



# IBM System x3690 X5: Workload Optimized System for Database supports 10-core Intel Xeon processors for higher performance

## Table of contents

<a href="#">1 Overview</a>	<a href="#">9 Publications</a>
<a href="#">3 Key prerequisites</a>	<a href="#">11 Technical information</a>
<a href="#">3 Planned availability date</a>	<a href="#">20 Terms and conditions</a>
<a href="#">3 Description</a>	<a href="#">26 Prices</a>
<a href="#">8 Product positioning</a>	<a href="#">27 Order now</a>
<a href="#">9 Product number</a>	

## At a glance

New IBM® System x3690 X5: Workload Optimized System for Database servers incorporate high-performance 10-core Xeon processors and:

- Up to 32 DIMM slots per chassis, with memory expansion board, delivering up to 1 TB of high-speed PC3-10600I 1066 MHz double data rate (DDR3) low voltage memory using 32 GB DIMMs
- Support for low voltage DIMMs and new power states to optimize power usage
- Optional MAX5 for an additional 32 DIMM slots available for most models
- Optional Emulex 10 Gb Ethernet Integrated Virtual Fabric Adapter
- Five PCIe Gen 2 I/O adapter slots (1-three-quarter length/full height, 1-half-length/full height, 3-half-length/low profile) Gen 2 slots
- Serial Attached SCSI (SAS) controller
- Integrated Broadcom 5709 Dual-port 10/100/1000 Megabit Ethernet
- Up to sixteen 2.5-inch hot-swap bays for flexible installation of HDDs, or twenty-four 1.8-inch SAS SSDs, supporting up to 16 TB<sup>1</sup> internal data storage
- eXFlash for high performance solid-state drive storage
- Standard Integrated Management Module
- One 675-watt, voltage sensing, rear access, hot-swap power supply; up to four hot-swap power supplies
- Optional Enhanced SATA CD-RW / DVD-ROM Combo drive
- Eight USB ports (two can be used for USB keyboard and mouse), SVGA video port, one serial port, and two 1 Gb Ethernet ports per chassis
- Three-year limited warranty<sup>3</sup>

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: SE001).

## Overview

These models of the IBM System x3690 X5: Workload Optimized System for Database server are powered with 10-core Intel Xeon™ processors, with optional IBM MAX5 memory expansion and eXFlash storage for powerful 2-socket, memory scalable systems. Workload models for database provide additional choices.

IBM MAX5 for System x® is a scalable, 1U, memory expansion drawer. It delivers an additional 32 DIMM slots to the x3690 X5. It has a memory controller for added performance. MAX5 is available as an option for most x3690 X5 models.

The x3690 X5 server is the latest generation of the Enterprise X-Architecture® , delivering innovation with enhanced reliability and availability features to enable optimal performance for databases and enterprise applications environments.

Potential benefits include:

- Increased performance, reliability, and availability
- Highly scalable memory
- High-performing databases and fast time to value for database workloads with preconfigured database optimized systems
- Up to two processors and 32 DIMM slots in the base system, for larger databases, enterprise applications, and mission-critical workloads
- Advanced networking capabilities with two Broadcom 5709 1 Gb Ethernet adapters standard in all models, and Emulex 10 Gb dual-port Virtual Fabric Adapter optional
- Low-power cost-effective memory with Advanced Buffer eXecution chip
- Integrated Management Module (IMM) for enhanced systems management capabilities
- Power management savings
- 10-core processing performance
- Memory ProteXion with Chipkill, memory mirroring, memory sparing, Intel™ SMI lane failover, SMI packet retry, and SMI clock failover
- Up to 32 DIMM slots per chassis, with memory expansion board, delivering up to 1 TB of high-speed PC3-10600I 1066 MHz double data rate (DDR3) low voltage memory using 32 GB DIMMs
- Support for low voltage DIMMs and new power states to optimize power usage
- Serial Attach SCSI (SAS) plus RAID 0, RAID 1, and RAID 10 to maximize throughput and ease installation; RAID 5 or RAID 6 optional
- Up to sixteen 2.5-inch SAS HDDs or twenty-four 1.8-inch SAS SSDs, or a combination of both; up to 16 TB<sup>1</sup> of maximum internal storage standard with one HDD backplane that can hold four 2.5-inch drives; second and third backplane optional for additional HDD or SSD
- High-performance integrated dual 1 Gb Ethernet built-in, high-speed networking with support for latest technologies
- Integrated Emulex 10 Gb Dual-port Ethernet Adapter optional
- 2U rack-optimized, tool-free chassis that strikes the balance between rack density and ease of maintenance
- Rear access, hot-swap power supplies for easy maintenance

#### *Fifth-generation X5 technology features*

- New leadership and scaling technology, with memory capacity above and beyond industry standard with MAX5
- New eXFlash high-IOPS solid-state storage technology for larger, faster databases
- Advanced fifth-generation Chipkill ECC memory controller to help correct single-bit, 2-bit, 3-bit, and 4-bit memory errors
- Memory ProteXion and memory mirroring support
- High-performance PCIe Gen 2 (5 GHz) I/O slots
- Hot-swap drive bays and redundant fans to replace selected components without powering down the server
- One hot-swap, rear access, redundant power supply with 220 V ac input; up to four power supplies
- Predictive Failure Analysis (PFA) on processors, memory, fans, power supply, and HDD options to help warn of problems before they occur

- Innovative light path diagnostics and top access design; easy to service and configure

**Warranty:** Three years, customer replaceable unit (CRU) and on-site<sup>2</sup> service, limited warranty<sup>3</sup>; optional warranty service upgrades available.

