IBM BladeCenter PS704 Express blade server with POWER7 processor delivers great value and high performance

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At a glance

The IBM® BladeCenter® PS704 Express® server:

- Allows workload consolidation on IBM POWER7™ processor-based BladeCenter® servers with application virtualization to better utilize resources and amplify the already-significant advantages of BladeCenter efficiencies
- Simplifies deployment with flexible configurations that make it easy to implement the right system, and provide the ability to run AIX®, IBM i, and Linux® operating systems simultaneously
- Helps you realize innovation with a flexible, scalable architecture that lets you choose the right solution for your dynamic business and delivers the utmost in investment protection, performance growth, and time to value
- Offers elegantly simple scalability, allowing easy expansion and pay-as-you-grow flexibility for the utmost in investment protection, performance growth, and time to value
- Designed to provide a secure, resilient infrastructure solution that can help drive cost down, improve energy efficiency, and enhance flexibility

Overview

Built on the proven foundation of the IBM BladeCenter family of products -- easy-to-use, integrated platforms with a high degree of deployment flexibility, energy efficiency, scalability, and manageability -- the BladeCenter PS704 Express is the premier blade for 64-bit applications. Minimize complexity, improve efficiency, automate processes, reduce energy consumption, and scale easily: these are the benchmarks that matter on a smarter planet. The new POWER7 processor-based IBM Power Systems™ blade automatically optimizes performance and capacity at either a system or virtual machine level and benefits from the new POWER7 processor, which contains innovative technologies to help maximize performance and optimize energy efficiency. It represents one of the most flexible and cost-efficient solutions for UNIX®, IBM i, and Linux deployments available in the market. Further enhanced by its ability to be installed in the same chassis with other IBM BladeCenter blade servers, the PS704 blade can deliver the rapid return on investment that clients and businesses demand.

The BladeCenter PS704 blade helps in delivering superior business and IT services with agility and speed, all in a simple-to-manage, highly efficient way. The PS704 Express blade has been preconfigured and tested by IBM and is based on proven technology. Utilizing four 8-core 2.4 GHz 64-bit POWER7 processors and available
in a 32-core configuration, it is designed to achieve maximum performance for both the system and its virtual machines. Couple that performance with PowerVM™, which can be purchased for an extra charge, and you are now enabled for workload consolidation that can drive maximum system utilization, predictable performance, and cost efficiency.

- Power® is effortlessly balancing of workload performance
  
  POWER7 Intelligent Threads technology enables workload optimization by selecting the most suitable threading mode: Single Thread (per core) or Simultaneous Multi Thread-2 or -4 modes. Consequently, Intelligent Threads technology can provide improved application performance. In addition, POWER7 processors can maximize cache access to cores, improving performance, using Intelligent Cache technology.

- Power is dynamic energy optimization
  
  EnergyScale™ Technology offers Intelligent Energy management features, which can dramatically and dynamically conserve power and further improve energy efficiency. These Intelligent Energy features enable the POWER7 processor to operate at a higher frequency if environmental conditions permit, for increased performance per watt; or alternatively operate at a reduced frequency if user settings permit, designed for significant energy savings.

- Smart BladeCenter Solutions with IBM Power Systems blades servers
  
  If you are looking for the perfect alternative to replacing traditional rack servers, then look no further. With a range of available Power Systems blade choices and BladeCenter chassis supported, you have the performance and scalability you need for demanding workloads of all sorts. When combined with the BladeCenter S Chassis, the PS704 blade becomes an ideal solution for deploying blades in an office or distributed enterprise environment. Unlike a stand-alone server that requires multiple power supplies and fans, individual systems management, numerous cables, and a lot of space, IBM BladeCenter is compact and easy to use. By integrating servers, storage, networking, and management, BladeCenter is helping companies in every industry sweep complexity aside. The blade contains the necessities to run most applications -- processors, memory, I/O, and storage. The chassis contains shared redundant power, shared hot-swap cooling, a media tray, integrated Ethernet, storage, switching, and consolidated powerful management.

Organizations are rethinking their server strategies and becoming more receptive to new ways of using IT. Blades are a next-generation solution that can improve your IT across your organization. The IBM BladeCenter PS703 Express is designed to use less energy and gives more choices and control for less complexity and more flexibility.

**Key prerequisites**

- A BladeCenter chassis (BladeCenter H, HT, or S)
- A rack (7014-B42 recommended)
- An operating system (IBM AIX, IBM i operating system, Red Hat Linux, or Novell SUSE Linux)

**Planned availability date**

May 20, 2011
IBM BladeCenter PS704 Express

The IBM BladeCenter PS704 Express is the latest high-density blade server with POWER7 and EnergyScale technology.

The IBM BladeCenter PS704 Express is a double-wide blade with four 8-core 64-bit 2.4 GHz processors, and 32 DIMM slots which can contain up to a maximum of 256 GB of memory. One or two optional SAS Small Form Factor (SFF) 2.5-inch drives or one, two, three, or four optional 1.8-inch SATA Solid State Drives (SSDs) can be installed in the PS704.

