnected cable. A Power 560 system with nonlooped configurations could experience degraded performance and serviceability. If a nonloop connection is detected, a problem is reported.

The first I/O drawer attached in any remote 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 I/O drawer attached to a host system requires two Power Control Cables. Each additional I/O drawer added to a host system requires one additional Power Control Cable. Each host system has one Power Control loop. All I/O drawers attached to a system are included in the same Power Control loop. Power Control Cable loops are different in this regard from data transfer cable loops.

Dual-Port 12X Channel Interface adapter options:

- Dual-Port 12X Channel Attach Adapter (#6446): Use the short run adapter for expansion I/O drawers located in close proximity to the host system or to other drawers in the I/O expansion loop. This adapter does not include signal repeaters.
- Dual-Port 12X Channel Attach Adapter (#6457): Use the long run adapter for expansion I/O drawers located farther from the host system or other I/O drawers in the I/O expansion loop. This adapter includes signal repeaters to accommodate the longer cable lengths.

12X Cable choice:

Each 5796 drawer requires one Dual-Port 12X Channel Adapter, either Short Run (#6446) or Long Run (#6457). The choice of adapters is dependent on the distance to the next 12X Channel connection in the loop, either to another I/O drawer or the host system. 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.

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

(1) The 12X cable (#1829) 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 5796 drawers mounted side by side in the same enclosure (#7314). It can also be used to connect between two modules located one beneath the other in a 7014 rack.

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

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

Integrated I/O

Although each CEC enclosure is equipped with integrated system port (serial) external connectors, these ports do not function with the attachment of the required HMC. These ports will, however, provide the needed communication for a UPS (uninterruptible power source) when used with a conversion cable feature 1827.

Each CEC enclosure must contain one Virtual Ethernet (HEA) Integrated I/O port card (#5636, #5637, or #5639). This selection is available only when a CEC enclosure is first ordered from the factory.

Each system has two HMC ports on the Service Interface Card in each CEC enclosure. The HMC must be attached to the Service Interface Card in all CEC enclosures in the Power 560 system. On two enclosure systems, an SPCN cable (#6006 or similar) must be used to connect the Service Interface Card in enclosure one to the Service Interface Card in enclosure two.

Disks, media, and boot (load source) devices

A device capable of reading a CD-ROM 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 (load source) is supported via DASD in a remote DASD drawer attached to a PCI adapter or an I/O drawer attached to GX adapter, or from a network via LAN adapters.

The minimum system configuration requires at least one SAS disk drive (two SAS drives for configurations with #2145) in one of the CEC enclosures or two SCSI disk drives (configurations with #2145 only) or an adapter capable of attaching a remote DASD drawer or a LAN adapter.

Each CEC enclosure can support one media device when the optional Media Enclosure and Backplane feature is ordered. Each system can support up to two media devices.

For systems running the Linux operating system, a DVD-ROM or DVD-RAM is required for each Linux partition.

I/O slots and adapters

Each Power 560 CEC enclosure has two PCI-X slots, four PCIe slots, and two GX+ slots. One of the PCIe slots shares physical space with one of the GX+ slots such that a maximum of seven adapters can be used in a single CEC enclosure. The two PCI-X 2.0 DDR slots are full length, 64-bit, 266 MHz slots. There are three full-length PCIe 8X slots and one short form factor PCIe 8X slot. The two GX+ slots support short form factor GX adapters.

The slots are identified on the back side of the CEC enclosure as follows:

Slot ID	Adapter type	Slot size
P1-C1	PCIe 8X	Full length
P1-C2	PCIe 8X	Full length
P1-C3	PCIe 8X	Full length
P1-C4	PCI-X 2.0 DDR	Full length
P1-C5	PCI-X 2.0 DDR	Full length
P1-C6/P1-C8	PCIe 8X / GX+	Short form factor
P1-C9	GX+	Short form factor

Adapter slots P1-C6 and P1-C8 share the same physical space in a CEC enclosure. When a GX+ adapter is installed in GX slot P1-C8, PCIe slot P1-C6 cannot be used.

A system configuration with only four processor cores (one processor card feature) does not support the use of GX slot P1-C9. In this configuration only, the P1-C8 GX slot will function (this slot is physically shared with PCIe slot P1-C6). Adding a second processor feature card to the enclosure will allow the P1-C9 slot to function.

The Power System 560 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 and the system remote I/O drawer features.

Adapters supported previously on IBM i (formerly i5/OS®) and known as "IOP" adapters are not supported on the Power 560 Express. Check the available feature list before adding an older adapter to the Power 560 Express to ensure it is supported for use.

Hot-plug options

The following options are hot-plug capable:

- System ac power supplies: One functional power supply must remain installed in each CEC enclosure at all times while the system is operating.
- Disk drives.
- Most PCI adapters.
- Processor power regulators: Two functional processor power regulators must remain installed in each CEC enclosure at all times while the system is operating.

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.

The following adapter is not hot-plug capable: POWER GXT135P Graphics Accelerator with Digital Support (#2849).

Logical partitioning

Dynamic LPAR allows one partition per processor.

Up to 10 partitions per processor are supported when PowerVM feature 7942 - Standard or feature 7995 - Enterprise is ordered.

For Linux partitions, a DVD-ROM or DVD-RAM is required.

Planning information

Customer responsibilities

Customer setup

The 8234-EMA is a service representative-installed system. Features of the model EMA are predominately customer installable. This is a list of the exceptions; features listed here are to be installed by an IBM service representative.

Function	Feature number
Internal Electronic Cards	5666, 5667, 5668, 5675, 7870
Memory	1921, 1922, 1923
Processors	7537
Chassis	5683

Cable orders

No additional cables are required.

Security, auditability, and control

This product uses the security and auditability features of the operating system 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.

IBM Global Financing

Yes

Warranty period

One year.

Warranty service

If required, IBM provides repair or exchange service. An IBM technician will attempt to resolve your problem over the telephone. You must follow IBM's problem determination and resolution procedures. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of 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.

Customer replaceable unit (CRU) service

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

- Tier 1 CRUs

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

For machines with On-site same-day response service, IBM will replace a Tier 1 CRU part at your request, at no additional charge.

- Tier 2 CRUs

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

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, return instructions and a container are shipped with the replacement CRU. You may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of receipt of the replacement.

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

- Keyboard
- Mouse
- Display
- Mounting hardware
- Fans
- Hard drives
- DVD Slimline Drive
- Line/power cord
- External cables
- Operator panel
- Power supply
- All PCI adapters
- Service Interface Card
- Service Interface Cable
- VPD Card
- Media Enclosure and Backplane
- Processor Power Regulator

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.

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response

Non-IBM parts support

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 its customers, and normal warranty service procedures for the IBM machine apply.

For ServiceElect (Z125-5510) and ServiceSuite™ (Z125-5745) Statements of Work:

Warranty service upgrades

On-site service

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

For machines with on-site same-day response service, IBM will replace a Tier 1 CRU part at your request, at no additional charge. For additional information on the CRU service, see warranty information.