<sup>1</sup> When referring to hard drive or tape backup capacity, GB stands for one billion bytes, and TB stands for terabyte, or 1,000 billion bytes. Total user capacity may vary depending on operating environments.

<sup>2</sup> IBM sends a technician after attempting to diagnose and resolve the problem remotely.

<sup>3</sup> For information on the IBM Statement of Limited Warranty, visit

[http://www.ibm.com/servers/support/machine\\_warranties/](http://www.ibm.com/servers/support/machine_warranties/)

Alternatively, this information is also available by contacting your IBM representative or reseller.

### **Feature exchange**

None

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## **Key prerequisites**

Refer to the [Hardware requirements](#) section for details.

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## **Planned availability date**

March 14, 2013

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## **Description**

### **Related options**

- Intel Xeon Processor E7-2860 10C 2.26GHz 24MB Cache 130w (88Y5644)

These processors support internal processing speeds of up to 2.26 GHz and external processing operations to memory at 1066 MHz. These new SMP capable server models contain integrated, full-speed 24 MB level 2 cache and 10-core Intel Xeon based processors.

### **Memory options**

- 2GB (1x2GB, Dual Rank x8) PC3-10600 CL9 ECC DDR3-1066 LP RDIMM (44T1481)
- 2GB MAX5 (1x2GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz LP RDIMM (44T1592)
- 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM (46C7448)
- 4GB MAX5 (1x4GB, Dual Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP RDIMM (44T1599)
- 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM (46C7482)
- 16GB (1x16GB, Quad Rankx4) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM (46C7483)
- 4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM (49Y1407)
- 8GB (1x8GB, 4Rx8, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM (49Y1399)
- 16GB (1x16GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM (49Y1400)

- 32GB (1x32GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM (90Y3101)(when available)

These high-speed, DDR3 registered DIMMs are synchronized to the processor. Once addressed, data can be transferred on both edges of the clock signal. This significantly improves performance of the 1333 MHz front-side bus Xeon processor.

**Memory Expansion Card (60Y0323)** provides the option to upgrade your machine with up to 16 memory expansion DIMMs. System memory can be expanded to 1 TB by adding 32 GB PC3-10600 CL4 ECC DDR3 SDRAM RDIMM in each of the 32 DIMM sockets. The MAX5 option provides an additional 32 DIMM slots.

Memory ProteXion:

- Utilizes unused bits in each memory DIMM (hot-spare bits)
- Doubles the amount of Chipkill memory sustainable per server
- Is included at no additional cost, requires no additional hardware, and works independently of the operating system
- Is similar to the "hot-spare" of a DASD array

Memory mirroring:

- Propels Intel-based servers toward continuous operations
- Dramatically helps to increase uptime and allow scheduled maintenance
- Helps provide capability and reliability approaching a mainframe
- Is operating system independent; does not require drivers or operating system support

Chipkill memory:

- Offers integrated XA-64e chipsets for using off-the-shelf DIMMs memory reliability Increases availability by detecting and helping to correct single-bit, 2-bit, 3-bit, and 4-bit memory errors

**IBM Systems Director CD** with 20 agent license proofs of entitlement includes support for the IBM System x3690 X5 server.

## **IBM System x3690 X5 server description**

### ***High-performance server subsystems***

The new x3690 X5 servers are high-throughput, scalable, and SMP-capable, featuring support for 10-core Intel Xeon processors. They deliver excellent scalability for adding memory, adapter cards, storage, and up to two processors.

Models are powered with 10-core Intel Xeon processors that use 64-byte cache lines. EMT64T architecture supports 64-bit extensions. Two connectors for Intel Xeon MP processors are standard on the system board. High-speed PC3-10600 ECC SDRAM provides excellent processor-to-memory subsystem performance.

The x3690 X5 system architecture is fine tuned and engineered to optimize the powerful Intel Xeon processors. This architecture consists of the following components:

- 10-core Intel Xeon processors
- System memory cards with Intel Scalable Memory Buffers
- Intel host-bridge I/O controllers

Each processor supports four independent buses to the memory, for a total of 16 GB/s of potential memory bandwidth per CPU.

## **High-availability and serviceability features**

Many enterprise on-demand environments run around the clock to supply information around the globe. These environments require ruggedly dependable servers designed with features that can tolerate a component failure without total shutdown. x3690 X5 servers pack numerous fault-tolerant and high-availability features into a high-density, rack-optimized package that helps significantly reduce the space needed to support massive network computing operations.

Features include:

- Five PCIe Gen 2 I/O adapter slots
- Up to 16 Serial Attach SCSI (SAS) HDD bays or 24 eFlash SSD bays
- MAX5 memory expansion option with 32 additional DIMM slots
- ECC DIMMs combined with an integrated advanced ECC memory controller with fifth-generation Chipkill support to correct many single-bit, 2-bit, 3-bit, and 4-bit memory errors to minimize disruption of service to LAN clients
- Memory ProteXion and memory mirroring
- Memory hardware scrubbing to correct many soft memory errors automatically without software intervention down time
- PFA on disk drive options, memory, processors, power supply, and fans, in conjunction with IBM Systems Director, to help alert the system administrator of an imminent component failure
- Up to four 675-watt power supplies that support typical configuration redundancy or full configurations requiring redundancy when operating with 240 V ac
- Hot-swap, multispeed fans to provide cooling redundancy and enable individual fan replacement without powering down the server, plus one fan in each of the hot-swap power supplies
- Standard IMM enabling diagnostic, reset, POST, and auto-recovery functions from remote locations and monitoring of temperature, voltage, and fan speed; alerts generated when thresholds are exceeded without utilizing an I/O slot
- Information LED panel, diagnostics LED panel, and component LEDs for visual indications of system well-being without removing the cover, to help reduce downtime and service costs
- Easy top access to system board, adapter cards, and memory
- CPU failure recovery in SMP configurations, allowing a failed processor to be forced offline, the server rebooted, an alert generated, and operation continued with the working processor

