

IBM Power E1050 enterprise midrange technology-based server delivers optimized, cost-effective performance and scale to meet today's business needs

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At a glance

The IBM^(R) Power^(R) E1050 server (9043-MRX) is an enhanced enterprise class four-socket, 4U server that provides massive scalability and flexibility. This system is agile and delivers extreme density in an energy-efficient design with superior reliability and resiliency. It will provide enterprise clients with a secure and flexible environment that balances mission-critical and modernization applications to deliver a frictionless hybrid cloud experience.

Power E1050 features include:

- IBM Power10 processor modules with 12, 18, or 24 cores options.
 - Twelve-core processor modules provide up to 48 cores per system typical 3.35--4.0 GHz (max).
 - Eighteen-core processor modules provide up to 72 cores per system typical 3.20--4.0 GHz (max).
 - Twenty-four-core processor modules provide up to 96 cores per system typical 2.95--3.90 GHz (max).
- Enterprise class 4U differential dual in-line memory module (DDIMM) memory technology with enhanced reliability, availability, and serviceability with 256 GB to 16 TB of memory capacity.
 - A two-processor module configuration provides 32 DDIMM slots and a maximum of 8 TB.
 - A three-processor module configuration provides 48 DDIMM slots and a maximum of 12 TB.
 - A four-processor module configuration provides 64 DDIMM slots and a server maximum of 16 TB.
- Peripheral Component Interconnect^(R) Express (PCIe) slots.
 - System unit supports up to 11 PCIe Gen5/4 slots.
 - One PCIe Gen4 slot reserved for default Ethernet adapter.
 - PCIe I/O expansion drawers support up to 48 additional PCIe slots.
- Up to ten nonvolatile memory express (NVMe) U.2 drive bays.
- Integrated USB controller provides two front and two rear USB ports.
- Additional storage can be attached.
 - Up to 1,536 SFF-2 bays for hard disk drives (HDDs) and solid-state drives (SSDs) with 64 EXP24SX I/O drawers.
 - Fibre Channel (FC) and local area network (LAN) adapters.

- Enterprise Base Machine Controller (eBMC) managed
- Titanium power supplies to meet the most stringent regulations on Power Supply Efficiency
- IBM Power Private Cloud with Dynamic Capacity (Elastic Capacity on Demand and Power Enterprise Pools 2.0).
- IBM Power to Cloud Rewards Program for IBM Lab Services engagements.
- Active Memory Expansion (AME) and Active Memory Mirroring (AMM) for Hypervisor.
- Packaged in a standard 19-inch rack mount 4U drawer.
- Support for IBM AIX^(R), Linux^(R) and VIOS operating systems.
- Standard three-year warranty with IBM Power Expert Care services

Overview

Power enterprise servers combines cloud management with leadership performance, scale, reliability, availability, and security to efficiently run the most data-intensive, mission-critical workloads.

The new Power E1050 (9043-MRX) server is designed to improve scale performance and security while delivering class-leading reliability. This design responds faster to business demands, protects data from core to cloud, and streamlines insights and automation. The enterprise family of systems can help deliver business agility by extending mission-critical workloads across a hybrid cloud with increased flexibility.

- **Respond faster to business demands:** The Power10 processor delivers higher levels of performance as compared to IBM Power9 for the same workloads without increasing energy or carbon footprint, enabling more efficient scaling. Power Private Cloud with Dynamic Capacity includes metering of Linux, OpenShift^(R), and AIX environments for flexible consumption consistently across public, private, and hybrid cloud when combined with the Power E1050.
- **Protect data from core to cloud:** You can support end-to-end security with simplified encryption using memory encryption at the processor level--without management overhead or performance impact. Power10 can also help you to stay ahead of future threats with support for post-quantum cryptography and fully homomorphic encryption.
- **Streamline insights and automation:** You can deduce insights faster as compared to Power9 from enhanced in-core AI inferencing capability with no additional specialized hardware required. You can extract insights from your most sensitive data where it resides, eliminating the time and risk of data movement.
- **Maximize availability and reliability:** You can help ensure your business stays up and running with built-in advanced recovery and self-healing for infrastructure redundancy and disaster recovery (DR) in IBM Cloud^(R).

The Power E1050 server includes the following additional software and services:

- **IBM Cloud Management Console (CMC) for Power.** CMC is a cloud-native platform that provides apps that give powerful insights into your Power infrastructure across data centers and geographies. With no additional software or infrastructure setup, you can get single pane of glass views of your inventory, software levels, resource capacity utilization, as well as launch-in-context of your on-premises software, such as IBM PowerVC and IBM PowerHA^(R). Each new Power E1050 server purchase includes 36 months of CMC service, which can be renewed. For more information, visit [IBM Cloud Management Console](#) website.
- **Open source cloud automation and configuration tooling for AIX.** IBM has expanded its commitment to keep key open source cloud management packages updated and to provide timely security fixes to enable you to leverage open source skills. The Power E1050 enables you to take advantage of key packages recently provided to enable cloud automation, including:
 - **chef** automation for configuration, deployment, and management. IBM is collaborating with clients in this community to provide useful resources for using chef with AIX systems.

- **yum** package management is available with repository access from both ftp and https protocols. rpm is also updated to enable automatic dependency discovery.
- **cloud-init** and all dependencies are available in the repository and includes support for licensed AIX users. For more information, see the [AIX Toolbox for Open Source Software](#) website.
- **Securely connect system-of-record workloads and data-to-cloud native applications.** IBM API Connect^(R) and IBM WebSphere^(R) Connect provide secure connectivity to cloud-based applications, giving you the ability to rapidly develop new applications and services, thereby helping accelerate your time to value. IBM's Power to Cloud services can help you get started with these solutions and in designing new applications that leverage IBM Cloud. Cloud enables you to rapidly build, deploy, and manage your cloud applications, while tapping a growing ecosystem of available services and runtime frameworks.
- **eBMC** is built on Open BMC Linux Foundation Project, with industry collaboration and industry-standard APIs.
- **Power to Cloud Rewards Program.** The Power to Cloud Rewards Program helps you design, build, and deliver cloud platforms on Power. Clients purchasing a Power E1050 server earn 5,000 IBM Power to Cloud Reward Program points per system. The points can be used for a range of services to transform traditional IT platforms to private and hybrid cloud platforms. Power to Cloud Reward Program service offerings leverage the proven expertise of IBM Systems Lab Services consultants. Visit ibm.biz/PowertoCloud or contact your IBM representative, IBM Business Partner, or ibmsls@us.ibm.com for full program details.

Power E1050 hardware components

The Power E1050 server delivers a high-performing and reliable four-socket system, with simultaneous multithreading of up to eight threads per core (SMT8). Each Power E1050 server's Power10 dual-chip module delivers 409 GB/sec of memory bandwidth per socket. I/O bandwidth is also increased to double that of the predecessor Power9 systems with the introduction of PCIe Gen5 integrated controllers.

The Power E1050 server utilizes the following Power10 processor options:

- Twelve-core with up to 48 cores typical 3.35--4.0 GHz (max)
- Eighteen-core with up to 72 cores typical 3.2--4.0 GHz (max)
- Twenty-four-core with up to 96 cores typical 2.95--3.90 GHz (max)

A minimum of two processor modules must be installed in each system, with a minimum quantity of one processor module's cores activated.

A Power E1050 server supports the following memory options:

- 64 GB (2x32GB) DDR4 DDIMMs, or
- 128 GB (2x64GB) DDR4 DDIMMs, or
- 256 GB (2x128GB) DDR4 DDIMMs, or
- 512 GB (2x256GB) DDR4 DDIMMs

E1050 provides 16 DDIMMs per socket to enable a maximum configuration of 16 TB. Minimum of 4 DDIMMs per socket must be installed.

A minimum of 50% or 256 GB, whichever is higher, of installed memory must be activated.

The PCIe capabilities provide up to 11 PCIe slots:

- Two PCIe Gen5 x8
- Three PCIe Gen4 x8
- Six PCIe Gen4 x16 or Gen5 8x

PCIe slots support concurrent maintenance (hot plug).

Additional PCIe adapters can be attached through up to four PCIe I/O expansion drawers, providing up to 48 additional PCIe Gen3 slots.

The external USB DVD plugs into one of the two front USB ports.

The Power E1050 server comes standard with phase-redundant power regulators for processors, memory, disk, and I/O. Hot-plug, redundant power supplies and a hot-plug time-of-day battery are also standard, and AMM for Hypervisor is available as an option.

Key requirements

One of the following operating systems is required:

- AIX
- Linux: Red Hat^(R) Enterprise Linux (RHEL) or SUSE Linux Enterprise Server (SLES)

For more information, see the [Hardware requirements](#) section and [Software requirements](#) section.

Planned availability date

July 22, 2022

July 26, 2022, for the software enablement for Power E1050 Healthcare Solution Edition

November 18, 2022, for the following feature: 512 GB (2 x 256 GB) DDIMM Memory (#EM7J)

September 16, 2022, in South Africa

Availability within a country is subject to local legal requirements.

Description

Power E1050 feature summary

The following features are available on the new Power E1050 server:

- The Power E1050 supports 24 to 96 processor cores with two to four Power10 processor modules.
- The Power E1050 delivers 256 GB--16 TB high-performance DDR4 memory.
- Each Power E1050 server can support up to 10 NVMe U.2 storage devices.
- Up to 11 hot-swap PCIe slots in the system unit:
 - 6 PCIe Gen5 x8 or Gen4 x16 slots.
 - 3 PCIe Gen4 x8 slots.
 - 2 PCIe Gen5 x 8 slots.
 - With two processor modules, there are seven PCIe slots; with three modules and four modules, there are eleven PCIe slots.
- The PCIe I/O Expansion Drawer (#EMX0) expands the number of full-high, hot-swap slots:
 - Up to two PCIe drawers with two processor modules (maximum 31 slots on the server).

- Up to three PCIe drawers with three processor modules (maximum 41 slots on the server).
- Up to four PCIe drawers with four processor modules (maximum 51 slots on the server).
- Up to 64 EXP24SX SFF Drawers (#ESLS) can be attached, providing up to 1,536 SAS bays for disks or SSDs.
- System unit I/O (integrated I/O):
 - USB 3.0 ports: four 3.0 ports, two front and two rear.
 - USB 2.0 ports: two rear 2.0 ports for limited use.
 - HMC ports: two 1 GbE RJ45.
- Four hot-plug and redundant power supplies 2300 W (200--240 V AC) (#EB39).
- System unit only 4U in a 19-inch rack-mount hardware.
- Primary operating systems:
 - AIX (#2146): small-tier licensing.
 - Linux (#2147): RHEL and SLES.

Processor modules

- The Power E1050 supports 24 to 96 processor cores:
 - Twelve-core typical 3.35--4.0 GHz (max) #EPEU Power10 processor.
 - Eighteen-core typical 3.20--4.0 GHz (max) #EPEV Power10 processor.
 - Twenty-four-core typical 2.95--3.90 GHz (max) #EPGW Power10 processor.
- A minimum of two and a maximum of four processor modules are required for each system. The modules can be added to a system at a later time through an MES order, but they will require scheduled downtime to install. All processor modules in one server must be the same gigahertz (same processor module feature number). They cannot be mixed.
- Permanent CoD processor core activations are required for the first processor module in the configuration and are optional for the second, third, and fourth modules. Specifically:
 - Two, three, or four 12-core, typical 3.35--4.0 GHz (max) processor modules (#EPEU) require 12 processor core activations (#EPUR) at a minimum.
 - Two, three, or four 18-core, typical 3.20--4.0 GHz (max) processor modules (#EPEV) require 18 processor core activations (#EPUS) at a minimum.
 - Two, three, or four 24-core, typical 2.95--3.90 GHz (max) processor modules (#EPGW) require 24 processor core activations (#EPYT) at a minimum.
- Temporary CoD capabilities are optionally used for processor cores that are not permanently activated:
 - An HMC is required for temporary CoD.

System memory

- 256 GB--16 TB high-performance up to 3200 MHz DDR4 OMI memory:
 - 64 GB DDR4 (2 x 32GB DDIMM's) Memory (#EM75).
 - 128 GB DDR4 (2 x 64GB DDIMM's) Memory (#EM76).
 - 256 GB DDR4 (2 x 128GB DDIMM's) Memory (#EM77).
 - 512 GB DDR4 (2 x 256GB DDIMM's) Memory (#EM7J).
 - Optional Active Memory Expansion (#EMBM).
- As your memory requirements increase, the system capabilities are increased as follows:
 - With two processor modules installed, 32 DDIMM slots are available; minimum memory is 256 GB.
 - With three processor modules installed, 48 DDIMM slots are available; minimum memory is 384 GB.

- With four processor modules installed, 64 DDIMM slots are available; minimum memory is 512 GB. Sixteen DDIMMs are available per socket.
- The more DDIMM slots that are filled, the larger the available bandwidth available to the server.

