IBM BladeCenter HS23 (E5-2600 v2)

IBM Redbooks Product Guide

The IBM® BladeCenter® HS23 (7875, E5-2600 v2) is a next-generation two-socket blade server running the Intel® Xeon® processor E5-2600 v2 product family. With its industry-leading RAS features, energy efficiency, outstanding performance, flexible and scalable I/O, and complete systems management, HS23 offers a robust platform optimized for your mission-critical applications. Standard 30 mm single-wide form-factor protects your investments by providing compatibility with the IBM BladeCenter H, E, S, and HT chassis.

Suggested use: versatile platform to run a broad range of workloads, including infrastructure, virtualization, and enterprise applications.

Figure 1 shows the IBM BladeCenter HS23.

Figure 1. IBM BladeCenter HS23

Did you know?

IBM BladeCenter HS23 offers four integrated LAN ports: dual-port Gigabit Ethernet and dual-port 10 Gb Ethernet with IBM Virtual Fabric capability. With Emulex 10GbE Virtual Fabric Adapter II for HS23 CFFh expansion card, HS23 scales up to 14 virtual NICs (vNICs) per single-wide blade server for a total of 18 I/O ports with the choice of Ethernet, Fibre Channel, SAS, iSCSI, and FCoE connectivity.

Key features

The IBM BladeCenter HS23 gives you the networking capacity that you need to manage your data center. The Virtual Fabric capable integrated 10 GbE offers extreme speed, and the HS23 is designed with highly scalable I/O to give you a total of up to four 10 GbE physical ports that can be divided into up to 14 virtual ports, as well as the ability to run multiple I/O protocols (FCoE, iSCSI). Sixteen DIMM slots supporting up to 512 GB of DDR3 memory allow you to fit more and larger virtual machines per blade. In addition, the HS23 is backward-compatible with all BladeCenter chassis, including the original BladeCenter E. (Some configurations might have restrictions. See Table 4 for compatibility details.)

Scalability and performance

The BladeCenter HS23 (7875, E5-2600 v2) offers numerous features to boost performance, improve scalability, and reduce costs:

- The Intel Xeon processor E5-2600 v2 product family improves productivity by offering superior system performance with up to 12-core processors (up to 2.7 GHz core speeds) or up to 3.5 GHz core speeds (4-core processors), up to 30 MB of L3 cache, and QPI interconnect links of up to 8 GT/s.
- Up to two processors, 24 cores, and 48 threads maximize the concurrent execution of multi-threaded applications.
- Intelligent and adaptive system performance with Intel Turbo Boost Technology 2.0 allows CPU cores to run at maximum speeds during peak workloads by temporarily going beyond processor TDP.
- Intel Hyper-Threading Technology boosts performance for multi-threaded applications by enabling simultaneous multi-threading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better utilize the hardware for virtualization workloads.
- Intel Advanced Vector Extensions (AVT) can significantly improve floating point performance for compute-intensive technical and scientific applications.
- Up to 16 DDR3 ECC memory RDIMMs provide speeds up to 1866 MHz and a memory capacity of up to 512 GB. (See Table 6 for details.)
- The use of solid-state drives (SSDs) instead of or along with traditional spinning drives (HDDs) can significantly improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- The HS23 scales to 18 I/O ports on a single-wide blade with integrated Gigabit Ethernet and 10 Gb Ethernet ports and optional expansion cards, offering the choice of Ethernet, Fibre Channel, SAS, iSCSI, and FCoE connectivity.
- The HS23 offers PCI Express 3.0 I/O expansion capabilities that improve the theoretical maximum bandwidth by almost 100% (8 GTps per link using 128b/130b encoding) compared to the PCI Express 2.0 (5 GTps per link using 8b/10b encoding).
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family. This helps to dramatically reduce I/O latency and increase overall system performance.

Availability and serviceability

The BladeCenter HS23 provides many features to simplify serviceability and increase system uptime:

- Dual independent power and signal connectors to the BladeCenter chassis midplane provide fault tolerance to increase uptime.