The servers include:

- Two sockets for SMP powerful 10-core Intel Xeon processors
- Up to 32 GB high-speed PC3-10600 DDR3 ECC memory standard, supporting up to 1 TB of system memory per chassis (up to 2 TB with MAX5)
- Up to four worldwide, voltage-sensing 675-watt, hot-swap power supplies with auto-restart, standard
- Up to 16 hot-swap HDD bays, supporting up to 16 TB of internal data storage (using 1 TB SAS hot-swap drives)
- Up to 24 hot-swap eFlash SSD bays, supporting up to 4.8 TB of internal data storage (using 200 GB drives)
- Eight terabytes of external data storage supporting optional storage units, ServeRAID SCSI controllers, and Fibre Channel controllers and storage units

## **Configurations**

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### **XpandOnDemand scalability**

- Modular building-block scalability delivers the flexibility to scale to meet your business needs, allowing you to configure your system to optimize your system for your application needs.

## **Systems management**

x3690 X5 servers feature IBM Systems Director, a powerful, highly integrated, systems-management software solution built on industry standards and designed for ease of use.

With IBM Systems Director, a network administrator can perform the following tasks:

- View the hardware configuration of remote systems in detail
- Monitor the usage and performance of critical components such as microprocessors, disks, and memory
- Centrally manage individual or large groups of IBM and non-IBM, Intel-based servers, desktop computers, workstations, and mobile computers on a variety of platforms

IBM Systems Director provides a comprehensive entry-level workgroup hardware manager. It has the following key features:

- Advanced self-management capabilities for maximum system availability.
- Support for multiple operating systems, including certain versions of Microsoft™ Windows™ 2003 Server, Windows XP Professional, Red Hat Linux™, SUSE Linux, and Novell NetWare. For a complete list of operating systems that support IBM Systems Director, visit

[http://publib.boulder.ibm.com/infocenter/eserver/v1r2/index.jsp?topic=/dirinfo\\_5.20/fqm0\\_r\\_supported\\_operating\\_systems.html](http://publib.boulder.ibm.com/infocenter/eserver/v1r2/index.jsp?topic=/dirinfo_5.20/fqm0_r_supported_operating_systems.html)

The list is updated periodically.

- Support for IBM and non-IBM servers, desktop computers, workstations, and mobile computers. (Not all IBM Systems Director features are supported on non-IBM servers)
- Support for systems-management industry standards.
- Integration into leading workgroup and enterprise systems-management environments.
- Ease of use, training, and setup.

IBM Systems Director also provides an extensible platform that supports advanced servers that are designed to help reduce the total cost of managing and supporting networked systems. By deploying IBM Systems Director, you may achieve reductions in ownership costs through the following potential benefits:

- Reduced down time
- Increased productivity of IT personnel and users
- Reduced service and support costs

For more information about IBM Systems Director, refer to the CD that comes with the server or the IBM Systems Director documentation on the CD, or visit

<http://www-03.ibm.com/systems/software/director/index.html>

IBM Systems Director includes IBM Systems Director Extensions, a portfolio of server tools that integrates into the IBM Systems Director interface and works with the Integrated Management Module, or other systems-management monitoring functions contained in IBM System x servers. Typical functions and monitoring capabilities can include:

- PFA-enabled critical hardware components
- Temperature
- Voltage
- Fan speed
- Light path diagnostics

The IT administrator gains comprehensive, virtual on-site control of IBM System x3690 X5 servers through the ability to remotely:

- Access the server, in many cases regardless of its status
- Inventory and display detailed system and component information
- View server bootup during POST
- Browse and delete logs of events and errors
- Reset or power cycle the server
- Run diagnostics, SCSI, and RAID setup during POST
- Monitor thresholds on server health including:
  - Operating system load
  - POST time-out
  - Voltage
  - Temperature
- Set proactive alerts for critical server events including PFA on:
  - Processors
  - Memory
  - Fans
  - Power supplies
  - HDDs
- Define automated actions such as:
  - Send an email or page to an administrator
  - Execute a command or program
  - Deliver an error message to the IBM Director console
- Flash BIOS
- Monitor and graph the utilization of server resources such as:
  - Memory
  - Processor
  - HDDs
- Identify potential performance bottlenecks and react to prevent down time

### ***Active Energy Manager tools and programs***

The IBM Active Energy Manager tool is available on the System x3690 X5 server. IBM Systems Director Active Energy Manager™ V3.1 is the next-generation product of IBM PowerExecutive™, which was previously available from IBM for x86 systems only. IBM Systems Director Active Energy Manager now supports multiple IBM platforms and provides new capabilities that build upon the functions previously available with IBM PowerExecutive V2.1. Enhancements to existing function include:

- Cross-system monitoring and management support
- Dynamic polling rate
- Discovery and monitoring of intelligent PDUs

The Active Energy Manager V3.1 offering has both no-charge (free) monitoring functions and optional chargeable (fee-based) management functions.

