



# IBM BladeCenter HX5 is a scalable blade server designed to provide new levels of utilization, performance, and reliability for compute- and memory-intensive workloads

## Table of contents

|   |   |
|---|---|
| <a href="#">2 Overview</a>                  | <a href="#">9 Product number</a>          |
| <a href="#">2 Key prerequisites</a>         | <a href="#">11 Publications</a>           |
| <a href="#">2 Planned availability date</a> | <a href="#">12 Technical information</a>  |
| <a href="#">3 Description</a>               | <a href="#">26 Pricing</a>                |
| <a href="#">9 Product positioning</a>       | <a href="#">28 Announcement countries</a> |

## At a glance

The IBM® BladeCenter® HX5 is a scalable blade server designed to provide new levels of utilization, performance, and reliability for compute- and memory-intensive workloads such as database, virtualization, business intelligence, modeling and simulation, and other enterprise applications.

Going beyond the industry standards with unique innovations from fifth-generation IBM X-Architecture® technology (eX5), the new IBM BladeCenter HX5 delivers unprecedented compute performance, memory footprint, and I/O bandwidth to enable new levels of utilization in a blade form factor for compute- and memory-intensive enterprise workloads.

The HX5 features:

- Single-wide (30 mm), scalable, high-performance blade server
- 2x Intel® Xeon® E7-8800, E7-4800, or E7-2800 series CPUs per single-wide node
- 16x DDR3 VLP DIMMs per single-wide node
- Scalable to 4-socket, 32 DIMM in double-wide form factor
- Support for additional Ethernet, SAS, Fibre Channel, and InfiniBand expansion cards and a total of eight I/O ports per blade
- Integrated dual Gigabit Ethernet connections
- Support for up to two solid-state drives and HW RAID 0 and 1 with SSD Expansion Card for IBM BladeCenter HX5
- Internal standard USB port for optional Embedded Hypervisor™
- Integrated Management Module for remote supervision with concurrent keyboard, video, and mouse (cKVM) standard
- Next-generation BIOS, Unified Extensible Firmware Interface (UEFI)
- Modular design, enabling standardization on same platform for 2- and 4-socket server needs to deliver faster time to value
- FlexNode partitioning and pay-as-you-grow expansion that offer great investment protection
- Mainframe-inspired reliability and FlexNode failover for optimal system uptime

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## Overview

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- FlexNode partitioning and pay-as-you-grow expansion that offer great investment protection
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IBM BladeCenter announces the addition of a 10Gb Ethernet Expansion Card from Mellanox (part number 90Y3570). Based on ConnectX-2 technology, the mezzanine card provides the lowest latency for high server productivity, and is ideal for HPC environments in industries including banking, finance, trading, research, utilities, and telecommunications.

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## Key prerequisites

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- BladeCenter chassis (BCH, BCS, BCHT)
- Monitor, keyboard, and mouse for setup
- Network switch module
- Boot device, such as on-board SSD or network storage device
- Advanced Management Module with latest-level firmware
- Rack and appropriate PDUs and main power distribution

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## Planned availability date

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- May 27, 2011: BladeCenter systems
- May 27, 2011: All BladeCenter features, options, and pseudo options

Except:

- April 19, 2011: Intel 10Gb 2-port Ethernet Expansion Card (CFFh) for IBM BladeCenter (MT 7872)
- May 6, 2011: Mellanox 2-port 10Gb E'net Expansion Card (CFFh) - IBM BladeCenter

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## Description

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### BladeCenter HX5

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#### ***High-performance, blade server subsystems***

The IBM BladeCenter HX5 is a scalable blade server designed to provide new levels of utilization, performance, and reliability for compute- and memory-intensive workloads such as database, virtualization, business intelligence, modeling and simulation, and other enterprise applications.

The BladeCenter HX5 server supports up to two Intel Xeon processors. The processor board has the following major components:

- Two 1567-pin LGA sockets for dual-processor operation.
- Two Enterprise Voltage Regulator-Down (EVRD) regulators. The EVRD supplies the processor core voltage, I/O voltage, and L2 cache voltage, and must adhere to the Intel Voltage Regulator Module (VRM) and EVRD 11.1 Specification.
- One Intel 7500 IOH I/O Controller.
- One Intel ICH10 South Bridge.
- Eight Intel 7500 Memory Buffers.
- Sixteen DDR-3 Very Low Profile (VLP) memory DIMM sockets.
- One Vitesse VSC452 Integrated Management Module (IMM) with Integrated VGA Controller.
- 128 MB DDR-2 Video Memory.
- One 8Mbit IMM Boot ROM.
- One Broadcom BCM5709S dual-port Gigabit Ethernet Controller.
- One Spartan 3E FPGA.
- One 128 Mb UEFI Flash ROM.
- One 4 Gb NAND Flash ROM and EEPROM for DSA, IMM Kernel, and IMM SDR/SER Logs.
- One TPM 1.2 Controller.
- Light Path LEDs.
- USB ports for keyboard, mouse, FDD, CD-ROM, and DVD-ROM.
- One CIOv Expansion Card Connector, which supports CIOv PCIe Expansion Cards.
- One CFFh Blade Expansion Connector, CFFh PCIe Expansion Cards, or Expansion Blades.
- One PCIe expansion connector to support the SSD Expansion Card option.
- One LGA Flex Scalability Connector, which interfaces with either the one-node speed burst card or the two-node scalability expansion cards.
- One USB Connector, which supports the USB Key for Embedded Hypervisor.

Each Intel processor contains six, eight, or ten cores, a memory controller, and QPI links to the other bridge chips. The Intel IOH provides PCI Express® links to the Blade Expansion Connectors and CIOv Expansion Connector. The Intel ICH10 provides a PCI Express link to the IMM and Broadcom BCM5709S Gigabit Ethernet Controller, an LPC bus interface to the IMM, and USB interfaces.

The I/O functions on BladeCenter HX5 include Video, I2C, USB, SATA, Gigabit Ethernet, USB (floppy, CD-ROM or DVD-ROM, keyboard, and mouse), and Serial over LAN.

The Intel I/O Hub (IOH) contains the following features:

- Dual independent processor QPI links - one processor per QPI link
- One ESI x4 bus to interface to the ICH10
- PCI Express features
  - Support for up to x36 PCI Express links operating at 5 GB/s
  - PCI Express 1.0 and 2.0 compliant

On the HX5, the PCI Express links on the IOH are configured as follows:

- Two x16 PCI Express links routed to CFFh expansion connector and SSD expansion option connector - one x16 PCIe link for each connector. Each x16 PCIe lane can be configured as one x16, or two x8. CFFh connector can also be configured as four x4 lanes.
- One x4 PCI Express link routed to a PCI Express switch which routes an x4 PCIe link to the CIOv Blade Expansion Connector.

## Intel ICH10

The Intel I/O Controller Hub 10 (ICH10) provides South bridge function to the system. It provides PCI Express, USB, SMBus, and LPC interfaces to peripherals and integrates functions such as timer, battery-backed SRAM, DMA, and interrupt controller.

The HX5 server memory is contiguous and is shared by both processors when both processors are installed. It is Error Correction Code (ECC) protected and supports 4 GB to 128 GB for each processor blade using 2 GB, 4 GB, 8 GB, or 16 GB industry-standard 240-pin, 72-bit, Very Low Profile (VLP) DDR-3 DIMMs on 16 DIMM connectors.

The operating speed of the memory is dependent on the SMI link speed of the processor.

The HX5 supports memory mirroring. Chipkill™ is supported in all memory configurations.