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response
- 9 hours per day, Monday through Friday, excluding holidays, 4-hour average, same-business-day response
- 24 hours per day, 7 days a week, 4-hour average response
- 24 hours per day, 7 days a week, 2-hour average response

Maintenance services

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. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard maintenance 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.

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

Customer replaceable unit service

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

- Tier 1 CRUs

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

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

- Tier 2 CRUs

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

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 is shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of your receipt of the replacement.

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

- Keyboard
- Mouse
- Display
- Mounting Hardware
- Fans
- Hard drives
- DVD Slimline Drive
- Line/power cord
- External cables
- Operator panel
- Power supply

- All PCI adapters
- Service Interface Card
- Service Interface Cable
- VPD Card
- Media Enclosure and Backplane
- Processor Power Regulator

On-site service

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

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response
- 9 hours per day, Monday through Friday, excluding holidays, 4-hour average, same-business-day response
- 24 hours per day, 7 days a week, 4-hour average response
- 24 hours per day, 7 days a week, 2-hour average response

Non-IBM parts support

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

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

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

Usage plan machine

No

IBM hourly service rate classification

Two

Field-installable features

Yes

Model conversions

No

Machine installation

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine. In the United States, contact IBM at 800-IBM-SERV (426-7378) and in other countries 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

Group number

- E5 for AIX
- P20 for IBM i

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 for which the customer has acquired. You can obtain the agreement by contacting your IBM representative or at

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

IBM may release changes to the machine code. IBM plans to make the machine code changes available for download from the IBM pSeries® 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.

An 8% educational allowance is available to qualifying institutions in accordance with the Attachment for Educational Allowance. The educational allowance may not be added to any other discount or allowance.

Prices

The following are newly announced features on the specific models of the IBM System p 8234 machine type:

Description	Model number	Feature numbers	Initial/MES/Both/Support		RP CSU MES	
			Support	CSU	MES	MES
IBM 8234-EMA	EMA					No
Specify Code for External High Speed Modem	EMA	0032	Both	Yes		No
Mirrored System Disk Level, Specify Code	EMA	0040	Both	Yes		No
Device Parity Protection-All, Specify Code	EMA	0041	Both	Yes		No
Mirrored System Bus Level, Specify Code	EMA	0043	Both	Yes		No
Device Parity RAID-6 All, Specify Code	EMA	0047	Both	Yes		No

RISC-to-RISC Data Migration	EMA	0205	Initial	Yes	No
AIX Partition Specify	EMA	0265	Both	N/A	No
Linux Partition Specify	EMA	0266	Both	N/A	No
IBM i Operating System Partition Specify	EMA	0267	Both	N/A	No
CSC Specify	EMA	0275	Both	Yes	No
Ext Tape Attached via #5736	EMA	0290	Both	Yes	No
Specify Custom Data Protection	EMA	0296	Both	Yes	No
Specify EXP24 Attach via Existing Controller	EMA	0302	MES	Yes	No
Mirrored Level System Specify Code	EMA	0308	Both	Yes	No
RAID Hot Spare Specify	EMA	0347	Both	Yes	No
V.24/EIA232 6.1m (20-Ft) PCI Cable	EMA	0348	Both	Yes	No
V.35 6.1m (20-Ft) PCI Cable	EMA	0353	Both	Yes	No
X.21 6.1m (20-Ft) PCI Cable	EMA	0359	Both	Yes	No
V.24/EIA232 24.4m (80-Ft) PCI Cable	EMA	0367	Both	Yes	No
UPS Factory Integration Specify	EMA	0373	MES	N/A	No
HMC Factory Integration Specify	EMA	0374	MES	N/A	No
Display Factory Integration Specify	EMA	0375	MES	N/A	No
Reserve Rack Space for UPS	EMA	0376	MES	N/A	No
Reserve Rack Space for HMC	EMA	0377	MES	N/A	No
Reserve Rack Space for Display	EMA	0378	MES	N/A	No
CBU SPECIFY	EMA	0444	Initial	Yes	No
Customer Specified Placement	EMA	0453	Initial	N/A	No
IBM i 6.1 Specify Code	EMA	0534	Both	Yes	No
19 inch, 1.8 meter high rack	EMA	0551	MES	Yes	No
19 inch, 2.0 meter high rack	EMA	0553	MES	Yes	No
19 inch, 1.3 meter high rack	EMA	0555	MES	Yes	No
Rack Filler Panel Kit	EMA	0599	Both	Yes	No
Balanced Warehouse Solution Indicator	EMA	0710	Initial	N/A	No
Load Source Not in CEC	EMA	0719	Both	Yes	No
Specify Load Source in #5786	EMA	0725	Both	Yes	No
Specify #5886 Load Source placement	EMA	0727	Both	Yes	No
#4328 Load Source Specify	EMA	0836	Both	Yes	No
SAN Load Source Specify	EMA	0837	Both	Yes	No
#3677 Load Source Specify	EMA	0839	Both	Yes	No
#3678 Load Source Specify	EMA	0840	Both	Yes	No
#3658 Load Source Specify	EMA	0844	Both	Yes	No
US TAA Compliance Indicator	EMA	0983	Initial	N/A	No

Modem Cable - US/Canada and General Use					
	EMA	1025	Both	Yes	No
Decline Electronic Service Agent Install Indicator					
	EMA	1120	NC	Initial	N/A No
System Unique Identifier					
	EMA	1311	MES	Yes	No
System Bezel					
	EMA	1715	Both	Yes	No
X Dual Port- RIO-2 Attach					
	EMA	1800	Both	Yes	No
GX Dual Port- 12X Channel Attach					
	EMA	1802	Both	Yes	No
System port/UPS Conversion Cable					
	EMA	1827	Both	Yes	No
1.5 Meter 12X to 4X Channel Conversion Cable					
	EMA	1828	Both	Yes	No
0.6 Meter 12X Cable					
	EMA	1829	Both	Yes	No
1.5 Meter 12X cable					
	EMA	1830	Both	Yes	No
8.0 Meter 12X Cable					
	EMA	1834	Both	Yes	No
3.0 Meter 12X Cable					
	EMA	1840	Both	Yes	No
3 Meter 12X to 4X Channel Conversion Cable					
	EMA	1841	Both	Yes	No
10 Meter 12X to 4X Channel Conversion Cable					
	EMA	1842	Both	Yes	No
Operator Panel					
	EMA	1845	Both	Yes	No
Activation of 8 GB DDR2 System Memory					
	EMA	1915	Both	Yes	No
0/8GB DDR2 Memory (4X2GB) DIMMs- 667 MHZ- System Memory					
	EMA	1921	Both	No	No
0/16GB DDR2 Memory (4X4GB) DIMMs- 533 MHZ- System Memory					
	EMA	1922	Both	No	No
0/32GB DDR2 Memory (4X8GB) DIMMs- 400 MHZ- System Memory					
	EMA	1923	Both	No	No
Ultra 320 SCSI Cable 1 Meter					
	EMA	2124	Both	Yes	No
Ultra 320 SCSI Cable 3 Meter					
	EMA	2125	Both	Yes	No
Ultra 320 SCSI Cable 5 Meter					
	EMA	2126	Both	Yes	No
Ultra 320 SCSI Cable 10 Meter					
	EMA	2127	Both	Yes	No
Ultra 320 SCSI Cable 20 Meter					
	EMA	2128	Both	Yes	No
0.55 Meter Ultra 320 SCSI Cable					
	EMA	2138	Both	Yes	No
Primary OS - IBM i					
	EMA	2145	Both	N/A	No
Primary OS - AIX					
	EMA	2146	Both	N/A	No
Primary OS - Linux					
	EMA	2147	Both	N/A	No
2M LC-SC 50 Micron Fiber Converter Cable					
	EMA	2456	Both	Yes	No
2M LC-SC 62.5 Micron Fiber Converter Cable					
	EMA	2459	Both	Yes	No
4 port USB PCIe Adapter					
	EMA	2728	Both	Yes	No
2-Port USB PCI Adapter					
	EMA	2738	Both	Yes	No
POWER GXT135P Graphics Accelerator with Digital Support					
	EMA	2849	Both	Yes	No
PCIe 2-Line WAN w/Modem					
	EMA	2893	Both	Yes	No
3M Asynchronous Terminal/Printer Cable EIA-232					
	EMA	2934	Both	Yes	No
Asynchronous Cable EIA-232/V.24 3M					
	EMA	2936	Both	Yes	No