### **No-charge monitor functions**

- Power Trending
- Thermal Trending
- iPDU Support

## Priced Management functions

- Power Capping
- Power Savings Mode

For more information refer to

<http://www-03.ibm.com/systems/management/director/extensions/actengmrg.html>

## World-class support tools and programs

The x3690 X5 servers include tools and programs designed to make ownership a positive experience. From the start, IBM programs help you purchase servers, get them running, and keep them running. IBM can help your company maintain ownership of technology leadership network servers.

The IBM ToolsCenter is a collection of server management tools to help manage your IBM System x and BladeServer environment. ToolsCenter makes managing your server environment less complicated, more productive, and cost effective.

<http://www-947.ibm.com/support/entry/portal/docdisplay?brand=5000008&Indocid=TOOL-CENTE R>

- IBM customer replaceable unit (CRU) and on-site, three-year limited warranty with next-business-day service (same-business-day service optionally available) protects your investment if a problem occurs. This service also includes replacement of parts identified through PFA.
- The ServerProven<sup>® 4</sup> program lets you confidently configure your server with various devices and operating systems. This web-based program provides compatibility information from actual testing of the x3690 X5 server with various adapters and devices.
- The ServerGuide<sup>5</sup> CD library includes online publications and utilities and drivers that help you load popular network operating systems.
- Electronic support on the web offers additional support in an easy-to-use format.

<sup>4</sup> IBM makes no warranties, expressed or implied, regarding non-IBM products and services that are ServerProven, including but not implied warranties and of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

<sup>5</sup> The Microsoft Windows Preinstallation Environment software, included as part of ServerGuide software, may be used for boot diagnostic, setup, restoration, installation, configuration, test, or disaster recovery purposes only. To download the ServerGuide, visit

<http://www-03.ibm.com/systems/management/serverguide/sub.html>

## IBM System x3690 X5 model configuration

System SEO Number	Processor	L3 Cache	Memory	HDD Iface	HDD	Power Supply
IBM System x3690 x5: workload Optimized System for Database						
7147-D3x	2 x 2.26 GHz Xeon E7-2860	24 MB 6.4 GTS	16 x 4 GB 10-core	SAS 130W	16 x 200GB 1.8" MLC SSD	four
7147-D4x	2 x 2.26 GHz Xeon E7-2860	24 MB 6.4 GTS	16 x 4 GB 10-core	SAS 130W	16 x 200GB 1.8" MLC SSD	four

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## Product positioning

These new IBM System x3690 X5 models enhance the server line by providing new levels of performance and price/performance. The IBM System x3690 X5 server features a high-density, 2U mechanical platform that supports 10-core Intel Xeon processors, PCIe architecture, and high-speed DDR3 memory.



IBM System x3690 X5 servers deliver additional processing, expandability, and high-availability features. These features make them ideal for handling complex, business-critical on-demand business applications that must be supported by space-saving, rack-optimized servers.

The IBM System x3690 X5 server is designed for extremely complex, compute-intensive applications requiring two-socket plus processing power and large memory support.

This makes the IBM System x3690 X5 server an excellent fit for current and future enterprise on-demand applications.

Applications include:

- On-demand business
- Business intelligence
- Transaction processing
- Enterprise resource planning
- Collaboration applications ( Microsoft Exchange and Lotus Notes® )
- Server consolidation
- Internet or intranet front-end serving
- Web content serving
- Database storage as a SAN solution

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## Product number

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Description	Machine	Model	SEO number
Single Entity Offerings (SEOs)			
IBM System x3690 X5: workload optimized System for Database			
	7147	D3U	7147D3U
	7147	D4U	7147D3U

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## Publications

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The following publications and CD-ROMs are shipped with the x3690 X5 servers.

- *x3690 X5 Installation Guide* contains an introduction to the computer, installation and setup, installing options, reference information, and problem determination. The installation guide has easy-to-use text and illustrations to enable you to quickly set up your x3690 X5 server.
- IBM Systems Director systems-management software is included.

**Note:** Software versions, features, and functions shipped with these systems may change as new releases become available or may be discontinued at any time.

The following publications are available immediately.

To order, contact your IBM representative.

The *x3690 X5 Installation Guide* and the *Problem Determination Guide*, in US English versions, are available from

<http://www-03.ibm.com/servers/eserver/serverproven/compat/us/indexsp.html>

## IBM Publications Center Portal

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

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

## Business Partner information

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

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=113-030>

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## Services

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### Global Technology Services

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

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

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

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

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

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

For details on education offerings related to specific products, visit

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

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

### System x and BladeCenter support services

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#### **Recommended core technical support**

When you buy IBM System x technology, include the support services you need -- to help keep both your hardware and software working for you, day after day, at peak performance. It is your first step toward helping to protect your investment and sustain high levels of system availability. We offer service-level and response-time options to fit your business needs. And we will help you get started with a core support package that includes:

- **Continuous system monitoring**

Electronic monitoring that helps speed up problem-solving with automated, early detection of potential problems and system errors.

- **Hardware maintenance**

World-class remote and on-site hardware problem determination and repair services.

- **Software technical support**

Access to help line calls for fast, accurate answers to your questions during installation and throughout ongoing operations.

