



IBM Power 710 Express server offers IBM POWER7+ technology in 2U rack-mount configuration

Table of contents

1 Overview	26 Publications
2 Key prerequisites	28 Technical information
2 Planned availability date	40 Terms and conditions
3 Description	46 Prices
17 Statements of general direction	60 Order now
18 Product number	

At a glance

The Power® 710 server is fueled by the outstanding performance and energy efficiency of the POWER7+™ processor with a choice of AIX®, IBM® i, or Linux™ operating systems and solutions from thousands of ISVs that can set your business apart from the competition -- all in a 2U rack-mount package.

- Powerful 64-bit 4-core, 6-core, and 8-core POWER7+ processor modules
 - 4-core, 6-core, and 8-core configurations
- Up to 256 GB of memory with optional memory riser cards, optionally augmented with POWER7+ hardware accelerated Active Memory™ Expansion
- Rich I/O options in the system unit:
 - Five available PCIe Gen2 Low Profile slots
 - PCIe2 LP 4-port 1GbE Adapter in a special PCIe x4 slot
 - Six disk/solid-state drive (SSD) SAS SFF (small form-factor) bays -- up to 5.4 TB (HDD)
 - Slimline DVD-RAM
 - Bay for tape or removable drive (with #EJ0E)
 - Integrated SAS/SATA controller with RAID 0, 1, and 10 support for hard disk drive (HDD), SSD, tape, and DVD
- 4-pack and 6-pack SSD features which can be ordered with a new server
- EnergyScale™ technology
- Expansion capabilities for storage drawers

Overview

The IBM Power 710 Express® Server is a high-performance, energy-efficient, reliable, and secure infrastructure and application server in a dense form factor. As a high-performance infrastructure or application server, the Power 710 Express server contains innovative workload-optimizing technologies that are designed to maximize performance based on client computing needs. It also includes Intelligent Energy features that are designed to maximize performance and optimize energy efficiency, resulting in one of the most cost-efficient solutions for UNIX™, IBM i, and Linux deployments.

The IBM Power 710 Express Server is a 2U rack-mount server with one processor socket offering 4-core 3.6 GHz, 6-core 4.2 GHz, and 8-core 4.2 GHz configurations. The new Power 710 Express model 8231-E1D provides increased performance with

the POWER7+ processors and expanded I/O capabilities using the high-performance Gen2 PCIe interfaces.

The Power 710 Express server supports a maximum of eight DDR3 DIMM slots, with four DIMM slots included in the base configuration and four DIMM slots available with an optional memory riser card, allowing for a maximum system memory of 256 GB.

Memory features (two memory DIMMs per feature) supported are 8 GB, 16 GB, 32 GB, and 64 GB and run at speeds of 1066 MHz. The POWER7+ hardware accelerator for Active Memory Expansion provides 25% higher levels of memory expansion than available with POWER7® chips. While POWER7 Systems™ offer up to 100% memory expansion, which can effectively double the server's maximum memory, POWER7+ servers offer up to 125% memory expansion for AIX partitions. Thus a system memory maximum of 256 GB could effectively become 512 GB effective memory capacity. This can enhance virtualization and server consolidation by allowing a partition to do significantly more work with the same physical amount of memory or a server to run more partitions and do more work with the same physical amount of memory.

The Power 710 Express server offers three storage backplane options. The first supports three SFF SAS HDDs or SSDs, an SATA DVD, and a half-high tape drive. The second supports six SFF SAS HDDs or SSDs and an SATA DVD. These two choices both provide an integrated SAS controller, offering RAID 0, 1, and 10 support. The third supports six SFF SAS HDDs or SSDs, an SATA DVD, and adds support for Dual Write Cache RAID 5 or 6, and an external SAS port. HDDs and SSDs are hot-swap and front accessible with each of the three alternatives.

Two new SSD packages offer ordering convenience and price savings for a new server order. Each 6-pack SSD feature ESR2 for the EXP30 Ultra SSD I/O Drawer can provide up to 140,000 IOPS (I/O Operations per second) in just 1/5th of a 1U drawer. The 4-pack SSD feature ESRA/ESRB/ESRC/ESRD can provide up to 90,000 IOPS. 6-pack or 4-pack SSD must be ordered with the server, not as a later MES order.

Other integrated features include:

- Five PCIe x8 Gen2 Low Profile expansion slots
- PCIe2 LP 4-port 1GbE Adapter (#5260)
- One GX++ slot for potential future expansion
- Service Processor
- Integrated SAS/SATA controller for HDD, SSD, tape, and DVD, supporting RAID 0, 1, and 10; RAID 5 and 6 available
- EnergyScale technology
- Two system ports, three USB ports, and two HMC ports
- Redundant and hot-swap power
- Redundant and hot-swap cooling

Available features offer expansion capabilities for attachment of storage drawers, supporting up to 102 disk bays.

Key prerequisites

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

Planned availability date

- February 20, 2013, for model E1D and all features except:
- March 15, 2013, for features EN0J and EN0B

Description

Power 710

Summary of standard features:

- 4-core, 6-core, and 8-core processor modules
 - 4-core, 6-core, and 8-core configurations
- 8 GB, 16 GB, 32 GB, or 64 GB of 1066 MHz DDR3 ECC memory (error checking and correcting) memory, expandable to 256 GB
- Three storage backplane options:
 - Three SFF SAS HDDs/SSDs, SATA DVD bay, tape drive bay
 - Six SFF SAS HDDs/SSDs, SATA DVD bay
 - Six SFF SAS HDDs/SSDs, SATA DVD bay, Dual Write Cache SAS RAID, external SAS port
- Five PCIe x8 Gen2 slots and one PCIe x4 Gen2 slot
 - 1 GbE adapter (#5260) is standard and occupies the x4 slot
- One GX++ slot
- Integrated:
 - Service Processor
 - EnergyScale technology
 - Hot-swap and redundant cooling
 - Three USB ports, two system ports, and two HMC ports
- One power supply
 - 1925 Watt AC, Hot-swap
 - Additional power supply available for redundant power
- Rack-mount (2U) configuration

Two new SSD packages offer ordering convenience and price savings for a new server. One 6-pack SSD feature ESR2 orders the equivalent of six feature ES02 387 GB SSDs for the feature EDR1 EXP30 Ultra SSD I/O Drawer, but has a lower price. Multiple 6-pack features can be ordered with a new server. Six-pack features and single SSD features can be combined in the same Ultra SSD Drawer.

One 4-pack SSD features orders the equivalent of four 387 GB SSDs for SAS bays in a system unit or in an I/O drawer, but has a lower price compared to ordering four ES0A/ES0B/ES0C/ES0D features. A maximum of one 4-pack feature (#ESRA/#ESRB/#ESRC/#ESRD) can be ordered with a new server. Four-pack features and single SSD features can be combined in the same system.

The minimum initial order must include a processor module, processor activations, 8 GB of memory, one HDD/SSD, a storage backplane, a LAN adapter, a power supply and power cord, an operating system indicator, and a Language Group Specify.

If IBM i is the Primary Operating System (#2145), the initial order must also include one additional HDD/SSD, Mirrored System Disk Level Specify Code, and a System Console Indicator. A DVD is defaulted on every order but may be de-selected.

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

Description	Feature number
0/4 core 3.6 GHZ POWER7+ Processor Module	EPCE
4 Processor Activations	4 X EPDE
8 GB (2 x 4096 MB) Memory	EM08
146.8 GB 15k SFF HDD	1886

Storage Backplane for 2.5-inch Drives	EJ0E
/SATA DVD/Tape	
PCIe2 LP 4-port 1 GbE Adapter	5260
Power Supply, 1925 watt AC	5532
Language Group Specify	9300/97xx
Primary Operating System Indicator - IBM AIX (#2146) or Linux (2147)	2146 or 2147
One Power Cord	6xxx

Note: No internal DASD is required if feature 0837 (Boot from SAN) is selected. A Fibre Channel or Fibre Channel over Ethernet adapter must be ordered if feature 0837 is selected.

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

Description	Feature number
0/4 core 3.6 GHz POWER7+ Processor Module	EPCE
4 Processor Activations	4 x EPDE
8 GB (2 x 4096 MB) Memory	EM08
139.5 GB 15K RPM SAS SFF HDD	2 x 1888
Storage Backplane for six SFF Drives/SATA DVD bay/Dual Write Cache SAS RAID, external SAS port	EJ0F
PCIe2 LP 4-port 1 GbE Adapter	5260
Power Supply, 1925 watt AC	5532
Language Group Specify	9300/97xx)
Primary Operating System Indicator - IBM i	2145
Mirrored System Disk Level Specify Code	0040
IBM i 6.1.1 or IBM i 7.1 indicator	0566 or 0567
IBM i 6.1.1 with IBM i 6.1.1 native I/O indicator	or EB34
System Console on HMC Indicator	5550
One Power Cord	6xxx

Notes :

- Planned availability of IBM i 6.1.1 is March 8, 2013.
- When IBM i is the primary operating system (#2145), a DVD-ROM or DVD-RAM must be accessible by the Power 710. A DVD will be defaulted on every order but may be de-selected.
- No internal DASD is required if feature 0837 (Boot from SAN) is selected. A Fibre Channel or Fibre Channel over Ethernet adapter must be ordered if feature 0837 is selected.

IBM Editions

IBM Editions are available only as initial order.

If you order a Power 710 server, IBM Edition as defined below, you can qualify for half the initial configuration's processor core activations at no additional charge.

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

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

Power 710

- 3.6 GHz 4-core processor module (#EPCE)
 - 2 x #EPDE (chargeable) and 2 x #EPEE (no-charge) with 4-core (1 x #EPCE) configuration

- 4.2 GHz 6-core processor module (#EPCG)
 - 3 x #EPDG (chargeable) and 3 x #EPEG (no-charge) with 6-core (1 x #EPCG) configuration
- 4.2 GHz 8-core processor module (#EPCJ)
 - 4 x #EPDJ (chargeable) and 4 x #EPEJ (no-charge) with 8-core (1 x #EPCJ) configuration

When you purchase an IBM Edition, you can purchase an AIX , IBM i, or Linux operating system license, or you may choose to purchase the system with no operating system. The AIX , IBM i, or Linux operating system is processed through a feature number on AIX 5.3, 6.1, or 7.1; IBM i 6.1.1 or IBM i 7.1; and SUSE Linux Enterprise Server or Red Hat Enterprise Linux . If you choose 6.1, or 7.1 for your primary operating system, you can also order IBM i 6.1.1 or IBM i 7.1 and SUSE Linux Enterprise Server or Red Hat Enterprise Linux . The converse is true if you choose an IBM i or Linux subscription as your primary operating system.

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

A minimum of 2 GB memory per core is needed to qualify for the IBM Edition. There can be different valid memory configurations that meet the minimum requirement.

A minimum of two HDD, two SSD, or two Fibre Channel adapters, or two FCoE adapters. You only need to meet one of these disk/SSD/FC/FCoE criteria. Partial criteria cannot be combined.

- Two SAS HDDs: Any capacity drives located in the system unit, feature 5886 DASD drawer, or feature 5887 DASD drawer qualify.
- Two SAS SSDs: Any capacity drives located in the system unit, feature EDR1 I/O drawer, feature 5886 DASD drawer, or feature 5887 DASD drawer qualify.
- Two SSD Modules with eMLC (#1995/#1996): Modules located in the system unit with feature 2053 qualify.
- Two SSD Modules with eMLC (#1995/#1996) -- modules located in the system unit with feature 2053 qualify.
- Two Fibre Channel PCI-e adapters located in the system unit.
- Two Fibre Channel over Ethernet PCI-e adapters located in the system unit.

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

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

- 3.6 GHz 4-core processor module
- 4.2 GHz 6-core processor module
- 4.2 GHz 8-core processor module

Dynamic logical partitioning

The dynamic logical partitioning (LPAR) function provides enhanced resource management for the Power 710 Express server. Dynamic LPAR allows available system resources to be quickly and easily configured across multiple logical partitions to meet the rapidly changing needs of your business.

Dynamic LPAR also allows you to add new system resources such as new HDDs or SSDs into your system's configuration without requiring a reboot. Without the optional PowerVM® Standard Edition (#5227) or PowerVM Enterprise Edition (#5228) feature, as many as eight LPARs are supported in a Power 710. If the PowerVM Standard or Enterprise Edition feature is installed in the system, a

maximum of 20 dynamic LPARs for each physical processor core can be defined, with a Power 710 system maximum of 160 dynamic LPARs.

An HMC or IVM is required to manage the Power 710 (8231-E1D) implementing partitioning. Multiple Power 710 servers can be supported by a single HMC.

If an HMC is used to manage the Power 710, the HMC must be a CR3, or later, model rack-mount HMC or C05, or later, deskside HMC.

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

PowerVM Editions (optional)

Three optional PowerVM Edition features are now available on the Power 710: PowerVM Express Edition, PowerVM Standard Edition, and PowerVM Enterprise Edition. These are managed using built-in Integrated Virtualization Manager (IVM) software or optionally through use of an HMC.

PowerVM Standard Edition (#5227) and PowerVM Enterprise Edition (#5228) allow customers to create partitions in units of less than 1 CPU (sub-CPU LPARs) and allow the same system I/O to be virtually added to these partitions. The optional features, available for a fee, also include a software component that provides cross-partition workload management.

PowerVM Standard and Enterprise Editions offer:

- Micro-Partitioning® (up to 20 partitions per processor core, 160 per Power 710 system)
- Virtualized disk and optical devices (VIOS)
- Automated CPU reconfiguration
- Real-time partition configuration and load statistics
- Support for dedicated and shared processor LPAR groups
- Support for manual provisioning of resources

At initial order entry, selecting Feature number 5227 or 5228 will result in Micro-Partitioning to be enabled during manufacture and the enabling software media and publications to be shipped to the customer. When ordering feature number 5227 or 5228 as an MES, an activation key will be posted on an IBM website, and the customer must retrieve it and install it on the system.

The IBM website is

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

Other features of PowerVM Editions:

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

PowerVM Enterprise Edition also includes Live Partition Mobility, which allows for the movement of a logical partition from one POWER6® or POWER7 server to another with no application downtime, and Active Memory Sharing, which dynamically reallocates memory between running logical partitions on a server. Also available is PowerVM Express (#5225), designed for users looking for an introduction to more advanced virtualization features at a highly affordable price. With PowerVM Express and IVM, users can create up to three partitions on the server, leverage VIOS, utilize Shared Dedicated Capacity to help optimize use of processor cycles, and even try out the Shared Processor Pool. With its intuitive browser-based interface, IVM is

easy to use and helps reduce the time and effort required to manage virtual devices, processors, and partitions. An HMC is not required.

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

By upgrading to PowerVM Standard or PowerVM Enterprise, users gain the ability to create up to 160 logical partitions on the Power 710. Users also gain the ability to manage their PowerVM enabled machine with either an HMC or the Integrated Virtualization Manager.

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

I/O drawer availability

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

- Feature 5886 EXP12S holds 3.5-inch SAS disk or SSD.
- Feature 5887 EXP24S holds 2.5-inch SAS disk or SSD.
- Feature EDR1 EXP30 holds thirty SSDs and two integrated SAS adapters.

A single feature 5886 or 5887 drawer can be cabled to the CEC external SAS port when a feature EJ0F DASD backplane is installed in the 8231-E1D. A 3 Gbps YI cable (#3687) is used to connect the drawer to the CEC external SAS port. Feature 5886, 5887, and EDR1 drawers are not available with 4-core processor feature EPC1.

EXP 12S SAS Drawer (#5886) (supported only -- not orderable)

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

The SAS HDDs or SSDs contained in the EXP12S are controlled by one or two PCIe SAS adapters connected to the EXP12S with SAS cables. The SAS cable will vary, depending upon the adapter being used, the operating system being used, and the protection desired. Twelve SAS bays are controlled by a single controller or a single pair of controllers.

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

Feature 5886 can also be directly attached to the SAS port on the rear of the Power 710, providing a very low-cost disk storage solution. When used this way, the imbedded SAS controllers in the system unit drive the HDDs in EXP12S. A second unit cannot be cascaded to a feature 5886 attached in this way.

EXP24S SFF Gen2-bay Drawer (#5887)

Feature 5886 can also be directly attached to the SAS port on the rear of the Power 710, providing a very low-cost disk storage solution. When used this way, the imbedded SAS controllers in the system unit drive the HDDs in EXP12S. A second unit cannot be cascaded to a feature 5886 attached in this way.

The SFF bays of the EXP24S are different from the SFF bays of the POWER7 system units or 12X PCIe I/O Drawer (#5802). The EXP24S uses Gen2 or SFF-2 SAS drives

that physically do not fit in the Gen1 or SFF-1 bays of the POWER7 system unit or 12X PCIe I/O Drawers or vice versa.

The following SFF-2/Gen2 SAS drives can be used in the EXP24S with the Power 710:

- HDDs
 - 10k RPM 283 GB/300 GB (#1956, #1925)
 - 10k RPM 571 GB/600 GB (#1962, #1964)
 - 15k RRM 139 GB/146 GB (#1947, #1917, #1948, #1953)
 - 10k RPM 900 GB/600 GB (#1752)
- SSDs
 - 387 GB (#ESRC, #ESRD, #ES0C, #ES0D)

The SAS adapters/controllers that support the EXP24S are:

- PCIe Dual-x4 SAS Adapter 3 Gb (#5278)

The integrated SAS controllers that support the EXP24S off the imbedded SAS port on the rear of the server are in:

- The Power 710, 720, 730, 740, 750, 755, 770, and 780
- The Power 520 (8203-E4A) and Power 550 (8204-E8A)

AIX , Linux , and VIOS support all of the above SAS adapters or controllers with the EXP24S.