Integrated features on the PS704 include:

- Four Gigabit Ethernet ports
- SAS Controller
- Service Processor
- Two USB ports and one Serial over LAN (SOL)
- Two PCI-e CIOv expansion card slots and two PCI-e CFFh high-speed expansion card slots

A heterogeneous infrastructure consolidation platform uses the BladeCenter H, HT, or S Chassis to run the PS704 alongside your x86-based blades in the same chassis with independent monitoring, security, power, and systems management. With several Gigabit Ethernet, Fibre Channel, iSCSI, and 4x high-performance expansion cards using InfiniBand technology to choose from, the PS704 can be tailored to the demands of your data center network and application workloads.

The BladeCenter S Chassis supports a maximum of six PS704 blades, or a mix of PS704 blades and other blades. For the BladeCenter H Chassis, the maximum number of PS704 blades is 7; for the BladeCenter HT Chassis, the maximum number of PS704 blades is 6.

IBM i operating system supports the BladeCenter S Chassis and BladeCenter H Chassis only. IBM i operating system does not support the BladeCenter HT Chassis.

In short term extended thermal conditions, the PS704 model automatically reduces the frequency of the processor to maintain acceptable thermal or power levels. The processor frequency will automatically cycle back up as thermal or power conditions improve.

The BladeCenter Management Module (MM) is notified when this power management starts and again when it stops. Entries are then made in the MM Event Log.

Clients should be aware that there may be applications that are sensitive to processor frequency changes. For instance, frequency reductions could potentially impact benchmarking or applications/tools that depend on execution times for accounting, CPU utilization, or profiling. It is recommended that clients check with their individual application vendors to see if there are possible impacts.

As a robust blade solution for 64-bit UNIX applications, the PS704 also delivers leadership single-instruction, multiple-data (SMID) capabilities with the Linux operating system for scientific research and HPC.

PS704 features and benefits:

- Highly efficient and flexible design of the IBM blade
  - Densely pack more servers into a smaller space.
  - Tailor the system to meet varied business requirements with a choice of BladeCenter chassis.
- Integrate networking switch infrastructure for improved cabling and data center maintenance.
- Deploy in virtually any office environment for quieter, highly secure, and contaminant-protected operation.

- Pioneering IBM EnergyScale technology and Systems Director Active Energy Manager software (an optional feature available for an additional charge)
  - Generate less heat by managing application utilization and server energy consumption.
  - Use less energy to cool the system.

- Industry-leading PowerVM virtualization technology
  - Potentially reduce infrastructure costs by doing more with fewer servers.
  - Simplify IT operations to leverage storage, network, and computing resources to control costs and be more responsive.

- Innovative reliability features and systems management
  - Help expedite hardware repairs and reduce service time.
  - Enable scheduled maintenance with proactive monitoring of critical system components to help reduce unplanned failures.

- Choice of IBM AIX, IBM i, or Linux operating environment
  - Standardize on a single platform that runs the large and varied portfolio of applications that support your business

**PowerVM Editions (Advanced Power Virtualization) (Optional)**

The PS704 supports PowerVM technology. The PS704 is designed to make it more affordable to consolidate multiple independent applications on a single blade using the same proven virtualization technologies offered on IBM Power servers.

The PS704 supports three leading-edge virtualization technologies:


- PowerVM Express Edition supports up to three partitions per system (VIOs, AIX, Linux, and/or IBM i) which share processors and I/O. No hardware management console (HMC) is required or supported. It allows users to try out the Integrated Virtualization Manager (IVM) and the Virtual I/O Server (VIOS), which they would not get with an HMC.

- PowerVM Standard Edition makes the PS704 an ideal platform for consolidation of AIX, Linux, and IBM i operating system applications, helping clients reduce infrastructure complexity and cost. Offering an intuitive, web-based interface for managing virtualization within a single blade, the IVM component of VIOS allows the small business IT manager to quickly and easily set up and manage logical partitions (LPARs). It also enables Virtual I/O and Virtual Ethernet so that storage and communications adapters can be shared among all the LPARs running on the PS704. Ultimately, IBM Micro-Partitioning™ technology allows each processor core to be subdivided into as many as 10 virtual servers. And since the PS704 is built with POWER7 technology, other advanced virtualization functions such as Shared Dedicated Capacity may be exploited.

- PowerVM Enterprise Edition includes all the features of PowerVM Standard Edition plus a new capability called Live Partition Mobility. Live Partition Mobility allows for the movement of a running AIX or Linux partition from one POWER7 processor-based server to another. Designed to have with no application downtime, Live Partition Mobility could result in better system utilization, improved application availability, and potential energy savings. With Live Partition Mobility, planned application downtime due to regular server maintenance can be a thing of the past. Software Maintenance for Virtual I/O Server (577x-PVE) must be purchased with VIOS (5765-PVE). PowerVM Enterprise Edition must be purchased separately.

PowerVM Standard Edition, or PowerVM Enterprise Edition is required when running the IBM i operating system on the PS704.

**Capacity Backup (CBU) support for IBM i on BladeCenter PS704**

The CBU designation can help meet your requirements for use of a second system as backup, high availability, and disaster recovery. It enables you to temporarily transfer IBM i processor entitlements and IBM i user entitlements purchased for a primary machine to a secondary CBU system. Temporarily transferring these resources, instead of purchasing them for a secondary system, may result in significant savings.

The CBU specify feature number 4898 for the BladeCenter PS704 (7891-74X) this feature is available as part of a new blade purchase. This CBU feature cannot be added to an existing blade server.