For more information, visit

<http://www.ibm.com/servers/eserver/xseries/services.html>

## Technical information

### Specified operating environment

#### *Physical specifications - x3690 X5*

EMEA x=G

	7147D3x
Processor	Xeon E7-2860 Ten-core 130 W
Internal speed	2.26 GHz
Memory bus speed	1066 MHz
Number standard	2
Maximum	2
Interconnect speed	6.4 GT/s
L3 cache total	24
Memory (PC3-10600 DDR3)	64 GB ECC
DIMMs	16 x 4 GB
DIMM sockets standard	16
DIMM sockets maximum	32 (Optional card)
Capacity	1024 GB <sup>6</sup>
Memory expansion card	1
Number standard	0
Maximum	1
MAX5	Optional
DIMMs	16 x 16 GB
DIMM sockets maximum	16
Video	SVGA
Memory	16 MB
SAS controller	ServerRAID-M5015
Ports	8
Connector internal	2
Connector external	0
HDD standard	16-200 GB 1.8" MLC SSD
Bays available	4 Standard, 16 with upgrade kit
2.5-inch slim	4 Standard, 16 with upgrade kit
Hot-swap	4 Standard, 16 with upgrade kit
Internal capacity	16 TB <sup>7</sup>
PCIe sockets	5
Management processor IMM	Standard
RAID 0/1/10	Standard
ServerRAID M5015 6Gb	Optional
Dual Ethernet controller	Standard
10/100/1000 Mbps	
Emulex 10Gb Dual-port	Standard
Ethernet Adapter	
Optical disk drive	Optional
Power supply	675 W
Number standard	4
Maximum	4
Hot-swap	Yes
Redundant power	Optional
Auto restart	Yes
MAX5 power supply	675 W

MAX5 number standard	1
MAX5 maximum	2
Hot-swap	Yes
Redundant power	Standard
Auto restart	Yes

EMEA x=G

7147D4x

Processor	Xeon E7-2860
	Ten-core 130 W
Internal speed	2.26 GHz
Memory bus speed	1066 MHz
Number standard	2
Maximum	2
Interconnect speed	6.4 GT/s
L3 cache total	24
Memory (PC3-10600 DDR3)	64 GB ECC
DIMMs	16 x 4 GB
DIMM sockets standard	16
DIMM sockets maximum	32 (Optional card)
Capacity	1024 GB <sup>6</sup>
Memory expansion card	1
Number standard	0
Maximum	1
MAX5	Optional
DIMMs	16 x 16 GB
DIMM sockets maximum	16
Video	SVGA
Memory	16 MB
SAS controller	ServerRAID-M5015
Ports	8
Connector internal	2
Connector external	0
HDD standard	16-200 GB 1.8" MLC SSD
Bays available	4 Standard, 16 with upgrade kit
2.5-inch slim	4 Standard, 16 with upgrade kit
Hot-swap	4 Standard, 16 with upgrade kit
Internal capacity	16 TB <sup>7</sup>
PCIe sockets	5
Management processor IMM	Standard
RAID 0/1/10	Standard
ServerRAID M5015 6Gb	Optional
Dual Ethernet controller	Standard
10/100/1000 Mbps	
Emulex 10Gb Dual-port	Standard
Ethernet Adapter	
Optical disk drive	Optional
Power supply	675 W
Number standard	4
Maximum	4
Hot-swap	Yes
Redundant power	Optional
Auto restart	Yes
MAX5 power supply	675 W
MAX5 number standard	1
MAX5 maximum	2
Hot-swap	Yes
Redundant power	Standard
Auto restart	Yes

<sup>6</sup> Capacities are based on installation of the memory expansion card and 32 x 32 GB DIMMs installed on the planar and in the memory expansion card.

<sup>7</sup> Capacities are based on installation of sixteen 200 GB 1.8-inch MLC SSDs. For the latest information on supported SSDs/HDDs options, visit

<http://www-03.ibm.com/servers/eserver/serverproven/compat/us/indexsp.html>

Supported video mode capabilities for the SVGA PCI controller:

windows 2008 (32-bit and 64-bit) and Linux (all distributions)

Resolution	Colors	Refresh Rate (Hz)
640 x 480 x 8	256	60, 72, 75, 85, 90, 100, 120, 160, 200
640 x 480 x 16	64K	60, 72, 75, 85, 90, 100, 120, 160, 200
640 x 480 x 32	16M	60, 72, 75, 85, 90, 100, 120, 160, 200
800 x 600 x 8	256	60, 70, 72, 75, 85, 90, 100, 120, 160, 200
800 x 600 x 16	64K	60, 70, 72, 75, 85, 90, 100, 120, 160, 200
800 x 600 x 32	16M	60, 70, 72, 75, 85, 90, 100, 120, 160
1024 x 768 x 8	256	60, 70, 72, 75, 85, 90, 100, 120, 140, 150, 160, 200
1024 x 768 x 16	64K	60, 70, 72, 75, 85, 90, 100, 120, 140, 150, 160, 200
1024 x 768 x 32	16M	60, 70, 72, 75, 85, 90, 100
1280 x 1024 x 8	256	60, 72, 75
1280 x 1024 x 16	64K	60, 72, 75
1280 x 1024 x 32	16M	60, 72, 75

### ***Dimensions***

2U rack drawer:

- Width: 440 mm (17.32 in.)
- Depth: 712.1 mm (28.04 in.)
- Height: 86.4 mm (3.40 in.)
- Minimum configuration: 35.4 kg (78 lb)
- Maximum configuration: 49.90 kg (110 lb)