## Standard BladeCenter HX5 configuration

### Model information

| Model   | Intel Xeon name | Cores | CPU speed | CPU power | QPI speed | Cache |
|---------|-----------------|-------|-----------|-----------|-----------|-------|
| 7873F2x | E7-4870         | 10    | 2.40 GHz  | 130w      | 6.40 GT/s | 30 MB |
| 7873D1x | E7-8867L        | 10    | 2.13 GHz  | 105w      | 6.40 GT/s | 30 MB |
| 7873B2x | E7-4830         | 8     | 2.13 GHz  | 105w      | 6.40 GT/s | 24 MB |
| 7873F1x | E7-4830         | 8     | 2.13 GHz  | 105w      | 6.40 GT/s | 24 MB |
| 7873C1x | E7-8837         | 8     | 2.67 GHz  | 130w      | 5.86 GT/s | 24 MB |
| 7873B1x | E7-4807         | 6     | 1.86 GHz  | 95w       | 4.80 GT/s | 18 MB |
| 7873A3x | E7-2870         | 10    | 2.40 GHz  | 130w      | 2.40 GT/s | 30 MB |
| 7873A2x | E7-2860         | 10    | 2.26 GHz  | 130w      | 2.26 GT/s | 24 MB |
| 7873A1x | E7-2830         | 8     | 2.13 GHz  | 105w      | 2.13 GT/s | 24 MB |
| 7873F3x | E7-4807         | 8     | 2.13 GHz  | 95w       | 1.86 GT/s | 24 MB |
| 7873G2x | E7-4830         | 8     | 2.13 GHz  | 105w      | 6.40 GT/s | 24 MB |

EMEA x = G

### Model configurations

| Model   | Intel Xeon name | CPUs | Standard memory | DIMM slots | SSDs | Blade width | Chassis   |
|---------|-----------------|------|-----------------|------------|------|-------------|-----------|
| 7873F2x | E7-4870         | 1    | 2 x 4 GB        | 16         | Open | 30 mm       | See Below |
| 7873D1x | E7-8867L        | 1    | 2 x 4 GB        | 16         | Open | 30 mm       |           |
| 7873B2x | E7-4830         | 1    | 2 x 4 GB        | 16         | Open | 30 mm       |           |
| 7873F1x | E7-4830         | 1    | 2 x 4 GB        | 16         | Open | 30 mm       |           |
| 7873C1x | E7-8837         | 1    | 2 x 4 GB        | 16         | Open | 30 mm       |           |

|         |         |   |          |    |      |       |
|---------|---------|---|----------|----|------|-------|
| 7873B1x | E7-4807 | 1 | 2 x 4 GB | 16 | Open | 30 mm |
| 7873A3x | E7-2870 | 2 | 4 x 4 GB | 16 | Open | 60 mm |
| 7873A2x | E7-2860 | 2 | 4 x 4 GB | 16 | Open | 60 mm |
| 7873A1x | E7-2830 | 2 | 4 x 4 GB | 16 | Open | 60 mm |
| 7873F3x | E7-4807 | 2 | 4 x 4 GB | 16 | Open | 60 mm |
| 7873G2x | E7-4830 | 2 | 8 x 8 GB | 16 | Open | 60 mm |

EMEA x = G

The models support the following chassis:

BladeCenter H Base Model (8852-4XX)  
 BladeCenter H Xccelerator Model (8852-HC1)  
 BladeCenter HT (Telco) AC Model (8750-1RX)  
 BladeCenter HT (Telco) DC Model (8740-1RX)  
 BladeCenter S Base Model (8886-1MX)  
 BladeCenter S Xccelerator Model (8886-AC1)  
 BladeCenter H-R3 Model (8852-4Tx)

### **Additional features**

- The BladeCenter HX5 system board contains 16 DIMM connectors (60 mm blade).
- Each DIMM connector supports 2 GB, 4 GB, 8 GB, or 16 GB DIMM options:
  - Chipkill is supported in all memory configurations.
- One or two solid state drives (50 GB each) are supported in each blade.
- Dual Gigabit Ethernet connections are provided.

BladeCenter HX5 blade servers are designed for high throughput from processor to memory, and to bus I/O.

These features, combined with SMP capability and blade-thin density, make it an excellent choice for space- and power-constrained environments used for:

- Database
- Virtualization
- General enterprise applications such as ERP and SCM
- Simulations

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

- Hot-swap blades enable easy access to each blade server.
- The management module interfaces with each blade server for single systems management control.

The BladeCenter HX5 blade servers deliver reliability and serviceability.

Features include:

- High-performance ECC memory, combined with an integrated ECC memory controller, to help correct soft and hard multi-bit memory errors, while reducing disruption of service to LAN clients.
- Chipkill memory correction for up to eight bits per DIMM to help keep your blade server up and running.
- Hardware memory scrubbing, designed to correct many soft memory errors automatically without software intervention.
- Processor L2 cache ECC to help improve data reliability and reduce downtime.
- CPU failure recovery in Symmetric Multi-Processing (SMP) configurations:
  - Forces failed processor offline
  - Automatically reboots server
  - Generates alerts
  - Continues operations with the working processor

- PFA on memory and processors to help alert the system administrator of an imminent component failure.
- Support for dual Gigabit Ethernet connections:
  - Failover, adapter fault tolerance
  - PXE 2.0 Boot Agent
  - Wake on LAN®
  - Load balancing or teaming
- Integrated management processor that supports diagnostic, reset, POST, and auto-recovery functions, and monitors temperature and voltage. Alerts are generated when certain thresholds are exceeded (refer to the [Limitations](#) section for restrictions).

### **Mellanox CX2 10Gb Ethernet Expansion Card (CFFh)**

Mellanox CX2 10Gb Ethernet Expansion Card (CFFh) functions as an PCI-Express blade server I/O card.

Key features are:

- Maximizes I/O consolidation with high-performance 10GbE ports
- Leverages existing IT investments
- Low Latency Ethernet for faster application completion, better server utilization
- Standards-based design to enable open architectures
- Proven, most deployed low latency technology
- Low cost
- Multipoint connections to the network

### **IBM Systems Director**

BladeCenter HX5 blade servers include IBM Systems Director. IBM Systems Director is an easy-to-use, point-and-click, platform management solution that streamlines the way physical and virtual systems are managed across a multisystem environment. Leveraging industry standards, IBM Systems Director supports multiple operating systems and virtualization technologies across IBM and non-IBM x86 platforms. Through a single user interface, IBM Systems Director provides consistent views for visualizing managed systems and determining how these systems relate to one another while identifying their individual status, thus helping to correlate technical resources with business needs.

IBM Systems Director utilizes a modular and extensible platform services foundation, providing a way to easily add advanced platform management capabilities to the base offering. The IBM Systems Director offering provides the base function needed for platform management. Advanced platform management functions can be seamlessly added as they are required. Systems Director is based on industry standards and can report results to other tools. IBM Systems Director is a strategic platform management tool that grows with the needs of a business.

### **Optional add-ons (available for an additional charge)**

- Active Energy Manager (AEM) is positioned as a key component of IBM's energy-efficient technologies and services, which are part of IBM's Project Green that began May 2007. AEM can measure, monitor, and manage the energy management components built into IBM servers and can provide a cross-platform management solution. AEM also retrieves temperature and power information via wireless sensors (SynapSense) and collects alerts, events, and data from facility providers related to power and cooling equipment.
- BladeCenter Open Fabric Manager is designed to help you manage growth and complexity by making it easy to manage I/O and network interconnects for up to 100 BladeCenter chassis -- up to 1,400 blade servers. BladeCenter Open Fabric Manager helps make blade deployment **easy**: once installed, the utility is resident in the Advanced Management Module (AMM) so you can preconfigure

LAN and SAN connections. Thus, I/O connections are made automatically when you plug in a blade. And no special tools or training is required; just manage with the easy-to-use GUI.

## **IBM ToolsCenter**

The IBM System x® ToolsCenter is a collection of system management tools that can help manage your HX5 blade server and BladeCenter environment. ToolsCenter makes managing your server environment less complicated, more productive, and cost-effective.

These tools include:

- **Deployment**

IBM ServerGuide™ is a tool that simplifies the process of installing and configuring IBM System x and BladeCenter servers. ServerGuide automates installation of Microsoft® Windows® server operating systems, device drivers, and other system components, with minimal user intervention.