Certain system prerequisites must be met, and system registration and approval is required before the CBU specify feature can be applied on a new server.

Standard IBM i terms and conditions do not allow either IBM i processor entitlements or IBM i user entitlements to be transferred permanently or temporarily. These entitlements remain with the machine for which they were ordered. When you register the association between a primary and on-order CBU system, you must agree to certain terms and conditions regarding the temporary transfer. After a CBU system designation is approved and the system is installed, you can temporarily move your optional IBM i processor entitlement and user entitlements from the primary system to the CBU system for any purpose, provided the corresponding primary system processors are not being used concurrently for production purposes. The CBU system can therefore better support failover and role swapping for a full range of test, disaster recovery, and high availability scenarios. Temporary entitlement transfer means that the entitlement is a property transferred from the primary system to the CBU system, and may remain in use on the CBU as long as the registered primary and CBU systems are in deployment for the high availability or disaster recovery operation.

<table>
<thead>
<tr>
<th>Primary System (Processor Group)</th>
<th>Capacity Backup System (Processor Group)</th>
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<tr>
<td>JS23/JS43 (P10)</td>
<td>JS23/JS43 (P10), PS701/PS702 (P10), PS700 (P05)</td>
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<td>JS23/JS43 (P10), PS701/PS702 (P10), PS700 (P05)</td>
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<td>JS12 (P05), PS700 (P05), PS703 (P10)</td>
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<td>PS701/PS702 (P10), PS700 (P05)</td>
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<td>JS23/JS43 (P10), PS700 (P05)</td>
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<td>PS701/PS702 (P10)</td>
<td>JS12 (P05), PS700 (P05)</td>
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<td>PS704 (P10)</td>
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<tr>
<td>PS704 (P10)</td>
<td>JS12 (P05), PS700 (P05)</td>
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</tbody>
</table>

These systems have IBM i software licenses with an IBM i P05 or P10 processor group. The primary machine must be in the same enterprise and country as the CBU system.

Before you can temporarily transfer IBM i processor entitlements from the registered primary system, you must have more than one IBM i processor entitlement on the primary machine and at least one IBM i processor entitlement on the CBU server. You can then transfer any IBM i processor entitlements above the minimum one, assuming the total IBM i workload on the primary system does not require the IBM i entitlement that you want to transfer during the time of the transfer. During this temporary transfer, the CBU system's internal records of its total number of IBM i processor entitlements are not updated, and you may see IBM i license noncompliance warning messages from the CBU system. These warning messages in this situation do not mean you are not in compliance.
The PS704 high availability options include PowerHA™ with Geographic Mirroring, iCluster®, and iClusterSMB. You may also use Metro Mirror or Global Mirror replication solutions provided by the storage subsystem, and other third-party software replication packages.

Before you can temporarily transfer IBM i user entitlements you must have more than five IBM i user entitlements on the PS704 primary server and at least five IBM user entitlements on the CBU server. You can transfer optional entitlements (any IBM i user entitlements above the minimum five) from the primary to the CBU. The user entitlements transferred to the CBU may not be used concurrently on the primary server from which they were transferred. If the primary server is of a P10 processor group, then the primary server must have a minimum of 10 user entitlements and the optional user entitlements (those over the 10 required) may be transferred temporarily to the CBU. As a general principle of the CBU on i offering, temporary entitlement transfer cannot originate on the CBU.

For example, if you have a PS704 as your primary system with two IBM i processor entitlements (one above the minimum) and 50 IBM i user entitlements (40 above the minimum), you can temporarily transfer up to one IBM i processor entitlement and up to 40 user entitlements. During this temporary transfer, the CBU system's internal records of its total number of IBM i processor and user entitlements are not updated, and you may see IBM i license noncompliance warning messages from the CBU system.

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

For CBU registration and further details, visit

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

N_PORT ID Virtualization - NPIV

NPIV provides direct access to Fibre Channel adapters from multiple client partitions, simplifying the management of Fibre Channel SAN environments. NPIV support is included with PowerVM Express, Standard, and Enterprise Edition.

Refer to the IBM BladeCenter Interoperability Guide for NPIV configuration support


Active Memory™ Expansion

Optional Active Memory Expansion, available with feature number 4796, is a POWER7 technology that allows the effective maximum memory capacity to be much larger than the true physical memory. Innovative compression/decompression of memory content using processor cycles can allow memory expansion up to 100%. This can allow an AIX 6.1, or later, partition to do significantly more work with the same physical amount of memory or a server to run more partitions and do more work with the same physical amount of memory.

Active Memory Expansion feature (#4796) requires the Systems Director Management Console (SDMC), either a physical appliance or a virtual appliance. The SDMC physical appliance is limited to the IBM 7042-CR6 Rack-mounted Hardware Management Console with the IBM SDMC indicator feature (#0963). The SDMC virtual appliance is obtained by ordering the Systems Director Management Console Virtual Appliance (5765-MCV). SDMC requires minimum eFirmware level 7.3.0.

Note: The 7042-CR6 is only orderable with SDMC.
**Systems Management and administrative tools**

Integrated diagnostic and administrative tools like IBM Predictive Failure Analysis® and light path diagnostics are designed to simplify administration to help lower costs and improve control of the IT environment. Remote management capabilities allow automating IT networking tasks.

Proven technology like VIOS allows the sharing of disk drives, communications, and Fibre Channel adapters.