### ***Electrical***

- 100 to 127 (nominal) V ac; 50 Hz or 60 Hz; System 20A (10A/PS)
- 200 to 208 (nominal) V ac; 50 Hz or 60 Hz; System 10A
- 200 to 240 (nominal) V ac; 50 Hz or 60 Hz; System 9A
  - Minimum configuration: 0.20 kVA (one power supply)
  - Minimum configuration: 0.26 kVA (two power supplies)
  - Typical configuration: 1.12 kVA (two power supplies)
  - Maximum configuration: 2.16 kVA (two power supplies)
- Btu output:
  - Ship configuration (1PS): 648 Btu/hr (190 watts)
  - Ship configuration (2PS): 802 Btu/hr (235 watts)
  - Typical configuration: 3,753 Btu/hr (1100 watts)
  - Full configuration: 7,336 Btu/hr (2150 watts)
- Noise level horizontal position: 6.3 bels

**Note:** The noise emission level stated is the declared (upper limit) sound power level, in bels, for a random sample of machines. All measurements made in accordance with ISO 7779 and reported in conformance with ISO 9296.

### ***Standards***

x3690 X5 servers are intended for use as rack-drawer servers and are tested and designed to operate in a horizontal position.

These systems support or comply with the following standards:

- Multiprocessor Specification (MPS) 1.4
- Hardware-enabled to meet ISO 9241, Part 3

In addition to the above standards, they are compatible with the PCI-E specification.

### ***Equipment approvals and safety***

- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, Class A
- IEC/UL 60950-1, 2nd Edition
- CAN/CSA - C22.2 No. 60950-1-07 2nd Edition
- NOM-019<sup>8</sup>

<sup>8</sup> This server is certified by the respective UL and NOM agencies.

### ***Operating environment***

- Temperature:
  - 10.0°C to 35.0°C (50°F to 95°F) at 0 to 914 m (0 to 3,000 ft)
  - 10.0°C to 32.0°C (50°F to 90°F) at 914 to 2,133 m (3,000 to 7,000 ft)
- Relative humidity: 8% to 80% (noncondensing)

### ***Homologation***

This product is certified only in the following countries for connection to interfaces of public telecommunications networks:

In other countries, further certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions. In some countries, the availability of the product may depend on the availability of the relevant national regulatory certificates.

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

### ***Hardware requirements***

For attended installation of an operating system, this server requires a compatible:

- Keyboard
- Mouse
- Display

Unattended or remote installation may be performed without requiring some or all of these components. Review your unattended software installation program information for specific hardware configuration requirements.

For service, the server requires a compatible:

- Keyboard
- Mouse
- Display

When having the unit serviced, plan to have these components attached to your server either directly or indirectly through a console switch.

The MAX5 option (feature code A19H) is not supported with Intel Xeon Processor E7-2820 (feature code A15X) and Intel Xeon Processor E7-2803 (feature code A15Y), and with Models 7147-A1x and 7147-A2x.

## **Software requirements**

### **Programming requirements**

The following network operating systems have been tested for compatibility with the x3690 X5 server:

- Microsoft :
  - Windows Server 2008 R2 (64-bit)
  - Windows Server 2008 (64-bit)
  - Windows Server 2012 (64-bit)
  - Windows Server 2003/2003 R2, Datacenter Edition
  - Windows Server 2003/2003 R2, Datacenter x64 Edition
- Linux :
  - Red Hat EL 5 Server for 64-bit
  - Red Hat EL 5 Server for 64-bit (with Xen)
  - Red Hat EL 6 Server for 64-bit
  - SUSE Linux ES 10 for x86-64
  - SUSE Linux ES 10 for x86-64 (with Xen)
  - SUSE Linux ES 11 for x86-64
  - SUSE Linux ES 11 for x86-64 (with Xen)
- VMware vSphere Hypervisor

### **Other - OS limitations**

#### **VMware statement**

The MAX5 drawer is designed work seamlessly with the server and VMware and provides a high-speed low-latency path to additional memory. The connection, enabled by the IBM-exclusive eX5 technology, is fast and wide enough to ensure that operating systems and applications see just a single, large memory space, thus no software modifications are necessary to use MAX5. MAX5 is not currently supported with vSphere 4.0. IBM is currently working with VMware to build support for MAX5 in a future release of vSphere.

**Note:** For information on additional support, certification, and versions of network operating systems, visit

<http://www.ibm.com/servers/eserver/serverproven/compat/us/>

IBM makes no representation or warranty regarding third-party products, including those designated as ServerProven .

#### **Compatibility**

The IBM System x3690 X5 server contains licensed system programs that include set configuration, set features, and test programs. IBM system BIOS is loaded from a "flash" EEPROM into system memory. This BIOS provides instructions and interfaces designed to support the standard features of the IBM System x3690 X5 server and to maintain compatibility with many current software programs.

For detailed information about IBM and non-IBM devices, adapters, software, and network operating systems supported with IBM System x3690 X5 servers, visit

<http://www-03.ibm.com/servers/eserver/serverproven/compat/us/indexsp.html>

Contact your IBM representative, or IBM Business Partner, or refer to the *IBM Sales Manual* for information on the compatibility of hardware and software for IBM

System x3690 X5 servers. The *Sales Manual* is updated periodically as new features and options are announced that support these servers.

## **Limitations**

### **Memory**

The x3690 X5 servers are shipped with 256 GB high-speed PC3-10600 DDR3 ECC memory standard. A maximum of 1 TB of system memory is supported by adding a 32 GB PC3-10600 CL4 ECC DDR3 SDRAM RDIMM in each of the 32 DIMM sockets when a memory expansion board is installed. All supported system memory is addressable through direct memory access (DMA). This server supports 2 GB, 4 GB, 8 GB, 16 GB, and 32 GB (when available) 1.5v or 1.35v 240-pin, PC3-10600 ECC DDR3 SDRAM RDIMMs. Supported DIMMs can coexist in the same server; however, memory DIMMs of the same capacity must be installed in matched pairs. Refer to the [Planning information](#) section or the IBM System x3690 X5 server web page for memory options.