8-Port Asynchronous Adapter EIA-232/RS-422, PCI bus				
	EMA	2943	Both	Yes No
Serial-to-Serial Port Cable for Drawer/Drawer- 3.7M				
	EMA	3124	Both	Yes No
Serial-to-Serial Port Cable for Rack/Rack- 8M				
	EMA	3125	Both	Yes No
RIO-2(Remote I/O-2)Cbl, 3.5M				
	EMA	3147	Both	Yes No
RIO-2 (Remote I/O-2) Cable, 10M				
	EMA	3148	Both	Yes No

NOTE: THESE FEATURES ARE SUBJECT TO AN \$8.00 ELECTRONICWASTE RECYCLING FEE (15-INCH TO 34-INCH VIDEO DEVICE.)
IBM T117 Flat Panel Monitor

	EMA	3645	Both	Yes No
146GB 15K RPM SAS Disk Drive				
	EMA	3647	Both	Yes No
300GB 15K RPM SAS Disk Drive				
	EMA	3648	Both	Yes No
450GB 15K RPM SAS Disk Drive				
	EMA	3649	Both	Yes No
External connection for the 6 internal SAS Disk slots.				
	EMA	3651	Both	Yes No
SAS Cable (EE) Drawer to Drawer 1M				
	EMA	3652	Both	Yes No
SAS Cable (EE) Drawer to Drawer 3M				
	EMA	3653	Both	Yes No
SAS Cable (EE) Drawer to Drawer 6M				
	EMA	3654	Both	Yes No
428GB 15K RPM SAS Disk Drive				
	EMA	3658	Both	Yes No
Processor Fabric Cable, 2 enclosure				
	EMA	3660	Both	Yes No
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 3M				
	EMA	3661	Both	Yes No
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 6M				
	EMA	3662	Both	Yes No
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 15M				
	EMA	3663	Both	Yes No
SAS Cable (YR) -1M				
	EMA	3667	Both	Yes No
139.5GB 15k rpm SAS Disk Drive				
	EMA	3677	Both	Yes No
283.7GB 15k rpm SAS Disk Drive				
	EMA	3678	Both	Yes No
SAS Cable (AI)- Adapter to Internal drive 1M				
	EMA	3679	Both	Yes No
SAS Cable (AE) Adapter to Enclosure, single controller/single path 3M				
	EMA	3684	Both	Yes No
SAS Cable (AE) Adapter to Enclosure, single controller/single path 6M				
	EMA	3685	Both	Yes No
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 1.5 M				
	EMA	3691	Both	Yes No
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 3 M				
	EMA	3692	Both	Yes No
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 6 M				
	EMA	3693	Both	Yes No
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 15 M				
	EMA	3694	Both	Yes No
0.3M Serial Port Converter Cable, 9-Pin to 25-Pin				
	EMA	3925	Both	Yes No
Asynch Printer/Terminal Cable, 9-pin to 25-pin, 4M				
	EMA	3926	Both	Yes No
Serial Port Null Modem Cable, 9-pin to 9-pin, 3.7M				
	EMA	3927	Both	Yes No
Serial Port Null Modem Cable, 9-pin to 9-pin, 10M				
	EMA	3928	Both	Yes No
1.8 M (6-ft) Extender Cable for Displays (15-pin D-shell to 15-pin D-shell)				
	EMA	4242	Both	Yes No
Extender Cable - USB Keyboards, 2M				

VGA to DVI Connection Converter	EMA	4256	Both	Yes	No
141.12GB 15k rpm Disk Unit	EMA	4276	Both	Yes	No
	EMA	4328	Both	Yes	No

One and only one rack indicator features is required on all orders (#4650 to #4666).

Rack Indicator- Not Factory Integrated

Rack Indicator, Rack #1	EMA	4650	Initial	N/A	No
Rack Indicator, Rack #2	EMA	4651	Initial	N/A	No
Rack Indicator, Rack #3	EMA	4652	Initial	N/A	No
Rack Indicator, Rack #4	EMA	4653	Initial	N/A	No
Rack Indicator, Rack #5	EMA	4654	Initial	N/A	No
Rack Indicator, Rack #6	EMA	4655	Initial	N/A	No
Rack Indicator, Rack #7	EMA	4656	Initial	N/A	No
Rack Indicator, Rack #8	EMA	4657	Initial	N/A	No
Rack Indicator, Rack #9	EMA	4658	Initial	N/A	No
Rack Indicator, Rack #10	EMA	4659	Initial	N/A	No
Rack Indicator, Rack #11	EMA	4660	Initial	N/A	No
Rack Indicator, Rack #12	EMA	4661	Initial	N/A	No
Rack Indicator, Rack #13	EMA	4662	Initial	N/A	No
Rack Indicator, Rack #14	EMA	4663	Initial	N/A	No
Rack Indicator, Rack #15	EMA	4664	Initial	N/A	No
Rack Indicator, Rack #16	EMA	4665	Initial	N/A	No
PCI-X Cryptographic Coprocessor (FIPS 4)	EMA	4666	Initial	N/A	No
Single 5250 Enterprise Enablement	EMA	4764	Both	Yes	No
Full 5250 Enterprise Enablement	EMA	4990	Both	N/A	No
Software Preload Required	EMA	4991	Both	N/A	No
Custom Service Specify, Off-site	EMA	5000	Initial	N/A	No
	EMA	5001	Both	N/A	No
	EMA	5002	Initial	N/A	No
Sys Console on OP Console	EMA	5544	Both	Yes	No
Sys Console On HMC	EMA	5550	Both	Yes	No
Sys Console-Ethernet No IOP	EMA	5553	Both	Yes	No
Processor Power Regulator	EMA	5617	Both	No	No
Sys AC Power Supply, 1600 w	EMA	5628	Both	Yes	No
Media Enclosure and Backplane	EMA	5629	Both	Yes	No
Integrated, 2 Port- 1Gb Virtual Ethernet, I/O ports	EMA	5636	Both	Yes	No
Integrated, 2 Port- 10Gb (SR) Virtual Ethernet, I/O ports	EMA	5637	Both	Yes	No
Integrated, 4 Port- 1Gb Virtual Ethernet, I/O ports	EMA	5639	Both	Yes	No
Blind Swap Type III Cassette- PCIe, Short Slot	EMA	5646	MES	Yes	No
Blind Swap Type III Cassette- PCI-X or PCIe, Standard Slot	EMA	5647	MES	Yes	No