Up to 24 HDDs can be supported with any of the supported SAS adapters or controllers.

The EXP24S has an adjustable set of rails that allows it to fit in standard Power Systems™ 19-inch racks such as the 7014-T42 or standard Power Systems 19-inch racks such as the 7014-T42 or EXP30 Ultra SSD I/O Drawer (#EDR1).

Feature EDR1 is a 1U high I/O drawer, providing 30 hot-swap SSD bays and a pair of integrated, large write cache, high-performance SAS controllers. Ultra-high levels of performance are provided without using any PCIe slots on the POWER7 server in an ultra-dense packaging design.

Each controller is connected to a GX++ PCIe adapter in a server (for example #EJ0H) over a PCIe x8 Cable (example: #EN05 or #EN07). Usually both controllers are attached to one server, but each controller can be assigned to a different server or partition or VIOS. Active/Active capability is supported, assuming at least two RAID arrays. The controllers provide RAID 0, RAID 5, RAID 6, and RAID 10 for AIX and Linux and VIOS. The controllers provide RAID 5 and RAID 6 for IBM i. AIX , IBM i, Linux , and VIOS also provide OS mirroring (LVM). The adapter's CCIN is 57C3.

Each controller is connected to a GX++ PCIe adapter in a server (for example #1914) over a PCIe x8 Cable (example: #EN05 or #EN07 or #EN08). Usually, both controllers are attached to one server, but each controller can be assigned to a different server or partition or VIOS. Active/Active capability is supported assuming at least two RAID arrays. The controllers provide RAID 0, RAID 5, RAID 6, and RAID 10 for AIX and Linux and VIOS. AIX/Linux/VIOS also provide OS mirroring (LVM). The adapter's CCIN is 57C3.

eMLC SSDs designed to fit in the Ultra drawer bays, such as the 387 GB SSDs (#ES02), are used. A minimum of six SSDs are required in each Ultra drawer. Each controller can access all 30 SSD bays. The bays can be configured as one set of bays run by a pair of controllers working together. Or the bays can be divided into two logical sets where each of the two controllers "owns" one of the logical sets. With proper software, if one of the controllers fails, the other controller can run both sets of bays.

19-inch racks

The Model 8231-E1D and its I/O drawers are designed to mount in the 25U 7014-S25 (#0555), 36U 7014-T00 (#0551), or the 42U 7014-T42 (#0553) rack. These racks are built to the 19-inch EIA standard. When you order a new 8231 system, you can also order the appropriate 7014 rack model with the system hardware on the same initial order. IBM is making the racks available as features of the 8231-E1D when you order additional I/O drawer hardware for an existing system (MES order). The rack feature number should be used if you want IBM to integrate the newly ordered I/O drawer in a 19-inch rack before shipping the MES order.

1.3-meter rack (#0555 -- supported only)

The 1.3-meter rack is a 25 EIA unit rack. The rack is the same rack delivered when you order the 7014-S25 rack.

1.8-meter rack (#0551)

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

2.0-meter rack (#0553)

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

IBM Power Systems Deployment-ready Services

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

- Integration
 - Component integration
 - Rack integration
 - Operating system preinstallation
 - Unit personalization
 - Third-party hardware/software installation
 - Customer-specified placement
- Asset tagging
 - Standard tagging Radio Frequency Item Device (RFID)
- Special packaging
 - Box consolidation
- System customization
 - Remote access partitioning customized operating system or firmware

For more information on Deployment-ready Services, refer to

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

Reliability, availability, and serviceability (RAS) features

Reliability, fault tolerance, and data correction

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

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

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

Memory error correction extensions

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

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

Fault monitoring functions

- Disk drive fault tracking is designed to alert the system administrator of an impending disk drive failure before it impacts customer operation.

Mutual surveillance

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

Environmental monitoring functions

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

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

Availability enhancement functions

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

POWER7+ processor functions

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

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

POWER7+ single processor check stopping

As in POWER6 and POWER7+ includes single processor check stopping for certain faults that cannot be handled by the availability enhancements described in the preceding section. This significantly reduces the probability of any one processor affecting total system availability.

Partition availability priority

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

POWER7+ cache availability

The L2 and L3 caches in the POWER7+ processor are protected with double-bit detect, single-bit correct error detection code (ECC). In addition, the caches maintain a cache line delete capability. A threshold of correctable errors detected on a cache line can result in the data in the cache line being purged and the cache line removed from further operation without requiring a reboot. An ECC uncorrectable error detected in the cache can also trigger a purge and delete of the cache line. This results in no loss of operation if the cache line contained data unmodified from what was stored in system memory. Modified data would be handled through Special Uncorrectable Error handling. L1 data and instruction caches also have a retry capability for intermittent error and a cache set delete mechanism for handling solid failures. In addition, the POWER7+ processors also have the ability to dynamically substitute a faulty bit-line in an L3 cache dedicated to a processor with a spare bit-line.

Special uncorrectable error handling

Special Uncorrectable Error (SUE) handling prevents an uncorrectable error in memory or cache from immediately causing the system to terminate. Rather, the system tags the data and determines whether it will ever be used again. If the error is irrelevant, it will not force a check stop. If the data is used, termination may be limited to the program/kernel or hypervisor owning the data; or the I/O adapters

controlled by an I/O hub controller would freeze if data were transferred to an I/O device.

PCI extended error handling

PCI extended error handling (EEH)-enabled adapters respond to a special data packet generated from the affected PCI slot hardware by calling system firmware, which will examine the affected bus, allow the device driver to reset it, and continue without a system reboot. For Linux, EEH support extends to the majority of frequently used devices, although some third-party PCI devices may not provide native EEH support.

Predictive failure and dynamic component deallocation

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

Uncorrectable error recovery

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

Serviceability

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

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

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

Service environments

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

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

- Attachment to one or more HMCs is a supported option by the system. This is the default configuration for servers supporting logical partitions with dedicated or virtual I/O. In this case, all servers have at least one logical partition.
- No HMC. There are two service strategies for non-HMC systems:
 - Full system partition: A single partition owns all the server resources and only one operating system may be installed.

- Partitioned system: In this configuration, the system can have more than one partition and can be running more than one operating system. In this environment, partitions are managed by the Integrated Virtualization Manager (IVM), which provides some of the functions provided by the HMC.

Service Interface

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

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

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

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

First Failure Data Capture and Error Data Analysis

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

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

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

Diagnostics

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

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

Automatic diagnostics

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

Stand-alone diagnostics

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

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

Concurrent maintenance

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

Service labels

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

- **Location diagrams:** Location diagrams are located on the system hardware, relating information regarding the placement of hardware components. Location diagrams may include location codes, drawings of physical locations, concurrent maintenance status, or other data pertinent to a repair. Location diagrams are especially useful when multiple components are installed such as DIMMs, CPUs, processor books, fans, adapter cards, LEDs, and power supplies.
- **Remove/replace procedures:** Service labels that contain remove/replace procedures are often found on a cover of the system or in other spots accessible to the servicer. These labels provide systematic procedures, including diagrams, detailing how to remove/replace certain serviceable hardware components.
- **Arrows:** Numbered arrows are used to indicate the order of operation and serviceability direction of components. Some serviceable parts such as latches, levers, and touch points need to be pulled or pushed in a certain direction and certain order for the mechanical mechanisms to engage or disengage. Arrows generally improve the ease of serviceability.

Packaging for service

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

- **Color coding (touch points):** Terracotta-colored touch points indicate that a component (FRU/CRU) can be concurrently maintained. Blue-colored touch points delineate components that are not concurrently maintained -- those that require the system to be turned off for removal or repair.
- **Tool-less design:** Selected IBM systems support tool-less or simple tool designs. These designs require no tools or simple tools such as flathead screw drivers to service the hardware components.
- **Positive retention:** Positive retention mechanisms help to assure proper connections between hardware components such as cables to connectors, and between two cards that attach to each other. Without positive retention, hardware components run the risk of becoming loose during shipping or installation, preventing a good electrical connection. Positive retention mechanisms like latches, levers, thumb-screws, pop Nylatches (U-clips), and

cables are included to help prevent loose connections and aid in installing (seating) parts correctly. These positive retention items do not require tools.

Error handling and reporting

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

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

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

Live Partition Mobility

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

Service Processor

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

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

Call Home

Call Home refers to an automatic or manual call from a customer location to IBM support structure with error log data, server status, or other service-related information. Call Home invokes the service organization in order for the appropriate

service action to begin. Call Home can be done through HMC or most non-HMC managed systems. While configuring Call Home is optional, clients are encouraged to implement this feature in order to obtain service enhancements such as reduced problem determination and faster and potentially more accurate transmittal of error information. In general, using the Call Home feature can result in increased system availability. The Electronic Service Agent™ application can be configured for automated call home. Refer to the next section for specific details on this application.

IBM Electronics Services

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

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

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

Select your country.

Click on " IBM Electronic Service Agent Connectivity Guide."

Benefits

Increased uptime:

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

Security:

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

More accurate reporting:

Because system information and error logs are automatically uploaded to the IBM Support Center in conjunction with the service request, customers are not

required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM, problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

Customized support:

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

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

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

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

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

Accessibility by people with disabilities

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

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

Statements of general direction

AIX 5.3 and 7.1 support for POWER 710, 720, 730, 740, 750, and 760

IBM intends to provide to those clients with AIX 7.1 Technology Level 0 and/or Technology Level 1 and AIX 5.3 Technology Level 12 (and the associated service extension offering) the ability to run that environment on the new Power 710 (8231-E1D), Power 720 (8202-E4D), Power 730 (8231-E2D), Power 740 (8205-E6D), Power 750 (8408-E8D), and Power 760 (9109-RMD).

VIOS 2.2.1 support for POWER 710, 720, 730, 740, 750, 760, PowerLinux™ 7R1, and PowerLinux 7R2

IBM intends to provide to those customers with VIOS 2.2.1, the ability to run that environment on the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D), and Power 760 (9109-RMD).

IBM intends to continue to work with Red Hat to provide support for the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D), and Power 760 (9109-RMD) with an upcoming Red Hat Enterprise Linux 6 release. For additional questions about the availability of this release and supported HW servers, consult the Red Hat Hardware Catalog at

Standard Red Hat Disclaimer Information concerning Red Hat Enterprise Linux was obtained from Red Hat. Questions concerning Red Hat Enterprise Linux should be directed to Red Hat, as Red Hat Enterprise Linux is not an IBM product. Red Hat Enterprise Linux is sold or licensed, as the case may be, to users under Red Hat's terms and conditions. Availability and support is the responsibility of Red Hat. IBM IS NOT LIABLE AND MAKES NO WARRANTIES, EXPRESS OR IMPLIED, REGARDING RED HAT ENTERPRISE LINUX, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OR CONDITION OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Moreover, all statements regarding IBM's or Red Hat's future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only. Information regarding potential future third-party products that may work with an IBM product should not be relied on in making a purchase decision. The information mentioned regarding potential future third-party products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future third-party products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for IBM or Red Hat products remains at IBM's or Red Hat's sole discretion, as applicable.

RHEL 6 Pre-Install feature for Power 710, 720, 730, 740, 750, 760, 7R1, and 7R2

IBM intends to provide support for pre-install of an upcoming Red Hat Enterprise Linux 6 release on the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D), and Power 760 (9109-RMD) systems.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Product number

The following are newly announced features on the specific models of the IBM Power Systems 8231 machine type:

Description	Machine type	Model	Feature number
IBM Power 710	8231	E1D	
SAS EX Cable 3m - Drawer to Drawer	8231	E1D	3675
SAS EX Cable 6m - Drawer to Drawer	8231	E1D	3680
System AC Power Supply, 1925 W	8231	E1D	5532
SAS EX Cable 1.5m - Drawer to Drawer	8231	E1D	5926
Specify Mode-1 & EXP30 for 1 EXP24S #5887	8231	E1D	9388
IBM i 6.1.1 Native I/O Enablement	8231	E1D	EB34
EXP30 Ultra SSD I/O Drawer	8231	E1D	EDR1
SPSS on Power Solution Indicator	8231	E1D	EHSS
16GB (2x8GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8231	E1D	EM4B
32GB (2x16GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8231	E1D	EM4C
64GB (2x32GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8231	E1D	EM4D
PCIe2 LP 16Gb 2-port Fibre Channel Adapter	8231	E1D	EN0B
PCIe2 LP 4-port (10Gb FCoE & 1GbE) SR&RJ45	8231	E1D	EN0J
4-core 3.6 GHz POWER7+ Processor Module	8231	E1D	EPCE

6-core 4.2 GHZ POWER7+ Processor Module	8231	E1D	EPCG
8-core 4.2 GHZ POWER7+ Processor Module	8231	E1D	EPCJ
One Processor Activation for Processor Feature #EPCE	8231	E1D	EPDE
One Processor Activation for Processor Feature #EPCG	8231	E1D	EPDG
One Processor Activation for Processor Feature #EPCJ	8231	E1D	EPDJ
Zero-priced Processor Activation for #EPCE	8231	E1D	EPEE
Zero-priced Processor Activation for #EPCG	8231	E1D	EPEG
Zero-priced Processor Activation for #EPCJ	8231	E1D	EPEJ
Six ES02 387GB 1.8" SAS SSD for AIX/Linux with eMLC	8231	E1D	ESR2
Four ES0A 387GB SFF-1 SSD for AIX/Linux with eMLC	8231	E1D	ESRA
Four ES0B 387GB SFF-1 SSD for IBM i with eMLC	8231	E1D	ESRB
Four ES0C 387GB SFF-2 SSD for AIX/Linux with eMLC	8231	E1D	ESRC
Four ES0D 387GB SFF-2 SSD for IBM i with eMLC	8231	E1D	ESRD
1.5TB Removable Disk Drive Cartridge	8231	E1D	EU15

The following are features already announced for the IBM Power Systems 8231 machine type:

Description	Machine type	Model	Feature number
One CSC Billing Unit	8231	E1D	0010
Ten CSC Billing Units	8231	E1D	0011
Mirrored System Disk Level, Specify Code	8231	E1D	0040
Device Parity Protection-All, Specify Code	8231	E1D	0041
Device Parity RAID-6 All, Specify Code	8231	E1D	0047
RISC-to-RISC Data Migration	8231	E1D	0205
AIX Partition Specify	8231	E1D	0265
Linux Partition Specify	8231	E1D	0266
IBM i Operating System Partition Specify	8231	E1D	0267
Specify Custom Data Protection	8231	E1D	0296
Mirrored Level System Specify Code	8231	E1D	0308
RAID Hot Spare Specify	8231	E1D	0347
V.24/EIA232 6.1m (20-Ft) PCI Cable	8231	E1D	0348
V.24/EIA232 15.2m (50-Ft) PCI Cable	8231	E1D	0349
V.35 6.1m (20-Ft) PCI Cable	8231	E1D	0353
V.35 15.2m (50-Ft) PCI Cable	8231	E1D	0354
V.36 6.1m (20-Ft) PCI Cable	8231	E1D	0356
X.21 6.1m (20-Ft) PCI Cable	8231	E1D	0359
X.21 15.2m (50-Ft) PCI Cable	8231	E1D	0360
V.24/EIA232 (80-Ft) PCI Cable	8231	E1D	0365
Customer Specified Placement	8231	E1D	0456
SSD Placement Indicator - CEC	8231	E1D	0462
SSD Placement Indicator - 5887	8231	E1D	0465
19 inch, 1.8 meter high rack	8231	E1D	0551
19 inch, 2.0 meter high rack	8231	E1D	0553
19 inch, 1.3 meter high rack	8231	E1D	0555
IBM i 6.1 with 6.1.1 Machine Code Specify Code	8231	E1D	0566
IBM i 7.1 Specify Code	8231	E1D	0567
Rack Filler Panel Kit	8231	E1D	0599
Load Source Not in CEC	8231	E1D	0719
#1787 Load Source Specify	8231	E1D	0722
#1996 Load Source Specify	8231	E1D	0724
Specify #5886 Load Source placement	8231	E1D	0727
Specify #5887 Load Source placement	8231	E1D	0728
Specify EXP30 Load Source placement	8231	E1D	0729
SAN Load Source Specify	8231	E1D	0837
#3677 Load Source Specify	8231	E1D	0839
#3678 Load Source Specify	8231	E1D	0840
#3658 Load Source Specify	8231	E1D	0844
#1888 Load Source Specify	8231	E1D	0853
#1909 Load Source Specify	8231	E1D	0854
#1911 Load Source Specify	8231	E1D	0856
#1916 Load Source Specify	8231	E1D	0857
#1879 Load Source Specify	8231	E1D	0870
#1947 Load Source Specify	8231	E1D	0871