Permanent CoD memory activations are required for at least 50% of the physically installed memory or 256 GB of activations, whichever is larger. Use 1 GB activation (#EMCP) and 100 GB activation (#EMCQ) features to order permanent memory activations.

- Temporary CoD for memory is available for memory capacity that is not permanently activated:
 - Delivery through Virtual Capacity machine type/model (MTM) (4586-COD) using Entitled Systems Support (ESS) process.
 - An HMC is required for temporary CoD.

Notes:

- A memory feature code consists of 2 DDIMMs.
- The Minimum memory orderable is 4 DDIMMs per processor socket.
- For 2-socket system, minimum memory orderable is 8 DDIMMs.
- For 3-socket system, minimum memory orderable is 12 DDIMMs.
- For 4-socket system, minimum memory orderable is 16 DDIMMs.
- Next memory increment is multiple of 4 DDIMMs.
- All DDIMMs belong to a processor must be of same size and type, i.e. same feature code.
- Each processor socket can have different total memory capacity from other processor sockets.
- The minimum memory supported per two Power10 processors installed is 256 GB.
- The minimum memory supported per three Power10 processors installed is 384 GB.
- The minimum memory supported per four Power10 processors installed is 512 GB.

Storage options

The Power E1050 supports up to ten NVMe 7-milimeter or 15-milimeter drives:

- Six NVMe drives within two or three-socket configuration
- Ten NVMe drives within a four-socket configuration

All NVMe drives are driven directly from the system backplane with no PCIe card or cables required.

The 7-millimeter NVMe drives from the IBM Power E950 are also supported on the Power E1050 with a carrier conversion feature that is offered to hold these drives.

Power Private Cloud Solution with Dynamic Capacity

The Power Private Cloud Solution with Dynamic Capacity is an infrastructure offering that enables you to take advantage of cloud agility and economics while getting the same business continuity and flexibility that you already enjoy from Power servers. The Power Private Cloud Solution offers:

- Cost optimization with pay-for-use pricing
- Automated and consistent IT management with Red Hat Ansible^(R) for Power
- IBM Proactive Support for Power services
- IBM Systems Lab Services Assessment and implementation assistance

Both Elastic and Shared Utility Capacity options are now available on all Power E1050 systems through the Virtual Capacity (4586-COD) MTM and the [ESS](#) website.

Elastic Capacity on the Power E1050 system enables you to deploy pay-for-use consumption of processor, memory, and supported operating systems, by the day, across a collection of Power E1050 and Power E950 systems.

Shared Utility Capacity on Power E1050 systems provides enhanced multisystem resource sharing and by-the-minute tracking and consumption of compute resources across a collection of systems within a Power Enterprise Pools (2.0). It delivers a complete range of flexibility to tailor initial system configurations with the right mix of purchased and pay-for-use consumption of processor, memory, and software. Clients with existing Power Enterprise Pools of Power E950 systems can simply add Power E1050 systems into their pool and migrate to them at the rate and pace of their choosing, as any Power E950 and Power E1050 server may seamlessly interoperate and share compute resources within the same pool.

A Power Private Cloud Solution infrastructure consolidated onto Power E1050 systems has the potential to greatly simplify system management so IT teams can focus on optimizing their business results instead of moving resources around within their data center.

Shared Utility Capacity resources are easily tracked by virtual machine (VM) and monitored by a CMC, which integrates with local HMCs to manage the pool and track resource use by system and VM, by the minute, across a pool.

You no longer need to worry about overprovisioning capacity on each system to support growth, as all available processor and memory on all systems in a pool are activated and available for use.

Base Capacity for processor, memory, and supported operating system entitlement resources is purchased on each Power E950 and Power E1050 system and is then aggregated across a defined pool of systems for consumption monitoring.

Metered Capacity is the additional installed processor and memory resource above each system's Base Capacity. It is activated and made available for immediate use when a pool is started, then monitored by the minute by a CMC.

Metered resource usage is charged only for minutes exceeding the pool's aggregate Base resources, and usage charges are debited in real-time against your purchased Capacity Credits (5819-CRD) on account.

IBM offers a Private Cloud Capacity Assessment and Implementation Service performed by Systems Lab Services professionals, which can be preselected at time of purchase or requested for qualifying Power E1050 servers.

I/O support

PCIe slots

The Power E1050 server has up to eight PCIe Gen5 and three PCIe Gen4 general purpose hot-plug slots, providing configuration flexibility and expandability. Six adapter slots are x16 Gen5/4, two adapter slots are x8 Gen5, and three adapter slots are x8 Gen4 . All adapter slots are full height, half length.

The number of slots supported vary by the number of processor modules.

Processor modules	2 socket	3/4 socket
x16 Gen4 or x8 Gen5 slots	2	6
x8 Gen4 slots	3	3
x8 Gen5 slots	2	2

Notes:

- The PCIe Genx8 slot, C1, is reserved for an Ethernet adapter to help ensure proper manufacture and test of the server.

- Blind-swap cassettes (BSC) are used for adapters in the system unit.
- All PCIe slots in the system unit are single root I/O virtualization (SR-IOV) capable.
- Each NVMe SSD interface is a Gen4 x4 PCIe bus. The NVMe drives can be in an OS-controlled RAID0, RAID1 array. Hardware RAID is not supported on the NVMe drives.

The x16 slots can provide up to twice the bandwidth of x8 slots because they offer twice as many PCIe lanes. PCIe Gen5 slots can support up to twice the bandwidth of a PCIe Gen4 slot and up to four times the bandwidth of a PCIe Gen3 slot, assuming an equivalent number of PCIe lanes. PCIe Gen1, PCIe Gen2, PCIe Gen3, PCIe Gen4, and PCIe Gen5 adapters can be plugged into a PCIe Gen5 slot, if that adapter is supported. The x16 slots and selective x8 slots can be used to attach PCIe Gen3 I/O expansion drawers.

This server is smarter than earlier servers about energy efficiency for cooling the PCIe adapter environment. They can sense which IBM PCIe adapters are installed in their PCIe slots. If an adapter is known to require higher levels of cooling, they automatically speed up fans to increase airflow across the PCIe adapters.

USB DVD external and boot devices

The Power E1050 provides two front USB ports, mainly to support the external USB DVD.

System boot is supported through these options:

1. NVMe drives
2. A SAN attached to FC or FCoE adapters and indicated to the server by the 0837 specify code
3. USB front port for external USB-based DVD
4. USB front port for USB memory key/flash drive

Assuming option 1 above, the minimum system configuration requires at least one NVMe disk drive in the system for AIX and Linux.

I/O drawer attachment

Clients migrating from earlier-generation servers may have been using I/O drawers such as the GX++ attached feature 5802 or feature 5877 PCIe 12X I/O drawers with PCIe Gen1 slots. Though most PCIe adapters in the feature 5802 or feature 5877 drawers can be moved to this server and its disk drives converted and moved to the feature ESLS EXP24SX drawer, the feature 5802 and feature 5877 drawers are not supported on this newer Power technology-based server. Similarly, the GX++ attached EXP30 Ultra SSD Drawer (#EDR1 or #5888) is not supported.

Up to 64 EXP24SX storage drawers can be attached to a Power E1050 server. With 24 drives per drawer, this means up to 1,536 SFF-2 drives are supported. A maximum of 16 EXP24SX per PCIe Gen3 I/O drawer is supported due to cable management considerations.

The older 3.5-inch-based EXP12S SAS Disk Drawer (#5886) and EXP24 SCSI Disk Drawer (#5786) are not supported.

IBM offers a 1U multimedia drawer that can hold one or more DVDs, tape drive, or RDX docking stations. The 7226-1U3 is the most current offering. The earlier 7216-1U2 and 7214-1U2 are also supported. Up to six of these multimedia drawers can be attached.

PCIe I/O expansion drawer

PCIe I/O Expansion Drawers (#EMX0) can be attached to the system unit to expand the number of full-high, hot-swap slots available to the server. The maximum

number of PCIe I/O drawers depends on the number of processor modules physically installed. The maximum is independent of the number of processor core activations.

- Up to two PCIe drawers with two processor modules.
- Up to three PCIe drawers with three processor modules.
- Up to four PCIe drawers with four processor modules.
- The 19-inch 4 EIA (4U) PCIe I/O Expansion Drawer (#EMX0) and two PCIe fanout modules (#EMXH) provide 12 PCIe I/O full-length, full-height slots. One fanout module provides six PCIe slots labeled C1 through C6. Slots C1 and C4 are x16 slots, and C2, C3^(R), C5, and C6 are x8 slots. All six slots in a PCIe3 6-slot fanout module are SR-IOV enabled. The feature EC2S and feature EC2U adapters are supported in slots C1 through C6, but only four feature EC2S and feature EC2U adapters can be in SR-IOV shared mode at a time.
- An EMX0 drawer can be configured with one or two EMXH fanout modules. Adding a second fanout module is not a hot-plug operation and requires scheduled downtime.
- PCIe Gen1, Gen2, and Gen3 full-high adapter cards are supported. The set of full-high PCIe adapters that are supported is found in the Sales Manual, identified by feature number. See the PCI Adapter Placement manual for the Power E1050 for details and rules associated with specific adapters supported and their supported placement in x8 or x16 slots.
- Each fanout module requires one PCIe Cable Adapter (#EJ2A), which is placed in a x16 PCIe slot and selective x8 slots of the system unit.
- A cable pair attaches the PCIe Cable Adapter (#EJ2A) to the fanout module. Feature ECC7 provides a pair of 3-meter optical cables with transceivers. Feature ECC8 provides a pair of 10-meter optical cables with transceivers. Feature ECCS provides a pair of 3-meter copper cables. Two cables of identical length, or one feature, is required for each fanout module. Optical cables are smaller diameter and more flexible and can be longer than the copper cables. Copper cables are lower cost. Copper and optical cables have the same performance and reliability characteristics.
- The cable adapter (#EJ2A) can be placed in any of the system units' available x16 slots and selective x8 slot and attached to any fanout module in any of the server's PCIe I/O drawers (#EMX0). The PCIe I/O drawer cannot be shared by two different servers.
- *Recommendation:* Locate any attached PCIe I/O expansion drawer in the same rack as the Power10 server for ease of service. However, the drawers can be installed in separate racks if the application or other rack content requires it. It is recommended to use 3-meter cables for PCIe drawers in the same rack as the system unit and 10-meter cables for drawers located in a different rack.
- Concurrent repair and add/removal of PCIe adapter cards is done by HMC-guided menus or by operating system support utilities.
- When the operating system is Linux, PowerVM^(R) is required for support of the I/O expansion drawer.

Rack cable brackets

The cable bracket is used to secure the communications cables so that they can be raised to remove the blind swap cassettes containing the PCIe adapters. To enable the server to be pulled forward on its rails for service access to memory, processors and voltage regulator modules requires the disconnecting the cables from the server.

Integrated I/O ports

E1050 integrated IO consists of four Operating System (OS) USB 3.0 port and those of the service processor eBMC. Two of the four OS USB 3.0 ports are at the front and 2 are at the rear physically on the eBMC card tailstock. The front OS USB 3.0 ports have higher current capacity than the two rear USB 3.0. The front USB 3.0 ports are typically used for the external DVD drive and for other general USB devices such as USB key. The two rear USB 3.0 are typical used for general USB devices such as USB key. Do not use the rear USB 3.0 port for external DVD drive.

The eBMC integrated IO consists of two Ethernet RJ45 ports and two USB 2.0 ports. All these ports are at the eBMC card tailstock, together with 2 OS USB 3.0 ports.

The two eBMC Ethernet are typically used for HMC connection, one for the primary HMC and the other could be used for an HMC secondary.

When HMC is not used, one of the Ethernet ports is typically connected to a network so that eBMC interface can be used to control and manage the system by means of the GUI, Redfish interface or command line .

The eBMC two USB2.0 can be used for USB key to update eBMC code or for Uninterruptible Power System (UPS) control cable. For UPS application, a converter cable, feature code ECCF, provides a USB-to-9-pin, D-shell connection to some UPS. The IBM 9910 Uninterruptible Power System, models E66 and E67, are supported as purchase options with the Power E1050 server.

Racks

The Power E1050 server is designed to fit a standard 19-inch rack. IBM Development has tested and certified the system for the following rack support:

- 7965-S42 (42U): field integration only
- 7014-T42 (42U): supported only

Clients can choose to place the server in other racks if they are confident those racks have the strength, rigidity, depth, and hole-pattern characteristics that are needed. Clients should work with IBM Service to determine the appropriateness of other racks. The Power E1050 rails can adjust their depth to fit a rack that is 22.75 inches--30.5 inches in depth based on the adjustable outer brackets going from the front rail to the rear rail.

IBM Manufacturing does not support the use of other racks with the Power E1050 initial system order or model upgrade. The 7965-S42 (#ECR0) or 7014-T42 (#0553) are 2-meter enterprise racks that provide 42U or 42 EIA of space.