Service Interface Card					
	EMA	5648	Both	Yes	No
Serv Interface Cable- 2 Enclosure					
	EMA	5657	Both	Yes	No
I/O Backplane					
	EMA	5666	Both	No	No
System Midplane					
	EMA	5667	Both	No	No
SAS Disk Backplane -6 slot					
	EMA	5668	Both	Yes	No
0/4 Core Processor Enclosure and Backplane					
	EMA	5675	Both	No	No
System Chassis - 4 EIA					
	EMA	5683	Both	No	No
System Ship Group					
	EMA	5699	Both	Yes	No
IBM Gigabit Ethernet-SX PCI-X Adapter					
	EMA	5700	Both	Yes	No
IBM 10/100/1000 Base-TX Ethernet PCI-X Adapter					
	EMA	5701	Both	Yes	No
IBM 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter					
	EMA	5706	Both	Yes	No
IBM 2-Port Gigabit Ethernet-SX PCI-X Adapter					
	EMA	5707	Both	Yes	No
1 Gigabit iSCSI TOE PCI-X on Copper Media Adapter					
	EMA	5713	Both	Yes	No
4-Port 10/100/1000 Base-TX PCI Express Adapter					
	EMA	5717	Both	Yes	No
10 Gb Ethernet-SR PCI-X 2.0 DDR Adapter					
	EMA	5721	Both	Yes	No
2-Port Asynchronous EIA-232 PCI Adapter					
	EMA	5723	Both	Yes	No
8 Gigabit PCI Express Dual Port Fibre Channel Adapter					
	EMA	5735	Both	Yes	No
PCI-X DDR Dual Channel Ultra320 SCSI Adapter					
	EMA	5736	Both	Yes	No
4-Port 10/100/1000 Base-TX PCI-X Adapter					
	EMA	5740	Both	Yes	No
IBM Single Bus Ultra 320 SCSI Repeater Card					
	EMA	5741	Both	Yes	No
IBM Dual Bus Ultra 320 SCSI Repeater Card					
	EMA	5742	Both	Yes	No
POWER GXT145 PCI Express Graphics Accelerator					
	EMA	5748	Both	Yes	No
4Gbps Fibre Channel (2-Port)					
	EMA	5749	Both	Yes	No
IDE Slimline DVD-ROM Drive					
	EMA	5756	Both	Yes	No
IBM 4.7 GB IDE Slimline DVD-RAM Drive					
	EMA	5757	Both	Yes	No
4 GB Single-Port Fibre Channel PCI-X 2.0 DDR Adapter					
	EMA	5758	Both	Yes	No
4 Gb Dual-Port Fibre Channel PCI-X 2.0 DDR Adapter					
	EMA	5759	Both	Yes	No
2-Port 10/100/1000 Base-TX Ethernet PCI Express Adapter					
	EMA	5767	Both	Yes	No
2-Port Gigabit Ethernet-SX PCI Express Adapter					
	EMA	5768	Both	Yes	No
10 Gigabit Ethernet-LR PCI Express Adapter					
	EMA	5772	Both	Yes	No
4 Gigabit PCI Express Single Port Fibre Channel Adapter					
	EMA	5773	Both	Yes	No
4 Gigabit PCI Express Dual Port Fibre Channel Adapter					
	EMA	5774	Both	Yes	No
PCI-X Disk Controller-90MB No IOP					
	EMA	5776	Both	Yes	No
PCI-X EXP24 Ctl-1.5GB No IOP					
	EMA	5782	Both	Yes	No
TotalStorage EXP24 Disk Dwr					
	EMA	5786	Both	Yes	No
PCI-DDR 12X Expansion Drawer					
	EMA	5796	Both	Yes	No
EXP 12S Expansion Drawer					
	EMA	5886	Both	Yes	No

PCI-X DDR Dual - x4 3Gb SAS RAID Adapter	EMA 5902	Both	Yes	No
Alternate SAS controller for 3 of 6 internal SAS Disk Slots	EMA 5909	Both	Yes	No
PCI-X DDR Dual - x4 SAS Adapter	EMA 5912	Both	Yes	No
Non-paired SAS RAID indicator	EMA 5922	Both	Yes	No
Full width Keyboard -- USB, US English, #103P	EMA 5951	Both	Yes	No
Full width Keyboard -- USB, French, #189	EMA 5952	Both	Yes	No
Full width Keyboard -- USB, Italian, #142	EMA 5953	Both	Yes	No
Full width Keyboard -- USB, German/Austrian, #129	EMA 5954	Both	Yes	No
Full width Keyboard -- USB, UK English, #166P	EMA 5955	Both	Yes	No
Full width Keyboard -- USB, Spanish, #172	EMA 5956	Both	Yes	No
Full width Keyboard -- USB, Japanese, #194	EMA 5957	Both	Yes	No
Full width Keyboard -- USB, Brazilian Portuguese, #275	EMA 5958	Both	Yes	No
Full width Keyboard -- USB, Hungarian, #208	EMA 5959	Both	Yes	No
Full width Keyboard -- USB, Korean, #413	EMA 5960	Both	Yes	No
Full width Keyboard -- USB, Chinese, #467	EMA 5961	Both	Yes	No
Full width Keyboard -- USB, French Canadian, #445	EMA 5962	Both	Yes	No
Full width Keyboard -- USB, Belgian/UK, #120	EMA 5964	Both	Yes	No
Full width Keyboard -- USB, Swedish/Finnish, #153	EMA 5965	Both	Yes	No
Full width Keyboard -- USB, Danish, #159	EMA 5966	Both	Yes	No
Full width Keyboard -- USB, Bulgarian, #442	EMA 5967	Both	Yes	No
Full width Keyboard -- USB, Swiss/French/German, #150	EMA 5968	Both	Yes	No
Full width Keyboard -- USB, Norwegian, #155	EMA 5969	Both	Yes	No
Full width Keyboard -- USB, Dutch, #143	EMA 5970	Both	Yes	No
Full width Keyboard -- USB, Portuguese, #163	EMA 5971	Both	Yes	No
Full width Keyboard -- USB, Greek, #319	EMA 5972	Both	Yes	No
Full width Keyboard -- USB, Hebrew, #212	EMA 5973	Both	Yes	No
Full width Keyboard -- USB, Polish, #214	EMA 5974	Both	Yes	No
Full width Keyboard -- USB, Slovakian, #245	EMA 5975	Both	Yes	No
Full width Keyboard -- USB, Czech, #243	EMA 5976	Both	Yes	No
Full width Keyboard -- USB, Turkish, #179	EMA 5977	Both	Yes	No
Full width Keyboard -- USB, LA Spanish, #171	EMA 5978	Both	Yes	No
Full width Keyboard -- USB, Arabic, #253	EMA 5979	Both	Yes	No
Full width Keyboard -- USB, Thai, #191	EMA 5980	Both	Yes	No
Full width Keyboard -- USB, Russian, #443	EMA 5981	Both	Yes	No
Full width Keyboard -- USB, Slovenian, #234	EMA 5982	Both	Yes	No
Full width Keyboard -- USB, US English Euro, #103P	EMA 5983	Both	Yes	No
Power Control Cable (SPCN) - 3 meter	EMA 6006	Both	Yes	No