#1948 Load Source Specify	8231	E1D	0872
#1956 Load Source Specify	8231	E1D	0874
#1962 Load Source Specify	8231	E1D	0875
#1737 Load Source Specify (856GB SFF-1 disk)	8231	E1D	0879
#1738 Load Source Specify (856GB SFF-2 disk)	8231	E1D	0880
#ES0B Load Source Specify	8231	E1D	0893
#ES0D Load Source Specify	8231	E1D	0894
USB External Docking Station for Removable Disk Drive	8231	E1D	1104
USB 160 GB Removable Disk Drive	8231	E1D	1106
USB 500 GB Removable Disk Drive	8231	E1D	1107
USB Internal Docking Station for Removable RDX Disk Drive	8231	E1D	1123
80/160GB DAT160 SAS Tape Drive (3.5")	8231	E1D	1124
Custom Service Specify, Rochester Minn, USA	8231	E1D	1140
200V 16A 4.3m (14-Ft) TL Line Cord	8231	E1D	1406
125V 4.3m (14-Ft) Line Cord	8231	E1D	1413
200V 1.8m (6-Ft) Locking Line Cord	8231	E1D	1414
4.3m 200V/16A Power Cord EU/Asia	8231	E1D	1420
4.3m 200V/16A Power Cord CH/DK	8231	E1D	1421
200V 4.3m (14-Ft) Locking Line Cord	8231	E1D	1426
200V 4.3m (14-Ft) Watertight Line Cord	8231	E1D	1427
4.3m 200V/10A Power Cord EU/Asia	8231	E1D	1439
4.3m 200V/10A Power Cord Denmark	8231	E1D	1440
4.3m 200V/10A Power Cord S. Africa	8231	E1D	1441
4.3m 200V/10A Power Cord Swiss	8231	E1D	1442
4.3m 200V/10A Power Cord UK	8231	E1D	1443
4.3m 200V/10A Power Cord Israel	8231	E1D	1445
4.3m 200V/32A Power Cord EU 1-PH	8231	E1D	1449
4.3m 200V/16A Power Cord EU 2-PH	8231	E1D	1450
Power Cord (4.3 M), To wall (250V/15A)	8231	E1D	1452
200V 12A (14-Ft) 4.3m TL Line Cord	8231	E1D	1454
200V (14-Ft) 4.3m Watertight Line Cord	8231	E1D	1456
4.3m 200V/12A Pwr Cd UK	8231	E1D	1476
4.3m 200V/16A Pwr Cd	8231	E1D	1477
856GB 10k RPM SAS SFF Disk Drive (IBM i)	8231	E1D	1737
856GB 10k RPM SAS SFF-2 Disk Drive (IBM i)	8231	E1D	1738
900GB 10K RPM SAS SFF Disk Drive (AIX/Linux)	8231	E1D	1751
900GB 10k RPM SAS SFF-2 Disk Drive (AIX/Linux)	8231	E1D	1752
177GB SFF-1 SSD w/ eMLC (AIX/Linux)	8231	E1D	1775
177GB SFF-1 SSD w/ eMLC (IBM i)	8231	E1D	1787
600GB 10K RPM SAS SFF Disk Drive (AIX/Linux)	8231	E1D	1790
System port/UPS Conversion Cable	8231	E1D	1827
283GB 15K RPM SAS SFF Disk Drive (IBM i)	8231	E1D	1879
300GB 15K RPM SAS SFF Disk Drive (AIX/Linux)	8231	E1D	1880
73.4 GB 15K RPM SAS SFF Disk Drive	8231	E1D	1883
69.7 GB 15K RPM SAS SFF Disk Drive	8231	E1D	1884
300GB 10K RPM SFF SAS Disk Drive	8231	E1D	1885
146GB 15K RPM SFF SAS Disk Drive (AIX/Linux)	8231	E1D	1886
139GB 15K RPM SFF SAS Disk Drive (IBM i)	8231	E1D	1888
283GB 10K RPM SFF SAS Disk Drive (IBM i)	8231	E1D	1911
571GB 10k RPM SAS SFF Disk Drive (IBM i)	8231	E1D	1916
146GB 15k RPM SAS SFF-2 Disk Drive (AIX/Linux)	8231	E1D	1917
300GB 10k RPM SAS SFF-2 Disk Drive (AIX/Linux)	8231	E1D	1925
139GB 15k RPM SAS SFF-2 Disk Drive (IBM i)	8231	E1D	1947
283GB 15k RPM SAS SFF-2 Disk Drive (IBM i)	8231	E1D	1948
300GB 15k RPM SAS SFF-2 Disk Drive (AIX/Linux)	8231	E1D	1953

283GB 10k RPM SAS SFF-2 Disk Drive (IBM i)	8231	E1D	1956
571GB 10k RPM SAS SFF-2 Disk Drive (IBM i)	8231	E1D	1962
600GB 10K RPM SAS SFF-2 Disk Drive (AIX/Linux)	8231	E1D	1964
177GB SSD Module with eMLC (AIX/Linux)	8231	E1D	1995
177GB SSD Module with eMLC (IBM i)	8231	E1D	1996
PCIe LP RAID & SSD SAS Adapter 3Gb	8231	E1D	2053
Primary OS - IBM i	8231	E1D	2145
Primary OS - AIX	8231	E1D	2146
Primary OS - Linux	8231	E1D	2147
Factory Deconfiguration of 1-core	8231	E1D	2319
2M LC-SC 50 Micron Fiber Converter Cable	8231	E1D	2456
2M LC-SC 62.5 Micron Fiber Converter Cable	8231	E1D	2459
3M Asynchronous Terminal/Printer Cable EIA-232	8231	E1D	2934
Asynchronous Cable EIA-232/V.24 3M	8231	E1D	2936
Serial-to-Serial Port Cable for Drawer/Drawer-3.7M	8231	E1D	3124
Serial-to-Serial Port Cable for Rack/Rack- 8M	8231	E1D	3125
3-meter DDR 4X Copper Cable	8231	E1D	3246
1m, (3.3-ft.) IB 40G Copper Cable QSFP/QSFP	8231	E1D	3287
3m, (9.8-ft.) IB 40G Copper Cable QSFP/QSFP	8231	E1D	3288
5m QDR IB/E'Net Copper Cable QSFP/QSFP	8231	E1D	3289
10 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	8231	E1D	3290
30 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	8231	E1D	3293
SAS YO Cable 1.5m - HD 6Gb Adapter to Enclosure	8231	E1D	3450
SAS YO Cable 3m - HD 6Gb Adapter to Enclosure	8231	E1D	3451
SAS YO Cable 6m - HD 6Gb Adapter to Enclosure	8231	E1D	3452
SAS YO Cable 10m - HD 6Gb Adapter to Enclosure	8231	E1D	3453
SAS X Cable 3m - HD 6Gb 2-Adapter to Enclosure	8231	E1D	3454
SAS X Cable 6m - HD 6Gb 2-Adapter to Enclosure	8231	E1D	3455
SAS X Cable 10m - HD 6Gb 2-Adapter to Enclosure	8231	E1D	3456
SAS YO Cable 15m - HD 3Gb Adapter to Enclosure	8231	E1D	3457
SAS X Cable 15m - HD 3Gb 2-Adapter to Enclosure	8231	E1D	3458
Widescreen LCD Monitor	8231	E1D	3632
IBM T541H /L150p 15" TFT Color Monitor	8231	E1D	3637
IBM ThinkVision L170p Flat Panel Monitor	8231	E1D	3639
ThinkVision L171p Flat Panel Monitor	8231	E1D	3640
IBM T115 Flat Panel Monitor	8231	E1D	3641
ThinkVision L191p Flat Panel Monitor	8231	E1D	3642
IBM T120 Flat Panel Monitor	8231	E1D	3643
IBM T119 Flat Panel Monitor	8231	E1D	3644
IBM T117 Flat Panel Monitor	8231	E1D	3645
146GB 15K RPM SAS Disk Drive (AIX/Linux)	8231	E1D	3647
300GB 15K RPM SAS Disk Drive (AIX/Linux)	8231	E1D	3648
450GB 15K RPM SAS Disk Drive (AIX/Linux)	8231	E1D	3649
SAS Cable (EE) Drawer to Drawer 1M	8231	E1D	3652
SAS Cable (EE) Drawer to Drawer 3M	8231	E1D	3653
SAS Cable (EE) Drawer to Drawer 6M	8231	E1D	3654
428GB 15K RPM SAS Disk Drive (IBM i)	8231	E1D	3658
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 3M:	8231	E1D	3661
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 6M:	8231	E1D	3662
SAS Cable (X) Adapter to SAS Enclosure, Dual Controller/Dual Path 15M:	8231	E1D	3663
139.5GB 15k rpm SAS Disk Drive (IBM i)	8231	E1D	3677
283.7GB 15k rpm SAS Disk Drive (IBM i)	8231	E1D	3678
SAS Cable (AE) Adapter to Enclosure, single controller/single path 3M	8231	E1D	3684
SAS Cable (AE) Adapter to Enclosure, single controller/single path 6M	8231	E1D	3685
SAS Cable (YI) System to SAS Enclosure, Single Controller/Dual Path 3M	8231	E1D	3687
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 1.5 M	8231	E1D	3691
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 3 M	8231	E1D	3692
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 6 M	8231	E1D	3693
SAS Cable (YO) Adapter to SAS Enclosure, Single Controller/Dual Path 15 M	8231	E1D	3694
0.3M Serial Port Converter Cable, 9-Pin to 25-Pin	8231	E1D	3925
Serial Port Null Modem Cable, 9-pin to 9-pin,			

3.7M	8231	E1D	3927
Serial Port Null Modem Cable, 9-pin to 9-pin, 10M	8231	E1D	3928
System Serial Port Converter Cable	8231	E1D	3930
1.8 M (6-ft) Extender Cable for Displays (15-pin D-shell to 15-pin D-shell)	8231	E1D	4242
Extender Cable - USB Keyboards, 1.8M	8231	E1D	4256
VGA to DVI Connection Converter	8231	E1D	4276
One and only one rack indicator feature is required on all orders (#4650 to #4666).			
Rack Indicator- Not Factory Integrated	8231	E1D	4650
Rack Indicator, Rack #1	8231	E1D	4651
Rack Indicator, Rack #2	8231	E1D	4652
Rack Indicator, Rack #3	8231	E1D	4653
Rack Indicator, Rack #4	8231	E1D	4654
Rack Indicator, Rack #5	8231	E1D	4655
Rack Indicator, Rack #6	8231	E1D	4656
Rack Indicator, Rack #7	8231	E1D	4657
Rack Indicator, Rack #8	8231	E1D	4658
Rack Indicator, Rack #9	8231	E1D	4659
Rack Indicator, Rack #10	8231	E1D	4660
Rack Indicator, Rack #11	8231	E1D	4661
Rack Indicator, Rack #12	8231	E1D	4662
Rack Indicator, Rack #13	8231	E1D	4663
Rack Indicator, Rack #14	8231	E1D	4664
Rack Indicator, Rack #15	8231	E1D	4665
Rack Indicator, Rack #16	8231	E1D	4666
Active Memory Expansion Enablement	8231	E1D	4795
Software Preload Required	8231	E1D	5000
Power Dist Unit 1 Phase NEMA	8231	E1D	5160
Power Dist Unit 1 Phase IEC	8231	E1D	5161
Power Dist Unit 2 of 3 Phase	8231	E1D	5162
Power Dist Unit - 3 Phase	8231	E1D	5163
PowerVM Express Edition	8231	E1D	5225
PowerVM Standard Edition	8231	E1D	5227
PowerVM Enterprise Edition	8231	E1D	5228
PCIe2 LP 4-port 1GbE Adapter	8231	E1D	5260
Memory Riser Card	8231	E1D	5265
PCIe LP POWER GXT145 Graphics Accelerator	8231	E1D	5269
PCIe LP 10Gb FCoE 2-port Adapter	8231	E1D	5270
PCIe LP 4-Port 10/100/1000 Base-TX Ethernet Adapter	8231	E1D	5271
PCIe LP 10GbE CX4 1-port Adapter	8231	E1D	5272
PCIe LP 8Gb 2-Port Fibre Channel Adapter	8231	E1D	5273
PCIe LP 2-Port 1GbE SX Adapter	8231	E1D	5274
PCIe LP 10GbE SR 1-port Adapter	8231	E1D	5275
PCIe LP 4Gb 2-Port Fibre Channel Adapter	8231	E1D	5276
PCIe LP 4-Port Async EIA-232 Adapter	8231	E1D	5277
PCIe LP 2-x4-port SAS Adapter 3Gb	8231	E1D	5278
PCIe2 LP 4-Port 10GbE&1GbE SFP+ Copper&RJ45	8231	E1D	5279
PCIe2 LP 4-Port 10GbE&1GbE SR&RJ45 Adapter	8231	E1D	5280
PCIe LP 2-Port 1GbE TX Adapter	8231	E1D	5281
PCIe2 LP 2-Port 4X IB QDR Adapter 40Gb	8231	E1D	5283
PCIe2 LP 2-port 10GbE SR Adapter	8231	E1D	5284
PCIe2 LP 2-Port 10GbE SFP+ Copper Adapter	8231	E1D	5286
PCIe LP 2-Port Async EIA-232 Adapter	8231	E1D	5290
Sys Console on HMC	8231	E1D	5550
System Console-Ethernet No IOP	8231	E1D	5557
SATA Slimline DVD-RAM Drive	8231	E1D	5762
SATA Slimline DVD-RAM Drive	8231	E1D	5771
EXP 12S Expansion Drawer	8231	E1D	5886
EXP24S SFF Gen2-bay Drawer	8231	E1D	5887
Shared EXP30 Indicator	8231	E1D	5925
Remote EXP30 Indicator	8231	E1D	5927
Full width Keyboard -- USB, US English, #103P	8231	E1D	5951
Full width Keyboard -- USB, French, #189	8231	E1D	5952
Full width Keyboard -- USB, Italian, #142	8231	E1D	5953
Full width Keyboard -- USB, German/Austrian, #129	8231	E1D	5954
Full width Keyboard -- USB, UK English, #166P	8231	E1D	5955
Full width Keyboard -- USB, Spanish, #172	8231	E1D	5956
Full width Keyboard -- USB, Japanese, #194	8231	E1D	5957
Full width Keyboard -- USB, Brazilian Portuguese, #275	8231	E1D	5958
Full width Keyboard -- USB, Hungarian, #208	8231	E1D	5959
Full width Keyboard -- USB, Korean, #413	8231	E1D	5960

Full width Keyboard -- USB, Chinese, #467	8231	E1D	5961
Full width Keyboard -- USB, French Canadian, #445	8231	E1D	5962
Full width Keyboard -- USB, Belgian/UK, #120	8231	E1D	5964
Full width Keyboard -- USB, Swedish/Finnish, #153	8231	E1D	5965
Full width Keyboard -- USB, Danish, #159	8231	E1D	5966
Full width Keyboard -- USB, Bulgarian, #442	8231	E1D	5967
Full width Keyboard -- USB, Swiss/French/German, #150	8231	E1D	5968
Full width Keyboard -- USB, Norwegian, #155	8231	E1D	5969
Full width Keyboard -- USB, Dutch, #143	8231	E1D	5970
Full width Keyboard -- USB, Portuguese, #163	8231	E1D	5971
Full width Keyboard -- USB, Greek, #319	8231	E1D	5972
Full width Keyboard -- USB, Hebrew, #212	8231	E1D	5973
Full width Keyboard -- USB, Polish, #214	8231	E1D	5974
Full width Keyboard -- USB, Slovakian, #245	8231	E1D	5975
Full width Keyboard -- USB, Czech, #243	8231	E1D	5976
Full width Keyboard -- USB, Turkish, #179	8231	E1D	5977
Full width Keyboard -- USB, LA Spanish, #171	8231	E1D	5978
Full width Keyboard -- USB, Arabic, #253	8231	E1D	5979
Full width Keyboard -- USB, Thai, #191	8231	E1D	5980
Full width Keyboard -- USB, Russian, #443	8231	E1D	5981
Full width Keyboard -- USB, Slovenian, #234	8231	E1D	5982
Full width Keyboard -- USB, US English Euro, #103P	8231	E1D	5983
Opt Front Door for 1.8m Rack	8231	E1D	6068
Opt Front Door for 2.0m Rack	8231	E1D	6069
1.8m Rack Acoustic Doors	8231	E1D	6248
2.0m Rack Acoustic Doors	8231	E1D	6249
1.8m Rack Trim Kit	8231	E1D	6263
2.0m Rack Trim Kit	8231	E1D	6272
Power Cord 4.3m (14-ft), Drawer to Wall/IBM PDU (250V/10A)	8231	E1D	6458
Power Cord 4.3m (14-ft), Drawer To OEM PDU (125V, 15A)	8231	E1D	6460
Power Cord 4.3m (14-ft), Drawer to Wall/OEM PDU (250V/15A) U. S.	8231	E1D	6469
Power Cord 1.8m (6-ft), Drawer to wall (125V/15A)	8231	E1D	6470
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU (125V/15A)	8231	E1D	6471
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU (250V/16A)	8231	E1D	6472
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU (250V/10A)	8231	E1D	6473
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/13A)	8231	E1D	6474
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/16A)	8231	E1D	6475
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	8231	E1D	6476
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/16A)	8231	E1D	6477
Power Cord 2.7 M(9-foot), To wall/OEM PDU, (250V, 16A)	8231	E1D	6478
Power Cord (9-foot) , To wall/OEM PDU, (250V, 10A)	8231	E1D	6479
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (125V/15A or 250V/10A)	8231	E1D	6488
4.3m (14-Ft) 3PH/24A 380-415V Power Cord	8231	E1D	6489
4.3m (14-Ft) 1PH/48A 200-240V Power Cord	8231	E1D	6491
4.3m (14-Ft) 1PH/48-60A 200-240V Power Cord	8231	E1D	6492
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	8231	E1D	6493
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU, (250V/10A)	8231	E1D	6494
Power Cord (9-foot), To Wall/OEM PDU, (250V, 10A)	8231	E1D	6495
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (250V, 10A)	8231	E1D	6496
Power Cord (6-foot), To Wall/OEM PDU, (250V, 10A)	8231	E1D	6497
Power Cord (6-foot), To Wall/OEM PDU, (250V, 15A)	8231	E1D	6498
Power Cable - Drawer to IBM PDU, 200-240V/10A	8231	E1D	6577
Optional Rack Security Kit	8231	E1D	6580
Modem Tray for 19-Inch Rack	8231	E1D	6586
Power Cord 2.7M (9-foot), To Wall/OEM PDU, (125V, 15A)	8231	E1D	6651