The ServerGuide Scripting Toolkit enables you to tailor and build custom hardware deployment solutions. It provides hardware configuration utilities and operating system (OS) installation examples for IBM System x and BladeCenter x86-based hardware. The ServerGuide Scripting Toolkit, Windows Edition enables you to create a bootable Windows Preinstallation Environment (Windows PE) 2.1 CD or DVD.

BladeCenter Start Now Advisor is a configuration tool that can help you quickly configure components of the BladeCenter S chassis. It automatically updates the firmware for selected chassis components, and provides you with the option of saving your configuration. Start Now Advisor guides you through the process of connecting your computer to the chassis, either over a network or through a direct attachment to the Ethernet port on the Advanced Management Module.

- **Configuration**

The Advanced Settings Utility (ASU) systems configuration utility provides a command line interface and unattended scripting capability, and is supported in multiple operating-system platforms such as DOS, Linux®, Solaris, Windows, and WinPE.

Storage Configuration Manager (SCM) is a scalable and integrated storage management tool for both internal and external storage subsystems for IBM System x and BladeCenter. Storage Configuration Manager is an open standards-based management tool that provides a uniform and rich user interface that is easy to use.

- **Updates**

The UpdateXpress System Packs (UXSPs) contain an integration-tested bundle of online firmware and device driver updates for your server. UXSPs facilitate the downloading and installation of all drivers and firmware for a given system and verify that you are working with a complete set of updates that have been tested together.

Bootable Media Creator pulls current updates for firmware and drivers from the IBM website and creates custom bootable media to CD, DVD, or USB key.

- **Diagnostics**

Dynamic System Analysis (DSA) collects and analyzes system information to aid in diagnosing system problems. DSA creates a merged log that allows for easy identification of cause-and-effect relationships from different log sources in the system.

## **BladeCenter Advanced Management Module**

BladeCenter HX5 is supported on the Advanced Management Module.

Use the Advanced Management Module in the BladeCenter to manage the BladeCenter and obtain vital system information about your installed BladeCenter HX5 servers. The management module communicates with the blade servers within the BladeCenter via an RS-485 intermanagement network. This network relays vital information about individual blade servers, such as:

- Voltages
- Power supply status
- Memory status
- Fan status
- SSD status
- Error and status log

You receive status and control all blade servers within the BladeCenter. You can shut down and restart any blade server from anywhere on the network to help save time and costs associated with travel to the actual installation.

These manageability functions are provided through a self-contained web page, creating an easy and familiar way for administrators to monitor, control, and maintain high availability.

### Standard BladeCenter HX5 configuration

| Model   | Processor  | CPU cache    | Memory                    | SSD<br>iface | SSD      | Power<br>supply |
|---|--|--------------|---------------------------|--------------|----------|-----------------|
| <b>BladeCenter HX5 Scalable 2 Socket Server</b>                     |  |              |                           |              |          |                 |
| 7873-F2G  | 1 x 2.40 GHz<br>Intel Xeon E7-4870<br>Virtual Fabric Adapter | 30 MB<br>10C | 2x4 GB<br>130W S4S        | SAS          | Open bay | **              |
| 7873-D1G  | 1 x 2.13 GHz<br>Intel Xeon E7-8867L                          | 30 MB<br>10C | 2x4 GB<br>105W S8S        | SAS          | Open bay | **              |
| 7873-B2G  | 1 x 2.13 GHz<br>Intel Xeon E7-4830                           | 24 MB<br>8C  | 2x4 GB<br>105W S4S        | SAS          | Open bay | **              |
| 7873-F1G  | 1 x 2.13 GHz<br>Intel Xeon E7-4830<br>Virtual Fabric Adapter | 24 MB<br>8C  | 2x4 GB<br>105W S4S        | SAS          | Open bay | **              |
| 7873-C1G  | 1 x 2.67 GHz<br>Intel Xeon E7-8837                           | 24 MB<br>8C  | 2x4 GB<br>130W S8S        | SAS          | Open bay | **              |
| 7873-B1G  | 1 x 1.86 GHz<br>Intel Xeon E7-4807                           | 18 MB<br>6C  | 2x4 GB<br>95W S4S         | SAS          | Open bay | **              |
| <b>BladeCenter HX5 - Memory Expanded Scalable Two Socket Server</b> |  |              |                           |              |          |                 |
| 7873-A3G  | 2 x 2.40 GHz<br>Intel Xeon E7-2870                           | 30 MB<br>10C | 4x4 GB<br>130W S2S + MAX5 | SAS          | Open bay | **              |
| 7873-A2G  | 2 x 2.26 GHz<br>Intel Xeon E7-2860                           | 24 MB<br>10C | 4x4 GB<br>130W S2S + MAX5 | SAS          | Open bay | **              |
| 7873-A1G  | 2 x 2.13 GHz<br>Intel Xeon E7-2830                           | 24 MB<br>8C  | 4x4 GB<br>105W S2S + MAX5 | SAS          | Open bay | **              |
| 7873-F3G  | 2 x 2.13 GHz<br>Intel Xeon E7-4807<br>Virtual Fabric Adapter | 18 MB<br>6C  | 4x4 GB<br>95W S4S + MAX5  | SAS          | Open bay | **              |
| <b>BladeCenter HX5 workload optimized offerings</b>                 |  |              |                           |              |          |                 |
| 7873-G2G  | 2 x 2.13 GHz<br>Intel Xeon E7-4830                           | 24 MB<br>8C  | 8x8 GB<br>105W S4S        | SAS          | Open bay | **              |



\*\* Power supplied through BladeCenter chassis

## Accessibility by people with disabilities

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

[http://www-03.ibm.com/able/product\\_accessibility/index.html](http://www-03.ibm.com/able/product_accessibility/index.html)

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## Product positioning

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The IBM BladeCenter HX5 is a scalable blade server designed to provide maximum utilization, performance, and reliability for compute- and memory-intensive workloads such as database, virtualization, business intelligence, modeling and simulation, and other enterprise applications.

The BladeCenter and BladeCenter HX5 blades can require less space and power resources than traditional rack offerings because of their high-density design, reduced power requirements, and single environment systems management. This is an extremely important consideration for:

- Large enterprises
- Application service providers
- Scientific and technical computing businesses

They are an excellent fit for applications such as:

- Databases
- Virtualization
- General enterprise applications such as ERP and SCM
- Simulations

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## Product number

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### MTM Starting Point Models

| Description         | Machine | Model | Part number |
|---------------------|---------|-------|-------------|
| IBM BladeCenter HX5 | 7873    | FT1   | 7873FT1     |

| Description                              | Machine | Model | Part number |
|--|---------|-------|-------------|
| BladeCenter HX5 Scalable 2 Socket Server |         |       | 7873F2G     |
|  |         |       | 7873D1G     |
|  |         |       | 7873B2G     |
|  |         |       | 7873F1G     |
|  |         |       | 7873C1G     |
|  |         |       | 7873B1G     |

|  |  |  |         |
|--|--|--|---------|
| BladeCenter HX5 Memory Expanded Scalable Two Socket Server |  |  | 7873A3G |
|  |  |  | 7873A2G |
|  |  |  | 7873A1G |
|  |  |  | 7873F3G |

|  |  |  |         |
|--|--|--|---------|
| BladeCenter HX5 workload optimized offerings |  |  | 7873G2G |
|--|--|--|---------|