Additional Power E1050 PCIe I/O Drawers (#EMX0) for an already-installed server can be MES ordered with or without a rack.

Typical good cable management practices apply. For example, it is usually a good practice to leave 1U or 2U open at the top or bottom of the rack for cables exiting the rack or to hold extra cable lengths. Or if you have more than four PCIe I/O drawers in the same rack, carefully consider how many four-port PCIe adapters have cables attached to all their ports. If you are not using something like the 8-inch extension for a 7965-S42 rack for extra space to lay the cables, service access can be a challenge, especially with thicker I/O cables. Or another example, if there are a lot of I/O cables in the rack, horizontally mounting the power distribution units (PDUs) versus mounting them vertically in the side pockets eases service access.

Rack front door options supported are the acoustic door (#6248 or #6249), the attractive geometrically accented door (#ERG7), and the cost-effective plain front door (#6068 or #6069). The front trim kit is also supported (#6263 or #6272).

PDUs

Using previously provided IBM PDU features 7188, 7109, and 7196 reduces the number of Power E1050 servers and other equipment that can be held most efficiently in a rack. The high-function PDUs provide more electrical power per PDU and thus offer better PDU footprint efficiency. In addition, they are intelligent PDUs that provide insight to actual power usage by receptacle and also provide remote power on/off capability for easier support by individual receptacle. The new PDUs are features ECJJ, ECJL, ECJN, and ECJQ.

IBM Manufacturing will only integrate the newer PDUs with the Power E1050 server. IBM Manufacturing does not support integrating earlier PDUs, such as the feature

7188, 7109, or 7196. You can choose to use older IBM PDUs in your racks, but you will have to install those earlier PDUs at your site.

	1-phase or 3-phase wye, depending on country wiring standards	3-phase 208 V, depending on country wiring standards
Nine C19 receptacles	#ECJJ	#ECJL
Twelve C13 receptacles	#ECJN	#ECJQ

- High-Function 9 x C19 PDU: Switched, Monitoring (#ECJJ)** . This is an intelligent, switched 200--240 V AC PDU with nine C19 receptacles on the front of the PDU. The PDU is mounted on the rear of the rack, making the nine C19 receptacles easily accessible. Each receptacle has a 20-amp circuit breaker. Depending on country wiring standards, the PDU is single-phase or three-phase wye. The PDU can be mounted vertically in rack side pockets, or it can be mounted horizontally. If mounted horizontally, it uses 1 EIA (1U) of rack space. Device power cords with a C20 plug connect to C19 PDU receptacles and are ordered separately. One country-specific wall line cord is also ordered separately and attaches to a UTG524-7 connector on the front of the PDU. Supported line cords include features 6489, 6491, 6492, 6653, 6654, 6655, 6656, 6657, 6658, and 6667.
- High-Function 9 x C19 PDU 3-Phase: Switched, Monitoring (#ECJL)** . This is an intelligent, switched 208 V three-phase AC PDU with nine C19 receptacles on the front of the PDU. The PDU is mounted on the rear of the rack, making the nine C19 receptacles easily accessible. Each receptacle has a 20-amp circuit breaker. The PDU can be mounted vertically in rack side pockets, or it can be mounted horizontally. If mounted horizontally, it uses 1 EIA (1U) of rack space. Device power cords with a C20 plug connect to C19 PDU receptacles and are ordered separately. One wall line cord is provided with the PDU (no separate feature number) and has an IEC60309 60A plug (3P+G). The PDU supports up to 48 amps. Two RJ45 ports on the front of the PDU enable you to monitor each receptacle's electrical power usage and to remotely switch any receptacle on or off. The PDU is shipped with a generic PDU password, and IBM strongly urges clients to change it upon installation.
- High-Function 12 x C13 PDU: Switched, Monitoring (#ECJN)** . This is an intelligent, switched 200--240 V AC PDU with twelve C13 receptacles on the front of the PDU. The PDU is mounted on the rear of the rack, making the twelve C13 receptacles easily accessible. Each receptacle has a 20-amp circuit breaker. Depending on country wiring standards, the PDU is single-phase or three-phase wye. The PDU can be mounted vertically in rack side pockets, or it can be mounted horizontally. If mounted horizontally, it uses 1 EIA (1U) of rack space. Device power cords with a C14 plug connect to C13 PDU receptacles and are ordered separately. One country-specific wall line cord is also ordered separately and attaches to a UTG524-7 connector on the front of the PDU. Supported line cords include features 6489, 6491, 6492, 6653, 6654, 6655, 6656, 6657, 6658, and 6667. Two RJ45 ports on the front of the PDU enable you to monitor each receptacle's electrical power usage and to remotely switch any receptacle on or off. The PDU is shipped with a generic PDU password, and IBM strongly urges clients to change it upon installation.
- High-Function 12 x C13 PDU 3-Phase: Switched, Monitoring (#ECJQ)** . This is an intelligent, switched 208 V three-phase AC PDU with twelve C13 receptacles on the front of the PDU. The PDU is mounted on the rear of the rack, making the twelve C13 receptacles easily accessible. Each receptacle has a 20-amp circuit breaker. The PDU can be mounted vertically in rack side pockets, or it can be mounted horizontally. If mounted horizontally, it uses 1 EIA (1U) of rack space. Device power cords with a C14 plug connect to C13 PDU receptacles and are ordered separately. One wall line cord is provided with the PDU (no separate feature number) and has a IEC60309 60A plug (3P+G). The PDU supports up to 48 amps. Two RJ45 ports on the front of the PDU enable you to monitor each receptacle's electrical power usage and to remotely switch any receptacle on or off. The PDU is shipped with a generic PDU password, and IBM strongly urges clients to change it upon installation.

Lifting considerations

Three to four service personnel are required to manually remove or insert a system unit into a rack, given its dimensions, weight, and content. To avoid the need for this many people to assemble at your site for a service action, a lift tool can be very useful. If you have chosen to install this customer setup (CSU) system, similar lifting considerations apply.

The Power E1050 server has a maximum weight of 69 kilograms (153 pounds). However, by temporarily removing the power supplies, fans, and RAID assembly, the weight is easily reduced to a maximum of 55 kilograms (121 pounds).

When lowering the Power E1050 server onto its rails in the rack, the server must be tilted on one end about 15 degrees so that the pins on the server enclosure fit onto the rails. This equates to lifting one end of the server about 4 centimeters (1.6 inches). This can be done using a tip plate on a lift tool or manually adjusting the load on a lift tool or tilting during the manual lift. Consider the optional feature EB2Z lift tool.

PowerVM Enterprise Edition License Entitlement is now included with each Power E1050 server.

PowerVM Enterprise Edition is available as a hardware feature (#EPVV) and supports up to 20 partitions per core, VIOS, and multiple shared processor pools. It also offers LPM, Active Memory Sharing, and PowerVP performance monitoring.

Other PowerVM technologies include:

- System Planning Tool simplifies the process of planning and deploying IBM Power LPARs and virtual I/O.
- VIOS is a single-function appliance that resides in a Power partition. It facilitates the sharing of physical I/O resources between AIX, Linux, and client partitions within the server. VIOS provides shared Ethernet adapter (SEA) virtual I/O to client LPARs.
- Virtual SCSI (VSCSI) enables the sharing of physical storage adapters (FC) and storage devices (disk and optical) between logical partitions.
- With virtual networking, a SEA enables connectivity between internal and external virtual LANs (VLANs); virtual Ethernet provides high-speed connections between partitions.

With LPM, you can move a running AIX or Linux VM from one physical server to another with no downtime. You can use this capability to:

- Evacuate workloads from a system before performing scheduled maintenance.
- Move workloads across a pool of different physical resources as business needs shift.
- Move workloads away from underutilized machines so that they can be powered off to save on energy and cooling costs.
- Move your workloads to new Power10 systems for upgrades without having to schedule an outage. With Active Memory Sharing, memory is dynamically moved between running partitions for optimal resource usage.

Active Memory Expansion

AME is an innovative technology supporting the AIX operating system that helps enable the effective maximum memory capacity to be larger than the true physical memory maximum. Compression or decompression of memory content can enable memory expansion up to 100% or more. This can enable a partition to do significantly more work or support more users with the same physical amount of memory. Similarly, it can enable a server to run more partitions and do more work for the same physical amount of memory.

AME uses CPU resource to compress or decompress the memory contents. The trade-off of memory capacity for processor cycles can be an excellent choice, but the degree of expansion varies on how compressible the memory content is. It also

depends on having adequate spare CPU capacity available for this compression or decompression.

Power10 chips include a hardware accelerator designed to boost AME efficiency and use less Power core resource. The Power10 accelerator includes some minor enhancements and also leverages Power10 higher bandwidth and lower latency characteristics.

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

A planning tool is included with AIX, enabling you to sample actual workloads and estimate both how expandable the partition's memory is and how much CPU resource is needed. Any Power model can run the planning tool. In addition, a one-time, 60-day trial of AME is available to enable more exact memory expansion and CPU measurements. You can request the trial using the [Power Capacity on Demand](#) website.

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

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

IBM Power E1050 Solution Edition for Healthcare

The Power E1050 Solution Edition for Healthcare provides a cost-effective up to 96-core processor and 16 TB memory solution for eligible healthcare industry clients running approved ISV applications, such as Epic.

- Solution Edition for Healthcare 24-core typical 2.95--3.90 GHz processor (#EHC8)
- Processor Activations (24) for #EHC8 (#EPYT)
- No-cost Processor Activations (#EHCA)
- Memory Activation (512 GB) for #EHC8 (#EMCE)
- No-cost Memory Activation (512 GB) (#EHCB)

The Power E1050 Solution Edition for Healthcare minimum requirement is a server with 2x typical 2.95--3.90 GHz processor modules, 48 cores (all active), and 1 TB memory (all active).

Note: For every purchased Processor Activation #EPYT, get one free activation #EHCA up to the max in the table below. Additional #EPYT may be purchased without #EHC8 required.

Sockets	Required feature EHC8	Processor Activation #EPYT		Free Processor Activation of #EHCA	Total maximum Processor Activations
		Min	Max		
2	2	24	24	up to 24	up to 48
3	3	24	36	up to 36	up to 72
4	4	24	48	up to 48	up to 96

Note: For every purchased Memory Activation #EMCE, get one free activation #EHCB up to the max in the table below. Additional #EMCE may be purchased without #EHC8 required.

Sockets	Required feature EHCS	Memory Activation #EMCE		Free Memory Activation of #EHCB	Total maximum Memory Activations
		Min	Max		
2	2	1	2	up to 2	up to 2 TB
3	3	1	3	up to 3	up to 3 TB
4	4	1	4	up to 4	up to 4 TB

For eligibility rules and registration of the Power Solution Edition for Healthcare by the sales channel, go to the [IBM Power Solution Editions](#) website.

Reliability, Availability, and Serviceability

Reliability, fault tolerance, and data correction

The reliability of systems starts with components, devices, and subsystems that are designed to be highly reliable. 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 Power10 processor-based E1050 system comes with the following RAS characteristics:

- Power10 processor RAS
- Open Memory Interface, differential DIMMs RAS
- Enterprise BMC service processor for system management and service
- Active Memory Mirroring for Hypervisor
- NVMe drives concurrent maintenance
- PCIe adapters concurrent maintenance
- Redundant and hot-plug cooling
- Redundant and hot-plug power
- Redundant voltage regulators
- Time-of-day battery concurrent maintenance
- Lightpath enclosure and FRU LEDs
- Service and FRU labels
- Client or IBM install
- Proactive support and service -- call home
- Client or IBM service

Service processor

The Power10 processor-based E1050 system comes with a redesigned service processor based on a Baseboard Management Controller (BMC) design with firmware that is accessible through open-source industry standard APIs, such as Redfish. An upgraded ASMI web browser user interface preserves the required RAS functions while allowing the user to perform tasks in a more intuitive way.

Diagnostic monitoring of recoverable error from the processor chipset is performed on the system processor itself, while the fatal diagnostic monitoring of the processor chipset is performed by the service processor. 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 BMC service processors menus (ASMI) can be accessed concurrently during system operation, allowing nondisruptive

abilities to change system default parameters, view and download error logs, check system health.

Redfish, an industry standard for server management, enables the Power servers to be managed individually or in a large data center. Standard functions such as inventory, event logs, sensors, dumps, and certificate management are all supported with Redfish. In addition, new user management features support multiple users and privileges on the BMC via Redfish or ASMI. User management via LDAP is also supported. The Redfish events service provides a means for notification of specific critical events such that actions can be taken to correct issues. The Redfish telemetry service provides access to a wide variety of data (eg. power consumption, ambient, core, DIMM and I/O temperatures, etc) that can be streamed on periodic intervals.

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 reports a service reference code when it detects surveillance loss. In the PowerVM environment, it will perform a reset/reload if it detects the loss of the service processor.

Environmental monitoring functions

The Power family does ambient and over temperature monitoring and reporting. It also adjusts fan speeds automatically based on those temperatures.