4.3m (14-Ft) 1PH/24-30A Pwr Cord	8231	E1D	6654
4.3m (14-Ft) 1PH/24-30A WR Pwr Cord	8231	E1D	6655
4.3m (14-Ft)1PH/24A Power Cord	8231	E1D	6656
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 15A)	8231	E1D	6659
Power Cord 4.3m (14-ft), Drawer to wall/OEM PDU (125V/15A)	8231	E1D	6660
Power Cord 2.8m (9.2-ft), Drawer to Wall/IBM PDU, (250V/10A)	8231	E1D	6665
Power Cord 4.3M (14-foot), Drawer to OEM PDU, (250V, 15A)	8231	E1D	6669
Power Cord (6-foot), To wall (125V, 15A), PT #59	8231	E1D	6670
Power Cord 2.7M (9-foot), Drawer to IBM PDU, 250V/10A	8231	E1D	6671
Power Cord 1.5M (5-foot), Drawer to IBM PDU, 250V/10A	8231	E1D	6672
Power Cord 2.7m (9-ft), Dawer to wall/OEM PDU, (250V/10A)	8231	E1D	6680
Power Cord (6-foot), To wall, (250V, 15A)	8231	E1D	6687
Intelligent PDU+, 1 EIA Unit, Universal UTG0247 Connector	8231	E1D	7109
Environmental Monitoring Probe	8231	E1D	7118
Power Distribution Unit	8231	E1D	7188
2.0m Rack Side Attach Kit	8231	E1D	7780
Ethernet Cable, 6M, Hardware Management Console to System Unit	8231	E1D	7801
Ethernet Cable, 15m, Hardware Management Console to System Unit	8231	E1D	7802
Side-by-Side for 1.8m Racks	8231	E1D	7840
Ruggedize Rack Kit	8231	E1D	7841
Linux Software Preinstall	8231	E1D	8143
Linux Software Preinstall (Business Partners)	8231	E1D	8144
Mouse - USB, with Keyboard Attachment Cable	8231	E1D	8841
USB Mouse	8231	E1D	8845
Order Routing Indicator- System Plant	8231	E1D	9169
Language Group Specify - US English	8231	E1D	9300
specify mode-1 & (1)5901/5278 for EXP24S #5887	8231	E1D	9359
Specify mode-1 & (2)5901/5278 for EXP24S #5887	8231	E1D	9360
Specify mode-2 & (2)5901/5278 for EXP24S #5887	8231	E1D	9361
Specify mode-4 & (4)5901/5278 for EXP24S #5887	8231	E1D	9365
Specify mode-2 & (4)5901/5278 for EXP24S #5887	8231	E1D	9366
Specify mode-1 & CEC SAS port for EXP24 #5887	8231	E1D	9384
New AIX License Core Counter	8231	E1D	9440
New IBM i License Core Counter	8231	E1D	9441
New Red Hat License Core Counter	8231	E1D	9442
New SUSE License Core Counter	8231	E1D	9443
Other AIX License Core Counter	8231	E1D	9444
Other Linux License Core Counter	8231	E1D	9445
3rd Party Linux License Core Counter	8231	E1D	9446
VIOS Core Counter	8231	E1D	9447
Month Indicator	8231	E1D	9461
Day Indicator	8231	E1D	9462
Hour Indicator	8231	E1D	9463
Minute Indicator	8231	E1D	9464
Qty Indicator	8231	E1D	9465
Countable Member Indicator	8231	E1D	9466
Language Group Specify - Dutch	8231	E1D	9700
Language Group Specify - French	8231	E1D	9703
Language Group Specify - German	8231	E1D	9704
Language Group Specify - Polish	8231	E1D	9705
Language Group Specify - Norwegian	8231	E1D	9706
Language Group Specify - Portuguese	8231	E1D	9707
Language Group Specify - Spanish	8231	E1D	9708
Language Group Specify - Italian	8231	E1D	9711
Language Group Specify - Canadian French	8231	E1D	9712

Language Group Specify - Japanese	8231	E1D	9714
Language Group Specify - Traditional Chinese (Taiwan)	8231	E1D	9715
Language Group Specify - Korean	8231	E1D	9716
Language Group Specify - Turkish	8231	E1D	9718
Language Group Specify - Hungarian	8231	E1D	9719
Language Group Specify - Slovakian	8231	E1D	9720
Language Group Specify - Russian	8231	E1D	9721
Language Group Specify - Simplified Chinese (PRC)	8231	E1D	9722
Language Group Specify - Czech	8231	E1D	9724
Language Group Specify -- Romanian	8231	E1D	9725
Language Group Specify - Croatian	8231	E1D	9726
Language Group Specify -- Slovenian	8231	E1D	9727
Language Group Specify - Brazilian Portuguese	8231	E1D	9728
Language Group Specify - Thai	8231	E1D	9729
PCIe2 LP 2-Port 10GbE RoCE SFP+ Adapter	8231	E1D	EC27
PCIe2 LP 2-Port 10GbE RoCE SR Adapter	8231	E1D	EC29
0.6m (2.0-ft), Blue CAT5 Ethernet Cable	8231	E1D	ECB0
1.5m (4.9-ft), Blue CAT5 Ethernet Cable	8231	E1D	ECB2
Custom Service Specify, Shenzhen, China	8231	E1D	ECSC
Storage Backplane -- 6 SFF Drives/SATA DVD	8231	E1D	EJ0D
Storage Backplane -- 3 SFF Drives/SATA DVD/HH Tape	8231	E1D	EJ0E
Storage Backplane -- 6 SFF Drives/SATA DVD/RAID/ External SAS Port	8231	E1D	EJ0F
GX++ LP 1-port PCIe2 x8 Adapter	8231	E1D	EJ0H
Specify Mode-1 & (1)ESA1/ESA2 for EXP24S #5887	8231	E1D	EJP1
Specify Mode-1 & (2)ESA1/ESA2 for EXP24S #5887	8231	E1D	EJP2
Specify Mode-2 & (2)ESA1/ESA2 for EXP24S #5887	8231	E1D	EJP3
Specify Mode-2 & (1)ESA1/ESA2 for EXP24S #5887	8231	E1D	EJP6
Specify Mode-2 (2)ESA1/ESA2 for EXP24 #5887	8231	E1D	EJP7
Specify mode-2 (1) ESA1/ESA2 for EXP24 #5887	8231	E1D	EJPA
Specify mode-2 (2)ESA1/ESA2 for EXP24#5887	8231	E1D	EJPB
Specify mode-4 (1)ESA1/ESA2 for EXP24 #5887	8231	E1D	EJPC
Specify mode-4 (2)ESA1/ESA2 for EXP24 #5887	8231	E1D	EJPD
Specify mode-2 (1)5901/5278 for EXP24 #5887	8231	E1D	EJPJ
Specify mode-2 (2)5901/5278 for EXP24 #5887	8231	E1D	EJPK
Specify mode-4 (1)5901/5278 for EXP24 #5887	8231	E1D	EJPL
Specify mode-4 (2)5901/5278 for EXP24 #5887	8231	E1D	EJPM
Specify mode-4 (3)5901/5278 for EXP24 #5887	8231	E1D	EJPN
Full width Keyboard -- USB, US English, #103P	8231	E1D	EK51
Full width Keyboard -- USB, French, #189	8231	E1D	EK52
Full width keyboard -- USB, Italian, #142	8231	E1D	EK53
Full width Keyboard -- USB, German/Austrian, #129	8231	E1D	EK54
Full width Keyboard -- USB, UK English, #166P	8231	E1D	EK55
Full width keyboard -- USB, Spanish, #172	8231	E1D	EK56
Full width Keyboard -- USB, Japanese, #194	8231	E1D	EK57
Full width keyboard -- USB, Brazilian Portuguese, #275	8231	E1D	EK58
Full width Keyboard -- USB, Hungarian, #208	8231	E1D	EK59
Full width Keyboard -- USB, Korean, #413	8231	E1D	EK60
Full width Keyboard -- USB, Chinese, #467	8231	E1D	EK61
Full width keyboard -- USB, French Canadian, #445	8231	E1D	EK62
Full width Keyboard -- USB, Belgian/UK, #120	8231	E1D	EK64
Full width Keyboard -- USB, Swedish/Finnish, #153	8231	E1D	EK65
Full width keyboard -- USB, Danish, #159	8231	E1D	EK66
Full width Keyboard -- USB, Bulgarian, #442	8231	E1D	EK67
Full width keyboard -- USB, Swiss/French/German, #150	8231	E1D	EK68
Full width Keyboard -- USB, Norwegian, #155	8231	E1D	EK69
Full width Keyboard -- USB, Dutch, #143	8231	E1D	EK70
Full width Keyboard -- USB, Portuguese, #163	8231	E1D	EK71
Full width keyboard -- USB, Greek, #319	8231	E1D	EK72
Full width keyboard -- USB, Hebrew, #212	8231	E1D	EK73
Full width keyboard -- USB, Polish, #214	8231	E1D	EK74
Full width keyboard -- USB, Slovakian, #245	8231	E1D	EK75
Full width Keyboard -- USB, Czech, #243	8231	E1D	EK76
Full width keyboard -- USB, Turkish, #179	8231	E1D	EK77
Full width Keyboard -- USB, LA Spanish, #171	8231	E1D	EK78
Full width keyboard -- USB, Arabic, #253	8231	E1D	EK79
Full width keyboard -- USB, Thai, #191	8231	E1D	EK80
Full width Keyboard -- USB, Russian, #443	8231	E1D	EK81
Full width keyboard -- USB, Slovenian, #234	8231	E1D	EK82
Full width keyboard -- USB, US English Euro,			

#103P	8231	E1D	EK83
Power 710 AIX Solution Edition	8231	E1D	ELB6
Trial PowerVM Live Partition Mobility	8231	E1D	ELPM
8GB (2x4GB) Memory DIMMs, 1066 MHz, 2Gb DDR3 DRAM	8231	E1D	EM08
1m (3.3-ft), 10GbE'Net Cable SFP+ Act Twinax Copper	8231	E1D	EN01
3m (9.8-ft), 10Gb E'Net Cable SFP+ Act Twinax Copper	8231	E1D	EN02
5m (16.4-ft), 10Gb E'Net Cable SFP+ Act Twinax Copper	8231	E1D	EN03
PCIe x8 Cable 1.5m	8231	E1D	EN05
PCIe x8 Cable 3m	8231	E1D	EN07
PCIe2 LP 8Gb 4-port Fibre Channel Adapter	8231	E1D	EN0Y
Quantity 150 of #3452 SAS YO Cable 6m - HD 6Gb Adapter to Enclosure	8231	E1D	EQ02
Quantity 150 of #3453 SAS YO Cable 10m - HD 6Gb Adapter to Enclosure	8231	E1D	EQ03
RFID Tags for Servers, Compute Nodes, Chassis, Racks, and HMCs	8231	E1D	ERF1
387GB 1.8" SAS SSD for AIX/Linux with eMLC	8231	E1D	ES02
387GB SFF-1 SSD for AIX/Linux with eMLC	8231	E1D	ES0A
387GB SFF-1 SSD for IBM i with eMLC	8231	E1D	ES0B
387GB SFF-2 SSD for AIX/Linux with eMLC	8231	E1D	ES0C
387GB SFF-2 SSD for IBM i with eMLC	8231	E1D	ES0D
PCIe2 LP RAID SAS Adapter Dual-port 6Gb S&H - No Charge	8231	E1D	ESA2
S&H-a	8231	E1D	ESC0
1TB Removable Disk Drive Cartridge	8231	E1D	ESC5
RDX USB External Docking Station for Removable Disk Cartridge	8231	E1D	EU01
RDX 320 GB Removable Disk Drive	8231	E1D	EU04
RDX USB Internal Docking Station for Removable Disk Cartridge	8231	E1D	EU08
Cognos on Power - Small	8231	E1D	EU23
Cognos on Power - Large	8231	E1D	EU24
	8231	E1D	EU25

Feature conversions

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

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

The following conversions are available to customers:

Feature conversions for 8231-E1D virtualization engine features

From FC:	To FC:	Return parts
5225 - PowerVM Express Edition	5227 - PowerVM Standard Edition	No
5225 - PowerVM Express Edition	5228 - PowerVM Enterprise Edition	No
5227 - PowerVM Standard Edition	5228 - PowerVM Enterprise Edition	No

Publications

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

- System overview
- Planning for the system
- Installing and configuring the system
- Working with consoles, terminals, and interfaces

Managing system resources
Working with operating systems and software applications
Troubleshooting, service, and support

You can access the product documentation at

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

Product documentation is also available on DVD (SK5T-7087).

The following information is shipped with the 8231-E1D:

Power Hardware Information DVD SK5T-7087
Installing the 8231-E1D
Safety Information
Statement of Warranty

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

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

AIX documentation can be found at the IBM AIX Information Center

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

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

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

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

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

IBM Publications Center Portal

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

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

Services

Global Technology Services

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

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

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

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

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

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

For details on education offerings related to specific products, visit

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

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

Technical information

Specified operating environment

Physical specifications

Rack-Mount:

width: 440 mm (19.0 in)
depth: 706 mm (27.8 in)
height: 89 mm (3.5 in)

weight (Maximum configuration): 28.2 kg (62 lbs)

Operating environment

- Temperature: (nonoperating) 5° to 45°C (41° to 113°F); recommended temperature (operating) 18° to 27°C (64° to 80°F); allowable operating temperature 5° to 35°C (41° to 95°F)
- Relative humidity: Nonoperating 8% to 80%; recommended 5.5°C (42°F) dew point to 60% RH and 15°C (59°F) dew point
- Maximum dew point: 28°C (84°F)(operating)
- Operating voltage: 100 to 127 V ac or 200 to 208 V ac or 220 to 240 V ac
- Operating frequency: 47/63 Hz
- Maximum measured power consumption:
 - 925 watts (maximum)
- Power factor: 0.98
- Thermal output:
 - 3,156 Btu/hour (maximum)
- Power-source loading
 - 0.944 kVa (maximum configuration)
 - Maximum altitude: 3,050 m (10,000 ft)

Note: The maximum measured value is the worst case power consumption expected from a fully populated server under an intensive workload. The maximum measured value also accounts for component tolerance and non-ideal operating conditions. Power consumption and heat load vary greatly by server configuration and utilization. The IBM Systems Energy Estimator should be used to obtain a heat output estimate based on a specific configuration

<http://www-912.ibm.com/see/EnergyEstimator>

Noise level and sound power (Preliminary data)

6.6 bels (Operating and idling)

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.

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

Homologation -- Telecom environmental testing (Safety and EMC):

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

This product is not certified for connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

Product safety/Country testing/Certification

- UL 60950 Underwriters Laboratory, Safety Information
- CSA C22.2 No. 60950-00, Canadian Standards Association
- EN60950 European Norm
- IEC 60950, Edition 1, International Electrotechnical Commission, Safety Information
- 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).

Homologation

This product is not certified for direct connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

Hardware requirements

Power 710 minimum system configuration

The Power 710 offers 4-core, 6-core, and 8-core configurations with one processor module. The Power 710 can contain up to 256 GB of system memory (128 GB maximum per memory riser card).

The Power 710 offers five PCIe x8 Gen2 slots and one PCIe x4 Gen2 Low Profile slot, and three or six SFF HDDs/SDDS and one or two media devices, depending on the storage back-plane selected.

Power 710 initial order must include a minimum of the following items:

- One system central electronics complex (CEC) enclosure with the following items:
 - One power cord (#6458, #6460, #6469-#6478, #6488-#6489, #6491-#6494, #6496, #6577, #6580, #6651, #6653-#6660, #6665, #6669, #6671, #6672, or #6680)
 - One Language Group, Specify (#9300 or #97xx)
- Choose one processor module from:
 - 4-core 3.6 GHz POWER7+ processor module (#EPCE)
 - 6-core 4.2 GHz POWER7+ processor module (#EPCG)

- 8-core 4.2 GHz POWER7+ processor module (#EPCJ)
- Choose processor activations from:
 - 4 x #EPDE, or 2 x #EPDE and 2 x #EPEE with processor module #EPCE.
 - 6 x #EPDG, or 3 x #EPDG and 3 x #EPEG with processor module #EPCG.
 - 8 x #EPDJ, or 4 x #EPDJ and 4 x #EPEJ with processor module #EPCJ.
 - Features EPEE, EPEG, and EPEJ are part of IBM Editions.
 - Processor activations are only available to SDIs as MES orders.
- Choose 8 GB minimum memory from:
 - 8 GB (2 x 4 GB) Memory DIMMs, 1066 MHz, DDR3 (#EM08)
 - 16 GB (2 x 8 GB) Memory DIMMs, 1066 MHz, DDR3 (#EM4B)
 - 32 GB (2 x 16 GB) Memory DIMMs, 1066 MHz, DDR3 (#EM4C)
 - 64 GB (2 x 32 GB) Memory DIMMs, 1066 MHz, DDR3 (#EM4D)
- Choose Storage Backplane from:
 - 3 x SFF/SATA DVD bay/Tape bay (#EJ0E)
 - 6 x SFF/SATA DVD bay (#EJ0D)
 - 6 x SFF/SATA DVD bay with Dual Write Cache RAID, and an external SAS port (#EJ0F)

Note: IBM i (#2145) requires feature EJ0F.
- One PCIe2 4-port 1 GbE Adapter (#5260)

Note: Takes up one PCIe slot.
- Choose HDD/SSD from any orderable SFF HDD or SSD:
 - Default is 146.8 GB SAS SFF HDD 15,000 RPM (#1886)

Notes :

- Features 1995 and 1996 require feature 2053.
- When feature 2145, the IBM i operating system, is selected, a minimum of two HDDs or SSDs is required.
- No internal HDD or SSD is required if feature 0837 (Boot from SAN) is selected. In this case, a Fibre Channel or Fibre Channel over Ethernet adapter must also be ordered.
- One 1925 watt ac power supply (#5532)
- Choose Primary Operating System Indicator from:
 - IBM i (#2145 -- requires #0566 or #0567, #5550 or #5557, #5762, and #0040)
 - AIX (#2146)
 - Linux (#2147)

Note: One nonfeaturized memory riser card is included in the base system. One additional memory riser card feature (#5265) can be ordered on the Power 710.