Power Control Cable (SPCN) - 15 meter				
EMA	6007	Both	Yes	No
Power Control Cable (SPCN) - 6 meter				
EMA	6008	Both	Yes	No
Opt Front Door for 1.8m Rack				
EMA	6068	MES	Yes	No
Opt Front Door for 2.0m Rack				
EMA	6069	MES	Yes	No
1.8m Rack Trim Kit				
EMA	6246	MES	Yes	No
2.0m Rack Trim Kit				
EMA	6247	MES	Yes	No
1.8m Rack Acoustic Doors				
EMA	6248	MES	Yes	No
2.0m Rack Acoustic Doors				
EMA	6249	MES	Yes	No
Dual-port 12X Channel Attach- Short Run				
EMA	6446	Both	Yes	No
Dual-port 12X Channel Attach- Long Run				
EMA	6457	Both	Yes	No
Power Cable -- Drawer to IBM PDU, 14-foot, 250V/10A				
EMA	6458	Both	Yes	No
3.7m (12-Ft) 250V/10A RA Pwr Cd				
EMA	6459	Both	Yes	No
Power Cord 4.3m (14-ft), Drawer To OEM PDU (125V, 15A)				
EMA	6460	Both	Yes	No
Power Cord 4.3m (14-foot), Drawer to OEM PDU, (250V, 15A), U. S.				
EMA	6469	Both	Yes	No
Power Cord 2.7m (9-foot), To wall/OEM PDU, (125V, 15A)				
EMA	6471	Both	Yes	No
Power Cord 2.7m (9-foot), To wall/OEM PDU, (250V, 16A)				
EMA	6472	Both	Yes	No
Power Cord 2.7m (9-foot), To wall/OEM PDU, (250V, 10A)				
EMA	6473	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 13A)				
EMA	6474	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 16A)				
EMA	6475	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 10A)				
EMA	6476	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 16A)				
EMA	6477	Both	Yes	No
Power Cord 2.7 M(9-foot), To wall/OEM PDU, (250V, 16A)				
EMA	6478	Both	Yes	No
Power Cord 1.8M (6-foot),To wall, (250V, 15A), United States				
EMA	6487	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (125V, 15A or 250V, 10A)				
EMA	6488	Both	Yes	No
4.3m (14-Ft) 3PH/24A Power Cord				
EMA	6489	Both	Yes	No
4.3m (14-Ft) 1PH/48A Pwr Cord				
EMA	6491	Both	Yes	No
4.3m (14-Ft) 1PH/48-60A Pwr Cord				
EMA	6492	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 10A)				
EMA	6493	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 10A)				
EMA	6494	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 10A)				
EMA	6496	Both	Yes	No
Optional Rack Security Kit				
EMA	6580	MES	Yes	No
Modem Tray for 19-Inch Rack				
EMA	6586	MES	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (125V, 15A)				
EMA	6651	Both	Yes	No
4.3m (14-Ft) 1PH/24-30A Pwr Cord				
EMA	6654	Both	Yes	No
4.3m (14-Ft) 1PH/24-30A WR Pwr Cord				
EMA	6655	Both	Yes	No
4.3m (14-Ft)1PH/24A Power Cord				
EMA	6656	Both	Yes	No
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 15A)				

Power Cord 3 M (10 ft), Drawer to IBM PDU, 250V/10A	EMA 6659	Both	Yes	No
Power Cord 4.3M (14-foot), Drawer to OEM PDU, (250V, 15A)	EMA 6665	Both	Yes	No
Power Cord 2.7M (9-foot), Drawer to IBM PDU, 250V/10A	EMA 6669	Both	Yes	No
Power Cord 1.5M (5-foot), Drawer to IBM PDU, 250V/10A	EMA 6671	Both	Yes	No
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	EMA 6672	Both	Yes	No
PCI 2-Line WAN IOA No IOP	EMA 6680	Both	Yes	No
PCI 4-Modem WAN IOA No IOP	EMA 6805	Both	Yes	No
PCI 2-Line WAN w/Modem NoIOP	EMA 6808	Both	Yes	No
Intelligent PDU+, 1 EIA Unit, Universal UTG0247 Connector	EMA 6833	Both	Yes	No
IBM/OEM Rack-mount Drawer Rail Kit- Adjustable Depth	EMA 7109	MES	Yes	No
Power Distribution Unit	EMA 7164	Both	Yes	No
SDI Software Pre-Install Indicator	EMA 7188	MES	Yes	No
I/O Drawer Mounting Enclosure	EMA 7305	NC	Initial	N/A No
Quantity 150 of #4328	EMA 7314	Both	Yes	No
Quantity 150 of #3677	EMA 7510	Both	Yes	No
Quantity 150 of #3678	EMA 7518	Both	Yes	No
3.6 GHz Proc Card, 0/4 Core POWER6, 12 DDR2 Memory Slots	EMA 7519	Both	Yes	No
One Processor Activation for Processor Feature #7537- Express	EMA 7537	Both	No	No
One Processor Activation for Processor Feature #7537	EMA 7722	Both	Yes	No
Ethernet Cable, 6M, Hardware Management Console to System Unit	EMA 7723	Both	Yes	No
Ethernet Cable, 15m, Hardware Management Console to System Unit	EMA 7801	Both	Yes	No
PCI Blind Swap Cassette Kit, Double wide Adapters, Type II	EMA 7802	Both	Yes	No
Power Distribution Backplane	EMA 7863	MES	Yes	No
PowerVM -Standard Edition	EMA 7870	Both	No	No
PowerVM - Enterprise Edition	EMA 7942	Both	Yes	No
Mouse - USB, with Keyboard Attachment Cable	EMA 7995	Both	Yes	No
Order Routing Indicator- System Plant	EMA 8841	Both	Yes	No
Language Group Specify - US English	EMA 9169	Initial	N/A	No
Month Indicator	EMA 9300	Initial	N/A	No
Day Indicator	EMA 9461	Initial	N/A	No
Hour Indicator	EMA 9462	Initial	N/A	No
Minute Indicator	EMA 9463	Initial	N/A	No
Qty Indicator	EMA 9464	Initial	N/A	No
Countable Member Indicator	EMA 9465	Initial	N/A	No
Reserved Rack Space Indicator - 4U	EMA 9466	Initial	N/A	No
Language Group Specify - Dutch	EMA 9570	Initial	N/A	No