- The HS23 offers Chipkill, memory mirroring, and memory rank sparing for redundancy in the event of a non-correctable memory failure.
- Tool-less cover removal provides easy access to upgrades and serviceable parts, such as CPU, memory, and adapter cards.
- The server offers hot-swap drives supporting integrated RAID 1 redundancy for data protection and greater system uptime.
- The power source independent light path diagnostics panel and individual light path LEDs quickly lead the technician to failed (or failing) components. This simplifies servicing, speeds up problem resolution, and helps improve system availability.
- The Predictive Failure Analysis (PFA) detects when system components (processors, memory, and hard disk drives) operate outside of standard thresholds and generates pro-active alerts in advance of possible failure, therefore increasing uptime.
- Solid-state drives (SSDs) offer significantly better reliability than traditional mechanical HDDs for greater uptime.
- Built-in Integrated Management Module II (IMM2) continuously monitors system parameters, triggers alerts, and performs recovering actions in case of failures to minimize downtime.
- Built-in diagnostics using Dynamic Systems Analysis (DSA) Preboot speeds up troubleshooting tasks to reduce service time.
- Three-year customer replaceable unit and onsite limited warranty, next business day 9x5. Optional service upgrades are available.

Manageability and security

Powerful systems management features simplify local and remote management of the HS23:

- The HS23 includes an Integrated Management Module II (IMM2) to monitor server availability and perform remote management.
- Integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Integrated Trusted Platform Module (TPM) 1.2 support enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Industry-standard AES NI support for faster, stronger encryption.
- IBM Systems Director is included for proactive systems management. It offers comprehensive systems management tools that help to increase up-time, reduce costs, and improve productivity through advanced server management capabilities.
- IBM Fabric Manager simplifies deployment of infrastructure connections by managing network and storage address assignments.
- IBM FastSetup simplifies, automates, and speeds up the deployment process from server power-up to production, making BladeCenter easier to manage, deploy, and maintain.
- Intel Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing an application to run in its own isolated space protected from all other software running on a system.

Energy efficiency

The HS23 offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to the green environment:

- Component-sharing design of the BladeCenter chassis provides ultimate power and cooling savings.
- The Intel Xeon processor E5-2600 v2 product family offers significantly better performance over the previous generation while fitting into the same thermal design power (TDP) limits.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.35 V DDR3 memory RDIMMs consume 19% less energy than 1.5 V DDR3 RDIMMs.
- Solid state drives (SSDs) consume as much as 80% less power than traditional spinning 2.5-inch HDDs.
- The HS23 uses hexagonal ventilation holes, a part of IBM Calibrated Vectored Cooling™ technology. Hexagonal holes can be grouped more densely than round holes, providing more efficient airflow through the system.
- IBM Systems Director Active Energy Manager™ provides advanced power management features with actual real-time energy monitoring, reporting, and capping features.

Locations of key components and connectors

Figure 2 shows the front view of the server, indicating key components.