Options part numbers

| Description   | Part number |
|---|-------------|
| Intel Xeon Processor E7-2803 6C 1.73GHz 18MB Cache 105w   | 69Y3062     |
| Intel Xeon Processor E7-2820 8C 2.00GHz 18MB Cache 105w   | 69Y3068     |
| Intel Xeon Processor E7-2830 8C 2.13GHz 24MB Cache 105w   | 69Y3074     |
| Intel Xeon Processor E7-2850 10C 2.00GHz 24MB Cache 130w  | 69Y3084     |
| Intel Xeon Processor E7-2860 10C 2.26GHz 24MB Cache 130w  | 69Y3094     |
| Intel Xeon processor E7-2870 10C 2.40GHz 30MB Cache 130w  | 88Y6150     |
| Intel Xeon Processor E7-4807 6C 1.86GHz 18MB Cache 95w    | 88Y6070     |
| Intel Xeon Processor E7-4820 8C 2.00GHz 18MB Cache 105w   | 88Y6076     |
| Intel Xeon Processor E7-4830 8C 2.13GHz 24MB Cache 105w   | 88Y6082     |
| Intel Xeon Processor E7-4850 10C 2.00GHz 24MB Cache 130w  | 88Y6092     |
| Intel Xeon Processor E7-4860 10C 2.26GHz 24MB Cache 130w  | 88Y6102     |
| Intel Xeon Processor E7-4870 10C 2.40GHz 30MB Cache 130w  | 88Y6160     |
| Intel Xeon Processor E7-8837 8C 2.67GHz 24MB Cache 130w   | 88Y6112     |
| Intel Xeon Processor E7-8867L 10C 2.13GHz 30MB Cache 105w | 88Y6124     |
| Mellanox 2-port 10Gb E'net Expansion Card (CFFh)          | 90Y3570     |
| - IBM BladeCenter   |             |
| IBM BladeCenter HX5 with MAX5                             | 88Y6128     |
| 8GB 4R x 8, 2Gbit DDR-3 1333MHZ VLP RDIMM                 | 46C0570     |

#### Pseudo options

The following pseudo part numbers cannot be ordered as stand-alone parts and can be ordered only as part of a configuration.

| Description  | Part number |
|--|-------------|
| Intel Xeon Processor E7-2803 6C 1.73GHz 18MB Cache 105w              | 69Y3061     |
| Intel Xeon Processor E7-2820 8C 2.00GHz 18MB Cache 105w              | 69Y3067     |
| Intel Xeon Processor E7-2830 8C 2.13GHz 24MB Cache 105w              | 69Y3073     |
| Intel Xeon Processor E7-2850 10C 2.00GHz 24MB Cache 130w             | 69Y3081     |
| Intel Xeon Processor E7-2860 10C 2.26GHz 24MB Cache 130w             | 69Y3091     |
| Intel Xeon processor E7-2870 10C 2.40GHz 30MB Cache 130w             | 88Y6147     |
| Intel Xeon Processor E7-4807 6C 1.86GHz 18MB Cache 95w               | 69Y3099     |
| Intel Xeon Processor E7-4820 8C 2.00GHz 18MB Cache 105w              | 88Y6075     |
| Intel Xeon Processor E7-4830 8C 2.13GHz 24MB Cache 105w              | 88Y6081     |
| Intel Xeon Processor E7-4850 10C 2.00GHz 24MB Cache 130w             | 88Y6089     |
| Intel Xeon Processor E7-4860 10C 2.26GHz 24MB Cache 130w             | 88Y6099     |
| Intel Xeon Processor E7-4870 10C 2.40GHz 30MB Cache 130w             | 88Y6157     |
| Intel Xeon Processor E7-8837 8C 2.67GHz 24MB Cache 130w              | 88Y6109     |
| Intel Xeon Processor E7-8867L 10C 2.13GHz 30MB Cache 105w            | 88Y6123     |
| HX5 EX Code  | 88Y6222     |
| HX5 EX Labels  | 88Y6213     |
| HX5 EX Blade Cover   | 88Y6215     |
| HX5 EX WOS Labels  | 88Y6217     |
| 8GB 4R x 8, 2Gbit DDR-3 1333MHz VLP RDIMM                            | 49Y1475     |
| Intel Xeon Processor E7-2850 10C 2.00GHz 24MB Cache 130w             | 69Y3082     |
| Additional Intel Xeon Processor E7-2850 10C 2.00GHz 24MB Cache 130w  | 69Y3083     |
| Intel Xeon Processor E7-2860 10C 2.26GHz 24MB Cache 130w             | 69Y3092     |
| Additional Intel Xeon Processor E7-2860 10C 2.26GHz 24MB Cache 130w  | 69Y3093     |
| Intel Xeon Processor E7-4850 10C 2.00GHz 24MB Cache 130w             | 88Y6090     |
| Additional Intel Xeon Processor E7-4850 10C 2.00GHz 24MB Cache 130w  | 88Y6091     |
| Intel Xeon Processor E7-4860 10C 2.26GHz 24MB Cache 130w             | 88Y6100     |
| Additional Intel Xeon Processor E7-4860 10C 2.26GHz 24MB Cache 130w  | 88Y6101     |
| Intel Xeon Processor E7-8837 8C 2.67GHz 24MB Cache 130w              | 88Y6110     |
| Additional Intel Xeon Processor E7-8837 8C 2.67GHz 24MB Cache 130w   | 88Y6111     |
| Intel Xeon E7-2870 Processor, 10C, 2.40GHz, 30M, 6.4GT/s, 130W       | 88Y6148     |
| Additional Intel Xeon E7-2870 Processor 10C 2.40GHz 30M 6.4GT/s 130W | 88Y6149     |
| Intel Xeon E7-4870 Processor, 10C, 2.40GHz, 30M, 6.4GT/s, 130W       | 88Y6158     |
| Additional Intel Xeon E7-4870 Processor 10C 2.40GHz 30M 6.4GT/s 130W | 88Y6159     |

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## Publications

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An installation and user's guide, and safety and warranty publications are shipped with each IBM BladeCenter HX5 blade. The following publications are available immediately.

| Title                    | Order number |
|--------------------------|--------------|
| BladeCenter Solutions    | GM13-0127    |
| System x Family Brochure | GM13-0128    |

The *IBM BladeCenter HX5 Installation and User's Guide* and *Hardware Maintenance Manual*, in US English, are available.

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## Services

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## Technical information

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### Specified operating environment

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#### *Physical specifications*

#### **BladeCenter HX5**

|  |                                    |
|--|------------------------------------|
|  | 7873-F2G                           |
| Processor  | Intel Xeon E7-4870<br>10 core 130w |
| Int. speed   | 2.40 GHz                           |
| Max. mem. speed                                      | 1066 MHz                           |
| Interconnect speed                                   | 6.4 GT/s                           |
| Number standard                                      | 1                                  |
| Maximum  | 2                                  |
| L3 cache (full speed)                                | 30 MB                              |
| Memory (VLP ECC DDR3)                                | 8 GB                               |
| DIMMs (Standard)                                     | 2 x 4 GB                           |
| DIMM sockets   | 16                                 |
| Capacity   | 256 GB <sup>1</sup>                |
| IBM BladeCenter PCI Express<br>Gen 2 Expansion Blade | Optional                           |
| IBM 320 GB High IOPS SD Class<br>SSD PCIe Adapter    | Optional <sup>2</sup>              |
| Virtual Fabric Adapter                               | Standard                           |
| Video  | SVGA                               |
| Memory   | 128 MB                             |
| Disk controller                                      | SAS (optional)                     |
| Channels   | 4                                  |
| Connector internal                                   | 2                                  |
| Connector external                                   | 0                                  |
| RAID   | Yes (optional)                     |
| SSD  | 0                                  |
| Connectors   | 2                                  |
| Internal capacity                                    | 100 GB <sup>3</sup>                |
| Total HDD bays                                       | Up to 2                            |
| PCI slots  | 0                                  |
| Management processor                                 | Standard                           |
| Ethernet controller                                  | Dual Gb                            |
| FC card  | Optional                           |
| DVD-ROM (IDE)  | 0                                  |
| Diskette drive                                       | 0                                  |
| Power supply   | 0                                  |
| Blade width  | 30 mm                              |