Memory subsystem RAS :

The Power10 processor-based E1050 system introduces a new 4U tall differential DIMM (DDIMM), which has new open CAPI memory interface known as OMI for resilient and fast communication to the processor. This new memory subsystem design delivers solid RAS as described below.

- **Memory Buffer:**The DDIMM contains a memory buffer with key RAS features, including protection of critical data/address flows using CRC, ECC, and parity, a maintenance engine for background memory scrubbing and memory diagnostics, and a Fault Isolation Register (FIR) structure, which enables firmware attention-based fault isolation and diagnostics.
- **OMI (Open Memory Interface):** The OMI interface between the memory buffer and processor memory controller is protected by dynamic lane calibration, as well as a CRC retry/recovery facility to retransmit lost frames to survive intermittent bit flips. A complete lane fail can also be survived by triggering a dynamic lane reduction from 8 to 4, independently for both up and downstream directions. A key advantage of the OMI interface is that it simplifies the number of critical signals that must cross connectors from processor to memory compared to a typical industry-standard DIMM design.
- **Memory ECC:** The DDIMM includes a robust 64-byte Memory ECC, with 8-bit symbols, capable of correcting up to five symbol errors (one x4 chip and one additional symbol), as well as retry for data and address uncorrectable errors.
- **Dynamic row repair:** To further extend the life of the DDIMM, the dynamic row repair feature can restore full use of a DRAM for a fault contained to a DRAM row, while system continues to operate.
- **Spare temperature sensors :** Each DDIMM provides spare temperature sensors, such that the failure of one does not require a DDIMM replacement.
- **Spare DRAMs:**4U DDIMMs include two spare x4 memory modules (DRAMs) per rank. These can be substituted for failed DRAMs during runtime operation. Combined with ECC correction, the 2 spares allow the 4U DDIMM to continue to function with 3 bad DRAMs per rank, compared to 1 (single device data correct) or 2 (double device data correct) bad DRAMs in a typical industry standard DIMM design. This extends self-healing capabilities beyond what is provided with dynamic row repair capability.

- **Spare power management integrated circuits (PMICs)** : 4U DDIMMs include PMICs such that the failure of one PMIC does not require a DDIMM replacement .

Power10 processor functions

As in Power9, the Power10 processor has the ability to do processor instruction retry for some transient errors and core-contained checkstop for certain solid faults. The fabric bus design with CRC and retry persists in Power10 where a CRC code is used for checking data on the bus and has an ability to retry a faulty operation.

Cache availability

The L2/L3 caches in the Power10 processor in the memory buffer chip are protected with double-bit detect, single-bit correct error detection code (ECC). In addition, a threshold of correctable errors detected on cache lines can result in the data in the cache lines being purged and the cache lines removed from further operation without requiring a reboot in the PowerVM environment.

Modified data would be handled through Special Uncorrectable Error handling. L1 data and instruction caches also have a retry capability for intermittent errors and a cache set delete mechanism for handling solid failures.

Special Uncorrectable Error handling

Special Uncorrectable Error (SUE) handling prevents an uncorrectable error in memory or cache from immediately causing the system to terminate. Rather, the system tags the data and determines whether it will ever be used again. If the error is irrelevant, it will not force a check stop. When and if data is used, I/O adapters controlled by an I/O hub controller would freeze if data were transferred to an I/O device, otherwise, termination may be limited to the program/kernel or if the data is not owned by the hypervisor.

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.

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 efficiently repair the system while attempting to minimize or eliminate impact to system operation. 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 client, an IBM representative, or an authorized warranty service provider.

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

- Design for SSR setup, install, and service
- Error Detection and Fault Isolation (ED/FI)
- First Failure Data Capture (FFDC)
- Light path service indicators
- Service and FRU labels available on the system

- Service procedures documented in IBM Documentation or available through the HMC
- Automatic reporting of serviceable events to IBM through the Electronic Service Agent Call Home application

Service environment

In the PowerVM environment, 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) or REST API. An HMC attached to the system enables support personnel (with client authorization) to remotely, or locally to the physical HMC that is in proximity of the server being serviced, log in to review error logs and perform remote maintenance if required.

The Power10 processor-based systems support several service environments:

- Attachment to one or more HMCs or vHMCs is a supported option by the system with PowerVM. 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 with PowerVM: A single partition owns all the server resources and only one operating system may be installed. The primary service interface is through the operating system and the service processor.
 - Partitioned system with NovaLink: In this configuration, the system can have more than one partition and can be running more than one operating system. The primary service interface is through the service processor.

Service interface

Support personnel can use the service interface to communicate with the service support applications in a server using an operator console, a graphical user interface on the management console or service processor, or an operating system terminal. The service interface helps to deliver a clear, concise view of available service applications, helping 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, hypervisor, and operating environment. The primary service interfaces are:

- LEDs
- Operator panel
- BMC Service Processor menu
- Operating system service menu
- Service Focal Point on the HMC or vHMC with PowerVM

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 enclosure fault LED, and 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 identify will occur to identify an enclosure in a rack. These enclosure LEDs will turn on solid and can be used to follow the light path from the enclosure and down to the specific FRU in the PowerVM environment.

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 service 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 so they can be resolved quickly. Elements of IBM's diagnostics strategy include:

- Provide a common error code format equivalent to a system reference code with PowerVM, 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 backend system.

Automatic diagnostics

The processor and memory FFDC technology is designed to perform without the need for recreate diagnostics nor require user intervention. Solid and intermittent errors are designed to be correctly detected and isolated at the time the failure occurs. Runtime and boot-time diagnostics fall into this category.

Standalone diagnostics

As the name implies, standalone or user-initiated diagnostics requires user intervention. The user must perform manual steps, including:

- Booting from the diagnostics CD, DVD, USB, or network
- Interactively selecting steps from a list of choices

Concurrent maintenance

The determination of whether a firmware release can be updated concurrently is identified in the readme information file that is released with the firmware. An HMC is required for the concurrent firmware update with PowerVM. In addition, concurrent maintenance of PCIe adapters and NVMe drives are supported with PowerVM. Power supplies, fans are hot pluggable.

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 service 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 such as DIMMs, processors, fans, adapter cards, and power supplies are installed.
- 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 or replace certain serviceable hardware components.

- Arrows: Numbered arrows are used to indicate the order of operation and the 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 in a certain order for the mechanical mechanisms to engage or disengage. Arrows generally improve the ease of serviceability.

QR labels

QR labels are placed on the system to provide access to key service functions through a mobile device. When the QR label is scanned, it will go to a landing page for Power10 processor-based systems that contains each MTM service functions of interest while physically located at the server. These include things such as installation and repair instructions, reference code look up, and so on.

Packaging for service

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

- Color coding (touch points): Blue-colored touch points delineate touchpoints on service components where the component can be safely handled for service actions such as removal or installation.
- 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, thumbscrews, 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, or if the system continues to operate, the error will be reported to the operating system. Hardware and software failures are recorded in the system log filesystem. When an HMC is attached in the PowerVM environment, 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.

The system has the ability to call home through the operating system to report platform-recoverable errors and errors associated with PCI adapters/devices.

In the HMC-managed environment, a call home service request will be initiated from the HMC 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 PowerVM Live Partition Mobility (LPM), users can migrate an AIX, IBM I, or Linux VM partition running on one Power partition system to another Power

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. The Power10 systems, using Power10 technology, support secure LPM, whereby the VM image is encrypted and compressed prior to transfer. Secure LPM uses on-chip encryption and compression capabilities of the Power10 processor for optimal performance.

Call home

Call home refers to an automatic or manual call from a client location to the 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 the Electronic Service Agent (ESA) imbedded in the HMC or through a version of ESA imbedded in the operating systems for non-HMC-managed or A version of ESA that runs as a standalone call home application. 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. See the next section for specific details on this application.

IBM Electronic Services

Electronic Service Agent and Client Support Portal (CSP) comprise the IBM Electronic Services solution, which is dedicated to providing fast, exceptional support to IBM clients. IBM Electronic Service Agent is a no-charge tool that proactively monitors and reports hardware events such as system errors and collects hardware and software inventory. Electronic Service Agent can help focus on the client's company business initiatives, save time, and spend less effort managing day-to-day IT maintenance issues. In addition, Call Home Connect Cloud web and mobile capability extends the common solution and offers IBM Systems- related support information applicable to servers and storage.

Details are available here: <https://clientvantage.ibm.com/channel/ibm-call-home-connect>.

System configuration and inventory information collected by Electronic Service Agent also can be used to improve problem determination and resolution between the client and the IBM support team. As part of an increased focus to provide even better service to IBM clients, Electronic Service Agent tool configuration and activation comes standard with the system. In support of this effort, a 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, see the "Security" section at the [IBM Electronic Service Agent](#).

Benefits: increased uptime

Electronic Service Agent is designed to enhance the warranty and maintenance service by potentially 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 24x7 monitoring and reporting means no more dependency on human intervention or off-hours client personnel when errors are encountered in the middle of the night.

Security: The Electronic Service Agent tool is designed to help secure the monitoring, reporting, and storing of the data at IBM. The Electronic Service Agent tool is designed to help securely transmit through the internet (HTTPS) to provide clients a single point of exit from their site. Initiation of communication is one way. Activating Electronic Service Agent does not enable IBM to call into a client's system.

For additional information, see the [IBM Electronic Service Agent](#) website.

More accurate reporting

Because system information and error logs are automatically uploaded to the IBM Support Center in conjunction with the service request, clients 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.

Client Support Portal

Client Support 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.

This web portal 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 client's IBM ID.

For more information on how to utilize client support portal, visit the following website or contact an IBM Systems Services Representative:

- <https://www.ibm.com/mysupport>

Statement of general direction

IBM intends to support SAP HANA on the IBM Power System E1050 (9043-MRX) in production mode, with the following Linux operating systems, following near-term certification of the environment.

- SUSE Linux Enterprise Server for SAP with SUSE Linux Enterprise Server 15 Service Pack 3, or later
- Red Hat Enterprise Linux for SAP with Red Hat Enterprise Linux 8.4 for Power LE, or later

Statements by IBM regarding its plans, directions, and intent are subject to change or withdrawal without notice at the sole discretion of IBM. Information regarding potential future products is intended to outline general product direction and 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 IBM products remain at the sole discretion of IBM.

Reference information

For additional information about IBM Power Expert Care, see announcement: [ZG22-0094](#), dated July 12, 2022

Product number

The following are newly announced features on the specific models of the IBM Power 9043 machine type:

Description	Machine type	Model number	Feature number
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IBM Power System E1050	9043	MRX	
Solution Delivery Integration (SDI) Bulk MES Order Indicator	9043	MRX	0003
EMEA Bulk MES Indicator	9043	MRX	0004
OEM Light Manufacturing Order Indicator - EMPTY	9043	MRX	0006
One CSC Billing Unit	9043	MRX	0010
Ten CSC Billing Units	9043	MRX	0011
Special Manufacturing Operations Indicator	9043	MRX	0098
AIX Partition Specify	9043	MRX	0265
Linux Partition Specify	9043	MRX	0266
UPS Factory Integration Specify	9043	MRX	0373
HMC Factory Integration Specify	9043	MRX	0374
Display Factory Integration Specify	9043	MRX	0375
Reserve Rack Space for UPS	9043	MRX	0376
Reserve Rack Space for HMC	9043	MRX	0377
Reserve Rack Space for Display	9043	MRX	0378
Customer Specified Placement	9043	MRX	0456
Load Source Not in CEC	9043	MRX	0719
Fiber Channel SAN Load Source Specify	9043	MRX	0837
Custom Service Specify, Rochester Minn, USA	9043	MRX	1140
300GB 15k RPM SAS SFF-2 Disk Drive (AIX/Linux)	9043	MRX	1953
600GB 10k RPM SAS SFF-2 HDD for AIX/Linux	9043	MRX	1964
Primary OS - AIX	9043	MRX	2146
Primary OS - Linux	9043	MRX	2147
Power Cord To PDU/UPS, (100-240V/16A)	9043	MRX	4558
Rack Integration Services: BP only	9043	MRX	4648
Rack Integration Services	9043	MRX	4649
Rack Indicator- Not Factory Integrated	9043	MRX	4650
Rack Indicator, Rack #1	9043	MRX	4651
Rack Indicator, Rack #2	9043	MRX	4652
Rack Indicator, Rack #3	9043	MRX	4653
Rack Indicator, Rack #4	9043	MRX	4654
Rack Indicator, Rack #5	9043	MRX	4655
Rack Indicator, Rack #6	9043	MRX	4656
Rack Indicator, Rack #7	9043	MRX	4657
Rack Indicator, Rack #8	9043	MRX	4658
Rack Indicator, Rack #9	9043	MRX	4659
Rack Indicator, Rack #10	9043	MRX	4660
Rack Indicator, Rack #11	9043	MRX	4661
Rack Indicator, Rack #12	9043	MRX	4662
Rack Indicator, Rack #13	9043	MRX	4663
Rack Indicator, Rack #14	9043	MRX	4664
Rack Indicator, Rack #15	9043	MRX	4665
Rack Indicator, Rack #16	9043	MRX	4666
Software Preload Required	9043	MRX	5000
PCIe2 4-port 1GbE Adapter	9043	MRX	5899
Power Cord 4.3m (14-ft), Drawer to IBM PDU (250V/10A)	9043	MRX	6458
Power Cord 4.3m (14-ft), Drawer To OEM PDU (125V, 15A)	9043	MRX	6460
Power Cord 4.3m (14-ft), Drawer to Wall/OEM PDU (250V/15A) U. S.	9043	MRX	6469
Power Cord 1.8m (6-ft), Drawer to Wall (125V/15A)	9043	MRX	6470
Power Cord 2.7m (9-ft), Drawer to Wall/OEM PDU			