Language Group Specify	EMA 9700	Initial	N/A	No
	- French			
Language Group Specify	EMA 9703	Initial	N/A	No
	- German			
Language Group Specify	EMA 9704	Initial	N/A	No
	- Polish			
Language Group Specify	EMA 9705	Initial	N/A	No
	- Norwegian			
Language Group Specify	EMA 9706	Initial	N/A	No
	- Portuguese			
Language Group Specify	EMA 9707	Initial	N/A	No
	- Spanish			
Language Group Specify	EMA 9708	Initial	N/A	No
	- Italian			
Language Group Specify	EMA 9711	Initial	N/A	No
	- Canadian Freh			
Language Group Specify	EMA 9712	Initial	N/A	No
	- Japanese			
Language Group Specify	EMA 9714	Initial	N/A	No
	- Traditional Chinese (Taiwan)			
Language Group Specify	EMA 9715	Initial	N/A	No
	- Korean			
Language Group Specify	EMA 9716	Initial	N/A	No
	- Turkish			
Language Group Specify	EMA 9718	Initial	N/A	No
	- Hungarian			
Language Group Specify	EMA 9719	Initial	N/A	No
	- Slovakian			
Language Group Specify	EMA 9720	Initial	N/A	No
	- Russian			
Language Group Specify	EMA 9721	Initial	N/A	No
	- Simplified Chinese (PRC)			
Language Group Specify	EMA 9722	Initial	N/A	No
	- Czech			
Language Group Specify	EMA 9724	Initial	N/A	No
	-- Romanian			
Language Group Specify	EMA 9725	Initial	N/A	No
	- Croatian			
Language Group Specify	EMA 9726	Initial	N/A	No
	-- Slovenian			
Language Group Specify	EMA 9727	Initial	N/A	No
	- Brazilian Portuguese			
Language Group Specify	EMA 9728	Initial	N/A	No
	- Thai			
Language Group Specify	EMA 9729	Initial	N/A	No

The following are features already announced for the IBM System p 7014 machine type:

Description	Model	Feature	Initial/	RP
Machine Type 7014	number	numbers	MES/	CSU MES
			Both/	
			Support	
Rack Content Specify:	8234-EMA-	4U		
	S25	0231	Initial	N/A No
Rack Content Specify:	8234-EMA-	8U		
	S25	0232	Initial	N/A No

Feature number	Description	List price
EMA	MT Model	\$3,600
0003	Solution Delivery Integration	\$0
0032	Specify Code for External High	\$519
0040	Mirrored System Disk Level, Sp	\$0
0041	Device Parity Protection-All,	\$0
0043	Mirrored System Bus Level, Spe	\$0
0047	Device Parity RAID-6 All, Spec	\$0
0050	IBM Express Seller Indicator	\$0
0099	SBO Indicator	\$0
0205	RISC-to-RISC Data Migration	\$0

0265	AIX Partition Specify	\$0
0266	Linux Partition Specify	\$0
0267	IBM i Operating System Partiti	\$0
0275	CSC Specify	\$0
0290	Ext Tape Attached via #5736	\$0
0296	Specify Custom Data Protection	\$0
0302	Specify EXP24 Attach via Exist	\$0
0308	Mirrored Level System Specify	\$0
0347	RAID Hot Spare Specify	\$0
0348	V.24/EIA232 6.1m (20-Ft) PCI C	\$124
0353	V.35 6.1m (20-Ft) PCI Cable	\$124
0359	X.21 6.1m (20-Ft) PCI Cable	\$371
0367	V.24/EIA232 24.4m (80-Ft) PCI	\$124
0373	UPS Factory Integration Specif	\$0
0374	HMC Factory Integration Specif	\$0
0375	Display Factory Integration Sp	\$0
0376	Reserve Rack Space for UPS	\$0
0377	Reserve Rack Space for HMC	\$0
0378	Reserve Rack Space for Display	\$0
0444	CBU Specify	\$0
0453	Customer Specified Placement	\$1,000
0534	IBM i 6.1 Specify Code	\$0
0551	19 inch, 1.8 meter high rack	\$2,644
0553	19 inch, 2.0 meter high rack	\$3,585
0555	19 inch, 1.3 meter high rack	\$1,978
0599	Rack Filler Panel Kit	\$74
0719	Load Source Not in CEC	\$0
0725	Specify Load Source in #5786	\$0
0727	Specify #5886 Load Source plac	\$0
0836	#4328 Load Source Specify	\$0
0837	SAN Load Source Specify	\$0
0839	#3677 Load Source Specify	\$0
0840	#3678 Load Source Specify	\$0
0844	#3658 Load Source Specify	\$0
1025	Modem Cable - US/Canada and Ge	\$13
1311	System Unique Identifier	\$0
1715	System Bezel	\$100
1800	GX Dual Port- RIO-2 Attach	\$3,000
1802	GX Dual Port- 12X Channel Atta	\$1,132
1827	System port/UPS Conversion Cab	\$95
1828	1.5 Meter 12X to 4X Channel Co	\$300
1829	0.6 Meter 12X Cable	\$350
1830	1.5 Meter 12X cable	\$400
1834	8.0 Meter 12X Cable	\$725
1840	3.0 Meter 12X Cable	\$475
1841	3 Meter 12X to 4X Channel Conv	\$375
1842	10 Meter 12X to 4X Channel Con	\$600
1845	Operator Panel	\$150
1915	Activation of 8 GB DDR2 POWER6	\$0
1921	0/8GB DDR2 Memory (4X1GB) DIMM	\$2,867

1922	0/16GB DDR2 Memory (4X1GB) DIM	\$13,926
1923	0/32GB DDR2 Memory (4X1GB) DIM	\$27,852
2124	Ultra 320 SCSI Cable 1 Meter	\$125
2125	Ultra 320 SCSI Cable 3 Meter	\$140
2126	Ultra 320 SCSI Cable 5 Meter	\$156
2127	Ultra 320 SCSI Cable 10 Meter	\$210
2128	Ultra 320 SCSI Cable 20 Meter	\$330
2138	0.55 Meter Ultra 320 SCSI Cabl	\$76
2145	Primary OS - IBM i	\$0
2146	Primary OS - AIX	\$0
2147	Primary OS - Linux	\$0
2456	2M LC-SC 50 Micron Fiber Conve	\$83
2459	2M LC-SC 62.5 Micron Fiber Con	\$83
2728	4 port USB PCIe Adapter	\$150
2738	2-Port USB PCI Adapter	\$45
2849	POWER GXT135P Graphics Acceler	\$339
2893	PCIe 2-Line WAN w/Modem	\$579
2894	PCIe 2-Line WAN w/Modem CIM	\$579
2934	3M Asynchronous Terminal/ Print	\$37
2936	Asynchronous Cable EIA-232/ V.2	\$61
2943	8-Port Asynchronous Adapter EI	\$1,162
3124	Serial-to-Serial Port Cable fo	\$67
3125	Serial-to-Serial Port Cable fo	\$67
3147	RIO-2(Remote I/O-2)Cbl, 3.5M	\$550
3148	RIO-2 (Remote I/O-2) Cable, 10	\$850
3645	IBM T117 Flat Panel Monitor	\$700
3647	146 GB 15K RPM SAS Disk Drive	\$498
3648	300 GB 15K RPM SAS Disk Drive	\$1,150
3649	450 GB 15K RPM SAS Disk Drive	\$1,599
3651	External connection for the 6	\$91
3652	SAS Cable (EE) Drawer to Drawe	\$50
3653	SAS Cable (EE) Drawer to Drawe	\$70
3654	SAS Cable (EE) Drawer to Drawe	\$120
3658	428GB 15K RPM SAS Disk Drive	\$1,599
3660	Processor Fabric Cable, 2 encl	\$1,511
3661	SAS Cable (X) Adapter to SAS E	\$150
3662	SAS Cable (X) Adapter to SAS E	\$301
3663	SAS Cable (X) Adapter to SAS E	\$528
3667	SAS Cable (YR) -1M	\$94
3677	139.5GB 15k rpm SAS Disk Drive	\$498
3678	283.7GB 15k rpm SAS Disk Drive	\$1,150
3679	SAS Cable (AI)- Adapter to Int	\$53