|  |                                     |
|--|-------------------------------------|
|  | 7873-D1G                            |
| Processor  | Intel Xeon E7-8867L<br>10 core 105w |
| Int. speed   | 2.13 GHz                            |
| Max. mem. speed                                      | 1066 MHz                            |
| Interconnect speed                                   | 6.4 GT/s                            |
| Number standard                                      | 1                                   |
| Maximum  | 2                                   |
| L3 cache (full speed)                                | 30 MB                               |
| Memory (VLP ECC DDR3)                                | 8 GB                                |
| DIMMs (Standard)                                     | 2 x 4 GB                            |
| DIMM sockets   | 16                                  |
| Capacity   | 256 GB <sup>1</sup>                 |
| IBM BladeCenter PCI Express<br>Gen 2 Expansion Blade | Optional                            |
| IBM 320 GB High IOPS SD Class<br>SSD PCIe Adapter    | Optional <sup>2</sup>               |
| Virtual Fabric Adapter                               | Optional                            |
| Video  | SVGA                                |
| Memory   | 128 MB                              |

|                      |                     |
|----------------------|---------------------|
| Disk controller      | SAS (optional)      |
| Channels             | 4                   |
| Connector internal   | 2                   |
| Connector external   | 0                   |
| RAID                 | Yes (optional)      |
| SSD                  | 0                   |
| Connectors           | 2                   |
| Internal capacity    | 100 GB <sup>3</sup> |
| Total HDD bays       | Up to 2             |
| PCI Slots            | 0                   |
| Management processor | Standard            |
| Ethernet controller  | Dual Gb             |
| FC card              | Optional            |
| DVD-ROM (IDE)        | 0                   |
| Diskette drive       | 0                   |
| Power supply         | 0                   |
| Blade width          | 30 mm               |

7873-B2G

|   |                       |
|---|-----------------------|
| Processor   | Intel Xeon E7-4830    |
|   | 8 core 105w           |
| Int. speed  | 2.13 GHz              |
| Max. mem. speed                                   | 1066 MHz              |
| Interconnect speed                                | 6.4 GT/s              |
| Number standard                                   | 1                     |
| Maximum   | 2                     |
| L3 cache (full speed)                             | 24 MB                 |
| Memory (VLP ECC DDR3)                             | 8 GB                  |
| DIMMs (Standard)                                  | 2 x 4 GB              |
| DIMM sockets                                      | 16                    |
| Capacity  | 256 GB <sup>1</sup>   |
| IBM BladeCenter PCI Express Gen 2 Expansion Blade | Optional              |
| IBM 320 GB High IOPS SD Class SSD PCIe Adapter    | Optional <sup>2</sup> |
| Virtual Fabric Adapter                            | Optional              |
| Video   | SVGA                  |
| Memory  | 128 MB                |
| Disk controller                                   | SAS (optional)        |
| Channels  | 4                     |
| Connector internal                                | 2                     |
| Connector external                                | 0                     |
| RAID  | Yes (optional)        |
| SSD   | 0                     |
| Connectors  | 2                     |
| Internal capacity                                 | 100 GB <sup>3</sup>   |
| Total HDD bays                                    | Up to 2               |
| PCI Slots   | 0                     |
| Management processor                              | Standard              |
| Ethernet controller                               | Dual Gb               |
| FC card   | Optional              |
| DVD-ROM (IDE)                                     | 0                     |
| Diskette drive                                    | 0                     |
| Power supply                                      | 0                     |
| Blade width                                       | 30 mm                 |

7873-F1G

|                       |                     |
|-----------------------|---------------------|
| Processor             | Intel Xeon E7-4830  |
|                       | 8 core 105w         |
| Int. speed            | 2.13 GHz            |
| Max. mem. speed       | 1066 MHz            |
| Interconnect speed    | 6.4 GT/s            |
| Number standard       | 1                   |
| Maximum               | 2                   |
| L3 cache (full speed) | 24 MB               |
| Memory (VLP ECC DDR3) | 8 GB                |
| DIMMs (Standard)      | 2 x 4 GB            |
| DIMM sockets          | 16                  |
| Capacity              | 256 GB <sup>1</sup> |

|   |                       |
|---|-----------------------|
| IBM BladeCenter PCI Express Gen 2 Expansion Blade | Optional              |
| IBM 320 GB High IOPS SD Class SSD PCIe Adapter    | Optional <sup>2</sup> |
| Virtual Fabric Adapter                            | Standard              |
| Video   | SVGA                  |
| Memory  | 128 MB                |
| Disk controller                                   | SAS (optional)        |
| Channels  | 4                     |
| Connector internal                                | 2                     |
| Connector external                                | 0                     |
| RAID  | Yes (optional)        |
| SSD   | 0                     |
| Connectors  | 2                     |
| Internal capacity                                 | 100 GB <sup>3</sup>   |
| Total HDD bays                                    | Up to 2               |
| PCI Slots   | 0                     |
| Management processor                              | Standard              |
| Ethernet controller                               | Dual Gb               |
| FC card   | Optional              |
| DVD-ROM (IDE)                                     | 0                     |
| Diskette drive                                    | 0                     |
| Power supply                                      | 0                     |
| Blade width                                       | 30 mm                 |

#### 7873-C1G

|   |                       |
|---|-----------------------|
| Processor   | Intel Xeon E7-8837    |
|   | 8 core 130w           |
| Int. speed  | 2.67 GHz              |
| Max. mem. speed                                   | 978 MHz               |
| Interconnect speed                                | 5.86 GT/s             |
| Number standard                                   | 1                     |
| Maximum   | 2                     |
| L3 cache (full speed)                             | 24 MB                 |
| Memory (VLP ECC DDR3)                             | 8 GB                  |
| DIMMs (Standard)                                  | 2 x 4 GB              |
| DIMM sockets                                      | 16                    |
| Capacity  | 256 GB <sup>1</sup>   |
| IBM BladeCenter PCI Express Gen 2 Expansion Blade | Optional              |
| IBM 320 GB High IOPS SD Class SSD PCIe Adapter    | Optional <sup>2</sup> |
| Virtual Fabric Adapter                            | Optional              |
| Video   | SVGA                  |
| Memory  | 128 MB                |
| Disk controller                                   | SAS (optional)        |
| Channels  | 4                     |
| Connector internal                                | 2                     |
| Connector external                                | 0                     |
| RAID  | Yes (optional)        |
| SSD   | 0                     |
| Connectors  | 2                     |
| Internal capacity                                 | 100 GB <sup>3</sup>   |
| Total HDD bays                                    | Up to 2               |
| PCI Slots   | 0                     |
| Management processor                              | Standard              |
| Ethernet controller                               | Dual Gb               |
| FC card   | Optional              |
| DVD-ROM (IDE)                                     | 0                     |
| Diskette drive                                    | 0                     |
| Power supply                                      | 0                     |
| Blade width                                       | 30 mm                 |

#### 7873-B1G

|                    |                    |
|--------------------|--------------------|
| Processor          | Intel Xeon E7-4807 |
|                    | 6 core 95w         |
| Int. speed         | 1.86 GHz           |
| Max. mem. speed    | 800 MHz            |
| Interconnect speed | 4.8 GT/s           |

|   |                       |
|---|-----------------------|
| Number standard                                   | 1                     |
| Maximum   | 2                     |
| L3 cache (full speed)                             | 18 MB                 |
| Memory (VLP ECC DDR3)                             | 8 GB                  |
| DIMMs (Standard)                                  | 2 x 4 GB              |
| DIMM sockets                                      | 16                    |
| Capacity  | 256 GB <sup>1</sup>   |
| IBM BladeCenter PCI Express Gen 2 Expansion Blade | Optional              |
| IBM 320 GB High IOPS SD Class SSD PCIe Adapter    | Optional <sup>2</sup> |
| Virtual Fabric Adapter                            | Optional              |
| Video   | SVGA                  |
| Memory  | 128 MB                |
| Disk controller                                   | SAS (optional)        |
| Channels  | 4                     |
| Connector internal                                | 2                     |
| Connector external                                | 0                     |
| RAID  | Yes (optional)        |
| SSD   | 0                     |
| Connectors  | 2                     |
| Internal capacity                                 | 100 GB <sup>3</sup>   |
| Total HDD bays                                    | Up to 2               |
| PCI Slots   | 0                     |
| Management processor                              | Standard              |
| Ethernet controller                               | Dual Gb               |
| FC card   | Optional              |
| DVD-ROM (IDE)                                     | 0                     |
| Diskette drive                                    | 0                     |
| Power supply                                      | 0                     |
| Blade width                                       | 30 mm                 |