(250V/10A)	9043	MRX	6471
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU (250V/16A)	9043	MRX	6472
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU (250V/10A)	9043	MRX	6473
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/13A)	9043	MRX	6474
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/16A)	9043	MRX	6475
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	9043	MRX	6476
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/16A)	9043	MRX	6477
Power Cord 2.7 M(9-foot), To wall/OEM PDU, (250V, 16A)	9043	MRX	6478
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (125V/15A or 250V/10A)	9043	MRX	6488
4.3m (14-Ft) 3PH/32A 380-415V Power Cord	9043	MRX	6489
4.3m (14-Ft) 1PH/63A 200-240V Power Cord	9043	MRX	6491
4.3m (14-Ft) 1PH/60A (48A derated) 200-240V Power Cord	9043	MRX	6492
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	9043	MRX	6493
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	9043	MRX	6494
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 10A)	9043	MRX	6496
Power Cable - Drawer to IBM PDU, 200-240V/10A	9043	MRX	6577
Power Cord 2.7M (9-foot), To wall/OEM PDU, (125V, 15A)	9043	MRX	6651
4.3m (14-Ft) 3PH/16A 380-415V Power Cord	9043	MRX	6653
4.3m (14-Ft) 1PH/30A (24A derated) Power Cord	9043	MRX	6654
4.3m (14-Ft) 1PH/30A (24A derated) WR Power Cord	9043	MRX	6655
4.3m (14-Ft) 1PH/32A Power Cord	9043	MRX	6656
4.3m (14-Ft) 1PH/32A Power Cord-Australia	9043	MRX	6657
4.3m (14-Ft) 1PH/30A (24A derated) Power Cord-Korea	9043	MRX	6658
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 15A)	9043	MRX	6659
Power Cord 4.3m (14-ft), Drawer to wall/OEM PDU (125V/15A)	9043	MRX	6660
Power Cord 2.8m (9.2-ft), Drawer to IBM PDU, (250V/10A)	9043	MRX	6665
4.3m (14-Ft) 3PH/32A 380-415V Power Cord-Australia	9043	MRX	6667
Power Cord 4.3M (14-foot), Drawer to OEM PDU, (250V, 15A)	9043	MRX	6669
Power Cord 2.7M (9-foot), Drawer to IBM PDU, 250V/10A	9043	MRX	6671
Power Cord 2M (6.5-foot), Drawer to IBM PDU, 250V/10A	9043	MRX	6672
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	9043	MRX	6680
OEM (Generic) Indicator	9043	MRX	7770
OEM (GROUPE BULL) Indicator	9043	MRX	7773
OEM (Hitachi) Indicator	9043	MRX	7775
Indicator for Inspur Power servers	9043	MRX	777A
Ethernet Cable, 15m, Hardware Management Console to System Unit	9043	MRX	7802
Order Routing Indicator- System Plant	9043	MRX	9169
Language Group Specify - US English	9043	MRX	9300
New AIX License Core Counter	9043	MRX	9440
New Red Hat License Core Counter	9043	MRX	9442
New SUSE License Core Counter	9043	MRX	9443
Other AIX License Core Counter	9043	MRX	9444
Other Linux License Core Counter	9043	MRX	9445
3rd Party Linux License Core Counter	9043	MRX	9446
VIOS Core Counter	9043	MRX	9447
Other License Core Counter	9043	MRX	9449
Ubuntu Linux License Core Counter	9043	MRX	9450
Month Indicator	9043	MRX	9461
Day Indicator	9043	MRX	9462
Hour Indicator	9043	MRX	9463
Minute Indicator	9043	MRX	9464

Qty Indicator	9043	MRX	9465
Countable Member Indicator	9043	MRX	9466
Language Group Specify - Dutch	9043	MRX	9700
Language Group Specify - French	9043	MRX	9703
Language Group Specify - German	9043	MRX	9704
Language Group Specify - Polish	9043	MRX	9705
Language Group Specify - Norwegian	9043	MRX	9706
Language Group Specify - Portuguese	9043	MRX	9707
Language Group Specify - Spanish	9043	MRX	9708
Language Group Specify - Italian	9043	MRX	9711
Language Group Specify - Canadian French	9043	MRX	9712
Language Group Specify - Japanese	9043	MRX	9714
Language Group Specify - Traditional Chinese (Taiwan)	9043	MRX	9715
Language Group Specify - Korean	9043	MRX	9716
Language Group Specify - Turkish	9043	MRX	9718
Language Group Specify - Hungarian	9043	MRX	9719
Language Group Specify - Slovakian	9043	MRX	9720
Language Group Specify - Russian	9043	MRX	9721
Language Group Specify - Simplified Chinese (PRC)	9043	MRX	9722
Language Group Specify - Czech	9043	MRX	9724
Language Group Specify - Romanian	9043	MRX	9725
Language Group Specify - Croatian	9043	MRX	9726
Language Group Specify - Slovenian	9043	MRX	9727
Language Group Specify - Brazilian Portuguese	9043	MRX	9728
Language Group Specify - Thai	9043	MRX	9729
Customer Install MES	9043	MRX	9742
Notify CSO After Install	9043	MRX	9743
Product Renovated by IBM Indicator	9043	MRX	9993
10m (30.3-ft) - IBM MTP 12 strand cable for 40/100G transceivers	9043	MRX	EB2J
30m (90.3-ft) - IBM MTP 12 strand cable for 40/100G transceivers	9043	MRX	EB2K
Lift Tool	9043	MRX	EB2Z
Power Supply - 2300W for Server (200-240 VAC)	9043	MRX	EB39
Lift tool based on GenieLift GL-8 (standard)	9043	MRX	EB3Z
10GbE Optical Transceiver SFP+ SR	9043	MRX	EB46
25GbE Optical Transceiver SFP28	9043	MRX	EB47
1GbE Base-T Transceiver RJ45	9043	MRX	EB48
QSFP28 to SFP28 Connector	9043	MRX	EB49
0.5m SFP28/25GbE copper Cable	9043	MRX	EB4J
1.0m SFP28/25GbE copper Cable	9043	MRX	EB4K
2.0m SFP28/25GbE copper Cable	9043	MRX	EB4M
2.0m QSFP28/100GbE copper split Cable to SFP28 4x25GbE	9043	MRX	EB4P
Service wedge shelf tool kit for EB3Z	9043	MRX	EB4Z
QSFP+ 40GbE Base-SR4 Transceiver	9043	MRX	EB57
100GbE Optical Transceiver QSFP28	9043	MRX	EB59
1.0M 100GbE Copper Cable QSFP28	9043	MRX	EB5K
1.5M 100GbE Copper Cable QSFP28	9043	MRX	EB5L
2.0M 100GbE Copper Cable QSFP28	9043	MRX	EB5M
3M 100GbE Optical Cable QSFP28 (AOC)	9043	MRX	EB5R
5M 100GbE Optical cable QSFP28 (AOC)	9043	MRX	EB5S
10M 100GbE Optical Cable QSFP28 (AOC)	9043	MRX	EB5T
15M 100GbE optical Cable QSFP28 (AOC)	9043	MRX	EB5U
20M 100GbE optical Cable QSFP28 (AOC)	9043	MRX	EB5V
30M 100GbE Optical Cable QSFP28 (AOC)	9043	MRX	EB5W
50M 100GbE optical cable QSFP28 (AOC)	9043	MRX	EB5X
PCIe3 2-Port 10Gb NIC&ROCE SR/Cu Adapter	9043	MRX	EC2S
PCIe3 LP 2-Port 25/10Gb NIC&ROCE SR/Cu Adapter	9043	MRX	EC2T
PCIe3 2-Port 25/10Gb NIC&ROCE SR/Cu Adapter	9043	MRX	EC2U
PCIe3 x8 1.6 TB NVMe Flash Adapter for AIX/Linux	9043	MRX	EC5B
PCIe3 x8 3.2 TB NVMe Flash Adapter for AIX/Linux	9043	MRX	EC5D
PCIe3 x8 6.4 TB NVMe Flash Adapter for AIX/Linux	9043	MRX	EC5F
Mainstream 800 GB SSD NVMe U.2 module	9043	MRX	EC5J
Mainstream 1.6 TB SSD NVMe U.2 module	9043	MRX	EC5K
Mainstream 3.2 TB SSD NVMe U.2 module	9043	MRX	EC5L
Enterprise 6.4 TB SSD PCIe4 NVMe U.2 module for AIX/Linux	9043	MRX	EC5V
Mainstream 800 GB SSD PCIe3 NVMe U.2 module for AIX/Linux	9043	MRX	EC5X
PCIe4 2-port 100Gb ROCE EN adapter	9043	MRX	EC66
PCIe2 2-Port USB 3.0 Adapter	9043	MRX	EC6K
PCIe4 1.6TB NVMe Flash Adapter x8 for AIX/Linux	9043	MRX	EC7B

PCIe4 3.2TB NVMe Flash Adapter x8 for AIX/Linux	9043	MRX	EC7D
PCIe4 6.4TB NVMe Flash Adapter x8 for AIX/Linux	9043	MRX	EC7F
800GB Mainstream NVMe U.2 SSD 4k for AIX/Linux	9043	MRX	EC7Q
800GB Mainstream NVMe U.2 SSD 4k for AIX/Linux	9043	MRX	EC7T
Carrier Conversion Kit for 7mm to 15mm NVMe			
Devices	9043	MRX	EC7X
1.5m (4.9-ft), Blue CAT5 Ethernet Cable	9043	MRX	ECB2
SAS X Cable 3m - HD Narrow 6Gb 2-Adapters to			
Enclosure	9043	MRX	ECBJ
SAS X Cable 6m - HD Narrow 6Gb 2-Adapters to			
Enclosure	9043	MRX	ECBK
SAS X Cable 15m - HD Narrow 3Gb 2-Adapters to			
Enclosure	9043	MRX	ECBM
SAS Y0 Cable 1.5m - HD Narrow 6Gb Adapter to			
Enclosure	9043	MRX	ECBT
SAS Y0 Cable 3m - HD Narrow 6Gb Adapter to			
Enclosure	9043	MRX	ECBU
SAS Y0 Cable 6m - HD Narrow 6Gb Adapter to			
Enclosure	9043	MRX	ECBV
SAS Y0 Cable 10m - HD Narrow 6Gb Adapter to			
Enclosure	9043	MRX	ECBW
SAS AE1 Cable 4m - HD Narrow 6Gb Adapter to			
Enclosure	9043	MRX	ECBY
SAS YE1 Cable 3m - HD Narrow 6Gb Adapter to			
Enclosure	9043	MRX	ECBZ
3M Optical Cable Pair for PCIe3 Expansion Drawer	9043	MRX	ECC7
10M Optical Cable Pair for PCIe3 Expansion Drawer	9043	MRX	ECC8
System Port Converter Cable for UPS	9043	MRX	ECCF
3M Copper CXP Cable Pair for PCIe3 Expansion			
Drawer	9043	MRX	ECCS
3M Active Optical Cable Pair for PCIe3 Expansion			
Drawer	9043	MRX	ECCX
10M Active Optical Cable Pair for PCIe3			
Expansion Drawer	9043	MRX	ECCY
3.0M SAS X12 Cable (Two Adapter to Enclosure)	9043	MRX	ECDJ
4.5M SAS X12 Active Optical Cable (Two Adapter			
to Enclosure)	9043	MRX	ECDK
10M SAS X12 Active Optical Cable (Two Adapter to			
Enclosure)	9043	MRX	ECDL
1.5M SAS Y012 Cable (Adapter to Enclosure)	9043	MRX	ECDT
3.0M SAS Y012 Cable (Adapter to Enclosure)	9043	MRX	ECDU
4.5M SAS Y012 Active Optical Cable (Adapter to			
Enclosure)	9043	MRX	ECDV
10M SAS Y012 Active Optical Cable (Adapter to			
Enclosure)	9043	MRX	ECDW
0.6M SAS AA12 Cable (Adapter to Adapter)	9043	MRX	ECE0
3.0M SAS AA12 Cable	9043	MRX	ECE3
4.5M SAS AA12 Active Optical Cable (Adapter to			
Adapter)	9043	MRX	ECE4
4.3m (14-Ft) PDU to wall 3PH/24A 200-240V			
Delta-wired Power Cord	9043	MRX	ECJ5
4.3m (14-Ft) PDU to wall 3PH/40A 200-240V Power			
Cord	9043	MRX	ECJ6
4.3m (14-Ft) PDU to wall 3PH/48A 200-240V			
Delta-wired Power Cord	9043	MRX	ECJ7
High Function 9xC19 Single-Phase or Three-Phase			
Wye PDU plus	9043	MRX	ECJJ
High Function 9xC19 PDU plus 3-Phase Delta	9043	MRX	ECJL
High Function 12xC13 Single-Phase or Three-Phase			
Wye PDU plus	9043	MRX	ECJN
High Function 12xC13 PDU plus 3-Phase Delta	9043	MRX	ECJQ
Machine Kit of Parts (MKIT) Indicator	9043	MRX	ECSL
Custom Service Specify, Mexico	9043	MRX	ECSM
Custom Service Specify, Poughkeepsie, USA	9043	MRX	ECSP
Optical Wrap Plug	9043	MRX	ECW0
1x HW Subscription Increment	9043	MRX	EHB1
10x HW Subscription Increment	9043	MRX	EHB2
100x HW Subscription Increment	9043	MRX	EHB3
SAP HANA TRACKING FEATURE	9043	MRX	EHKV
Boot Drive / Load Source in EXP24SX Specify (in			
#ESLS or #ELLS)	9043	MRX	EHR2
SSD Placement Indicator - #ESLS/#ELLS	9043	MRX	EHS2