RAID

Multiple protection options exist for HDD/SSD drives in the SAS SFF bays in the Power 710 system unit or drives in 12X attached I/O drawers or drives in disk-only I/O drawers. Although protecting drives is always recommended, AIX/Linux users may choose to leave some or all drives unprotected at their own risk and IBM supports these configurations. IBM i configuration rules differ in this regard, and IBM supports IBM i partition configurations only when HDD/SSD drives are protected.

This HDD/SSD drive protection can be provided by AIX/IBM i/Linux software or by the HDD/SSD hardware controllers. Mirroring of drives is provided by AIX/IBM i/Linux software. In addition, AIX/Linux supports controllers providing RAID 0, 5, 6, or 10. IBM i integrated storage management already provides striping, so IBM

i also supports controllers providing RAID 5 or 6. To further augment HDD/SSD protection, hot spare capability can be used for protected drives. Specific hot spare prerequisites apply.

An integrated SAS HDD/SSD controller is provided in the Power 710 system unit and is indicated by feature 5618 and provides support for JBOD and RAID 0, 1, and 10. Feature 5618 is optionally augmented by the ability to split the drive bays into two groups when feature EJ02 is added to the configuration. For even more function, feature EJ01 can be used instead of feature 5618 or feature 5618 plus feature EJ02. Feature EJ01 provides JBOD, RAID 0, 5, 6, and 10. In addition to these protection options, mirroring of drives by the operating system is supported. AIX or Linux supports all of these options. IBM i does not use JBOD and uses imbedded functions instead of RAID 10, but does leverage the RAID 5 or 6 function of the integrated controllers. Other disk/SSD controllers are provided as PCI adapters. PCI-X SCSI, PCI-X SAS, and PCIe SAS adapters are supported. PCI Controllers with and without write cache are supported. RAID 5 and RAID 6 on controllers with write cache are supported with one exception. The PCIe RAID and SSD SAS Adapter has no write cache but supports RAID 5 and RAID 6.

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

Software requirements

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

- AIX Version 7.1 with the 7100-02 Technology Level and Service Pack 2, or later
- AIX Version 6.1 with the 6100-08 Technology Level and Service Pack 2, or later
- AIX Version 6.1 with the 6100-07 Technology Level and Service Pack 7, or later (planned availability March 29, 2013)
- AIX Version 6.1 with the 6100-06 Technology Level and Service Pack 11, or later (planned availability March 29, 2013)

Note: VIOS support requires VIOS 2.2.2.0, or later

If installing the IBM i operating system (one of these):

- IBM i 7.1, or later
- IBM i 6.1 with i 6.1.1 machine code, or later (Planned availability March 8, 2013)

Note: Feature EB34 is required in order to have native I/O with IBM i 6.1 with machine code 6.1.1.

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

- SUSE Linux Enterprise Server 11 Service Pack 2, or later, with current maintenance updates available from SUSE to enable all planned functionality

Users interested in Red Hat Enterprise Linux should consult the Red Hat Statement of Direction.

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

<http://www.ibm.com/support/customercare/sas/f/lopdiags/home.html>

If installing VIOS:

- VIOS 2.2.2.2, or later

Java™ 1.4.2 on POWER7+

There are unique considerations when running Java 1.4.2 on POWER7+ . For best exploitation of the outstanding performance capabilities and most recent improvements of POWER7+ technology, IBM recommends upgrading Java-based applications to Java 7, Java 6, or Java 5 whenever possible.

For more information, visit

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

Refer to the IBM Prerequisite website for software requirements for each feature number

https://www-912.ibm.com/e_dir/eServerPrereq.nsf

Limitations

System

- Integrated system ports are not supported under AIX or Linux when the HMC ports are connected to an HMC. Either the HMC ports or the integrated system ports can be used, but not both. IBM i can continue to use a system port for communication to a UPS even with an HMC attached.
- The integrated system ports are supported for modem and async terminal connections by AIX or Linux . Any other application using serial ports requires a serial port adapter to be installed in a PCI slot. The integrated system ports do not support HACMP™ configurations. IBM i only supports the use of the system ports for attachment to a UPS.

Hardware Management Console (HMC) machine code

An HMC or IVM is required to manage the Power 710 (8231-E1C) implementing partitioning. Multiple Power 710 servers can be supported by a single HMC.

If an HMC is used to manage the Power 710, the HMC must be a CR3, or later, model rack-mount HMC or C05, or later, desktide HMC.

If attaching an HMC to a new server or adding function to an existing server that requires a firmware update, the HMC machine code may need to be updated. Machine Code includes firmware and microcode. Access to machine code updates is conditioned on entitlement and license validation in accordance with IBM policy and practice. IBM may verify entitlement through customer number, serial number, electronic restrictions, or any other means or methods employed by IBM in its discretion.

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

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

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

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

The IBM Hardware Management Console (HMC) Release 7.7.0 Service Pack 1 contains the following:

- Support for managing IBM Power 710, 720, 730, 740 and IBM PowerLinux™ 7R1/7R2 systems

HMC V7 R7.7.0: The IBM Hardware Management Console (HMC) V7.7.0 contains the following:

- support for managing IBM Power 710, 720, 730, 740 and IBM PowerLinux 7R1/7R2 systems

HMC V7 R7.7.0 SP1: The IBM Hardware Management Console (HMC) V7.7.0 contains the following:

- Support for PowerVM functions such as: new HMC GUI interface for VIOS install; improved transition from IVM to HMC management; support for 802.1 Qbg on virtual Ethernet adapters; ability to update the user's password in Kerberos from the HMC for clients utilizing remote HMC

Boot requirements

- Selection of feature 0837 will indicate boot from SAN.
- If IBM i (#2145) is selected as the primary operating system and SAN boot is not selected (#0837), one of the following Load Source specify codes must be specified:
 - #0722 -- #1787 (177 GB SFF SSD) Load Source Specify
 - #0724 -- #1996 (177 GB 1.8" SSD) Load Source Specify
 - #0727 -- Remote Load Source Specify in #5886¹
 - #0728 -- Remote Load Source Specify in #5887
 - #0729 -- Remote Load Source Specify in #5888/#EDR1
 - #0839 -- #3677 (139.5 GB 15K RPM HDD) Load Source Specify¹
 - #0840 -- #3678 (283.7 GB 15K RPM HDD) Load Source Specify¹
 - #0844 -- #3658 (428 GB 15K RPM HDD) Load Source Specify¹
 - #0853 -- #1888 (138 GB 15K RPM SFF HDD) Load Source Specify
 - #0854 -- #1909 (69 GB SFF SSD) Load Source Specify¹
 - #0856 -- #1911 (283 GB 10K RPM SFF HDD) Load Source Specify
 - #0857 -- #1916 (571 GB 10K RPM SFF HDD) Load Source Specify
 - #0870 -- #1879 (283 GB 15K RPM SFF HDD) Load Source Specify
 - #0871 -- #1947 (139 GB 15K RPM SFF HDD) Load Source Specify
 - #0872 -- #1948 (283 GB 15K RPM SFF HDD) Load Source Specify
 - #0874 -- #1956 (283 GB 10K RPM SFF HDD) Load Source Specify
 - #0875 -- #1962 (571 GB 10K RPM SFF HDD) Load Source Specify
 - #0879 -- #1737 (856 GB 10K RPM SFF HDD) Load Source Specify
 - #0880 -- #1738 (856 GB 10K RPM SFF HDD) Load Source Specify
 - #0893 -- #ES0B (387 GB SFF SSD) Load Source Specify
 - #0894 -- #ES0D (387 GB SFF SSD) Load Source Specify

¹
Support only, not orderable

- If IBM i (#2145) is selected, one of the following system console specify codes must be selected:
 - #5550 -- System Console on HMC
 - #5557 -- System Console - Ethernet No IOP

Processor modules

- One processor module is required on an order with four, six, or eight processor cores on the processor module. A minimum/maximum of one processor module is required on a Power 710 order.
- All processors must be activated.

- The 4-core 3.6 GHz processor module (#EPCE) requires that four processor activation codes be ordered. A maximum of four processor activation code features (4 x #EPDE, or 2 x #EPDE and 2 x #EPEE) are allowed per processor module.
- The 6-core 4.2 GHz processor module (#EPCG) requires that six processor activation codes be ordered. A maximum of six processor activation code features (6 x #EPDG, or 3 x #EPDG and 3 x #EPEG) are allowed per processor module.
- The 8-core 4.2 GHz processor module (#EPCJ) requires that eight processor activation codes be ordered. A maximum of eight processor activation code features (8 x #EPDJ, or 4 x #EPDJ and 4 x #EPEJ) are allowed per processor module.

Power supply

- One 1925 watt AC power supply (1 x #5532).
- A second 1925 watt ac power supply (#5532) is available for redundant power.

Redundant fans

- Redundant fans standard

Power cords

One power cord is required for each power supply on the order. The Power 710 supports 110-127 V ac and 200-240 V ac power cords.

System memory

A minimum 8 GB or two DIMMs of memory is required on the Power 710.

- The base machine contains one nonfeaturized memory riser card with four DIMM sockets. Memory features consume two memory DIMM sockets.
 - The Power 710 offers one optional memory riser card feature (1 x #5265) without an additional four DIMM sockets. Maximum system memory is 128 GB with feature 5265 and 256 GB with one x feature 5265.
- A system can be ordered with a single memory feature EM08, EM4B, EM4C, or EM4D. The second memory feature ordered on the same memory riser card does not have to match the first memory feature. Memory features can be mixed on either memory riser card.
- A minimum of one memory feature must be plugged into each memory riser card. Empty memory riser cards are not allowed.
- There is a performance benefit when all DIMMs on a memory riser card are of the same capacity.
- It is generally recommended that memory be installed evenly across all memory riser cards in the system. Balancing memory across the installed memory riser cards allows memory access in a consistent manner and typically results in the best possible performance for your configuration. However, balancing memory fairly evenly across multiple memory riser cards, compared to balancing memory exactly evenly typically has a very small performance difference.

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

Figure 1. Memory features

Feature	Feature number	Minimum quantity	Maximum quantity
8 GB 1066 MHZ	EM08	0	4
16 GB 1066 MHZ	EM4B	0	4
32 GB 1066 MHZ	EM4C	0	4
64 GB 1066 MHZ	EM4D	0	4

Drawer/Tower attachment:

- Feature 5886 EXP12S SAS DASD Expansion Drawer (supported --- not orderable)
 - Feature EJ0F supports one feature number 5886 drawer directly off the system unit's SAS port.
 - EXP12S drawers are attached to a PCIe SAS adapter through SAS cables.
 - Not supported on a 4-core Power 710 system (#EPCE).
 - The system maximum is eight.
- Feature 5887 EXP24S SAS DASD Expansion Drawer
 - Feature EJ0F supports one feature number 5887 drawer directly off the system unit's SAS port.
 - EXP24S drawers are attached to a PCIe SAS adapter through SAS cables.
 - Not supported on a 4-core Power 710 system (#EPCE).
 - The system maximum is four.
- Feature EDR1
 - Not supported on a 4-core Power 710 system (#EPCE).
 - The system maximum is one.

The following list shows I/O drawers that are supported or available on the 8231 machine type and the correct interface to use for each of the drawers.

Feature description	Order status	Interface
5886 Exp 12S SAS Disk Drawer	Supported	SAS
5887 Exp 24S SAS Disk Drawer	Available	SAS
EDR1 EXP30 Ultra SSD I/O Drawer	Available	SAS

PCI card slots

The Power 710 contains five PCIe x8 Gen2 slots and one PCIe x4 Gen2 Low Profile slot.

- Feature 5260 is required in the 8231-E1D minimum configuration and occupies the x4 slot.
- One GX++ slot is available on the Power 710. The GX++ slot does not share space with the CEC PCIe Low Profile adapter slots.

Graphics adapters

- A graphics adapter, keyboard, and mouse are not required in the minimum configuration.
- The maximum number of graphics adapters supported in the Power 710 CEC is four. Not supported under IBM i.

I/O adapters

- Feature 5260 is required in the 8231-E1D minimum configuration and occupies the x4 slot.
- Refer to Figure 2 for additional I/O adapter information.

Figure 2. I/O adapter features

I/O adapter	Orderable feature number	Supported feature number	CEC Max qty	Sys Max qty	Size
PCIe LP RAID & SSD SAS A	2053		2	2	LP
PCIe2 LP 4-port 1GbE Adapter	5260		6	6	LP
PCIe LP POWER GXT145 Graphics Acc	5269		5	5	LP
PCIe LP 10Gb FCoE 2-port Adapter	5270		5	5	LP

PCIe LP 4-Port 10/100/1000 Base-T	5271	5	5	LP
PCIe LP 10GbE CX4 1-port Adapter	5272	5	5	LP
PCIe LP 8Gb 2-Port Fibre Channel	5273	5	5	LP
PCIe LP 2-Port 1GbE SX Adapter	5274	5	5	LP
PCIe LP 10GbE SR 1-port Adapter	5275	5	5	LP
PCIe LP 4Gb 2-Port Fibre Channel	5276	5	5	LP
PCIe LP 4-Port Async EIA-232 Adap	5277	5	5	LP
PCIe LP 2-x4-port SAS Adapter 3Gb	5278	5	5	LP
PCIe2 LP 4-port 1/10GbE SFP+	5279	5	5	LP
PCIe2 LP 4-port 1/10GbE SR	5280	5	5	LP
PCIe LP 2-port 1GbE TX	5281	5	5	LP
PCIe2 LP PCIe2 2-port 4X IB QDR	5283	2	2	LP
PCIe2 LP PCIe2 2-port 10GbE SR	5284	5	5	LP
PCIe2 LP PCIe2 2-Port 10GbE SFP	5286	5	5	LP
PCIe LP 2-Port Async EIA 232	5290	2	2	LP
PCIe2 LP 2-Port 10GbE RoCE SFP+	EC27	5	5	LP
PCIe2 LP 2-Port 10GbE RoCE SR	EC29	5	5	LP
PCIe2 LP 16Gb 2-port Fibre Channel	EN0B	5	5	LP
PCIe2 LP 4-port (10Gb FCoE&1GbE)	EN0J	5	5	LP
PCIe2 LP 8Gb 4-port Fibre Channel	EN0Y	5	5	LP
PCIe2 LP RAID SAS 2-port 6Gb	ESA2	2	2	LP

Storage devices/Bays

- The Power 710 has a slim media bay that can contain an optional DVD-RAM (#5771 or follow-on) and a tape bay (only available with #EJ0E) that can contain a tape drive or removable disk drive.
- Either feature EJ0E, EJ0D, or EJ0F must be selected.
 - Feature EJ0E supports three small form-factor (SFF) disk units, either HDD or SSD, an SATA DVD, and a tape. No split backplane supported. No RAID 5 or RAID 6 support.
 - Feature EJ0D supports six SFF disk units, either HDD or SSD, and an SATA DVD. No split backplane supported. No RAID 5 or RAID 6 support.
 - Feature EJ0F supports six SFF disk units, either HDD or SSD, and an SATA DVD. No split backplane supported. RAID 5 and RAID 6 are supported.
 - A valid orderable HDD or SSD is required in a minimum configuration. No HDDs or SSDs are required in the CEC if feature number 0837 is selected.
 - A feature 1124 DAT160 80/160 GB tape feature and a feature 1123 USB Internal Docking Station for Removable RDX Disk Drive and a feature EU23 RDX USB Internal Docking Station for Removable Disk Cartridge are mutually exclusive. Only one of the three can be on the system. A minimum of one x feature 1106, 1107, EU01, EU08, EU15, or follow-on must be ordered with each feature 1123 or EU23 ordered.
- SAS-bay-based SSDs support restrictions:
 - SFF features ES0A, ES0B, ESRA, ESRB, 1775, and 1787 are supported in the Power 710 CEC.
 - SSDs and disk drives (HDDs) are not allowed to mirror each other.
 - When feature EJ0F contains SSDs, no feature 5886 or 5887 DASD drawer is allowed to connect to the external SAS port.
- HDD/SSD Data Protection -- if IBM i (#2145) is selected, one of the following is required:
 - Disk mirroring (default) -- requires feature 0040 or 0308
 - SAN boot (#0837)
 - RAID -- requires feature EJ0F
 - Mixed Data Protection (#0296)

Figure 3. Storage device features

Device	Maximum quantity	Bay	Orderable feature number	Supported feature number
SATA Slimline DVD-RAM	1	Slim		5762
DVD-RAM (SATA)	1	Slim	5771	
DAT160 80/160 GB Tape	1	Tape	1124	
USB Internal Docking Station for Removable RDX Disk Drive	1	Tape		1123
RDX USB External Docking Station for Removable Disk Cartridge	3	USB port	EU04	
RDX USB Internal Docking Station for Removable Disk Cartridge	1	Tape	EU23	

Device	Maximum quantity	Bay	Orderable feature number	Supported feature number
AIX IBM i Linux				
858 GB SAS, SFF, Solid-state	0	6	0 SFF 1-6	1737
900 GB 10K, SAS, SFF	6	0	6 SFF 1-6	1751
177 GB SAS, SFF, Solid-state	6	0	6 SFF 1-6	1775
177 GB SAS, SFF, Solid-state	0	6	0 SFF 1-6	1787
600 GB 10K, SAS, SFF	6	0	6 SFF 1-6	1790
283 GB 10K, SAS, SFF	0	6	0 SFF 1-6	1879
300 GB 10K, SAS, SFF	6	0	6 SFF 1-6	1880
73.4 GB 15K, SAS, SFF	6	0	6 SFF 1-6	1883
69.7 GB 15K, SAS, SFF	0	6	0 SFF 1-6	1884
300 GB 10K, SAS, SFF	6	0	6 SFF 1-6	1885
146.8 GB 15K, SAS, SFF	6	0	6 SFF 1-6	1886
139.5 GB 15K, SAS, SFF	0	6	0 SFF 1-6	1888
283 GB 10K, SAS, SFF	0	6	0 SFF 1-6	1911
571 GB 10K, SAS, SFF	0	6	0 SFF 1-6	1916
177 GB SAS, 1.8", Solid-state	8	0	8	1995
177 GB SAS, 1.8", Solid-state	0	8	8 in 2 x #2053	1996
387 GB SAS SSD for #EDR1	30	0	30 Maximum 30 in 1 x #EDR1	ES01
387 GB SAS SSD for #EDR1	0	30	0 Maximum 30 in 1 x #EDR1	ES02
387 GB SAS, SFF, Solid-state	6	0	6 SFF 1-6	ES0A
387 GB SAS, SFF, Solid-state	0	6	0 SFF 1-6	ES0B
6 x #ES02	5	0	5 Maximum 30 in 1 x #EDR1	ESR2
4 x #ES0A 387 GB SAS, SFF, Solid-state	1	0	1 SFF 1-6	ESRA
4 x #ES0B 387 GB SAS, SFF, Solid-state	0	1	0 SFF 1-6	ESRB

Note: Six hard disk drives or solid-state drives maximum can be installed internally.