**Systems management tools for the PS704:**

- AIX 5.3, AIX 6.1, or AIX 7.1: IBM Director V6.2, Cluster Systems Management (CSM) for AIX, V1.7, and Extreme Cloud Administrative Toolkit (xCAT) V2
- SUSE Linux Enterprise Server 11 Service Pack 1 for POWER, with current maintenance updates available from Novell to enable all planned functionality: IBM Director V6.2.
- Red Hat Enterprise Linux 5.6, for POWER, or Red Hat Enterprise Linux 6.0, for POWER, or later
- IBM Director V6.2 xCAT V2
- IBM i 6.1 with i 6.1.1 machine code or IBM i 7.1, or later: IBM Director V6.2

IBM Director V6.2 must be downloaded from


- xCAT is an open source scalable distributed computing management and provisioning tool that provides a unified interface for hardware control, discovery, and OS diskful/diskfree deployment. Highlights include:
  - Client/server architecture
  - Role-based administration
  - Stateless and iSCSI support
  - Scalability
  - Automatic discovery
  - Plug-in architecture
  - Notification
  - SNMP monitoring
  - Centralized console and system logs
  - Documentation

xCAT V2 can be downloaded from


CSM for AIX, V1.7 (5765-F67) provides a full suite of systems management software for the PS704, including:

- Hardware control
- Installation and updating of software on nodes
- Distributed command execution
- File synchronization across a cluster
- Monitoring and automated response
- Automatic security configuration
- Management of node groups (static and dynamic)
- Diagnostics tools

More information on CSM and xCAT can be found at
http://www-03.ibm.com/systems/clusters/software.html

Note: CSM for AIX and IBM Director are available at an additional charge. xCAT is available at no additional charge.

xCAT/IBM Director positioning

xCAT is recommended for HPC computing customers for managing Linux clusters and has been enhanced to support the unique HPC requirements needed to integrate with other open source system management tools.

For general computing customers who operate non-HPC clustering infrastructures, IBM Systems Director and its family of products are IBM’s strategic cross-platform system management solution.

IBM BladeCenter PS704 Express system at a glance

- **Form factor**
  The PS704 is a double-wide blade server for BladeCenter S, BladeCenter H, or BladeCenter HT Chassis.

- **Processor cores**
  The PS704 contains four 8-core 64-bit 2.4 GHz POWER7 processors. Processors are not features. Processors contain AltiVec SIMD and Hardware Decimal Floating-Point acceleration.

- **Level 2 (L2) cache**
  256 KB per processor core.

- **Level 3 (L3) cache**
  4 MB per processor core.

- **Memory (standard and maximum)**
  Base offering: 32 GB minimum. Up to 256 GB maximum in 32 DIMM slots. ECC and Chipkill™ DDR3 SDRAM memory running at 1066 MHz, optionally augmented with Active Memory Expansion.

- **Internal drive storage maximums (optional)**
  - Two 300 GB or 600 2.5-inch Serial Attached SCSI (SAS) 10,000 RPM non-hot-swappable hard disk drives.
  - Four 177 GB 1.8-inch SATA Solid State Drives (SSDs). Selection of 1.8-inch SSD drives requires selection of feature number 4539. Each feature number 4539 supports two 1.8-inch SSDs.
  - Integrated RAID-0 or RAID-1 standard on blade server with support for disk mirroring.

- **Networking**
  Four 1-Gigabit Ethernet ports.

- **I/O upgrade**
  Two PCI-e CIOv expansion card slots and two PCI-e CFFh high-speed expansion card slots.

- **Optional connectivity**
  1 Gbps and 10 Gbps Ethernet, 4 Gbps and 8 Gbps Fibre Channel, 4X InfiniBand, SAS Expansion.

- **PowerVM Express Edition (optional, when running AIX or Linux)**
  Support for up to three partitions per system which share processors and I/O.

- **PowerVM Standard Edition (optional, when running AIX or Linux)**
  Virtual LAN, POWER Hypervisor™, Micro-partitioning, Virtual I/O Server with Integrated Virtualization Manager, Shared Dedicated Capacity, PowerVM Lx86.

- **PowerVM Enterprise Edition (optional, when running AIX or Linux)**
All the features of PowerVM Standard Edition plus Live Partition Mobility and Active Memory Sharing.

- **Systems management**
  - Integrated systems management processor, IBM Systems Director Active Energy Manager™, light path diagnostics, Predictive Failure Analysis, Cluster Systems Management for AIX (CSM), Serial Over LAN, IPMI-compliant.