PCIe3 RAID SAS Adapter Quad-port 6Gb x8	9043	MRX	EJ0J
PCIe3 12GB Cache RAID SAS Adapter Quad-port 6Gb x8	9043	MRX	EJ0L
Storage NVME Backplane	9043	MRX	EJ0Q
PCIe3 12GB Cache RAID PLUS SAS Adapter Quad-port 6Gb x8	9043	MRX	EJ14
PCIe3 SAS Tape/DVD Adapter Quad-port 6Gb x8	9043	MRX	EJ10
PCIe x16 to CXP Optical or CU converter Adapter for PCIe3 Expansion Drawer	9043	MRX	EJ20
PCIe4 x16 to XFP Converter Adapter (support AOC)	9043	MRX	EJ2A
PCIe3 Crypto Coprocessor no BSC 4767	9043	MRX	EJ32
PCIe3 Crypto Coprocessor BSC-Gen3 4767	9043	MRX	EJ33
PCIe3 Crypto Coprocessor no BSC 4769	9043	MRX	EJ35
PCIe3 Crypto Coprocessor BSC-Gen3 4769	9043	MRX	EJ37
Non-paired Indicator EJ14 PCIe SAS RAID+ Adapter	9043	MRX	EJRL
Non-paired Indicator EJ0L PCIe SAS RAID Adapter	9043	MRX	EJRU
Specify Mode-1 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)Y012 for EXP24SX #ESLS/ELLS	9043	MRX	EJW1
Specify Mode-1 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)Y012 for EXP24SX #ESLS/ELLS	9043	MRX	EJW2
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJW3
Specify Mode-2 & (4)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJW4
Specify Mode-4 & (4)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJW5
Specify Mode-2 & (1)EJ0J/EJ0M/EL3B/EL59 & (2)Y012 for EXP24SX #ESLS/ELLS	9043	MRX	EJW6
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (2)Y012 for EXP24SX #ESLS/ELLS	9043	MRX	EJW7
Specify Mode-2 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)Y012 for EXP24SX #ESLS/ELLS	9043	MRX	EJWA
Specify Mode-2 & (2)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJWB
Specify Mode-4 & (1)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJWC
Specify Mode-4 & (2)EJ0J/EJ0M/EL3B/EL59 & (1)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJWD
Specify Mode-4 & (3)EJ0J/EJ0M/EL3B/EL59 & (2)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJWE
Specify Mode-1 & (2)EJ14 & (2)Y012 for EXP24SX #ESLS/ELLS	9043	MRX	EJWF
Specify Mode-2 & (2)EJ14 & (2)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJWG
Specify Mode-2 & (2)EJ14 & (1)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJWH
Specify Mode-2 & (4)EJ14 & (2)X12 for EXP24SX #ESLS/ELLS	9043	MRX	EJWJ
PowerVM for Linux indicator	9043	MRX	ELBV
1-core Linux Processor Activation for #EPEU	9043	MRX	ELBW
1-core Linux Processor Activation for #EPEV	9043	MRX	ELBX
1-core Linux Processor Activation for #EPGW	9043	MRX	ELBY
PDU Access Cord 0.38m	9043	MRX	ELC0
4.3m (14-Ft) PDU to wall 24A 200-240V Power Cord North America	9043	MRX	ELC1
4.3m (14-Ft) PDU to wall 3PH/24A 415V Power Cord North America	9043	MRX	ELC2
Power Cable - Drawer to IBM PDU (250V/10A)	9043	MRX	ELC5
64GB (2 x 32GB) DDR4 Memory DDIMM	9043	MRX	EM75
128GB (2 x 64GB) DDR4 Memory DDIMM	9043	MRX	EM76
256GB (2 x 128GB) DDR4 Memory DDIMM	9043	MRX	EM77
512GB (2 x 256GB) DDR4 Memory DDIMM	9043	MRX	EM7J
Active Memory Mirroring	9043	MRX	EM81
Power Active Memory Expansion	9043	MRX	EMBM
512 of #EMCP 1GB Memory Activations for MRX	9043	MRX	EMCE
512 of #EMCP 1GB Linux Memory Activations for MRX	9043	MRX	EMCG
1GB Memory Activations for MRX	9043	MRX	EMCP
100GB Memory Activations for MRX	9043	MRX	EMCQ
PCIe Gen3 I/O Expansion Drawer	9043	MRX	EMX0
AC Power Supply Conduit for PCIe3 Expansion Drawer	9043	MRX	EMXA
PCIe3 6-slot Fanout Module for PCIe3 Expansion Drawer	9043	MRX	EMXF
PCIe3 6-slot Fanout Module for PCIe3 Expansion	9043	MRX	EMXF

Drawer	9043	MRX	EMXG
PCIe3 6-Slot Fanout Module for PCIe3 Expansion			
Drawer	9043	MRX	EMXH
1m (3.3-ft), 10Gb E'Net Cable SFP+ Act Twinax			
Copper	9043	MRX	EN01
3m (9.8-ft), 10Gb E'Net Cable SFP+ Act Twinax			
Copper	9043	MRX	EN02
5m (16.4-ft), 10Gb E'Net Cable SFP+ Act Twinax			
Copper	9043	MRX	EN03
PCIe3 16Gb 2-port Fibre Channel Adapter	9043	MRX	EN0A
PCIe2 4-Port (10Gb+1GbE) SR+RJ45 Adapter	9043	MRX	EN0S
PCIe2 4-port (10Gb+1GbE) Copper SFP+RJ45 Adapter	9043	MRX	EN0U
PCIe2 2-port 10/1GbE BaseT RJ45 Adapter	9043	MRX	EN0W
PCIe3 32Gb 2-port Fibre Channel Adapter	9043	MRX	EN1A
PCIe3 16Gb 4-port Fibre Channel Adapter	9043	MRX	EN1C
PCIe3 16Gb 4-port Fibre Channel Adapter	9043	MRX	EN1E
PCIe3 2-Port 16Gb Fibre Channel Adapter	9043	MRX	EN1G
PCIe4 32Gb 2-port Optical Fibre Channel Adapter	9043	MRX	EN1J
PCIe3 16Gb 2-port Fibre Channel Adapter	9043	MRX	EN2A
IBM eBMC Indicator node 9043-MRX for China	9043	MRX	ENSH
Power Enterprise Pools 2.0 Enablement	9043	MRX	EP20
Lab Services Private Cloud Capacity Assessment	9043	MRX	EP2X
Deactivation of LPM (Live Partition Mobility)	9043	MRX	EPA0
12-core Typical 3.35 to 4.0 GHZ (max) processor	9043	MRX	EPEU
18-core Typical 3.20 to 4.0 GHZ (max) processor	9043	MRX	EPEV
24-core Typical 2.95 to 3.90 GHZ (max) processor	9043	MRX	EPGW
Front Heatsink + TIM PAD (For MRX)	9043	MRX	EPLU
Rear Heatsink + TIM PAD (For MRX)	9043	MRX	EPLV
1 core Base Processor Activation (Pools 2.0) for EPEU	9043	MRX	EPRS
1 core Base Processor Activation (Pools 2.0) for EPEV	9043	MRX	EPRT
1 core Base Processor Activation (Pools 2.0) for EPGW	9043	MRX	EPRV
1 core Base Linux Processor Activation (Pools 2.0) for EPEU	9043	MRX	EPRW
1 core Base Linux Processor Activation (Pools 2.0) for EPEV	9043	MRX	EPRX
1 core Base Linux Processor Activation (Pools 2.0) for EPGW	9043	MRX	EPRZ
1 core Base Processor Activation (Pools 2.0) for #EPEU (From Static)	9043	MRX	EPSA
1 core Base Processor Activation (Pools 2.0) for #EPEV (From Static)	9043	MRX	EPSB
1 core Base Processor Activation (Pools 2.0) for #EPGW (From Static)	9043	MRX	EPSD
1 core Base Processor Activation (Pools 2.0) for #EPEU (From Static) Linux only	9043	MRX	EPSE
1 core Base Processor Activation (Pools 2.0) for #EPEV (From Static) Linux only	9043	MRX	EPSF
1 core Base Processor Activation (Pools 2.0) for #EPGW (From Static) Linux only	9043	MRX	EPSH
1GB Base Memory activation (Pools 2.0)	9043	MRX	EPSJ
100GB Base Memory activation (Pools 2.0)	9043	MRX	EPSP
512GB Base Memory Activation for Pools 2.0 (From Static)	9043	MRX	EPSQ
1GB Base Memory Activation for Pools 2.0 (From Static)	9043	MRX	EPSR
100GB Base Memory Activation for Pools 2.0 (From Static)	9043	MRX	EPSS
512GB Base Memory Activation for Pools 2.0 (From Linux)	9043	MRX	EPST
256GB Base Memory Activation for Pools 2.0 - Linux only	9043	MRX	EPSU
256GB Base Memory Activation for Pools 2.0	9043	MRX	EPSW
Horizontal PDU Mounting Hardware	9043	MRX	EPTH
High Function 9xC19 PDU: Switched, Monitoring	9043	MRX	EPTJ
High Function 9xC19 PDU 3-Phase: Switched, Monitoring	9043	MRX	EPTL
High Function 12xC13 PDU: Switched, Monitoring	9043	MRX	EPTN
High Function 12xC13 PDU 3-Phase: Switched, Monitoring	9043	MRX	EPTQ

1 core Processor Activation for #EPEU	9043	MRX	EPUR
1 core Processor Activation for #EPEV	9043	MRX	EPUS
PowerVM - Enterprise Edition	9043	MRX	EPVV
1 core Processor Activation for #EPGW	9043	MRX	EPYT
Record Purpose Only (RPO) Order indicator	9043	MRX	ERP0
1 core Base Processor Activation (Pools 2.0) for EPEU (from Prev)	9043	MRX	ERQ0
1 core Base Processor Activation (Pools 2.0) for EPEV (from Prev)	9043	MRX	ERQ1
1 core Base Processor Activation (Pools 2.0) for EPGW (from Prev)	9043	MRX	ERQ2
1 core Base Linux only Processor Activation (Pools 2.0) for EPEU (from Prev)	9043	MRX	ERQ4
1 core Base Linux only Processor Activation (Pools 2.0) for EPEV (from Prev)	9043	MRX	ERQ5
1 core Base Linux only Processor Activation (Pools 2.0) for EPGW (from Prev)	9043	MRX	ERQ6
256GB Base Memory Activation (Pools 2.0) (from Prev)	9043	MRX	ERQM
256GB Base Linux only Memory Activation (Pools 2.0) (from Prev)	9043	MRX	ERQN
Enterprise 1.6 TB SSD PCIe4 NVMe U.2 module for AIX/Linux	9043	MRX	ES1E
Enterprise 3.2 TB SSD PCIe4 NVMe U.2 module for AIX/Linux	9043	MRX	ES1G
Enterprise 1.6 TB SSD PCIe4 NVMe U.2 module for AIX/Linux	9043	MRX	ES3B
Enterprise 3.2 TB SSD PCIe4 NVMe U.2 module for AIX/Linux	9043	MRX	ES3D
Enterprise 6.4 TB SSD PCIe4 NVMe U.2 module for AIX/Linux	9043	MRX	ES3F
387GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ES94
387GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ESB2
775GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ESB6
387GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESBA
775GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESBG
1.55TB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESBL
S&H - No Charge	9043	MRX	ESC0
S&H	9043	MRX	ESC7
Virtual Capacity Expedited Shipment	9043	MRX	ESCT
iSCSI SAN Load Source Specify for AIX	9043	MRX	ES CZ
600GB 10K RPM SAS SFF-2 HDD 4K for AIX/Linux	9043	MRX	ESEV
1.2TB 10K RPM SAS SFF-2 HDD 4K for AIX/Linux	9043	MRX	ESF3
1.8TB 10K RPM SAS SFF-2 HDD 4K for AIX/Linux	9043	MRX	ESFT
387GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ESGV
775GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ESGZ
931GB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJ0
1.86TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJ2
3.72TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJ4
7.45TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJ6
931GB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJJ
1.86TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJL
3.72TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJN
7.44TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESJQ
387GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ESK1
775GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ESK3
387GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESK8
775GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESKC
1.55TB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESKG
931GB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESKK
1.86TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESKP
3.72TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESKT
7.44TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESKX
Specify AC Power Supply for EXP24SX			
Storage Enclosure	9043	MRX	ESLA
EXP24SX SAS Storage Enclosure	9043	MRX	ESLS
931GB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESMB
1.86TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESMF
3.72TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESMK
7.44TB Mainstream SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESMV
775GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESNA
1.55TB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ESNE
300GB 15K RPM SAS SFF-2 4k Block Cached Disk Drive (AIX/Linux)	9043	MRX	ESNM