The x3690 X5 has RAID 0, RAID 1, and RAID 10 standard. The optional ServeRAID M5015 SAS/SATA, ServeRAID BR10i, and ServeRAID M1015 Controllers provide additional RAID 5 or RAID 6 level support.

### **ServerGuide**

Use the *ServerGuide*, available on the web, to load software and drivers. Earlier versions of *ServerGuide* may not be compatible with the server.

## **Planning information**

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### **Customer responsibilities**

#### **x3690 X5 Server and related options**

The x3690 X5 server is designated as customer setup. Customer setup instructions are shipped with systems.

### **Configuration information**

#### **Bay configuration**

The x3690 X5 server contains 16 customer-accessible drive bays on the front of the server. An upper right bay is for the optional slim combo drive.

The optional disk drive is cabled directly to the SATA port.

#### **Internal SCSI cabling**

These models of the x3690 X5 server contain a DASD backplane supporting four hot-swap, SCA-2-compliant drive bays. The x3690 X5 models with the SAS controller support RAID 0, RAID 1, and RAID 10 standard. The optional ServeRAID-M5015 SAS/SATA, ServeRAID-M1015, and ServeRAID-BR10i Controllers provide additional RAID 5 or RAID 6 level support.

#### **Processor upgrade**

The following processor upgrade options are supported:

- Intel Xeon Processor E7-8867L 10C 2.13GHz 30MB Cache 105w (88Y5654)
- Intel Xeon Processor E7-8837 8C 2.67GHz 24MB Cache 130w (88Y5657)
- Intel Xeon Processor E7-4807 6C 1.86GHz 18MB Cache 95w (88Y5662)
- Intel Xeon Processor E7-2870 10C 2.40GHz 30MB Cache 130w (88Y5663)
- Intel Xeon Processor E7-2860 10C 2.26GHz 24MB Cache 130w (88Y5664)
- Intel Xeon Processor E7-2830 8C 2.13GHz 24MB Cache 105w (88Y5665)
- Intel Xeon Processor E7-2820 8C 2.00GHz 18MB Cache 105w (88Y5666)



- Intel Xeon Processor E7-2803 6C 1.73GHz 18MB Cache 105w (88Y5667)
- Intel Xeon Processor E7-2850 10C 2.00GHz 24MB Cache 130w (88Y5720)

### ***Memory support***

The following memory options are supported:

- 2 GB PC3-10600 CL4 ECC DDR3 SDRAM RDIMM (44T1481)
- 2GB MAX5 (1x2GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333MHz LP RDIMM (44T1592)
- 4GB MAX5 (1x4GB, Dual Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP RDIMM (44T1599)
- 4 GB PC3-10600 CL4 ECC DDR3 SDRAM RDIMM (46C7448)
- 8 GB PC3-10600 CL4 ECC DDR3 SDRAM RDIMM (46C7482)
- 16 GB (2X8 GB KIT) PC3-10600 CL4 ECC DDR3 SDRAM RDIMM (46C7483)
- 4GB (1x4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz LP RDIMM (49Y1407)
- 8GB (1x8GB, 4Rx8, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM (49Y1399)
- 16GB (1x16GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM (49Y1400)
- 32GB (1x32GB, 4Rx4, 1.35V) PC3L-8500 CL7 ECC DDR3 1066MHz LP RDIMM (90Y3101) (when available)

Memory DIMMs should be plugged in order of size; largest first, followed by next size. When plug order moves to new DIMM numbers, start with the memory card with smallest total amount.

### ***PCIe adapter installations***

The x3690 X5 server contains PCIe architecture and five PCIe Gen 2 I/O slots.

### ***Rack installations***

x3690 X5 2U, rack-drawer models are designed to be installed in a 19-inch rack cabinet designed for 28-inch deep devices, such as the NetBAY42 ER, NetBAY42 SR, NetBAY25 SR, or NetBAY11.

If using a non-IBM rack, the cabinet must meet the EIA-310-D standards with a depth of at least 71.1 cm (28 in). Also, adequate space (approximately 5 cm (2 in) for the front bezel and 2.5 cm (1 in) for air flow) must be maintained from the slide assembly to the front door of the rack cabinet to allow sufficient space for the door to close and provide adequate air flow.

### ***Power considerations***

These x3690 X5 models include one standard 675-watt, hot-swap power supply with redundancy for all configurations when powered at 200 - 240 V ac.

### ***Cable orders***

The 10/100/1000 Mbps full-duplex, Dual Ethernet PCI-E Controller is standard with the x3690 X5 server. The RJ-45 connectors provide a 10Base-T or 100/1000Base-TX interface for connecting twisted-pair cable to the Ethernet network. Cabling is not included with the server. To connect the Ethernet controller to a repeater or switch, use a UTP cable with RJ-45 connectors at both ends. For 100/1000 Mbps operation, Category 5 cabling must be used. For 10 Mbps operation, Category 3, or better, cabling must be used.

There are no additional cabling requirements, other than for system power, keyboard, mouse, and monitor connections.

## **Installability**

The x3690 X5 server requires about 60 minutes for installation. Installation includes unpacking, setting up, and powering on the system. Additional time is required to install an operating system, additional adapters, or features.