- **RAS features**
  - IBM Chipkill ECC detection and correction
  - Processor Instruction Retry
  - Service processor with fault monitoring
  - Hot-swappable disk bays (in BladeCenter S Chassis)
  - Hot-plug power supplies and cooling fans (on chassis)
  - Dynamic processor deallocation
  - Dynamic deallocation of logical partitions and PCI bus slots
  - Extended error handling on PCI-e slots
  - Redundant power supplies and cooling fans (on chassis)

- **Operating environments**
  - AIX V5.3 with the 5300-12 Technology Level with Service Pack 4, or later (Planned availability June 30, 2011)
  - AIX V5.3 with the 5300-11 Technology Level with Service Pack 7, or later (Planned availability June 30, 2011)
  - AIX V6.1 with the 6100-06 Technology Level with Service Pack 5, or later
  - AIX V6.1 with the 6100-05 Technology Level with Service Pack 6, or later (Planned availability June 3, 2011)
  - AIX V6.1 with the 6100-04 Technology Level with Service Pack 10, or later (Planned availability June 3, 2011)
  - AIX V7.1 with Service Pack 3, or later
  - IBM i 6.1 with i 6.1.1 machine code, or later
  - IBM i 7.1, or later
  - Novell SUSE Linux Enterprise Server 11 Service Pack 1 for POWER, with current maintenance updates available from Novell to enable all planned functionality
  - Red Hat Enterprise Linux 5.6, for POWER, or later
  - Red Hat Enterprise Linux 6.0, for POWER, or later

**Note:** Users should also update their systems with the latest Linux for Power service and productivity tools from the IBM website


**Note:** For detailed installation instructions and I/O support information for IBM i, refer to the "Read Me First" and "Supported Environments" at

http://www.ibm.com/systems/power/hardware/blades/ibmi.html

- **High availability**
  - IBM PowerHA family.

**Enhancements for IBM i 6.1 and IBM i 7.1**

**Enhanced support for BladeCenter**

Support for BladeCenter PS704 blade

IBM i 6.1 and IBM i 7.1 support the BladeCenter PS704 blade. For IBM i, the BladeCenter PS704 blade is supported in the BladeCenter S and BladeCenter H Chassis. The blade also supports AIX and Linux operating systems.
IBM i uses the PowerVM VIOS partition for access to BladeCenter resources and storage devices. The VIOS partition owns adapters on the blade and virtualizes the resources to the IBM i partition.

IBM i operating system supports the following I/O adapters and storage options on the BladeCenter PS704:

- QLogic 8 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8242)
- Emulex 8 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8240)
- QLogic 4 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8241)
- Broadcom 2-port Gb Ethernet Expansion Card (CIOv) for IBM BladeCenter (#8243)
- 3 Gb SAS Passthrough Expansion Card (CIOv) for IBM BladeCenter (#8246)
- QLogic Ethernet and 4 Gb Fibre Channel Expansion Card (CFFh) (#8252)
- QLogic 8 Gb Fibre Channel Expansion Card (CFFh) (#8271)
- QLogic 2-port 10 Gb Converged Network Adapter (CFFh) (#8275)
- Broadcom 2/4-port Ethernet Expansion Card (CFFh) (#8291)
- IBM 300 GB SAS 10K SFF HDD (#8274)
- IBM 600 GB SAS 10K SFF HDD (#8276)
- IBM 177 GB SATA SSD (#8207)

For use with IBM i, the blade can be deployed with one VIOS partition and one IBM i partition, or with one VIOS partition and multiple IBM i partitions, or with one VIOS partition and a combination of IBM i, AIX, and Linux partitions. Integrated Virtualization Manager (IVM), a function of VIOS, is used to set up and manage the partitions.

IBM i 6.1 (5761-SS1) and IBM i 7.1 (5770-SS1) include per processor core and per user entitlements for blade servers. When you select IBM i on a BladeCenter PS704 blade, you must purchase at least one processor core entitlement and at least five user entitlements. You may purchase additional IBM i processor core entitlements up to a maximum of four on the PS704. Additional IBM i user entitlements can also be purchased in blocks of five users. You may also purchase unlimited user, external user, and unlimited collaboration user options.

IBM i supports Fibre Channel only on BladeCenter H Chassis.

Support for virtual tape

IBM i 6.1 with Machine code 6.1.1 and IBM i 7.1 partitions on BladeCenter PS703 and PS704 blades support virtual tape, which simplifies backup and restore processing. IBM i can use native save/restore commands and BRMS to directly back up to a PowerVM VIOS attached LTO-4 or LTO-5 tape drive, saving hardware costs and management time. This virtual tape support provides an effective backup solution for BladeCenter S configurations. It can also be used with BladeCenter H implementations. The virtual tape function supports the IBM Systems Storage SAS LTO-4 drive (specifically, the TS2240) and the IBM Systems Storage SAS LTO-5 drive, (specifically, the TS2250).

Tape backup with IBM i 6.1 with Machine Code 6.1.1, or IBM i 7.1, or later, partitions on BladeCenter PS703 and PS704 blades may also be done using N_Port ID Virtualization (NPIV) with Fibre Channel attached tape libraries. NPIV support is available for the following tape libraries: 3584 (TS3500), 3573 (TS3100 and TS3200) and, 3576 (TS3310). NPIV is provided via these Fibre Channel and CNA Adapters:

- QLogic 8 Gb Fibre Channel Expansion Card (CFFh) (#8271)
- QLogic 8 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8242)
- Emulex 8 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8240)
- Qlogic 10 Gb Converged Network Adapter (CFFh) (#8275)
Support for BladeCenter S SAS RAID Controller Module

The BladeCenter S SAS RAID Controller Module is supported with POWER7 processor-based blades in addition to x86 processor-based blades with the BladeCenter S Chassis. This controller module provides additional protection options for BladeCenter S storage, providing:

- Support for RAID 0, 1, 10, and 5
- Support for two disk storage modules with up to 12 SAS drives
- Support for an external SAS tape drive
- Support for 3 Gb SAS Passthrough Expansion Card (CIOv) for IBM BladeCenter (#8246) for PS704 blade
- 1 GB of battery-backed write cache between the two modules

Two SAS RAID Controller Modules are required with the BladeCenter S. For environments with high performance demands, separate RAID sets are recommended for each IBM i partition and for x86 blades. The controller is supported with BladeCenter JS12, JS22, JS23, JS43, PS700, PS701, PS702, PS703, and PS704 blades running AIX, Linux, and VIOS partitions, including a VIOS partition that virtualizes I/O resources for IBM i 6.1 or IBM i 7.1 partitions.