7873-A3G

|                        |                     |
|------------------------|---------------------|
| Processor              | Intel Xeon E7-2870  |
|                        | 10 core 130w        |
| Int. speed             | 2.40 GHz            |
| Max. mem. speed        | 1066 MHz            |
| Interconnect speed     | 6.4 GT/s            |
| Number standard        | 2                   |
| Maximum                | 2                   |
| L3 cache (full speed)  | 30 MB               |
| Memory (VLP ECC DDR3)  | 16 GB               |
| DIMMs (Standard)       | 4 x 4 GB            |
| DIMM sockets           | 40                  |
| Capacity               | 640 GB <sup>1</sup> |
| MAX5                   | Standard            |
| Virtual Fabric Adapter | Optional            |
| Video                  | SVGA                |
| Memory                 | 128 MB              |
| Disk controller        | SAS (optional)      |
| Channels               | 4                   |
| Connector internal     | 2                   |
| Connector external     | 0                   |
| RAID                   | Yes (optional)      |
| SSD                    | 0                   |
| Connectors             | 2                   |
| Internal capacity      | 100 GB <sup>3</sup> |
| Total HDD bays         | Up to 2             |
| PCI Slots              | 0                   |
| Management processor   | Standard            |
| Ethernet controller    | Dual Gb             |
| FC card                | Optional            |
| DVD-ROM (IDE)          | 0                   |
| Diskette drive         | 0                   |
| Power supply           | 0                   |
| Blade width            | 60 mm               |

7873-A2G

|           |                    |
|-----------|--------------------|
| Processor | Intel Xeon E7-2860 |
|-----------|--------------------|

|                        |                     |
|------------------------|---------------------|
|                        | 10 core 130w        |
| Int. speed             | 2.26 GHz            |
| Max. mem. speed        | 1066 MHz            |
| Interconnect speed     | 6.4 GT/s            |
| Number standard        | 2                   |
| Maximum                | 2                   |
| L3 cache (full speed)  | 24 MB               |
| Memory (VLP ECC DDR3)  | 16 GB               |
| DIMMs (Standard)       | 4 x 4 GB            |
| DIMM sockets           | 40                  |
| Capacity               | 640 GB <sup>1</sup> |
| MAX5                   | Standard            |
| Virtual Fabric Adapter | Optional            |
| Video                  | SVGA                |
| Memory                 | 128 MB              |
| Disk controller        | SAS (optional)      |
| Channels               | 4                   |
| Connector internal     | 2                   |
| Connector external     | 0                   |
| RAID                   | Yes (optional)      |
| SSD                    | 0                   |
| Connectors             | 2                   |
| Internal capacity      | 100 GB <sup>3</sup> |
| Total HDD bays         | Up to 2             |
| PCI Slots              | 0                   |
| Management processor   | Standard            |
| Ethernet controller    | Dual Gb             |
| FC card                | Optional            |
| DVD-ROM (IDE)          | 0                   |
| Diskette drive         | 0                   |
| Power supply           | 0                   |
| Blade width            | 60 mm               |

#### 7873-A1G

|                        |                     |
|------------------------|---------------------|
| Processor              | Intel Xeon E7-2830  |
|                        | 8 core 105w         |
| Int. speed             | 2.13 GHz            |
| Max. mem. speed        | 1066 MHz            |
| Interconnect speed     | 6.4 GT/s            |
| Number standard        | 2                   |
| Maximum                | 2                   |
| L3 cache (full speed)  | 24 MB               |
| Memory (VLP ECC DDR3)  | 16 GB               |
| DIMMs (Standard)       | 4 x 4 GB            |
| DIMM sockets           | 40                  |
| Capacity               | 640 GB <sup>1</sup> |
| MAX5                   | Standard            |
| Virtual Fabric Adapter | Optional            |
| Video                  | SVGA                |
| Memory                 | 128 MB              |
| Disk controller        | SAS (optional)      |
| Channels               | 4                   |
| Connector internal     | 2                   |
| Connector external     | 0                   |
| RAID                   | Yes (optional)      |
| SSD                    | 0                   |
| Connectors             | 2                   |
| Internal capacity      | 100 GB <sup>3</sup> |
| Total HDD bays         | Up to 2             |
| PCI Slots              | 0                   |
| Management processor   | Standard            |
| Ethernet controller    | Dual Gb             |
| FC card                | Optional            |
| DVD-ROM (IDE)          | 0                   |
| Diskette drive         | 0                   |
| Power supply           | 0                   |
| Blade width            | 60 mm               |

#### 7873-F3G



|                        |                     |
|------------------------|---------------------|
| Processor              | Intel Xeon E7-4807  |
|                        | 6 core 95w          |
| Int. speed             | 1.86 GHz            |
| Max. mem. speed        | 800 MHz             |
| Interconnect speed     | 4.8 GT/s            |
| Number standard        | 2                   |
| Maximum                | 2                   |
| L3 cache (full speed)  | 18 MB               |
| Memory (VLP ECC DDR3)  | 16 GB               |
| DIMMs (Standard)       | 4 x 4 GB            |
| DIMM sockets           | 40                  |
| Capacity               | 640 GB <sup>1</sup> |
| MAX5                   | Standard            |
| Virtual Fabric Adapter | Standard            |
| Video                  | SVGA                |
| Memory                 | 128 MB              |
| Disk controller        | SAS (optional)      |
| Channels               | 4                   |
| Connector internal     | 2                   |
| Connector external     | 0                   |
| RAID                   | Yes (optional)      |
| SSD                    | 0                   |
| Connectors             | 2                   |
| Internal capacity      | 100 GB <sup>3</sup> |
| Total HDD bays         | Up to 2             |
| PCI Slots              | 0                   |
| Management processor   | Standard            |
| Ethernet controller    | Dual Gb             |
| FC card                | optional            |
| DVD-ROM (IDE)          | 0                   |
| Diskette drive         | 0                   |
| Power supply           | 0                   |
| Blade width            | 60 mm               |

7873-G2G

|   |                     |
|---|---------------------|
| Processor   | Intel Xeon E7-4830  |
|   | 8 core 105w         |
| Int. speed  | 2.13 GHz            |
| Max. mem. speed   | 1066 MHz            |
| Interconnect speed  | 6.4 GT/s            |
| Number standard   | 2                   |
| Maximum   | 2                   |
| L3 cache (full speed)                                       | 24 MB               |
| Memory (VLP ECC DDR3)                                       | 64 GB               |
| DIMMs (Standard)  | 8 x 8 GB            |
| DIMM sockets  | 16                  |
| Capacity  | 256 GB <sup>1</sup> |
| IBM BladeCenter PCI Express<br>Gen 2 Expansion Blade (BPE4) | Standard            |
| IBM 320 GB High IOPS SD Class<br>SSD PCIe Adapter           | Standard            |
| 320 GB Fusion IO  | 2                   |
| Virtual Fabric Adapter                                      | Standard            |
| Video   | SVGA                |
| Memory  | 128 MB              |
| Disk controller   | SAS (optional)      |
| Channels  | 4                   |
| Connector internal  | 2                   |
| Connector external  | 0                   |
| RAID  | Yes (optional)      |
| SSD   | 0                   |
| Connectors  | 2                   |
| Internal capacity   | 100 GB <sup>3</sup> |
| Total HDD bays  | Up to 2             |
| PCI Slots   | 0                   |
| Management processor  | Standard            |
| Ethernet controller   | Dual Gb             |
| FC card   | optional            |
| DVD-ROM (IDE)   | 0                   |
| Diskette drive  | 0                   |

|              |       |
|--------------|-------|
| Power supply | 0     |
| Blade width  | 60 mm |

<sup>1</sup> Total system memory capacity is based on using 16 GB memory DIMMs.