Device	Maximum quantity	Bay	Orderable feature number	Supported feature number
	AIX IBM i Linux			
146.8 GB 15K RPM, SAS	96 0 96	8 x #5886		3647
300 GB 15K RPM, SAS	96 0 96	8 x #5886		3648
450 GB 15K RPM, SAS	96 0 96	8 x #5886		3649
139.6 GB 15K RPM, SAS	0 96 0	8 x #5886		3677
283.8 GB 15K RPM, SAS	0 96 0	8 x #5886		3678
428.4 GB 15K RPM, SAS	0 96 0	8 x #5886		3658
856 GB, 10K, SAS, SFF, GEN2	0 96 0	4 x #5887	1738	
900 GB, 10K, SAS, SFF, GEN2	96 0 96	4 x #5887	1752	
146.8 GB, 15K, SAS, SFF, GEN2	96 0 96	4 x #5887	1917	
300 GB 10K, SAS, SFF, GEN2	96 0 96	4 x #5887	1925	
139 GB 15K, SAS, SFF, GEN2	0 96 0	4 x #5887	1947	
283 GB 15K, SAS, SFF, GEN2	0 96 0	4 x #5887	1948	
300 GB 15K, SAS, SFF, GEN2	96 0 96	4 x #5887	1953	
283 GB 10K, SAS, SFF, GEN2	0 96 0	4 x #5887	1956	
571 GB 10K, SAS, SFF, GEN2	0 96 0	4 x #5887	1962	
600 GB 10K, SAS, SFF, GEN2	96 0 96	4 x #5887	1964	
387 GB SAS, SFF, Solid-state, GEN2	48 0 48	4 x #5887	ES0C	
387 GB SAS, SFF, Solid-state, GEN2	0 48 0	4 x #5887	ES0D	
4 x #ES0C 387 GB SAS, SFF, Solid-state	1 0 1	4 x #5887	ESRC	
4 x #ES0D 387 GB SAS, SFF, Solid-state	0 1 0	4 x #5887	ESRD	

Notes :

- 3.5-inch DASD is not supported in the 8231-E1D CEC.
- SCSI disks are not supported on the 8231-E1D.
- Each feature 5886 supports a maximum of 12 HDDs or 8 SSDs.
- Each feature 5887 supports a maximum of 24 HDDs or SSDs.
- Ninety-six Gen2 disks or solid-state drives maximum can be installed in 4 x feature 5887.

Planning information

Cable orders

No cables required.

Security, auditability, and control

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

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

IBM Electronic Services

Electronic Service Agent and the IBM Electronic Support web portal are dedicated to providing fast, exceptional support to IBM Systems customers. The IBM Electronic Service Agent tool is a no-additional-charge tool that proactively monitors and reports hardware events, such as system errors, performance issues, and inventory. The Electronic Service Agent tool can help you stay focused on your company's strategic business initiatives, save time, and spend less effort managing day-to-day IT maintenance issues. Servers enabled with this tool can be monitored remotely around the clock by IBM Support all at no additional cost to you.

Now integrated into the base operating system of AIX 5.3, AIX 6.1, and AIX 7.1, Electronic Service Agent is designed to automatically and electronically report system failures and utilization issues to IBM, which can result in faster problem resolution and increased availability. System configuration and inventory information collected by the Electronic Service Agent tool also can be viewed on the secure Electronic Support web portal, and used to improve problem determination and resolution by you and the IBM support team. To access the tool main menu, simply type "smitty esa_main", and select "Configure Electronic Service Agent ." In addition, ESA now includes a powerful Web user interface, giving the administrator easy access to status, tool settings, problem information, and filters. For more information and documentation on how to configure and use Electronic Service Agent, refer to

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

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

Benefits

Increased uptime: The Electronic Service Agent tool is designed to enhance the Warranty or Maintenance Agreement by providing 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. Its 24 x 7 monitoring and reporting mean no more dependence on human intervention or off-hours customer personnel when errors are encountered in the middle of the night.

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

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

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

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

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

For more information on how to utilize the power of IBM Electronic Services, contact your IBM Systems Services Representative, or visit

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

Terms and conditions

Volume orders: Contact your IBM representative.

IBM Global Financing

Yes

ICA Lease or Financing Offering:	Yes
Eligible for Maintenance:	Yes

Warranty period

Three years.

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

Warranty 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 website. IBM may request Electronic Service Agent (ESA) activation and you must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend on the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives, may be limited in some areas, 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-specific and location-specific information.

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 (mandatory) or a Tier 2 (optional) CRU.

Tier 1 CRU:

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

Tier 2 CRU:

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

Based upon availability, CRUs will be shipped for next-business-day (NBD) 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 15 days of your receipt of the replacement.

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

- DASD Drive
- DASD Media Backplane
- DVD Drive
- Fan Air Baffle
- Fan
- All PCI Adapters
- Memory Riser Card
- Power Supply
- Line/power cord
- Keyboard
- Mouse
- External cables
- Display
- Operator Panel
- TOD Battery
- Memory DIMMs
- Processor VRM
- SAS Conduit Cable
- SAS Tape Drive Cables
- USB and SAS Tape Drive
- USB Tape Drive Signal Cable
- Storage Interposer
- SPCN Cable
- Interlock Switch
- RAID Battery
- RAID Battery Package Card

- RAID Battery Card

To service a Linux system end to end, Linux service and productivity tools must be installed from the web page at:

<http://www.ibm.com/support/customercare/sas/f/lopdiags/home.html>

It is automatically loaded if IBM manufacturing installs Linux image or IBM Installation Toolkit.

PowerPack is the best way to install required service packages from the website.

Linux call home feature is also supported in a standalone system configuration to report serviceable events.

On-site Service

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

Service level is:

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response. Calls must be received by 5:00 p.m. local time in order to qualify for next-business-day response.

Non-IBM parts support

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

Non-IBM parts service

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

Warranty service upgrades

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

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

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 on-site response-time objectives are available as warranty service upgrades for your machine.

The service level is:

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

Note: Canada does not offer 2-hour response option.

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

Maintenance services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. IBM may request Electronic Service Agent (ESA) activation and you must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives, may be limited in some areas, and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service

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

Service levels are:

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

Note: Canada does not offer 2-hour response option.

Customer Replaceable Unit Service

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

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective

CRU must be returned to IBM . When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

CRUs are designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU.

Tier 1 (mandatory) CRUs: Installation of Tier 1 CRUs, as specified in this announcement, 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 (optional) CRUs: You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

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

- DASD Drive
- DASD Media Backplane
- DVD Drive
- Fan Air Baffle
- Fan
- All PCI Adapters
- Memory Riser Card
- Power Supply
- Line/power cord
- Keyboard
- Mouse
- External cables
- Display
- Operator Panel
- TOD Battery
- Memory DIMMs
- Processor VRM
- SAS Conduit Cable
- SAS Tape Drive Cables
- USB and SAS Tape Drive
- USB Tape Drive Signal Cable
- Storage Interposer
- SPCN Cable
- Interlock Switch
- RAID Battery
- RAID Battery Package Card
- RAID Battery Card

To service a Linux system end to end, Linux service and productivity tools must be installed from the web page at

<http://www.ibm.com/support/customercare/sas/f/lopdiags/home.html>

It is automatically loaded if IBM manufacturing installs Linux image or IBM Installation Toolkit.

PowerPack is the best way to install required service packages from the website.

Linux call home feature is also supported in a standalone system configuration to report serviceable events.

Non-IBM parts service

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

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines and provides the labor to replace the failing parts at no additional charge.

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

Warranty service upgrades

Usage plan machine

No

IBM hourly service rate classification

Two

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

Field-installable features

Yes

Model conversions

No

Machine installation

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

Graduated program license charges apply

Yes

The applicable processor tier is: small

Licensed machine code

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

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

Machine using LMC Type Model

Access to Machine Code updates is conditioned on entitlement and license validation in accordance with IBM policy and practice. IBM may verify entitlement through customer number, serial number, electronic restrictions, or any other means or methods employed by IBM in its discretion.

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

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

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

Prices

Prices are subject to change without notice.

GST, QST, and sales taxes, where applicable, are extra.

For additional information and current prices, contact your local IBM representative.

The following are newly announced features on the specific models of the IBM Power Systems 8231 machine type:

Description	Model number	Feature numbers	Purchase price	Minimum Initial/Monthly Maint. charge	Initial/MES/Both/Support	RP CSU	MES
IBM Power 710							
One CSC Billing Unit	E1D					Yes	
Ten CSC Billing Units	E1D	0010			Both	Yes	No
Mirrored System Disk Level, Sp	E1D	0011			Both	Yes	No
Device Parity Protection All	E1D	0040			Both	Yes	No
Device Parity RAID 6 All	E1D	0041			Both	Yes	No
RISC to RISC Data Migration	E1D	0047			Both	Yes	No
AIX Partition Specify	E1D	0205			Initial	N/A	No
Linux Partition Specify	E1D	0265			Both	Yes	No
IBM i Partition Specify	E1D	0266			Both	Yes	No
Specify Custom Data Protection	E1D	0267			Both	Yes	No
Mirrored Level System Specify	E1D	0296			Both	Yes	No
RAID Hot Spare Specify	E1D	0308			Both	Yes	No
V.24/EIA232 6.1m (20 Ft) PCI C	E1D	0347			Both	Yes	No
V.24/EIA232 15.2m (50 Ft) PCI	E1D	0348			Both	Yes	No
	E1D	0349			Support	Yes	No

V.35 6.1m (20 Ft) PCI Cable	E1D	0353	Both	Yes	No
V.35 15.2m (50 Ft) PCI Cable	E1D	0354	Support	Yes	No
V.36 6.1m (20 Ft) PCI Cable	E1D	0356	Support	Yes	No
X.21 6.1m (20 Ft) PCI Cable	E1D	0359	Both	Yes	No
X.21 15.2m (50 Ft) PCI Cable	E1D	0360	Support	Yes	No
V.24/EIA232 (80 Ft) PCI Cable	E1D	0365	Support	Yes	No
Customer Specified Placement	E1D	0456	Initial	N/A	No
SSD Placement Indicator CEC	E1D	0462	Initial	N/A	No
SSD Placement Indicator 5887	E1D	0465	Initial	N/A	No
19 inch, 1.8 meter high rack	E1D	0551	MES	Yes	No
19 inch, 2.0 meter high rack	E1D	0553	MES	Yes	No
19 inch, 1.3 meter high rack	E1D	0555	Support	Yes	No
IBM i 6.1 w/6.1.1 Machine Code	E1D	0566	Both	Yes	No
IBM i 7.1 Specify Code	E1D	0567	Both	Yes	No
Rack Filler Panel Kit	E1D	0599	Both	Yes	No
Load Source Not in CEC	E1D	0719	Both	Yes	No
#1787 Load Source Specify	E1D	0722	Both	Yes	No
#1996 Load Source Specify	E1D	0724	Both	Yes	No
Specify 5886 Load Source plac	E1D	0727	Support	Yes	No
#5887 Load Source Specify	E1D	0728	Both	Yes	No
EXP30 Load Source Specify	E1D	0729	Both	Yes	No
SAN Load Source Specify	E1D	0837	Both	Yes	No
3677 Load Source Specify	E1D	0839	Support	Yes	No
3678 Load Source Specify	E1D	0840	Support	Yes	No
3658 Load Source Specify	E1D	0844	Support	Yes	No
1888 Load Source Specify	E1D	0853	Both	Yes	No
1909 Load Source Specify	E1D	0854	Support	Yes	No
1911 Load Source Specify	E1D	0856	Both	Yes	No
#1916 Load Source Specify	E1D	0857	Both	Yes	No
#1879 Load Source Specify	E1D	0870	Both	Yes	No
#1947 Load Source Specify	E1D	0871	Both	Yes	No
#1948 Load Source Specify	E1D	0872	Both	Yes	No
#1956 Load Source Specify	E1D	0874	Both	Yes	No
#1962 Load Source Specify	E1D	0875	Both	Yes	No
#1737 Load Source Specify(856G	E1D	0879	Both	Yes	No
#1738 Load Source Specify SFF2	E1D	0880	Both	Yes	No
#ES0B Load Source Specify	E1D	0893	Both	Yes	No

#ES0D Load Source Specify	E1D	0894	Both	Yes	No
USB External Docking Station R	E1D	1104	Support	Yes	No
USB 160 GB Removable Disk Dr	E1D	1106	Support	Yes	No
USB 500 GB Removable Disk Dr	E1D	1107	Both	Yes	No
USB Internal Docking Station	E1D	1123	Support	Yes	No
80/160GB DAT160 SAS Tape Drive	E1D	1124	Both	Yes	No
Custom Serv. Specify, Roch	E1D	1140	Both	Yes	No
200V 16A 4.3m (14 Ft) TL Line	E1D	1406	Support	Yes	No
125V 4.3m (14 Ft) Line Cord	E1D	1413	Support	Yes	No
200V 1.8m (6 Ft) Locking Line	E1D	1414	Support	Yes	No
4.3m 200V/16A Power Cord EU/As	E1D	1420	Support	Yes	No
4.3m 200V/16A Power Cord CH/DK	E1D	1421	Support	Yes	No
200V 4.3m (14 Ft) Locking Line	E1D	1426	Support	Yes	No
200V 4.3m (14 Ft) Watertight L	E1D	1427	Support	Yes	No
4.3m 200V/10A Power Cord EU/As	E1D	1439	Support	Yes	No
4.3m 200V/10A Power Cord Denma	E1D	1440	Support	Yes	No
4.3m 200V/10A Power Cord S. Af	E1D	1441	Support	Yes	No
4.3m 200V/10A Power Cord Swiss	E1D	1442	Support	Yes	No
4.3m 200V/10A Power Cord UK	E1D	1443	Support	Yes	No
4.3m 200V/10A Power Cord Israe	E1D	1445	Support	Yes	No
4.3m 200V/32A Power Cord EU 1	E1D	1449	Support	Yes	No
4.3m 200V/16A Power Cord EU 2	E1D	1450	Support	Yes	No
200V (14 Ft) 4.3m Line Cord	E1D	1452	Support	Yes	No
200V 12A (14 Ft) 4.3m TL Line	E1D	1454	Support	Yes	No
200V (14 Ft) 4.3m Watertight L	E1D	1456	Support	Yes	No
4.3m 200V/12A Pwr Cd UK	E1D	1476	Support	Yes	No
4.3m 200V/16A Pwr Cd	E1D	1477	Support	Yes	No
856GB 10k RPM SAS SFF Disk	E1D	1737	Both	Yes	No
856GB 10k RPM SAS SFF-2 Disk	E1D	1738	Both	Yes	No
900GB 10k RPM SAS SFF Disk	E1D	1751	Both	Yes	No
900GB 10k RPM SAS SFF-2 Disk	E1D	1752	Both	Yes	No
177GB SFF-1 SSD w/ eMLC AIX/Li	E1D	1775	Both	Yes	No