600GB 15K RPM SAS SFF-2 4k Block Cached Disk Drive (AIX/Linux)	9043	MRX	ESNR
AIX Update Access Key (UAK)	9043	MRX	ESWK
387GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ETK1
775GB Enterprise SAS 5xx SFF-2 SSD for AIX/Linux	9043	MRX	ETK3
387GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ETK8
775GB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ETKC
1.55TB Enterprise SAS 4k SFF-2 SSD for AIX/Linux	9043	MRX	ETKG
Order Placed Indicator	9043	MRX	EU29
Standalone USB DVD drive w/cable	9043	MRX	EUA5
BP Post-Sale Services: 1 Day	9043	MRX	SVBP
IBM Systems Lab Services Post-Sale Services: 1 Day	9043	MRX	SVCS
Other IBM Post-Sale Services: 1 Day	9043	MRX	SVNN
5000 Power to Cloud Reward points	9043	MRX	SVPC

The following are newly announced features on the specific models of the IBM Power 7965 machine type:

Planned Availability Date July 22, 2022

New Feature

Description	Machine type	Model number	Feature number
Rack Content Specify	9043-MRX	4EIA unit	7965 S42 ER3E

Feature conversions

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 clients:

Feature conversions for 9043-MRX adapter features:

From FC:	To FC:	Return parts
EJ20 - PCIe x 16 to CXP Optical or CU converter Adapter for PCIe3 Expansion Drawer	EJ2A -PCIe4 x 16 to CXP Converter Adapter (support) AOC)	No
EJ35 - PCIe3 Crypto Coprocessor no BSC 4769	EJ37 - PCIe3 Crypto Coprocessor BSC-Gen3 4769	No

Feature conversions for 9043-MRX cable features:

From FC:	To FC:	Return parts
ECC7 - 3M Optical Cable Pair for PCIe3 Expansion Drawer	ECCX - 3M Active Optical Cable Pair for PCIe3 Expansion Drawer	No
ECC8 - 10M Optical Cable Pair for PCIe3 Expansion Drawer	ECCY - 10M Active Optical Cable Pair for PCIe3 Expansion Drawer	No

Feature conversions for 9043-MRX global resource activation features:

From FC:	To FC:	Return parts
EP2X - Lab Services Private Cloud Capacity Assessment	EP20 - Power Enterprise Pools 2.0 Enablement	No

Feature conversions for 9043-MRX memory features:

From FC:	To FC:	Return parts
EMCP - 1GB Memory Activations for MRX	EPSR - 1GB Base Memory Activation for Pools 2.0 (From Static)	No
EMCQ - 100GB Memory Activations for MRX	EPSS - 100GB Base Memory Activation for Pools 2.0 (From Static)	No
EMCE - 512 of #EMCP 1GB Memory Activations for MRX	EPSQ - 512GB Base Memory Activation for Pools 2.0 (From Static)	No
EMCG - 512 of #EMCP 1GB Linux Memory Activations for MRX	EPST - 512GB Base Memory Activation for Pools 2.0 (From Linux)	No

Feature conversions for 9043-MRX processor features:

From FC:	To FC:	Return parts
EPUR - 1 core Processor Activation for #EPEU	EPSA - 1 core Base Processor Activation (Pools 2.0) for #EPEU (From Static)	No
EPUS - 1 core Processor Activation for #EPEV	EPSB - 1 core Base Processor Activation (Pools 2.0) for #EPEV (From Static)	No
EPYT - 1 core Processor Activation for #EPGW	EPSD - 1 core Base Processor Activation (Pools 2.0) for #EPGW (From Static)	No
ELBW - 1 core Processor Activation for #EPEU Linux only	EPSE - 1 core Base Processor Activation (Pools 2.0) for #EPEU (From Static) Linux only	No
ELBX - 1 core Processor Activation for #EPEV Linux only	EPSF - 1 core Base Processor Activation (Pools 2.0) for #EPEV (From Static) Linux only	No
ELBY - 1 core Processor Activation for #EPGW Linux only	EPSH - 1 core Base Processor Activation (Pools 2.0) for #EPGW (From Static) Linux only	No

Feature conversions for 9043-MRX rack-related features:

From FC:	To FC:	Return parts
EMXG - PCIe3 6-Slot Fanout Module for PCIe3 Expansion Drawer	EMXH - PCIe3 6-Slot Fanout Module for PCIe3 Expansion Drawer	No

Publications

No publications are shipped with the announced product.

To access the IBM Publications Center Portal, go to the [IBM Publications Center](#) website.

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. A large number of publications are available online in various file formats, which can currently be downloaded.

National language support

Not applicable

Services

IBM Systems Lab Services

Systems Lab Services offers infrastructure services to help build hybrid cloud and enterprise IT solutions. From servers to storage systems and software, Systems Lab Services can help deploy the building blocks of a next-generation IT infrastructure to empower a client's business. Systems Lab Services consultants can perform infrastructure services for clients online or onsite, offering deep technical expertise, valuable tools, and successful methodologies. Systems Lab Services is designed to help clients solve business challenges, gain new skills, and apply best practices.

Systems Lab Services offers a wide range of infrastructure services for IBM Power servers, IBM Storage systems, IBM Z^(R), and IBM LinuxONE. Systems Lab Services has a global presence and can deploy experienced consultants online or onsite around the world.

For assistance, contact Systems Lab Services at ibmsls@us.ibm.com.

To learn more, see the [IBM Systems Lab Services](#) website.

IBM ConsultingTM

As transformation continues across every industry, businesses need a single partner to map their enterprise-wide business strategy and technology infrastructure. IBM Consulting is the business partner to help accelerate change across an organization. IBM specialists can help businesses succeed through finding collaborative ways of working that forge connections across people, technologies, and partner ecosystems. IBM Consulting brings together the business expertise and an ecosystem of technologies that help solve some of the biggest problems faced by organizations. With methods that get results faster, an integrated approach that is grounded in an open and flexible hybrid cloud architecture, and incorporating technology from IBM Research^(R) and IBM Watson^(R) AI, IBM Consulting enables businesses to lead change with confidence and deliver continuous improvement across a business and its bottom line.

For additional information, see the [IBM Consulting](#) website.

IBM Technology Support Services (TSS)

Get preventive maintenance, onsite and remote support, and gain actionable insights into critical business applications and IT systems. Speed developer innovation with support for over 240 open-source packages. Leverage powerful IBM analytics and AI-enabled tools to enable client teams to manage IT problems before they become emergencies.

TSS offers extensive IT maintenance and support services that cover more than one niche of a client's environment. TSS covers products from IBM and OEMs, including servers, storage, network, appliances, and software, to help clients ensure high availability across their data center and hybrid cloud environment.

For details on available services, see the [Technology support for hybrid cloud environments](#) website.

IBM Expert Labs

Expert Labs can help clients accelerate their projects and optimize value by leveraging their deep technical skills and knowledge. With more than 20 years of industry experience, these specialists know how to overcome the biggest challenges to deliver business results that can have an immediate impact.

Expert Labs' deep alignment with IBM product development allows for a strategic advantage as they are often the first in line to get access to new products, features, and early visibility into roadmaps. This connection with the development enables them to deliver First of a Kind implementations to address unique needs or expand a client's business with a flexible approach that works best for their organization.

For additional information, see the [IBM Expert Labs](#) website.

IBM Security^(R) Expert Labs

With extensive consultative expertise on IBM Security software solutions, Security Expert Labs helps clients and partners modernize the security of their applications, data, and workforce. With an extensive portfolio of consulting and learning services, Expert Labs provides project-based and premier support service subscriptions.

These services can help clients deploy and integrate IBM Security software, extend their team resources, and help guide and accelerate successful hybrid cloud solutions, including critical strategies such as zero trust. Remote and on-premises software deployment assistance is available for IBM Cloud Pak^(R) for Security, IBM Security QRadar^(R)/QRoC, IBM Security SOAR/Resilient^(R), IBM i2^(R), IBM Security Verify, IBM Security Guardium^(R), and IBM Security MaaS360^(R).

For more information, contact Security Expert Labs at sel@us.ibm.com.

For additional information, see the [IBM Security Expert Labs](#) website.

IBM support

For installation and technical support information, see the [IBM Support Portal](#).

Additional support

IBM Client Engineering for Systems

Client Engineering for Systems is a framework for accelerating digital transformation. It helps you generate innovative ideas and equips you with the practices, technologies, and expertise to turn those ideas into business value in weeks. When you work with Client Engineering for Systems, you bring pain points into focus. You empower your team to take manageable risks, adopt leading technologies, speed up solution development, and measure the value of everything you do. Client Engineering for Systems has experts and services to address a broad array of use cases, including capabilities for business transformation, hybrid cloud, analytics and AI, infrastructure systems, security, and more. Contact Client Engineering at sysgarage@ibm.com.

Technical information

Specified operating environment

Physical specifications

Power E1050 (9043-MRX)

System node

- Width: 448 mm (17.6 in.)
- Depth: 902 mm (35.5 in.)
- Height: 175 mm (6.9 in.), 4 EIA units
- Weight: 69 kg (153 lb)

Note:

- The EMX0 remote I/O drawer connection with optical or copper cable in S42 rack does not require rack extension.
- The EMX0 remote I/O drawer connection with copper cable in the T42 racks will stop the rear door from closing, thus requiring the mandatory 8-inch rack extensions.

PCIe I/O expansion drawer

- Width: 448 mm (17.5 in.)
- Depth: 736.6 mm (29 in.)
- Height: 177.8 mm (7.0 in.), 4 EIA units
- Weight: 54.4 kg (120 lb)

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

Operating environment

- Temperature:
 - 5°C--45°C (41°F--113°F) nonoperating
 - 18°C--27°C (64.4°F--80.6°F) recommended operating
 - 5°C--40°C (41°F--104°F) allowable operating
 - Derate maximum allowable dry-bulb temperature 1°C (1.8°F) per 175 m (574 ft) above 900 m (2,953 ft) up to a maximum allowable elevation of 3050 m (10,000 ft).
- Relative humidity (noncondensing):
 - 5%--85% RH nonoperating
 - 8%--80% operating
- Maximum dew point:
 - 27°C (80°F) nonoperating
 - 24°C (75°F) operating
- Operating voltage: 200--240 V AC
 - ASHRAE class: A3 (fourth edition)
 - Operating frequency: 50--60 Hz +/- 3 Hz
 - Maximum Power consumption: 4,950 watts (per system node)
 - Power source loading: 5.1 kVA maximum (per system node)
 - Thermal output: 16,889 Btu/hr maximum (per system node)
 - Maximum altitude: 3,050 m (10,000 ft)
- **Note:**
 - To calculate the amperage, multiply the kVA by 1000 and divide that number by the operating voltage.

- Model 9043-MRX use four power supply units.
- Noise level: (Acoustics A-weighted Upper-Limit Sound Power Levels)
 - One typically configured Four processors, 2 TB memory:
 - 7.2 bels (operating/idle: 25 C, 500 m)
 - One maximum configured Four processor, 2 TB memory:
 - 8.2 bels (heavy workload, 25 C, 500 m)

The Power E1050 server must be installed in a rack with a rear door and side panels for EMC compliance. The native HMC Ethernet ports must use shielded Ethernet cables.

Note: Government regulations, such as those prescribed by OSHA or European Community Directives, may govern noise level exposure in the workplace and may apply to you and your server installation. This IBM system is available with an optional acoustical door feature that can help reduce the noise emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

EMC conformance classification

This equipment is subject to Electromagnetic Compatibility (EMC) regulations and shall comply with the appropriate country EMC regulations before final delivery to the buyer or centers of distribution.