<sup>2</sup> The IBM 320 GB High IOPS SD Class SSD PCIe Adapter can only be installed when a IBM BladeCenter PCI Express Gen 2 Expansion Blade (BPE4) is present.

<sup>3</sup> Capacities are based on installation of two 50 GB SSDs.

For latest information on supported HDD options, visit

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

### **Video subsystem**

- Matrox video core
- Integrated on the blade

### **Supported BladeCenter HX5 video resolutions**

| Resolution | Maximum refresh rate supported | CRT support | CRT ISO 9241.3 compliance | Flat Panel support |
|------------|--------------------------------|-------------|---------------------------|--------------------|
| 640 x 480  | 85 Hz                          | Yes         | Yes                       | Yes                |
| 800 x 600  | 85 Hz                          | Yes         | Yes                       | Yes                |
| 1024 x 768 | 75 Hz                          | Yes         | Yes                       | Yes                |

**Note:** For resolutions supported by different operating systems, refer to the operating system documentation.

### **Dimensions - BladeCenter HX5**

- Height: 24.5 cm (9.7 in)
- Depth: 44.6 cm (17.6 in)
- Width: 5.8 cm (2.28 in)
- Maximum weight: 9.5 kg (21 lb) (depending on the configuration when options are added)

### **Electrical**

- BladeCenter chassis: 200 to 240 (nominal) V ac; 50 Hz or 60 Hz
- BladeCenter HX5: 12.2 (nominal) V dc

### **Mellanox CX2 10Gb Ethernet Expansion card (CFFh)**

- Height: 159 mm (6.26 in)
- Width: 125 mm (4.92 in)
- Depth: 12.7 mm (0.50 in)
- Weight: .0975 kg (0.215 lb)

**Note:** All weights and measurements are approximate.

### **Standards**

This system supports or complies with the following standards:

- Multiprocessor Specification (MPS) 1.4
- Hardware-enabled to meet the International Organization for Standardization (ISO) 9241, Part 3

### **Equipment approvals and safety**

- CE Mark (EN55022:1998 Class A, EN60950, EN55024:1998, EN61000-3-2 and EN61000-3-3)
- CISPR 22, Class A
- TUV-GS (EN60950/ISO 9241-3/ISO 9241-8)
- FCC - Verified to comply with Part 15 of the FCC Rules (Class A) prior to product delivery
- IEC 60950 CB Certificate and CB Test Report indicating compliance to Group Differences

The Mellanox CX2 10Gb Ethernet Expansion card (CFFh) supports or complies with the following standards:

- CE Mark (EN55022:1998 Class A, EN60950, EN55024:1998, EN61000-3-2 and EN61000-3-3)
- CISPR 22, Class A
- TUV-GS (EN60950/ISO 9241-3/ISO 9241-8)
- FCC - Verified to comply with Part 15 of the FCC Rules (Class A) prior to product delivery
- IEC 60950 CB Certificate and CB Test Report indicating compliance to Group Differences

### ***Operating environment***

#### **BladeCenter HX5**

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

#### **Mellanox CX2 10Gb Ethernet Expansion card (CFFh)**

Temperature and altitude:

- Operating:
  - 10 to 52 degrees C (50 to 125.6 degrees F) at an altitude of 0 to 914 m (0 to 3,000 ft)
  - 10 to 49 degrees C (50 to 120.2 degrees F) at an altitude of 0 to 3 000 m (0 to 10,000 ft)
- Nonoperating:
  - 40 to 65 degrees C (-40 to 149 degrees F) at an altitude of 0 to 12 000 m (0 to 39,370 ft)
- Humidity:
  - Operating: 8% to 80%, noncondensing
  - Nonoperating: 5% to 80%, noncondensing

### ***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 via a console switch.

### **Software requirements**

The following network operating systems have been tested for compatibility with the BladeCenter HX5:

- Microsoft:
  - Microsoft Windows Server 2008 R2
  - Microsoft Windows Server 2008, Datacenter x64 Edition
  - Microsoft Windows Server 2008, Enterprise x64 Edition
  - Microsoft Windows Server 2008 HPC Edition
  - Microsoft Windows Server 2008, Standard x64 Edition
  - Microsoft Windows Server 2008, Web x64 Edition
  - Windows Small Business Server 2008, Premium Edition
  - Windows Small Business Server 2008, Standard Edition
- Linux:
  - SUSE Linux Enterprise Server 10 for AMD64/EM64T
  - SUSE Linux Enterprise Server 10 with Xen for AMD64/EM64T
  - SUSE Linux Enterprise Server 11 for AMD64/EM64T
  - SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
  - Red Hat Enterprise Linux 5 Server x64 Edition
  - Red Hat Enterprise Linux 5 Server with Xen x64 Edition
  - Red Hat Enterprise Linux 6 Server x64 Edition
- Other:
  - VMware ESX 4.1
  - VMware ESXi 4.1

For additional information, support, certification, and versions of network operating systems, access

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

### **Compatibility**

The IBM BladeCenter HX5 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 BladeCenter HX5 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 System x servers, visit

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

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

### **Limitations**

- Minimum supported VMware version is vSphere 4.1.
- A minimum of two DIMMs per CPU must be installed; DIMMs must be installed in pairs after that. DIMMs must be installed in matched pairs for Mirror Mode.
  - Supports 2 GB, 4 GB, 8 GB and 16 GB DIMMs.

Refer to the [Planning information](#) section or the System x server web page for memory options.

- Microprocessors must be of the same type, power level, and clock speed on each BladeCenter HX5. Mixing microprocessors of different speeds, power levels, or cache sizes or upgrading the base processors is not supported. The latest BladeCenter hardware and software compatibility is available via the website <http://www.ibm.com/servers/eserver/serverproven/compat/us/>
- The BladeCenter HX5 is supported in the BladeCenter H chassis (8852), the BladeCenter S chassis (8886), and the BladeCenter HT chassis (8740, 8750). For supported configurations, refer to the AC Model BladeCenter hardware configuration tools via the website <http://www-03.ibm.com/systems/x/hardware/configtools.html>

Refer to the [Software requirements](#) section for operating system limitations.

### **Planning information**

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#### **Customer responsibilities**

This product is designated as customer setup. Customer setup instructions are shipped with the product.

#### **Configuration information**

BladeCenter HX5 blades must be installed in a BladeCenter chassis.

#### **BladeCenter configuration**

The BladeCenter contains 14 blade server bays supporting up to 14 hot-swap BladeCenter HX5 blades. A control panel, located at the top left of the unit, contains the following LEDs:

- Power good
- Blade location
- Over temperature
- Information
- General fault

#### **Memory support**

The following memory options are supported with BladeCenter HX5:

| option description   | option  |
|--|---------|
| 2 GB (1x2 GB, 1Rx8, 1.35V) PC3-10600 CL9 ECC DDR3 1333 MHZ VLP RDIMM | 46C0560 |
| 4 GB (1x4 GB, 2Rx8, 1.35V) PC3-10600 CL9 ECC DDR3 1333 MHZ VLP RDIMM | 46C0564 |
| 8 GB (1x8 GB, 4Rx8, 1.35V) PC3-8500 CL7                              | 46C0570 |

ECC DDR3 1066 MHZ VLP RDIMM  
16 GB (1x16 GB, 4Rx8, 1.35V) PC3-10600 CL9 46C0599  
ECC DDR3 1066 MHZ VLP RDIMM

Memory must be installed in pairs of two identical DIMMs per processors installed. Although the DIMM pairs installed can be of different sizes, the pairs must be of the same speed.