3684	SAS Cable (AE) Adapter to Encl	\$150
3685	SAS Cable (AE) Adapter to Encl	\$301
3691	SAS Cable (YO) Adapter to SAS	\$90
3692	SAS Cable (YO) Adapter to SAS	\$110
3693	SAS Cable (YO) Adapter to SAS	\$150
3694	SAS Cable (YO) Adapter to SAS	\$528
3925	0.3M Serial Port Converter Cab	\$21
3926	Asynch Printer/Terminal Cable,	\$77
3927	Serial Port Null Modem Cable,	\$68
3928	Serial Port Null Modem Cable,	\$68
4242	1.8 M (6-ft) Extender Cable fo	\$83
4256	Extender Cable - USB Keyboards	\$42
4276	VGA to DVI Connection Converte	\$8
4328	141.12GB 15k rpm Disk Unit	\$981
4650	Rack Indicator- Not Factory In	\$0
4651	Rack Indicator, Rack #1	\$0
4652	Rack Indicator, Rack #2	\$0
4653	Rack Indicator, Rack #3	\$0
4654	Rack Indicator, Rack #4	\$0
4655	Rack Indicator, Rack #5	\$0
4656	Rack Indicator, Rack #6	\$0
4657	Rack Indicator, Rack #7	\$0
4658	Rack Indicator, Rack #8	\$0
4659	Rack Indicator, Rack #9	\$0
4660	Rack Indicator, Rack #10	\$0
4661	Rack Indicator, Rack #11	\$0
4662	Rack Indicator, Rack #12	\$0
4663	Rack Indicator, Rack #13	\$0
4664	Rack Indicator, Rack #14	\$0
4665	Rack Indicator, Rack #15	\$0
4666	Rack Indicator, Rack #16	\$0
4764	PCI-X Cryptographic Coprocesso	\$9,000
4990	Single 5250 Enterprise Enablem	\$50,000
4991	Full 5250 Enterprise Enablemen	\$200,000
5000	Software Preload Required	\$0
5001	Custom Service Specify, Off-Si	\$0
5002	Customer Solution Center - Roc	\$0
5544	Sys Console on OP Console	\$0
5550	Sys Console On HMC	\$0
5553	Sys Console-Ethernet No IOP	\$0
5617	Processor Power Regulator	\$1,600
5627	System CEC Enclosure with OEM	\$378
5628	Sys AC Power Supply, 1600 W	\$1,134
5629	Media Enclosure and Backplane	\$140
5636	Integrated, 2 Port- 1Gb Virtua	\$301
5637	Integrated, 2 Port- 10Gb (SR)	\$4,231
5639	Integrated, 4 Port- 1Gb Virtua	\$528
5642	Generic IBM Drawer Indicator f	\$0

5643	Generic OEM Drawer Indicator f	\$0
5646	Blind Swap Type III Cassette-	\$38
5647	Blind Swap Type III Cassette-	\$38
5648	Service Interface Card	\$756
5657	Serv Interface Cable- 2 Enclos	\$1,511
5666	I/O Backplane	\$3,400
5667	System Midplane	\$756
5668	SAS Disk Backplane -6 slot	\$794
5675	0/4 Core Processor Enclosure a	\$1,600
5683	System Chassis - 4 EIA	\$4,000
5699	System Ship Group	\$15
5700	IBM Gigabit Ethernet-SX PCI-X	\$863
5701	IBM 10/100/1000 Base-TX Ethern	\$528
5706	IBM 2-Port 10/100/1000 Base- TX	\$754
5707	IBM 2-Port Gigabit Ethernet-SX	\$1,322
5713	1 Gigabit iSCSI TOE PCI-X on C	\$900
5717	4-Port 10/100/1000 Base-TX PCI	\$830
5721	10 Gb Ethernet-SR PCI-X 2.0 DD	\$4,742
5723	2-Port Asynchronous EIA-232 PC	\$129
5735	8 Gigabit PCI Express Dual Por	\$3,499
5736	PCI-X DDR Dual Channel Ultra32	\$587
5740	4-Port 10/100/1000 Base-TX PCI	\$830
5741	IBM Single Bus Ultra 320 SCSI	\$499
5742	IBM Dual Bus Ultra 320 SCSI Re	\$998
5748	POWER GXT145 PCI Express Graph	\$378
5749	4Gbps Fibre Channel (2-Port)	\$2,499
5756	IDE Slimline DVD-ROM Drive	\$208
5757	IBM 4.7 GB IDE Slimline DVD- RA	\$499
5758	4 GB Single-Port Fibre Channel	\$1,510
5759	4 Gb Dual-Port Fibre Channel P	\$2,499
5767	2-Port 10/100/1000 Base-TX Eth	\$528
5768	2-Port Gigabit Ethernet-SX PCI	\$1,322
5772	10 Gigabit Ethernet-LR PCI Exp	\$4,742
5773	4 Gigabit PCI Express Single P	\$1,510
5774	4 Gigabit PCI Express Dual Por	\$2,499
5776	PCI-X Disk Controller-90MB No	\$1,978
5782	PCI-X EXP24 Ctl-1.5GB No IOP	\$8,457
5786	TotalStorage EXP24 Disk Dwr	\$5,440
5796	PCI-DDR 12X Expansion Drawer	\$4,945
5886	EXP 12S Expansion Drawer	\$4,500
5902	PCI-X DDR Dual - x4 3Gb SAS RA	\$1,889
5909	Alternate SAS controller for 3	\$1,058
5912	PCI-X DDR Dual - x4 SAS Adapte	\$825
5922	Non-paired SAS RAID indicator	\$0