- US: FCC CFR, Title 47, Part 15, EMI Class A
- EEA, Turkey: EU Council Directive 2014/30/EU, EMI Class A
- Japan: VCCI Council, EMI Class A
- Korea: RRA, EMI Class A
- China (PRC): CPCS, EMI Class A
- Taiwan R.O.C.: BSMI CNS 13438, EMI Class A
- Australia\New Zealand: ACMA, EMI Class A
- Canada: ICES-003, EMI Class A
- Eurasian Economic Area (EAEU), EMI Class A
- Saudi Arabia: MoCI, EMI Class A
- Vietnam: MIC, EMI Class A
- Morocco EMC Order, EMC Class A

Homologation -- Telecom type approval

Homologation approval for specific countries has been initiated with the IBM Homologation and Type Approval (HT&A) organization in Nice, France.

The IBM Power E1050 server nodes or system control unit or PCIe Expansion units are not certified for connection 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 and for information on PCIe adapters that can be used in the system and which are certified.

Product safety/country testing/certification

- UL 60950-1:2007 Underwriters Laboratory
- CAN/CSA22.2 No. 60950-1-07
- EN60950-1:2006 European Norm
- IEC 60950-1 2nd Edition + all National Differences

Systems

- Product category: D.
- Weighted Teraflops (WT) is based on the number of floating point operations the processor can perform in a cycle.
 - The WT for a Power E1050 0/12 core, typical 3.35--4.0 GHz, single-core processor is 0.0804 WT.
 - The WT for a Power E1050 0/18 core, typical 3.20--4.0 GHz, single-core processor is 0.0768 WT.
 - The WT for a Power E1050 0/24 core, typical 2.95--3.90 GHz, single-core processor is 0.0708 WT.

Notes:

- Multiply 0.0804 WT by the number of typical 3.35--4.0 GHz processor cores to find the system WT number, or multiply 0.0768 WT by the number of typical 3.20--
- 4.0 GHz processor cores to find the system WT number, or multiply 0.0708 WT by the number of typical 2.95--3.90 GHz processor cores to find the system WT number.
- The WT for 3.35 GHz 12-core system is $0.0804 \times 12 = 0.97648$ WT.
- The WT for 3.20 GHz 18-core system is $0.0768 \times 18 = 1.3824$ WT.
- The WT for 2.95 GHz 24-core system is $0.0708 \times 24 = 1.6992$ WT.

Hardware requirements

Not applicable

Software requirements

If installing the AIX operating system LPAR with any I/O configuration (one of these):

- AIX Version 7.3 with the 7300-00 Technology Level and Service Pack 7300-00-02-2220, or later
- AIX Version 7.2 with the 7200-05 Technology Level and Service Pack 7200-05-04-2220, or later
- AIX Version 7.2 with the 7200-04 Technology Level and Service Pack 7200-04-06-2220, or later (planned availability September 16, 2022)

If installing the AIX operating system Virtual I/O only LPAR (one of these):

- AIX Version 7.3 with the 7300-00 Technology Level and service pack 7300-00-01-2148, or later
- AIX Version 7.2 with the 7200-05 Technology Level and service pack 7200-05-01-2038, or later
- AIX Version 7.2 with the 7200-04 Technology Level and Service Pack 7200-04-02-2016, or later
- AIX Version 7.1 with the 7100-05 Technology Level and Service Pack 7100-05-06-2016, or later

See the [Power Systems Prerequisites](#) website for compatibility information for hardware features and the corresponding AIX Technology Levels.

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

- Red Hat Enterprise Linux 8.4, for Power LE, or later
- Red Hat Enterprise Linux 9.0, for Power LE, or later
- SUSE Linux Enterprise Server 15 Service Pack 3, or later
- SUSE Linux Enterprise Server for SAP with SUSE Linux Enterprise Server 15 Service Pack 3, or later
- Red Hat Enterprise Linux for SAP with Red Hat Enterprise Linux 8.4 for Power LE, or later
- Red Hat OpenShift Container Platform 4.9, or later

Please review the [Linux on IBM - Readme first issues page](#) for any known Linux issues or limitations.

Note: The above list applies to the installation of the Linux operating system LPAR in non-production SAP HANA implementations. Reference "IBM Power E1050 (9040-MRX) for SAP HANA Production Use" Statement of Direction for production support.

If installing VIOS:

- VIOS 3.1.3.21, or later

Java™ is supported on Power10 servers. For best use of the performance capabilities and the most recent improvements of Power10 technology, IBM recommends upgrading Java-based applications to Java 7, Java 8, or later, whenever possible. For those clients who want to run Java in AIX environments, see the [AIX Download and service information](#) website.

For Linux (including PowerLinux), see the [Linux Download information](#) website.

Recommendation: Clients are strongly encouraged to move to a more current supported version: Java 7, Java 7.1, Java 8, or later.

Planning information

Cable orders

None

Security, auditability, and control

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

Terms and conditions

Volume orders

Contact your IBM representative.

Products - terms and conditions

Warranty period

Warranty and Additional Coverage Options:	Coverage Summary ⁽¹⁾ :
Warranty Period:*	3 years
Service Level:	IBM CRU & On-Site , 9x5 Next Business Day

Service Upgrade Options :

Warranty and Additional Coverage Options:	Coverage Summary ⁽¹⁾ :
Warranty Service Upgrade	IBM On-Site Repair, 9x5 Same Day ⁽²⁾ and 24x7 Same Day options
Maintenance Services (Post-Warranty):	IBM On-Site Repair, Next Business Day and Same Day options
IBM Hardware Maintenance Services - committed maintenance ⁽³⁾ :	Y

⁽¹⁾ See complete coverage details below.

⁽²⁾ Offered in US and EMEA only.

⁽³⁾ Not offered in the US.

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM. An IBM part or feature installed during the initial installation of an IBM machine is subject to the full warranty period specified by IBM. 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. 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.

Any IBM Mainstream devices (previously called read intensive device) identified in this document have a maximum number of write cycles. IBM Mainstream device failures will be replaced during standard warranty and maintenance period for devices that have not reached the maximum number of write cycles. Devices that reach this limit may fail to operate according to specifications and must be replaced at the client's expense. Individual service life may vary and can be monitored using an operating system command.

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically through 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. If applicable to your product, parts considered Client Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-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 (mandatory) CRU

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.

The following parts have been designated as Tier 1 CRUs:

- Front Bezel
- Op Panel - Base
- Op Panel - LCD
- Fans
- NVMe Drives
- IO Cassette
- PCIe Adapter
- Power Supply
- Service Cover
- TOD Battery
- Processor VRM
- IO VRM
- TPM Card

Tier 2 (optional) 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 2 CRUs:

- Processor module

CRU and On-site Service

At IBM's discretion, you will receive specified CRU service, or 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 3:00 PM local time in order to qualify for next-business-day response.

Non-IBM parts service

Warranty service

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

International Warranty Service

International Warranty Service allows you to relocate any machine that is eligible for International Warranty Service and receive continued warranty service in any country where the IBM machine is serviced. If you move your machine to a different country, you are required to report the machine information to your Business Partner or IBM representative.

The warranty service type and the service level provided in the servicing country may be different from that provided in the country in which the machine was purchased. Warranty service will be provided with the prevailing warranty service type and service level available for the eligible machine type in the servicing country, and the warranty period observed will be that of the country in which the machine was purchased.

The following types of information can be found on the [International Warranty Service](#) website

- Machine warranty entitlement and eligibility
- Directory of contacts by country with technical support contact information
- Announcement Letters

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. Service levels are response-time objectives and are not guaranteed. See the Warranty 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.

Maintenance service options

CRU and On-site Service

At IBM's discretion, you will receive CRU service or IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

- IBM On-Site Repair, Same-Day On-Site Response Target, Monday-Friday 08:00-17:00 (excluding public holidays), Last Call Registration: 12:00
- IBM On-Site Repair, Same-Day On-Site Response Target, Monday-Sunday 00:00-24:00, 365 days a year

Customer Replaceable Units (CRUs) may be provided as part of the machine's standard warranty CRU Service except that you may install a CRU yourself or request IBM installation, at no additional charge, under 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, through 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. Service levels are response-time objectives and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information.

The following service selections are available as maintenance options, at additional cost, for your machine type.

- IBM On-Site Repair, Next-Business-Day Response Target, Monday-Friday. Calls must be received by 3:00 PM local time in order to qualify for next-business-day response.
- IBM On-Site Repair, Same-Day On-Site Response Target, Monday-Friday 08:00-17:00 (excluding public holidays), Last Call Registration: 12:00.
- IBM On-Site Repair, Same-Day On-Site Response Target, Monday-Sunday 00:00-24:00, 365 days a year.

IBM Hardware Maintenance Services -- committed maintenance⁽²⁾

Organizations can lose as much as USD \$100 million per year to downtime related to information and communications technology. IBM Hardware Maintenance Services -- committed maintenance can deliver different types of hardware service for IBM equipment from the moment you call for support worldwide (based on the countries in which IBM has a presence) and around the clock. Through clear response targets and standardized service-delivery metrics, we can help you optimize your IT infrastructure and can help reduce the threat of hardware-related outages.

For more information, see the [IBM Hardware Maintenance Services - committed maintenance Data Sheet \(D\) - USEN](#).

⁽²⁾ Currently not available in the US.

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.

Customer Replaceable Unit (CRU) Service

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the 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.

CRUs will be shipped based upon availability. 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.

The following parts have been designated as Tier 1 CRUs:

- Front Bezel
- Op Panel - Base
- Op Panel - LCD
- Fans
- NVMe Drives
- IO Cassette
- PCIe Adapter

- Power Supply
- Service Cover
- TOD Battery
- Processor VRM
- IO VRM
- TPM Card

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

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

9043-MRX

Additional reference for Europe

The following European documents can be found on the [IBM Maintenance and Technical Support Services](#) website.

- European Announcement Letter ZS03-0150 for IBM Customer Agreement (ICA)
- European Announcement Letter ZS04-0135 for Enterprise Agreement Contract
- European Announcement Letter ZS98-0118 for ServiceSuite Contract

Non-IBM parts service

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

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

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

Usage plan machine

No

IBM hourly service rate classification

Two

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

Maintenance service offerings

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

General terms and conditions

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

No

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. It can also be found on the [License Agreement for Machine Code and Licensed Internal Code](#).

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.

Prices

For all local charges, contact your IBM representative.

IBM Global Financing

IBM Global Financing offers competitive financing to credit-qualified clients 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 client segments: small, medium, and large enterprise), rates, terms, and availability can vary by country. Contact your local IBM Global Financing organization or go to the [IBM Global Financing](#) website for more information.

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Financing solutions from IBM Global Financing can help you stretch your budget and affordably acquire the new product. But beyond the initial acquisition, our end-to-end approach to IT management can also help keep your technologies current, reduce costs, minimize risk, and preserve your ability to make flexible equipment decisions throughout the entire technology lifecycle.

Regional availability

Europe: Aland Islands, Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bouvet Island, British Indian Ocean Territory, Bulgaria, Union of the Comoros, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Falkland Islands (Malvinas), Faroe Islands, Finland, France, French Guiana, French Polynesia, French Southern Territories, Georgia, Germany, Gibraltar, Greece, Greenland, Guadeloupe, Guernsey, Holy See (Vatican City State), Hungary, Iceland, Ireland, Isle of Man, Israel, Italy, Jersey, Kazakhstan, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Martinique, Mayotte, Republic of Moldova, Monaco, Montenegro, Netherlands, New Caledonia, Republic of North Macedonia, Norway, Pitcairn, Poland, Portugal, Reunion, Romania, Saint Barthelemy, Saint Helena Ascension and Tristan da Cunha, Saint Martin, Saint Pierre and Miquelon, San Marino, Serbia, Slovakia, Slovenia, South Georgia and the South Sandwich Islands, Spain, Svalbard and Jan Mayen, Sweden, Switzerland, Tajikistan, Turkmenistan, Ukraine, United Kingdom, Uzbekistan, Vanuatu, and Wallis and Futuna

Middle East and Africa: Afghanistan, Algeria, Angola, Bahrain, Benin, Botswana, Burkina Faso, Burundi, Republic of Cabo Verde, Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, Republic of the Congo, Republic of Côte d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Eritrea, Kingdom of Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Iraq, Jordan, Kenya, Kuwait, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Oman, Pakistan, State of Palestine, Qatar, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, United Republic of Tanzania, Togo, Tunisia, Turkey, Uganda, United Arab Emirates, Western Sahara, Yemen, Zambia, and Zimbabwe

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[Terms of use](#)

For the most current information regarding IBM products, consult your IBM representative or reseller, or go to the [IBM worldwide contacts page](#)

Corrections

(Corrected on November 1, 2022)

Modifications made to the Description, Technical information, Extended warranty service, and General terms and conditions sections.