### Power considerations

The BladeCenter HX5 is supported in the BladeCenter H chassis (8852), the BladeCenter S chassis (8886), and the BladeCenter HT chassis (8740, 8750). For supported configurations, refer to the AC Model BladeCenter hardware configuration tools via the web

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

**Note:** Consult specific chassis announcements for more information on setup and redundancy.

### Cable orders

Each BladeCenter HX5 blade contains two Gigabit Ethernet connections. An optional BladeCenter Gigabit Ethernet Switch Module must be installed in the BladeCenter to support external Ethernet connections.

Cabling is not included with the server. Consult the Ethernet Switch module documentation for external cabling requirements.

Installations using the BladeCenter Fibre Channel Switch Module require short- or long-wave small form factor pluggable (SFP) options and appropriate Fibre Channel cabling.

### Installability

Each IBM BladeCenter HX5 requires approximately 10 minutes for installation. Installation includes unpacking, setting up, and powering on the system. Additional time is required to install an operating system, additional options, or features.

### Packaging

#### BladeCenter HX5

| Product         | Package description                              | Boxes |
|-----------------|--|-------|
| BladeCenter HX5 | BladeCenter HX5 Carton                           | 1     |
|                 | Contents:  |       |
|                 | BladeCenter HX5                                  | 1     |
|                 | Publications/CD Package                          | 1     |
| BladeCenter HX5 | Publications Package                             | 1     |
|                 | Contents:  |       |
|                 | Documentation CD-ROM (softcopy of publications)  |       |
|                 | Safety flyer                                     |       |
|                 | Standard form factor I/O Expansion card tray kit |       |

The BladeCenter HX5 blades are shipped in a single package. The approximate shipping dimensions and weight are:

- Single pack dimensions: 60.32 x 33.4 x 15.57 cm (23.75 x 13.13 x 6.13 in)
- Single pack weight: 9.0 kg (20 lb)

### Related options

## Mellanox CX2 10Gb Ethernet Expansion card (CFFh)

| Product  | Package description                              | Boxes |
|--|--|-------|
| Mellanox CX2 10Gb Ethernet Expansion card (CFFh) | Mellanox Carton<br>Contents:                     | 1     |
|  | Mellanox CX2 10Gb Ethernet Expansion card (CFFh) | 1     |

The Mellanox CX2 10Gb Ethernet Expansion cards are shipped in a single package. The approximate shipping dimensions and weight are:

- Single pack dimensions: 58 mm (2.28 in) x 147 mm (5.80 in) x 167 mm (6.57 in)
- Single pack weight: 0.9 kg (2 lb)

### Security, auditability, and control

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Security and auditability features include:

- A power-on password function helps provide control of who has access to the data and server setup program on the server.
- A set unattended boot mode allows the system keyboard to be locked to all entries except the password and at the same time allows other computers on the network to access the system hard disk drive.
- A selectable boot sequence can be used to help prevent unauthorized installation of software or removal of data from the diskette drive.

The IBM BladeCenter HX5 blades have no security intrusion detection. Therefore, they should be installed in a rack environment that provides security through lockable doors or other security measures. It is the client's responsibility to ensure that the server is secure to protect sensitive data.

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

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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.

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## IBM Electronic Services

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IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM

on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

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

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## Terms and conditions

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

### Warranty period

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

The following have been designated as consumables or supply items and are, therefore, not covered by this warranty:

- RAID 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- 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 designated for your machine.

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:

- Blank filler
- Cable-management arm
- Solid state drive
- Hot-swap fan
- Hot-swap power supply
- Lift handle kit
- Memory DIMM card
- Optical drive
- PCI adapter
- Power cord
- Service label
- System label
- Top cover

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

At IBM's discretion you will receive CRU service or IBM or your reseller will repair the failing machine at your location and verify its operation. If required, On-site Repair is provided, 9 hours per day, Monday through Friday excluding holidays, NBD response. 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.

### ***International Warranty Service***

International Warranty Service (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.ibm.com/support>

For more information on IWS, refer to Services Announcement [ZS01-0168](#), 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.

## **Warranty service upgrades**

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

Two

### **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.

### **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.ibm.com/servers/support/machine\\_warranties/machine\\_code.html](http://www.ibm.com/servers/support/machine_warranties/machine_code.html)

IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBM 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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## **Pricing**

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For all local charges, contact your IBM representative.

### **ServicePac service upgrades**

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The announced products are also eligible for ServicePac® warranty upgrades. ServicePacs provide a higher level of service than that provided under the base IBM Machine Warranty.

ServicePacs can be purchased from your IBM Business Partner and are specific to the machines/products listed.

| ServicePac offering                                | PC no | Ordering part number       |
|--|-------|----------------------------|
| 3yr On-site Repair<br>9hr x 5 days 4hr Resp Target | PC937 | e-ServicePac - 54Y4716 (2) |

|   |        |              |                            |
|---|--------|--------------|----------------------------|
| 3yr On-site Repair<br>24hr x 7 days 4hr Resp Target           | PC635  | e-ServicePac | - 12X6611 (2)              |
| 3yr On-site Repair<br>24hr x 7 days 6hr Committed<br>Service  | PC505  | e-ServicePac | - 41W9359 (4)              |
| 3yr On-site Repair<br>24hr x 7 days 6hr Committed<br>Service  | PC934  | e-ServicePac | - 54Y4500<br>(UK only)     |
| 3yr On-site Repair<br>24hr x 7 days 8hr Committed<br>Service  | PC834  | e-ServicePac | - 51J9369 (5)              |
| 3yr On-site Repair<br>24hr x 7 days 24hr Committed<br>Service | PC831  | e-ServicePac | - 51J9366 (6)              |
| 3yr On-site Repair<br>24hr x 7 days 24hr Committed<br>Service | PC831  | e-ServicePac | - 51J9366 (7)              |
| 4yr On-site Repair<br>9hr x 5 days 4hr Resp Target            | PC636  | e-ServicePac | - 12X6612 (2)              |
| 4yr On-site Repair<br>24hr x 7 days 4hr Resp Target           | PC1071 | e-ServicePac | - 65Y5217 (2)              |
| 5yr On-site Repair<br>9hr x 5 days 4hr Resp Target            | PC1137 | e-ServicePac | - 68Y5333 (2)              |
| 5yr On-site Repair<br>24hr x 7 days 4hr Resp Target           | PC1073 | e-ServicePac | - 65Y5219 (2)              |
| 3yr On-site Repair<br>9hr x 5 days NBD Comm Parts             | PC1020 | e-ServicePac | - 65Y0087<br>(Russia only) |

### Announcement countries for ServicePacs

Announcement is restricted to the following countries:

e-ServicePac

Austria Belgium Bulgaria Croatia Czech Rep  
Denmark Egypt Estonia(8)Finland France (1) Germany Greece  
Hungary Ireland Israel Italy Latvia(8) Lithuania(8)  
Luxembourg Netherlands Norway Pakistan Poland Portugal  
Romania Russia (2) S. Africa Serbia Slovakia Slovenia Spain  
Sweden Switzerland Turkey UK (3) Ukraine

- (1) Except overseas Territories
- (2) Except Russia
- (3) UK mainland Only
- (4) Austria, Germany and Turkey Only
- (5) Czech Republic, Hungary, Poland, Slovakia, Slovenia,  
Switzerland, Romania, Russia, Bulgaria and Croatia only.
- (6) Austria, Germany and Switzerland Only.
- (7) Czech Republic, Hungary, Poland, Slovakia, Slovenia,  
Turkey, Romania, Russia, Bulgaria and Croatia only.
- (8) Order and registration via Finland

Maintenance

The products in this document are also covered by Maintenance Agreements and ServiceSuite™ contracts.

## **IBM Global Financing**

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

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## **Announcement countries**

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All European, Middle Eastern, and African countries.

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