5951	Full Width Keyboard -- USB, US	\$83
5952	Full Width Keyboard -- USB, Fr	\$83
5953	Full Width Keyboard -- USB, It	\$83
5954	Full Width Keyboard -- USB, Ge	\$83
5955	Full Width Keyboard -- USB, UK	\$83
5956	Full Width Keyboard -- USB, Sp	\$83
5957	Full Width Keyboard -- USB, Ja	\$83
5958	Full Width Keyboard -- USB, Br	\$83
5959	Full Width Keyboard -- USB, Hu	\$83
5960	Full Width Keyboard -- USB, Ko	\$83
5961	Full Width Keyboard -- USB, Ch	\$83
5962	Full Width Keyboard -- USB, Fr	\$83
5964	Full Width Keyboard -- USB, Be	\$83
5965	Full Width Keyboard -- USB, Sw	\$83
5966	Full Width Keyboard -- USB, Da	\$83
5967	Full Width Keyboard -- USB, Bu	\$83
5968	Full Width Keyboard -- USB, Sw	\$83
5969	Full Width Keyboard -- USB, No	\$83
5970	Full Width Keyboard -- USB, Du	\$83
5971	Full Width Keyboard -- USB, Po	\$83
5972	Full Width Keyboard -- USB, Gr	\$83
5973	Full Width Keyboard -- USB, He	\$83
5974	Full Width Keyboard -- USB, Po	\$83
5975	Full Width Keyboard -- USB, SI	\$83
5976	Full Width Keyboard -- USB, Cz	\$83
5977	Full Width Keyboard -- USB, Tu	\$83
5978	Full Width Keyboard -- USB, LA	\$83
5979	Full Width Keyboard -- USB, Ar	\$83
5980	Full Width Keyboard -- USB, Th	\$83
5981	Full Width Keyboard -- USB, Ru	\$83
5982	Full Width Keyboard -- USB, SI	\$83
5983	Full Width Keyboard -- USB, US	\$83
6006	Power Control Cable (SPCN) - 3	\$40
6007	Power Control Cable (SPCN) - 1	\$70
6008	Power Control Cable (SPCN) - 6	\$50
6068	Opt Front Door for 1.8m Rack	\$340
6069	Opt Front Door for 2.0m Rack	\$416
6246	1.8m Rack Trim Kit	\$226
6247	2.0m Rack Trim Kit	\$226
6248	1.8m Rack Acoustic Doors	\$3,513
6249	2.0m Rack Acoustic Doors	\$3,513
6446	Dual-port 12X Channel Attach-	\$576
6457	Dual-port 12X Channel Attach-	\$2,500
6458	Power Cable -- Drawer to IBM P	\$14
6459	3.7m (12-Ft) 250V/10A RA Pwr C	\$5
6460	Power Cord 4.3m (14-ft), Drawe	\$14
6469	Power Cord 4.3m (14-foot), Dra	\$14
6471	Power Cord 2.7m (9-foot), To W	\$14
6472	Power Cord 2.7m (9-foot), To W	\$14

6473	Power Cord 2.7m (9-foot), To W	\$14
6474	Power Cord 2.7M (9-foot), To W	\$14
6475	Power Cord 2.7M (9-foot), To W	\$14
6476	Power Cord 2.7M (9-foot), To W	\$14
6477	Power Cord 2.7M (9-foot), To W	\$14
6478	Power Cord 2.7 M(9-foot), To W	\$14
6487	Power Cord 1.8M (6-foot),To Wa	\$14
6488	Power Cord 2.7M (9-foot), To W	\$40
6489	4.3m (14-Ft) 3PH/24A Power Cor	\$208
6491	4.3m (14-Ft) 1PH/48A Pwr Cord	\$302
6492	4.3m (14-Ft) 1PH/48-60A Pwr Co	\$302
6493	Power Cord 2.7M (9-foot), To W	\$14
6494	Power Cord 2.7M (9-foot), To W	\$14
6496	Power Cord 2.7M (9-foot), To W	\$14
6580	Optional Rack Security Kit	\$136
6586	Modem Tray for 19-Inch Rack	\$189
6651	Power Cord 2.7M (9-foot), To W	\$14
6654	4.3m (14-Ft) 1PH/24-30A Pwr Co	\$181
6655	4.3m (14-Ft) 1PH/24-30A WR Pwr	\$339
6656	4.3m (14-Ft)1PH/24A Power Cord	\$181
6659	Power Cord 2.7M (9-foot), To W	\$14
6665	Power Cord 3 M (10 ft), Drawer	\$14
6669	Power Cord 4.3M (14-foot), Dra	\$14
6671	Power Cord 2.7M (9-foot), Draw	\$14
6672	Power Cord 1.5M (5-foot), Draw	\$14
6680	Power Cord 2.7M (9-foot), To W	\$14
6805	PCI 2-Line WAN IOA No IOP	\$420
6808	PCI 4-Modem WAN IOA No IOP	\$1,583
6833	PCI 2-Line WAN w/Modem NoIOP	\$579
7109	Intelligent PDU+, 1 EIA Unit,	\$1,099
7164	IBM/OEM Rack-mount Drawer Rail	\$168
7188	Power Distribution Unit	\$756
7314	I/O Drawer Mounting Enclosure	\$525
7510	Quantity 150 of #4328	\$147,150
7518	Quantity 150 of #3677	\$74,700
7519	Quantity 150 of #3678	\$172,500
7537	3.6 GHz Proc Card, 0/4 Core PO	\$5,900
7722	One Processor Activation for P	\$0
7723	One Processor Activation for P	\$5,900

7770	OEM (Generic) Indicator	\$0
7773	OEM (GROUPE BULL) Indicator	\$0
7775	OEM (Hitachi) Indicator	\$0
7779	OEM Publications for IBM Logo	\$0
7801	Ethernet Cable, 6M, Hardware M	\$12
7802	Ethernet Cable, 15m, Hardware	\$26
7863	PCI Blind Swap Cassette Kit, D	\$50
7870	Power Distribution Backplane	\$200
7942	PowerVM -Standard Edition	\$0
7995	PowerVM - Enterprise Edition	\$0
8841	Mouse - USB, with Keyboard Att	\$62

US ITS Minimum Maintenance Charges - Models

Description	Machine Type	Model	Monthly Minimum Maint IOR 24x7
IBM 8234-EMA	8234	EMA	\$145

US ITS Minimum Maintenance Charges - Features

Description	Machine Type	Model	Feature	Monthly Minimum Maint IOR 24x7
19 inch,1.8 meter high rack	8234	EMA	0551	\$ 0
19 inch,2.0 meter high rack	8234	EMA	0553	\$ 0
19 inch,1.3 meter high rack	8234	EMA	0555	\$ 0
IBM Single Bus Ultra 320 SCSI	8234	EMA	5741	\$ 98
IBM Dual Bus Ultra 320 SCSI Re	8234	EMA	5742	\$ 98
TotalStorage P24 Disk Dwr	8234	EMA	5786	\$ 62
PCI-DDR 12X Expansion Drawer	8234	EMA	5796	\$ 86
EXP 12S Expansion Drawer	8234	EMA	5886	\$ 228
3.6 GHz Processor,0/4 Core P0	8234	EMA	7537	\$ 227
One Processor Activation for P	8234	EMA	7722	\$ 0
One Processor A	8234	EMA	7723	\$ 0

Maintenance charges

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