Product number

The following are newly announced features on the specific models of the IBM Power Systems 7891 machine type.

<table>
<thead>
<tr>
<th>Description</th>
<th>MT</th>
<th>Model</th>
<th>Feature</th>
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<td>IBM BladeCenter PS704</td>
<td>7891</td>
<td>74X</td>
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<td>Rack Indicator, Rack 2</td>
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<td>4652</td>
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<td>Rack Indicator, Rack 3</td>
<td>7891</td>
<td>74X</td>
<td>4653</td>
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</tbody>
</table>
The following are newly announced features on the specific models of the IBM Power Systems 7779, 7989 machine types.
Feature conversions

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

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

The following conversions are available to customers:

Feature conversions for 7891-74X virtualization engine features

<table>
<thead>
<tr>
<th>From FC:</th>
<th>To FC:</th>
<th>Return parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>5225 - PowerVM Express Edition</td>
<td>5227 - PowerVM Standard Edition</td>
<td>No</td>
</tr>
<tr>
<td>5225 - PowerVM Express Edition</td>
<td>5228 - PowerVM Enterprise Edition</td>
<td>No</td>
</tr>
<tr>
<td>5227 - PowerVM Standard Edition</td>
<td>5228 - PowerVM Enterprise Edition</td>
<td>No</td>
</tr>
</tbody>
</table>

Publications

No publications are shipped with the announced product.

With the IBM Systems Information Center, users can use a single information center to access product documentation for IBM Systems hardware, operating systems, and server software. Through a consistent framework, users can efficiently find information and personalize their access to that information. The IBM Systems Information Center is at


Services

Global Technology Services

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

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

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

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

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

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

For details on education offerings related to specific products, visit
Technical information

Specified operating environment

**Physical specifications**

- **PS704**
  - Height: 245 mm (9.65 in)
  - Width: 59 mm (2.32 in)
  - Depth: 445 mm (17.55 in)
  - Weight: 8.7 kg (19.2 lb)
- **BladeCenter H Chassis**
  - Height: 400 mm (15.75 in)
  - Width: 444 mm (17.5 in)
  - Depth: 711 mm (28.0 in)
  - Weight: 159 kg (350 lb)
- **BladeCenter S Chassis**
  - Height: 306 mm (12.0 in)
  - Width: 444 mm (17.5 in)
  - Depth: 733 mm (28.3 in)
  - Weight: 108.2 kg (240 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:
  - 10° C to 35° C (50° F to 95° F) at 0 to 914 m (0 to 3,000 ft)
  - 10° C to 32° C (50° F to 90° F) at 914 to 2,133 m (3,000 to 7,000 ft)

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


- Relative humidity: 8% to 80%
- Maximum altitude: 2,133 m (7,000 ft)
- Power consumption (@ +12 V supplied by BladeCenter chassis): 492 watts maximum

**EMC conformance**

- US: FCC - Verified to comply with Part 15 of the FCC Rules Class A
- Canada: ICES-004, issue 3 Class A
- EMEA: EN55022: 2006 Class A
- Australia and New Zealand: CISPR 22, Class A
Safety certifications

- US: (UL Mark) UL 60950-1 1st Edition
- CAN: (cUL Mark) CAN/CSA22.2 No.60950-1 1st Edition
- Europe: EN60950-1:2006+A11:2009
- CB: IEC60950-1, 1st Edition
- Russia: (GOST Mark) IEC60950-1

Hardware requirements

Standard PS704 blade configuration

<table>
<thead>
<tr>
<th></th>
<th>Processor</th>
<th>L3 Cache</th>
<th>Memory</th>
<th>Ethernet</th>
<th>Local Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS704</td>
<td>32-core</td>
<td>4 MB/256 GB</td>
<td>Four 1.8&quot; SSDs</td>
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<tr>
<td></td>
<td>2.4 GHz</td>
<td>Gigabit</td>
<td>2.5&quot; SFF drive</td>
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<td></td>
<td>POWER7</td>
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</tbody>
</table>

Serial over LAN (SOL) function routes the console data stream over the standard two 1 Gb Ethernet ports to the chassis AMM.

Minimum system configuration

Each 7891-74X configuration must contain a minimum of:

- 32 GB Memory:
  - 4 x 8 GB (2 x 4 GB DIMMs) DDR3 1066 MHz (#8196)
  - 2 x 16 GB (2 x 8 GB DIMMs) DDR3 1066 MHz (#8199)

  **Note:** Mixing of memory features is allowed in order to meet 32 GB minimum. Memory size and speed must be the same on a processor but can be mixed from processor to processor.