177GB SFF-1 SSD w/ eMLC IBM i	E1D	1787	Both	Yes	No
600GB 10k RPM SAS SFF Disk	E1D	1790	Both	Yes	No
System port/UPS Conversion Cab	E1D	1827	Both	Yes	No
283GB 15K RPM SAS Disk	E1D	1879	Both	Yes	No
300GB 15K RPM SAS Disk	E1D	1880	Both	Yes	No
73.4 GB 15K RPM SAS SFF Disk D	E1D	1883	Support	Yes	No
69.7 GB 15K RPM SAS SFF Disk D	E1D	1884	Support	Yes	No
300GB 10K RPM SFF SAS Disk D	E1D	1885	Both	Yes	No
146GB 15K RPM SFF SAS Disk D	E1D	1886	Both	Yes	No
139GB 15K RPM SFF SAS Disk D	E1D	1888	Both	Yes	No
283GB 10K RPM SFF SAS Disk Dri	E1D	1911	Both	Yes	No
571GB 10k RPM SAS SFF Disk	E1D	1916	Both	Yes	No
146GB 15k RPM SAS SFF-2 Disk	E1D	1917	Both	Yes	No
300GB 10k RPM SAS SFF-2 Disk	E1D	1925	Both	Yes	No
139GB 15k RPM SAS SFF-2 Disk	E1D	1947	Both	Yes	No
283GB 15k RPM SAS SFF-2 Disk	E1D	1948	Both	Yes	No
300GB 15k RPM SAS SFF-2 Disk	E1D	1953	Both	Yes	No
283GB 10k RPM SAS SFF-2 Disk	E1D	1956	Both	Yes	No
571GB 10k RPM SAS SFF-2 Disk	E1D	1962	Both	Yes	No
600GB 10k RPM SAS SFF-2 Disk	E1D	1964	Both	Yes	No
177GB SSD Module with eMLC (AI	E1D	1995	Both	No	No
1 Gigabit iSCSI TOE PCI X on C	E1D	1996	Both	No	No
PCIe LP RAID SSD SAS Adapter 3	E1D	2053	Both	Yes	No
Primary OS - IBM i	E1D	2145	Both	Yes	No
Primary OS AIX	E1D	2146	Both	Yes	No
Primary OS Linux	E1D	2147	Both	Yes	No
Factory Deconfiguration of 1 c	E1D	2319	Initial	N/A	No
LC-SC 50 Micron Fiber Conv Cab	E1D	2456	Both	Yes	No
LC-SC 62.5 Mic.Fib.Conv.Cable	E1D	2459	Both	Yes	No
Asynch.Termin/Print.Cbl EIA232	E1D	2934	Both	Yes	No
Asynchronous Cable EIA 232/V	E1D	2936	Both	Yes	No
Ser to Ser Port Cab Draw/Draw	E1D	3124	Both	Yes	No
Serial to Se.Port Cbl Rack 8M	E1D	3125	Both	Yes	No
3-meter DDR 4X Copper	E1D	3246	Support	Yes	No
1m, QDR IB Copper Cable	E1D	3287	Both	Yes	No
3m, QDR IB Copper Cable	E1D	3288	Both	Yes	No
5m QDR IB/E'Net Copper Cable	E1D	3289	Both	Yes	No

10m QDR IB Optic Cable	E1D	3290	Both	Yes	No
30m QDR IB Optic Cable	E1D	3293	Both	Yes	No
SAS YO Cable 1.5m - HD 6Gb Ada	E1D	3450	Both	Yes	No
SAS YO Cable 3m - HD 6Gb Adapt	E1D	3451	Both	Yes	No
SAS YO Cable 6m - HD 6Gb Adapt	E1D	3452	Both	Yes	No
SAS YO Cable 10m - HD 6Gb Adap	E1D	3453	Both	Yes	No
SAS X Cable 3m - HD 6Gb 2-Adap	E1D	3454	Both	Yes	No
SAS X Cable 6m - HD 6Gb 2-Adap	E1D	3455	Both	Yes	No
SAS X Cable 10m - HD 6Gb 2-Ada	E1D	3456	Both	Yes	No
SAS YO Cable 15m - HD 3Gb Adap	E1D	3457	Both	Yes	No
SAS X Cable 15m - HD 3Gb 2-Ada	E1D	3458	Both	Yes	No
Widescreen LCD Monitor	E1D	3632	Both	Yes	No
T541H/L150p 15inchTFT Col.M	E1D	3637	Support	Yes	No
ThinkVision L170p Flat Pan.M	E1D	3639	Support	Yes	No
ThinkVision L171p Flat Panel M	E1D	3640	Support	Yes	No
IBM T115 Flat Panel Monitor	E1D	3641	Support	Yes	No
ThinkVision L191p Flat Panel M	E1D	3642	Support	Yes	No
IBM T120 Flat Panel Monitor	E1D	3643	Support	Yes	No
19in. Flat Panel Monitor	E1D	3644	Support	Yes	No
17in. Flat Panel Monitor	E1D	3645	Support	Yes	No
146GB 15K RPM SAS Disk Drive	E1D	3647	Support	Yes	No
300GB 15K RPM SAS Disk Drive	E1D	3648	Support	Yes	No
450GB 15K RPM SAS Disk Drive	E1D	3649	Support	Yes	No
SAS Cable (EE) Drawer to Dr 1M	E1D	3652	Both	Yes	No
SAS Cable (EE) Drawer to Dr 3M	E1D	3653	Both	Yes	No
SAS Cable (EE) Drawer to Dr 6M	E1D	3654	Both	Yes	No
428GB 15K RPM SAS Disk Drive	E1D	3658	Support	Yes	No
SAS Cable (X) Adapter to SAS E	E1D	3661	Both	Yes	No
SAS Cbl X Adp SAS Enclosure 6M	E1D	3662	Both	Yes	No
SAS Cbl X Adp SAS Encl 15M	E1D	3663	Both	Yes	No
SAS EX cable 3M - Drw to Drw	E1D	3675	Both	Yes	No
139.5GB 15k rpm SAS Disk Drive	E1D	3677	Support	Yes	No
283.7GB 15k rpm SAS Disk Drive	E1D	3678	Support	Yes	No
SAS EX Cable 6m - Drw to Drw	E1D	3680	Both	Yes	No
SAS Cab (AE) Adapter to En 3M	E1D	3684	Both	Yes	No

SAS Cable(AE) Adapter to En 6M	E1D	3685	Both	Yes	No
SAS Ca(YI) System to SAS 3M	E1D	3687	Both	Yes	No
SAS Cab(YO) Adapter to SAS1.5M	E1D	3691	Both	Yes	No
SAS Cab(YO) Adapter to SAS 3M	E1D	3692	Both	Yes	No
SAS Cab(YO) Adapter to SAS 6M	E1D	3693	Both	Yes	No
SAS Cab(YO) Adapter to SAS 15M	E1D	3694	Both	Yes	No
0.3M Serial Prt Converter Cbl	E1D	3925	Both	Yes	No
Serial Port Null Mod Cab 3.7M	E1D	3927	Both	Yes	No
Ser.Port Null Modem Cable,10M	E1D	3928	Both	Yes	No
System Serial Port Converter C	E1D	3930	Both	Yes	No
6Foot Extend.Cbl for Displays	E1D	4242	Both	Yes	No
Extender Cable USB Keybo 1.8M	E1D	4256	Both	Yes	No
VGA to DVI Connection Converte	E1D	4276	Both	Yes	No
One and only one rack indicator feature is required on all orders (#4650 to #4666). No Factory Integration Ind.					
Rack Indicator, Rack 1	E1D	4650	Initial	N/A	No
Rack Indicator, Rack 2	E1D	4651	Initial	N/A	No
Rack Indicator, Rack 3	E1D	4652	Initial	N/A	No
Rack Indicator, Rack 4	E1D	4653	Initial	N/A	No
Rack Indicator, Rack 5	E1D	4654	Initial	N/A	No
Rack Indicator, Rack 6	E1D	4655	Initial	N/A	No
Rack Indicator, Rack 7	E1D	4656	Initial	N/A	No
Rack Indicator, Rack 8	E1D	4657	Initial	N/A	No
Rack Indicator, Rack 9	E1D	4658	Initial	N/A	No
Rack Indicator, Rack 10	E1D	4659	Initial	N/A	No
Rack Indicator, Rack 11	E1D	4660	Initial	N/A	No
Rack Indicator, Rack 12	E1D	4661	Initial	N/A	No
Rack Indicator, Rack 13	E1D	4662	Initial	N/A	No
Rack Indicator, Rack 14	E1D	4663	Initial	N/A	No
Rack Indicator, Rack 15	E1D	4664	Initial	N/A	No
Rack Indicator, Rack 16	E1D	4665	Initial	N/A	No
Active Memory Expansion Enabl	E1D	4666	Initial	N/A	No
Software Preload Required	E1D	4795	Both	Yes	No
Power Dist Unit 1 Phase NEMA	E1D	5000	Initial	N/A	No
Power Dist Unit 1 Phase IEC	E1D	5160	Support	Yes	No
Power Dist Unit 2 of 3 Phase	E1D	5161	Support	Yes	No
Power Dist Unit - 3 Phase	E1D	5162	Support	Yes	No
	E1D	5163	Support	Yes	No

PowerVM Express Edition	E1D	5225	Both	Yes	No
PowerVM Standard Edition	E1D	5227	Both	Yes	No
PowerVM Enterprise Edition	E1D	5228	Both	Yes	No
PCIe2 LP 4-port 1GbE Adapter	E1D	5260	Both	Yes	No
Memory Riser Card	E1D	5265	Both	Yes	No
PCIe LP POWER GXT145 Graphics	E1D	5269	Both	Yes	No
PCIe LP 10Gb FCoE 2 port Adapt	E1D	5270	Both	Yes	No
PCIe LP 4 Port 10/100/1000 Bas	E1D	5271	Both	Yes	No
PCIe LP 10GbE CX4 1 port Adapt	E1D	5272	Both	Yes	No
PCIe LP 8Gb 2 Port Fibre Chann	E1D	5273	Both	Yes	No
PCIe LP 2 Port 1GbE SX Adapter	E1D	5274	Both	Yes	No
PCIe LP 10GbE SR 1 port Adapt	E1D	5275	Both	Yes	No
PCIe LP 4Gb 2 Port Fibre Chann	E1D	5276	Both	Yes	No
PCIe LP 4 Port Async EIA 232 A	E1D	5277	Both	Yes	No
PCIe LP 2 x4 port SAS Adapter	E1D	5278	Both	Yes	No
PCIe2 4Port 10GBE&1GBE SFP+ LP	E1D	5279	Both	Yes	No
PCIe2 4-Port 10GbE&1GbE SR LP	E1D	5280	Both	Yes	No
PCIe LP 2-Port 1GbE TX Adapter	E1D	5281	Support	Yes	No
PCIe2 LP 2-Port 4X IB QDR Adap	E1D	5283	Both	Yes	No
PCIe2 LP 2 port 10GbE SR Adapt	E1D	5284	Both	Yes	No
PCIe2 LP 2 Port 10GbE SFP Copp	E1D	5286	Both	Yes	No
PCIe LP 2 Port Async EIA 232 A	E1D	5290	Both	Yes	No
System Pwr Sup -1925W	E1D	5532	Both	Yes	No
Sys Console On HMC	E1D	5550	Both	Yes	No
Sys Console-Ethernet No IOP	E1D	5557	Initial	N/A	No
SATA Slimline DVD RAM Drive	E1D	5762	Support	Yes	No
SATA Slimline DVD-RAM Drive	E1D	5771	Both	Yes	No
EXP 12S Expansion Drawer	E1D	5886	Support	Yes	No
EXP24S SFF Gen2-bay Drawer	E1D	5887	Both	Yes	No
Shared EXP30 Indicator	E1D	5925	Both	Yes	No
SAS EX Cable 1.5m - Drw to Drw	E1D	5926	Both	Yes	No
Remote EXP30 Indicator	E1D	5927	Both	Yes	No
Full width Key USB, US English	E1D	5951	Support	Yes	No
Full width Key USB, French	E1D	5952	Support	Yes	No
Full width Key USB, Italian	E1D	5953	Support	Yes	No
Full width Key USB, German/Aus	E1D	5954	Support	Yes	No
Full width Key USB, UK English	E1D	5955	Support	Yes	No

Full width Key USB, Spanish	E1D	5956	Support	Yes	No
Full width Key USB, Japanese	E1D	5957	Support	Yes	No
Full width Key USB, BrazilianP	E1D	5958	Support	Yes	No
Full width Key USB, Hungarian	E1D	5959	Support	Yes	No
Full width Key USB, Korean	E1D	5960	Support	Yes	No
Full width Key USB, Chinese	E1D	5961	Support	Yes	No
Full width Key USB, French Can	E1D	5962	Support	Yes	No
Full width Key USB, Belgian/UK	E1D	5964	Support	Yes	No
Full width Key USB, Swedish/Fi	E1D	5965	Support	Yes	No
Full width Key USB, Danish	E1D	5966	Support	Yes	No
Full width Key USB, Bulgarian	E1D	5967	Support	Yes	No
Full width Key USB, Swiss/Fr/G	E1D	5968	Support	Yes	No
Full width Key USB, Norwegian	E1D	5969	Support	Yes	No
Full width Key USB, Dutch	E1D	5970	Support	Yes	No
Full width Key USB, Portuguese	E1D	5971	Support	Yes	No
Full width Key USB, Greek	E1D	5972	Support	Yes	No
Full width Key USB, Hebrew	E1D	5973	Support	Yes	No
Full width Key USB, Polish	E1D	5974	Support	Yes	No
Full width Key USB, Slovakian	E1D	5975	Support	Yes	No
Full width Key USB, Czech	E1D	5976	Support	Yes	No
Full width Key USB, Turkish	E1D	5977	Support	Yes	No
Full width Key USB, LA Spanish	E1D	5978	Support	Yes	No
Full width Key USB, Arabic	E1D	5979	Support	Yes	No
Full width Key USB, Thai	E1D	5980	Support	Yes	No
Full width Key USB, Russian	E1D	5981	Support	Yes	No
Full width Key USB, Slovenian	E1D	5982	Support	Yes	No
Full width Key USB, US English	E1D	5983	Support	Yes	No
Opt Front Door for 1.8m Rack	E1D	6068	MES	Yes	No
Opt Front Door for 2.0m Rack	E1D	6069	MES	Yes	No
1.8m Rack Acoustic Doors	E1D	6248	MES	Yes	No
2.0m Rack Acoustic Doors	E1D	6249	MES	Yes	No
1.8m Rack Trim Kit	E1D	6263	MES	Yes	No
2.0m Rack Trim Kit	E1D	6272	MES	Yes	No
Pwr Crd 4.3m 14ft wall IBM PDU	E1D	6458	Both	Yes	No
Pwr Crd (14FT), Drwr - OEM PDU	E1D	6460	Both	Yes	No
Pwr Crd 4.3m 14ft wall OEM PDU	E1D	6469	Both	Yes	No
Pwr Crd 1.8m 6ft wall 125V/15A	E1D	6470	Both	Yes	No

Pwr Crd 2.7m 9ft wall OEM PDU E1D	6471	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6472	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6473	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6474	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6475	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6476	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6477	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6478	Both	Yes	No
PWR Cord(9foot), (250V,10A) E1D	6479	Support	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6488	Both	Yes	No
4.3m (14 Ft) 3PH/24A Power Cor E1D	6489	MES	Yes	No
4.3m (14 Ft) 1PH/48A Pwr Cord E1D	6491	MES	Yes	No
4.3m (14 Ft) 1PH/48 60A Pwr Co E1D	6492	MES	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6493	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6494	Both	Yes	No
To wall/OEM PDU, (250V, 10A) E1D	6495	Support	Yes	No
Pwr Crd 2.7m 9ft wall 250V,10A E1D	6496	Both	Yes	No
PWR Cord(6ft),To wall/OEM PDU E1D	6497	Support	Yes	No
Power Cord 6ftTo wall OEM PDU E1D	6498	Support	Yes	No
Power Cable Drawer to IBM PD E1D	6577	Both	Yes	No
Optional Rack Security Kit E1D	6580	MES	Yes	No
Modem Tray for 19-Inch Rack E1D	6586	MES	Yes	No
Pwr Crd 2.7m 9ft wall 125V,15A E1D	6651	Both	Yes	No
4.3m 1PH/24-30A Pwr Cord E1D	6654	MES	Yes	No
4.3m 14Ft 1PH/24 30A WR Pwr E1D	6655	MES	Yes	No
4.3m 14Ft 1PH/24A Power Cord E1D	6656	MES	Yes	No
Pwr.Cord(9ft),To wall/OEM PDU E1D	6659	Both	Yes	No
Pwr Crd 14ft 4.3m wallOEM PDU E1D	6660	Both	Yes	No
Pwr Crd 2.8m 9.2ft wall PDU E1D	6665	Both	Yes	No
Pwr Crd 4.3M, Drwr - OEM PDU E1D	6669	Both	Yes	No
Pwr Crd 6-FT, (125V,15A)PT#59 E1D	6670	Support	Yes	No
Pwr Crd 2.7M, Drwr - IBM PDU E1D	6671	Both	Yes	No
Pwr Crd 1.5M, Drwr - IBM PDU E1D	6672	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU E1D	6680	Both	Yes	No
Power Cord (6ft),To wall E1D	6687	Support	Yes	No
IIntelligent PDU+ 1 EIA Unit E1D	7109	MES	Yes	No
Environmental Monitoring Probe E1D	7118	Both	Yes	No