## **Packaging**

Product	Shipment group	Number of boxes
IBM System x3690 X5	System unit carton	1
	Contents:	
	System unit	
	Rack components:	
	Rails	
	Cable management hardware	
IBM System x3690 X5	Country kit carton	1
	Contents:	
	Two 2.8 m 220 V intra-rack cables	
	Safety booklet	
	IBM Systems Director	
	CD-ROM Packages	

The x3690 X5 system is shipped as a single package. The country kit carton is contained inside the top portion of the system unit carton, while the rack components are contained in the system unit carton.

The following publications will be available on the support website and on the Documentation CD.

The *IBM System x3690 X5 Installation and User's Guide*, the *IBM System x3690 X5 Problem Determination and Service Guide*, and the *Rack Installation Instructions*, in US English versions, are available from our website.

The *Warranty Information* publication will be available as a hardcopy publication.

## **Related options**

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### **Processor upgrades**

- Intel Xeon processor
- VRM and heat sink
- Installation publications/warranty

### **Supplies**

None

## **Security, auditability, and control**

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Security and auditability features include:

- Power-on and remote-control password functions provide control of who has access to the data and server setup program on the server.

It is a customer's responsibility to ensure that the server is secure to prevent sensitive data from being removed.

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

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## IBM Electronic Services

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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.

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.

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### 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>

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## Terms and conditions

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### **IBM Global Financing**

Yes

### **IBM System x3690 X5**

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To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM .

In the United States, call 800-IBM-SERV (426-7378), or write to:

Warranty Information  
P.O. Box 12195  
Research Triangle Park, NC 27709  
Attn: Dept JDJA/B203

### **Warranty period**

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- System x3690 X5 - Three years
- Optional features - One year

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 is feature 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 in.

**Note:** For configurations that support the RAID Battery, the RAID battery will be warranted for one year effective on its "Date of Installation." All other product warranty terms for the machine remain unchanged.

The following has been designated as a consumable or supply item and is, therefore, not covered by this warranty:

- ServeRAID SAS controller battery

## Warranty service

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If required, IBM provides repair or exchange service, depending on the type of warranty service specified below for the machine. 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. 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.

The type of service is Customer Replaceable Unit (for example, keyboard, mouse, speaker, memory, or hard disk drive) Service and On-site Service.

### **Customer Replaceable Unit (CRU) Service**

IBM provides a replacement 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. A CRU is designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) 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. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service specified below, On-site Service.

Based upon availability, a CRU 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, 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.

The following parts have been designated as Tier 1 CRUs: (Unless indicated otherwise)

- Enet Cd
- PRO/1000 (T2)
- Svr Adapter
- Svr Adapter
- 10 GbE Fibre
- 10 GB CNA
- 10 GB HBA (T2)
- 8 GB PCI-e
- 8 GB FC HBA
- 8 GB FC HBA
- 8 GB FC HBA
- 3U Adapter
- PCI-e
- 2 GB Memory
- 2 GB RDIMM
- 4 GB RDIM
- Backplane (FRU)
- Battery CMOS

- 8 GB FC SNG Adapter
- 8 GB FC DUA Adapter
- Exp Ethernet Adapter
- Quad Enet Adapter
- Dual Port Adapter
- Quad Port Adapter
- 10 GbE Adapter
- 4 GB FC Adapter
- 4 GB FC Dual
- Slide Kit (T2)
- CMA
- Dual Port Adapter
- Quad Port Adapter
- 2.8 m PDU Jumper
- Memory expansion card

### ***On-site Service***

This provides On-site Repair, 9 hours per day, Monday through Friday excluding holidays, NBD response. IBM or your reseller 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. On-site Service is not available in all countries, and some countries have kilometer or mileage limitations from an IBM service center. In those locations where On-site Service is not available, the normal in-country service delivery is used.

Call IBM at 1-800-IBM-SERV (426-7378) to assist with problem isolation for hardware to determine if warranty service is required. Telephone support may be subject to additional charges, even during the limited warranty period.

Calls must be received by 5:00 p.m. local time in order to qualify for NBD 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

<http://www-947.ibm.com/support/entry/portal/docdisplay?Indocid=GCOR-3FBJK2>

For more information on IWS, refer to Services Announcement [601-034](#), dated September 25, 2001 .

### ***Licensing***

Programs included with this product are licensed under the terms and conditions of the License Agreements that are shipped with the system.

## **Maintenance services**

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### ***ServicePac , ServiceSuite , ServiceElect, and ServiceElite***

ServicePac® , ServiceSuite® , ServiceElect, and ServiceElite provide hardware warranty service upgrades, maintenance, and selected support services in one agreement.

### ***Warranty service upgrade***

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. 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.

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.

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. 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.

#### *CRU Service*

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, 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.

## **Maintenance service (ICA)**

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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. 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.

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. 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.

#### ***CRU Service***

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, 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.



## **Non-IBM parts support**

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### ***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 its 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.

### ***IBM hourly service rate classification***

One

### ***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 or visiting

[http://www-304.ibm.com/systems/support/machine\\_warranties/machine\\_code.html](http://www-304.ibm.com/systems/support/machine_warranties/machine_code.html)

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

<http://www-304.ibm.com/systems/support/>

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.

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## Prices

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For current prices, contact IBM at 888-Shop-IBM (746-7426) or visit

<http://www-03.ibm.com/systems/x/>

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### **IBM System x3690 X5 - 7147**

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