- Thirty-two Processor Entitlements (one of these)
  - 32 x #8408, or 16 x #8408 and 16 x #8415

  **Notes:**
  - Feature number 8415 is part of Express Product Offerings.
  - PowerVM Express Edition (32 x #5225) will be included in the base configuration. Either PowerVM Standard Edition (32 x #5227) or PowerVM Enterprise Edition (32 x #5228) may be substituted for PowerVM Express Edition. PowerVM is not required and may be removed from the order. If the IBM i operating system is installed on the PS704, a PowerVM edition is required.

**Note:** A minimum of one copy of the PS703/PS704 Installation and User’s Guide (1550-1564) is required at each customer installation.

Express Product Offerings

If you order a PS704 server Express Product Offering, as defined here, you may qualify for a processor entitlement at no additional charge. A minimum of 128 GB of memory and one SAS 10 K SFF disk drive is required to determine if you are entitled to a processor entitlement at no additional charge.

You can make changes to the standard features as needed and still qualify for processor entitlements at no additional charge. However, selection of total memory smaller than the totals defined as the minimums disqualifies the order as an Express Product Offering.
BladeCenter PS704 Express

- Minimum 64 GB memory:
  - Eight 8 GB (2 x 4 GB DIMMs) DDR3 1066 MHz (#8196)
  - Four 16 GB (2 x 8 GB DIMMs) DDR3 1066 MHz (#8199)

  **Notes:**
  - Mixing of memory features is allowed in order to meet 64 GB minimum. Memory size and speed must be the same on a processor but can be mixed from processor to processor.
  - Additional memory DIMMs of any size may be added.

- One of these:
  - One 300 GB SAS 10K SFF HDD (#8274)
  - One 600 GB SAS 10K SSF HDD (#8276)
- Sixteen Processor Entitlements (#8408)
- Sixteen Zero-priced Processor Entitlements (#8415); receive 16 processor entitlements (#8415) at no additional charge. Thirty-two cores are entitled.

  **Note:** A minimum of one copy of the *PS703/PS704 Installation and User’s Guide* (1550-1564) is required at each customer installation.

**Optional and additional features**

- Up to 256 GB of system memory
  - Each PS704 processor contains eight RDIMM memory connections, or a total of thirty-two per PS704 blade.
  - Memory DIMMs must be installed in matched pairs (same size and speed) with a minimum of 32 GB and maximum of 256 GB.
  - Memory size and speed must be the same on a processor but can be mixed from processor to processor.
  - PS704 supports Memory Scrubbing, ECC, and Chipkill.
  - Memory features operate at 1066 MHz.
- Storage devices
  - The PS704 does not support removable media within the blade.
  - PS704 has two locations for installation of a 2.5-inch SAS SFF drive.
  - PS704 has four locations for installation of a 1.8-inch SATA Solid State Drive (SSD). Selection of SSDs requires selection of interposer (#4539). The interposer installs in one SAS SFF mounting location.
  - Maximum combinations:
    -- Two SAS SFF drives
    -- One SAS SFF drive and two SSDs
    -- Four SSDs

**Expansion cards**

The PS704 has two PCI-e CIOv expansion card slots and two PCI-e CFFh High Speed expansion card slots.

CFFh expansion cards include:

- QLogic Ethernet and 4 GB Fibre Channel Expansion Card (CFFh) (#8252)

  **Note:** Not supported in the BladeCenter S Chassis (7779-BCS)
- QLogic Ethernet and 8 Gb Fibre Channel Expansion Card (CFFh) (#8271)
- QLogic 2-port 10 Gb Converged Network Adapter (CFFh) (#8275)
- Broadcom 2/4-port Ethernet Expansion Card (CFFh) (#8291)
CIOv expansion cards include:

- Emulex 8 Gb Fibre Channel Expansion Card (CIOv) (#8240)
- QLogic 4 Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter (#8241)
- QLogic 8 Gb Fibre Channel Expansion Card (CIOv) (#8242)
- Broadcom 2-port Gb Ethernet Expansion Card (CIOv) for IBM BladeCenter (#8243)
- 3 Gb SAS Passthrough Expansion Card (CIOv) for IBM BladeCenter (#8246)

**Note:** IBM i operating system does not support Fiber Channel adapters (feature numbers 8252, 8240, 8241, 8242) when used in the BladeCenter S Chassis.

**Software requirements**

The PS704 server supports the AIX, Linux, and IBM i operating systems, providing the flexibility of using applications written for any one of the three. IBM has qualified two popular Linux distributions for use with the PS704 server:

- Red Hat Enterprise Linux for POWER
- Novell SUSE Linux Enterprise Server for POWER Systems

One or more of the following operating systems is required for an operational PS704:

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

- AIX V5.3 with the 5300-12 Technology Level with Service Pack 4, or later (Planned availability June 30, 2011)
- AIX V5.3 with the 5300-11 Technology Level with Service Pack 7, or later (Planned availability June 30, 2011)
- AIX V6.1 with the 6100-06 Technology Level with Service Pack 5, or later
- AIX V6.1 with the 6100-05 Technology Level with Service Pack 6, or later (Planned availability June 3, 2011)
- AIX V6.1 with the 6100-04 Technology Level with Service Pack 10, or later (Planned availability June 3, 2011)
- AIX V7.1 with Service Pack 3, or later

If installing the IBM i operating system:

- IBM i 6.1 with i 6.1.1 machine code, or later
- IBM i 7.1, or later

**Note:** VIOS is required with the IBM i operating system.

If installing VIOS:

- VIOS 2.2.0.12-FP24 SP02, or later

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

- Novell SUSE Linux Enterprise Server 11 Service Pack 1 for POWER, with current maintenance updates available from Novell to enable all planned functionality
- Red Hat Enterprise Linux 5.6 for POWER, or later
- Red Hat Enterprise Linux 6.0 for POWER, or later

Users should also update their systems with the latest Linux for Power service and productivity tools from the IBM website


**Note:** For systems ordered with the Linux operating system, IBM ships the most current versions available from the distributor. If your hardware requires a different
version of a Linux OS than that shipped by IBM, you must obtain it via download from the Linux distributor's website. Information concerning access to a distributor's website is located on the product registration card delivered to you as part of your Linux OS order.