Power Distribution Unit	E1D	7188		MES	Yes	No
2.0m Rack Side Attach Kit	E1D	7780		Support	Yes	No
Eth Cbl 6M HW Management	E1D	7801		Support	Yes	No
Eth Cbl 15M HW Management	E1D	7802		Both	Yes	No
Side-by-Side for 1.8m Racks	E1D	7840		Support	Yes	No
Ruggedize Rack Kit	E1D	7841		Support	Yes	No
Linux Software Preinstall	E1D	8143		Initial	N/A	No
Linux Software Preinstall BP	E1D	8144		Initial	N/A	No
Mouse-USB,Black KBD Att C	E1D	8841		Support	Yes	No
USB Mouse	E1D	8845		Both	Yes	No
Order Routing Indicator System	E1D	9169		Initial	N/A	No
Language Group Spcf-US	E1D	9300	NC	Initial	N/A	No
specify mode-1 & (1)5901/5278	E1D	9359		Both	Yes	No
Specify mode-1 & (2)5901/5278	E1D	9360		Both	Yes	No
Specify mode-2 & (2)5901/5278	E1D	9361		Both	Yes	No
Specify mode-4 & (4)5901/5278	E1D	9365		Both	Yes	No
Specify mode-2 & (4)5901/5278	E1D	9366		Both	Yes	No
Specify mode-1 & CEC SAS port	E1D	9384		Both	Yes	No
Mode-1 & EXP30 for 1 EXP24S #5	E1D	9388		Both	Yes	No
New AIX License Core Counter	E1D	9440	NC	Initial	N/A	No
New IBM i Lic Core Counter	E1D	9441	NC	Initial	N/A	No
New Red Hat Lic Core Counter	E1D	9442	NC	Initial	N/A	No
New SUSE Lic Core Counter	E1D	9443	NC	Initial	N/A	No
Other AIX Lic Core Counter	E1D	9444	NC	Initial	N/A	No
Other Linux Lic Core Counter	E1D	9445	NC	Initial	N/A	No
3rd Party Linux Lic Core Cnt	E1D	9446	NC	Initial	N/A	No
VIOS Core Counter	E1D	9447	NC	Initial	N/A	No
Month Indicator	E1D	9461		Initial	N/A	No
Day Indicator	E1D	9462		Initial	N/A	No
Hour Indicator	E1D	9463		Initial	N/A	No
Minute Indicator	E1D	9464		Initial	N/A	No
Qty Indicator	E1D	9465		Initial	N/A	No
Countable Member Indicator	E1D	9466		Initial	N/A	No
Language Group Spcf-Dutch	E1D	9700	NC	Initial	N/A	No
Language Group Spcf-French	E1D	9703	NC	Initial	N/A	No
Language Group Spcf-German	E1D	9704	NC	Initial	N/A	No
Language Group Spcf-Polish						

E1D	9705	NC	Initial	N/A	No
Lang Group Specify - Norwegian	E1D	9706	NC	Initial	N/A
Lang.Group Spcf-Portuguese	E1D	9707	NC	Initial	N/A
Language Group Spcf-Spanish	E1D	9708	NC	Initial	N/A
Language Group Spcf-Italian	E1D	9711	NC	Initial	N/A
Langua Gr Speci Canadian Frenc	E1D	9712	NC	Initial	N/A
Language Group Spcf-Japanese	E1D	9714	NC	Initial	N/A
Language Group Specify Tr Chin	E1D	9715	NC	Initial	N/A
Language Group Spcf-Korean	E1D	9716	NC	Initial	N/A
Language Group Spcf-Turkish	E1D	9718	NC	Initial	N/A
Language Group Spcf-Hungarian	E1D	9719	NC	Initial	N/A
Language Group Spcf-Slovakian	E1D	9720	NC	Initial	N/A
Language Group Spcf-Russian	E1D	9721	NC	Initial	N/A
Lang Group Spcf Simpl Chinese	E1D	9722	NC	Initial	N/A
Language Group Spcf-Czech	E1D	9724	NC	Initial	N/A
Language Group Spcf-Romanian	E1D	9725	NC	Initial	N/A
Lang Group Specify - Croatian	E1D	9726	NC	Initial	N/A
Language Group Spcf-Slovenian	E1D	9727	NC	Initial	N/A
Lang Group Specify - Braz Port	E1D	9728	NC	Initial	N/A
Lang Group Specify - Thai	E1D	9729	NC	Initial	N/A
IBM i 6.1.1 Native I/O Enablem	E1D	EB34	Both	Yes	No
PCIe2 LP 2-Port 10GbE RoCE SFP	E1D	EC27	Both	Yes	No
PCIe2 LP 2-Port 10GbE RoCE SR	E1D	EC29	Both	Yes	No
0.6m Blue CAT5 Ethernet Cable	E1D	ECB0	Both	Yes	No
1.5m Blue CAT5 Ethernet Cable	E1D	ECB2	Both	Yes	No
Custom Serv. Specify, Shen	E1D	ECSC	Both	Yes	No
EXP30 Ultra SSD I/O Drawer	E1D	EDR1	Both	Yes	No
SPSS on Pwr Sol Ind	E1D	EHSS	Initial	Yes	No
Storage Backplane 6 SFF Dri	E1D	EJ0D	Both	Yes	No
Storage Backplane 3 SFF Dri	E1D	EJ0E	Both	Yes	No
Storage Backplane w/ext SAS	E1D	EJ0F	Both	Yes	No
GX++LP 1-port PCIe2 x8 Adapter	E1D	EJ0H	Both	Yes	No
Mode-1 & (1)ESA1/ESA2 for 5887	E1D	EJP1	Both	Yes	No
Mode-1 & (2)ESA1/ESA2 for 5887	E1D	EJP2	Both	Yes	No
Mode-2 & (2)ESA1/ESA2 for 5887	E1D	EJP3	Both	Yes	No
Mode-2 & (1)ESA1/ESA2 for 5887	E1D	EJP6	Both	Yes	No
Specify Mode-2(2)ESA1/ESA2	E1D	EJP7	Both	Yes	No
Specify mode-2(1) ESA1/ESA2					

Specify mode-2 (2) ESA1/ESA2	E1D	EJPA	Both	Yes	No
Specify mode-4 (1) ESA1/ESA2	E1D	EJPB	Both	Yes	No
Specify mode-4(2) ESA1/ESA2	E1D	EJPC	Both	Yes	No
Specify mode-2 (1) 5901/5278	E1D	EJPD	Both	Yes	No
Specify mode-2(2) 5901/5278	E1D	EJPE	Both	Yes	No
Specify mode-4 (1) 5901/5278	E1D	EJPK	Both	Yes	No
Specify mode-4 (2) 5901/5278	E1D	EJPL	Both	Yes	No
Specify mode-4 (3) 5901/5278	E1D	EJPM	Both	Yes	No
Full width Key USB, US English	E1D	EJPN	Both	Yes	No
Full width Key USB, French	E1D	EK51	Both	Yes	No
Full width Key USB, Italian	E1D	EK52	Both	Yes	No
Full width Key USB, German/Aus	E1D	EK53	Both	Yes	No
Full width Key USB, UK English	E1D	EK54	Both	Yes	No
Full width Key USB, Spanish	E1D	EK55	Both	Yes	No
Full width Key USB, Japanese	E1D	EK56	Both	Yes	No
Full width Key USB, BrazilianP	E1D	EK57	Both	Yes	No
Full width Key USB, Hungarian	E1D	EK58	Both	Yes	No
Full width Key USB, Korean	E1D	EK59	Both	Yes	No
Full width Key USB, Chinese	E1D	EK60	Both	Yes	No
Full width Key USB, French Can	E1D	EK61	Both	Yes	No
Full width Key USB, Belgian/UK	E1D	EK62	Both	Yes	No
Full width Key USB, Swedish/Fi	E1D	EK64	Both	Yes	No
Full width Key USB, Danish	E1D	EK65	Both	Yes	No
Full width Key USB, Bulgarian	E1D	EK66	Both	Yes	No
Full width Key USB, Swiss/Fr/G	E1D	EK67	Both	Yes	No
Full width Key USB, Norwegian	E1D	EK68	Both	Yes	No
Full width Key USB, Dutch	E1D	EK69	Both	Yes	No
Full width Key USB, Portuguese	E1D	EK70	Both	Yes	No
Full width Key USB, Greek	E1D	EK71	Both	Yes	No
Full width Key USB, Hebrew	E1D	EK72	Both	Yes	No
Full width Key USB, Polish	E1D	EK73	Both	Yes	No
Full width Key USB, Slovakian	E1D	EK74	Both	Yes	No
Full width Key USB, Czech	E1D	EK75	Both	Yes	No
Full width Key USB, Turkish	E1D	EK76	Both	Yes	No
Full width Key USB, LA Spanish	E1D	EK77	Both	Yes	No
Full width Key USB, Arabic	E1D	EK78	Both	Yes	No
Full width Key USB, Thai	E1D	EK79	Both	Yes	No

Full width Key USB, Russian	E1D	EK80	Both	Yes	No
Full width Key USB, Slovenian	E1D	EK81	Both	Yes	No
Full width Key USB, US English	E1D	EK82	Both	Yes	No
Power 710 AIX Solution Edition	E1D	EK83	Both	Yes	No
Trial Live Partition Mobility	E1D	ELB6	Initial	N/A	No
8GB (2x4GB) Memory DIMMs 1066	E1D	ELPM	Both	Yes	No
16GB (2x8GB) Memory DIMMs 1066	E1D	EM08	Both	Yes	No
32GB (2x16GB) Mem DIMMs 1066	E1D	EM4B	Both	Yes	No
64GB (2x32GB) Mem DIMMs 1066	E1D	EM4C	Both	Yes	No
1m 10GbE Cable SFP+ Act Twinax	E1D	EM4D	Both	Yes	No
3m 10GbE Cable SFP+ Act Twinax	E1D	EN01	Both	Yes	No
5m 10GbE Cable SFP+ Act Twinax	E1D	EN02	Both	Yes	No
PCIe x8 Cable 1.5m	E1D	EN03	Both	Yes	No
PCIe x8 Cable 3m	E1D	EN05	Both	Yes	No
PCIe2 LP 16Gb 2-port Fibre Channel	E1D	EN07	Both	Yes	No
PCIe2 LP 4-port 10Gb FCoE & 1G	E1D	EN0B	Both	Yes	No
PCIe2 LP 8Gb 4-port Fibre Channel	E1D	EN0J	Both	Yes	No
4-core 3.6 GHz POWER7+ Proc	E1D	EN0Y	Both	Yes	No
6-core 4.2 GHz POWER7+ Proc	E1D	EPCE	Both	No	No
8-core 4.2 GHz POWER7+ Proc	E1D	EPCG	Both	No	No
One processor Activ for #EPCE	E1D	EPCJ	Both	No	No
One processor Activ for #EPCG	E1D	EPDE	Both	Yes	No
One processor Activ for #EPCJ	E1D	EPDG	Both	Yes	No
One Zero-priced Act for #EPCE	E1D	EPDJ	Both	Yes	No
One Zero-priced Act for #EPCG	E1D	EPEE	Both	Yes	No
One Zero-priced Act for #EPCJ	E1D	EPEG	Both	Yes	No
Quantity 150 of #3452 SAS Cabl	E1D	EPEJ	Both	Yes	No
Quantity 150 of #3453 SAS YO	E1D	EQ02	Both	Yes	No
RFID Tags for Compute Nodes	E1D	EQ03	Both	Yes	No
387GB 1.8" SAS SSD (AIX/Linux)	E1D	ERF1	Initial	N/A	No
387GB SFF-1 SSD for AIX/Linux	E1D	ES02	Both	Yes	No
387GB SFF-1 SSD for IBM i	E1D	ES0A	Both	Yes	No
387GB SFF-2 SSD for AIX/Linux	E1D	ES0B	Both	Yes	No
387GB SFF-2 SSD for IBM i	E1D	ES0C	Both	Yes	No
PCIe2 LP RAID SAS Adapter 6Gb	E1D	ES0D	Both	Yes	No
S&H - No Charge	E1D	ESA2	Both	Yes	No
S&H-a	E1D	ESC0	Initial	N/A	No

Six ES02 387GB 1.8" SAS AIX/Li	E1D	ESC5	Initial	N/A	No
Four ES0A 387GB SFF-1 SSD AIX	E1D	ESR2	Initial	Yes	No
Four ES0B 387GB SFF-1 SSD IBMi	E1D	ESRA	Initial	Yes	No
Four ES0C387GB SFF-2 SSD AIX	E1D	ESRB	Initial	Yes	No
Four ES0D 387GB SFF-2 SSD IBMi	E1D	ESRC	Initial	Yes	No
1TB Removable Disk Cartridge	E1D	ESRD	Initial	Yes	No
RDX USB External Docking	E1D	EU01	Both	Yes	No
RDX 320 GB Removable Disk Driv	E1D	EU04	Both	Yes	No
1.5TB Removable Disk Cartridge	E1D	EU08	Both	Yes	No
RDX USB Internal Docking	E1D	EU15	Both	Yes	No
Cognos on Power - Small	E1D	EU23	Both	Yes	No
Cognos on Power - Large	E1D	EU24	Initial	N/A	No
	E1D	EU25	Initial	N/A	No

Feature conversions

Feature conversions for 8231-E1D virtualization engine features

From FC:	To FC:	Parts returned	Purchase price
5225 - PowerVM Express Edition	5227 - PowerVM Standard Edition	No	
5225 - PowerVM Express Edition	5228 - PowerVM Enterprise Edition	No	
5227 - PowerVM Standard Edition	5228 - PowerVM Enterprise Edition	No	

Maintenance charges

For additional information on maintenance and pricing, contact your IBM representative or your IBM Business Partner, or call 1-800-IBM-CALL (1-800-426-2255).

IBM Global Financing

IBM Global Financing offers competitive financing to credit-qualified customers to assist them in acquiring IT solutions. Offerings include financing for IT acquisition, including hardware, software, and services, from both IBM and other manufacturers or vendors. Offerings (for all customer segments: small, medium, and large enterprise), rates, terms, and availability can vary by country. Contact your local IBM Global Financing organization or visit

<http://www.ibm.com/financing>

IBM Global Financing offerings are provided through IBM Credit LLC in the United States, and other IBM subsidiaries and divisions worldwide to qualified commercial and government customers. Rates are based on a customer's credit rating, financing terms, offering type, equipment type, and options, and may vary by country. Other restrictions may apply. Rates and offerings are subject to change, extension, or withdrawal without notice.

IBM Global Financing offers competitive financing of hardware, software, and services, from both IBM and other manufacturers or vendors.

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

Through our IBM Project Financing™ program, credit qualified customers can obtain funding to design and build their entire IT infrastructure, aligning up-front costs to expected project benefits. This could include financing for select facility design and construction, building and structural upgrades, infrastructure equipment, IT hardware, software, services and consulting. Through our Global Asset Recovery Services' buyback program customers can obtain cash for marketable IT assets and dispose of non-marketable assets in a way that complies with environmental laws and regulations.

IBM Global Financing offerings are provided through IBM Credit LLC in the United States, and other IBM subsidiaries and divisions worldwide to qualified commercial and government customers. For all customer segments offerings, rates, financing terms, offering type, equipment type, and options, may vary by country. Other restrictions may apply. Rates and offerings are subject to change, extension, or withdrawal without notice.

Order now

To order, contact the Americas Call Centers or your local IBM representative, or your IBM Business Partner.

To identify your local IBM representative or IBM Business Partner, call 800-IBM-4YOU (426-4968).

Phone: 800-IBM-CALL (426-2255)
Fax: 800-2IBM-FAX (242-6329)
For IBM representative: askibm@ca.ibm.com
For IBM Business Partner: pswsna@us.ibm.com
Mail: IBM Teleweb Customer Support
ibm.com® Sales Execution Center, Americas North
3500 Steeles Ave. East, Tower 3/4
Markham, Ontario
Canada
L3R 2Z1

Reference: YE001

The Americas Call Centers, our national direct marketing organization, can add your name to the mailing list for catalogs of IBM products.

Note: Shipments will begin after the planned availability date.

Trade-marks

POWER7+, Active Memory, EnergyScale, POWER7 Systems, Power Systems, Focal Point, Electronic Service Agent, PowerLinux, HACMP, IBM PowerLinux and IBM Project Financing are trade-marks of IBM Corporation in the United States, other countries, or both.

Power, AIX, IBM, Express, POWER7, PowerVM, Micro-Partitioning, POWER6, POWER and ibm.com are registered trade-marks of IBM Corporation in the United States, other countries, or both.

Linux is a registered trade-mark of Linus Torvalds in the United States, other countries, or both.

UNIX is a registered trade-mark of The Open Group in the United States and other countries.

Other company, product, and service names may be trade-marks or service marks of others.

™ Trade-mark owned by International Business Machines Corporation and is used under license by IBM Canada Ltd.

® Registered trade-mark of International Business Machines Corporation and is used under license by IBM Canada Ltd.

(**) Company, product or service name may be a trade-mark or service mark of others.

Terms of use

IBM products and services which are announced and available in your country can be ordered under the applicable standard agreements, terms, conditions, and prices in effect at the time. IBM reserves the right to modify or withdraw this announcement at any time without notice. This announcement is provided for your information only. Additional terms of use are located at

<http://www.ibm.com/legal/us/en/>

For the most current information regarding IBM products, consult your IBM representative or reseller, or visit the IBM worldwide contacts page

<http://www.ibm.com/planetwide/ca/>