Processor is the unit of measure by which this program is licensed. A processor (commonly called a processor core or CPU) is a functional unit within a computing device that interprets and executes instructions. A processor consists of at least an instruction control unit and one or more arithmetic or logic unit. With multicore technology, each core is considered a processor. For programs eligible for sub-capacity licensing, a Proof of Entitlement (PoE) must be acquired for all activated processors available for use in each partition (utilizing eligible partitioning technologies) where the program runs. A Proof of Entitlement (PoE) must be acquired for all activated processor cores available for use on the server.

Planning information

Cable orders

No cables are required.

Security, auditability, and control

Security and auditability features include:

- A power-on password function provides control of who has access to the data and server setup program on the server.
- A selectable boot sequence can be used to prevent unauthorized installation of software or removal of data from the diskette drive.

Limitations

The BladeCenter and PS704 blade have no security-intrusion detection.

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

Global Technology Services

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

IBM Electronic Services

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

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

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

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

Benefits

**Increased uptime:** The Electronic Service Agent tool is designed to enhance the Warranty or Maintenance Agreement by providing faster hardware error reporting and uploading system information to IBM Support. This can translate to less wasted time monitoring the "symptoms," diagnosing the error, and manually calling IBM Support to open a problem record. Its 24 x 7 monitoring and reporting mean no more dependence on human intervention or off-hours customer personnel when errors are encountered in the middle of the night.

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

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

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

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

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

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

http://www.ibm.com/support/electronic
Terms and conditions

Volume orders: Contact your IBM representative.

Warranty period
Three years

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

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

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

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

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

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

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

The following parts have been designated as Tier 1 CRUs:

- Hard disk drive
- Daughter cards
- Battery
- Bezel
- Memory DIMMs
- Top cover
- SSD carrier
- SSDs

**On-site Service**

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

The service level is

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

**Additional reference for Europe**

For additional info, refer to the European HW Operations Guide and Service Level Description Table available at

http://www-5.ibm.com/services/europe/maintenance/

**Machine Exchange Service**

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

**Warranty service upgrades and maintenance service options**

**Warranty service upgrades**

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

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

CRUs will be provided as part of the machine's standard warranty CRU Service except that you may install a Tier 1 CRU yourself or request IBM installation, at no additional charge, under one of the On-site Service levels specified below.

**On-site Service**

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

- IBM On-site Repair, Same Business Day On-site Response Time, Latest Call Registration 12:00, 9 hours per day, Monday through Friday, excluding public or national holidays
- IBM On-site Repair, Same Business Day On-site Response Time, Latest Call Registration 18:00, 18 hours per day, Monday through Saturday, excluding public or national holidays
• IBM On-site Repair, Same Business Day 6 hours average On-site Response Time, 24 hours per day, Monday through Sunday, 365 days a year

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

**Maintenance services**

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM website. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed.

**CRU Service**

If your problem can be resolved with a CRU (for example, memory, or hard disk drive), IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request.

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, and 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.

**On-site Service**

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

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

**Maintenance service (ICA)**

Maintenance services are available for ICA legacy contracts.

**Alternative service (warranty service upgrades)**

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

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

A CRU will be provided as part of the machine's standard warranty CRU Service except that you may install a Tier 1 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service specified below, 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.

**Maintenance service**

If required, IBM provides repair or exchange service depending on the type of maintenance service specified below for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM website. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed.

**Customer Replaceable Unit (CRU) Service**

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

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

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

- 7891-74X Type/Model
- 7891-74X Feature Number 8207

**Non-IBM parts support**

**Warranty service**

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

**Warranty service upgrades and maintenance services**

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

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

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

**International Warranty Service (IWS)**

IWS is available in selected countries or regions.

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. Under IWS, warranty service will be provided with the prevailing warranty service type and service level available for the IWS-eligible machine type in the servicing country and the warranty period observed will be that of the country in which the machine was purchased.

To determine the eligibility of your machine and to view a list of countries where service is available, visit


For more information on IWS, refer to Services Announcement ZS01-0168, dated September 25, 2001.

**Usage plan machine**

No

**IBM hourly service rate classification**

Two

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

**Field-installable features**

Yes

**Model conversions**

No

**Machine installation**

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

**Graduated program license charges apply**

Yes

The applicable processor tier is small.

**Licensed Machine Code**

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

Machine using LMC Type Model 7891-74X

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

http://www-947.ibm.com/support/entry/portal/

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.

Business Partner terms and conditions

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


Prices

For all local charges, contact your IBM representative.

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Corrections

(Corrected on July 19, 2011)
Description section modified.