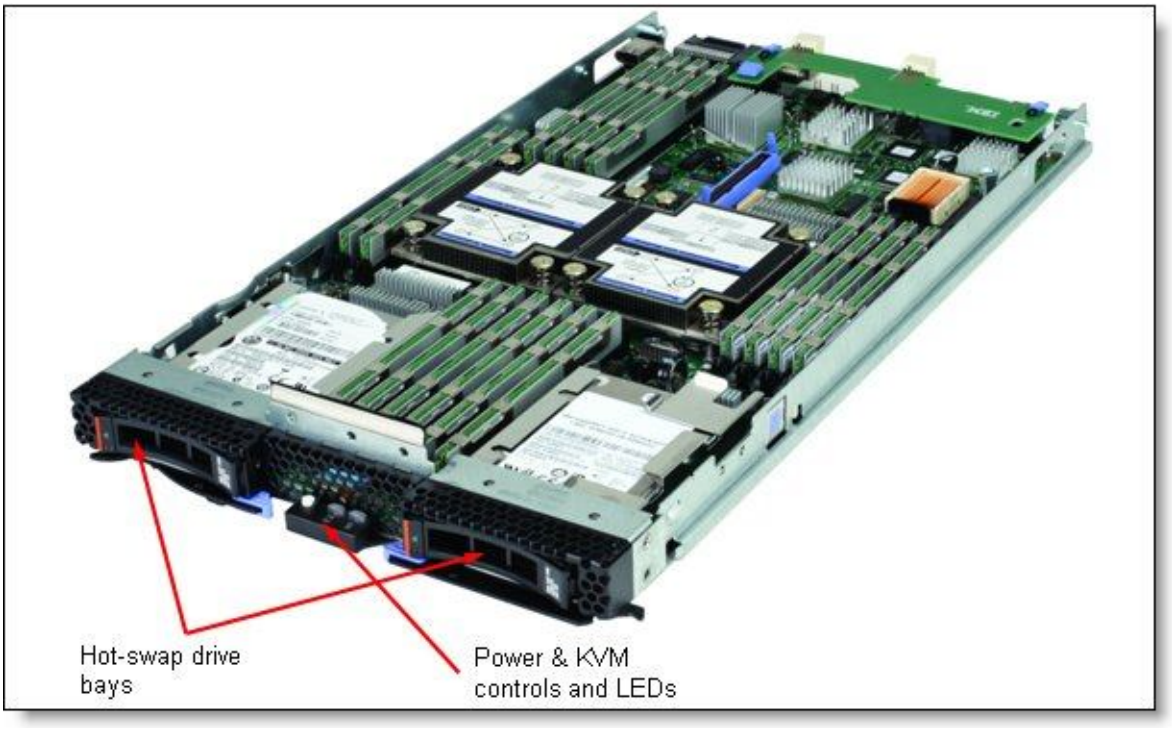

Figure 2. Front view of the IBM BladeCenter HS23

Figure 3 shows the top view of the server, indicating key components.

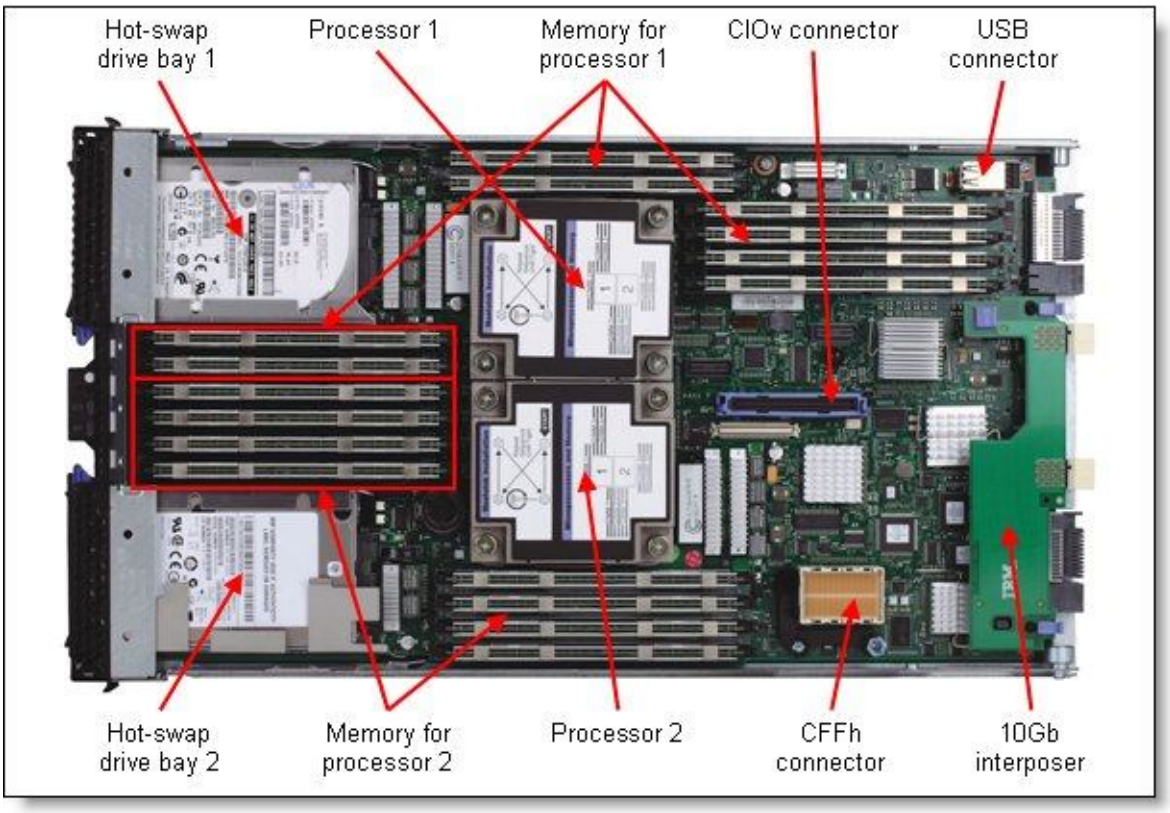

Figure 3. Top view of the IBM BladeCenter HS23

Figure 4 shows the bottom view of the IBM BladeCenter HS23 (contains light path diagnostics panel).

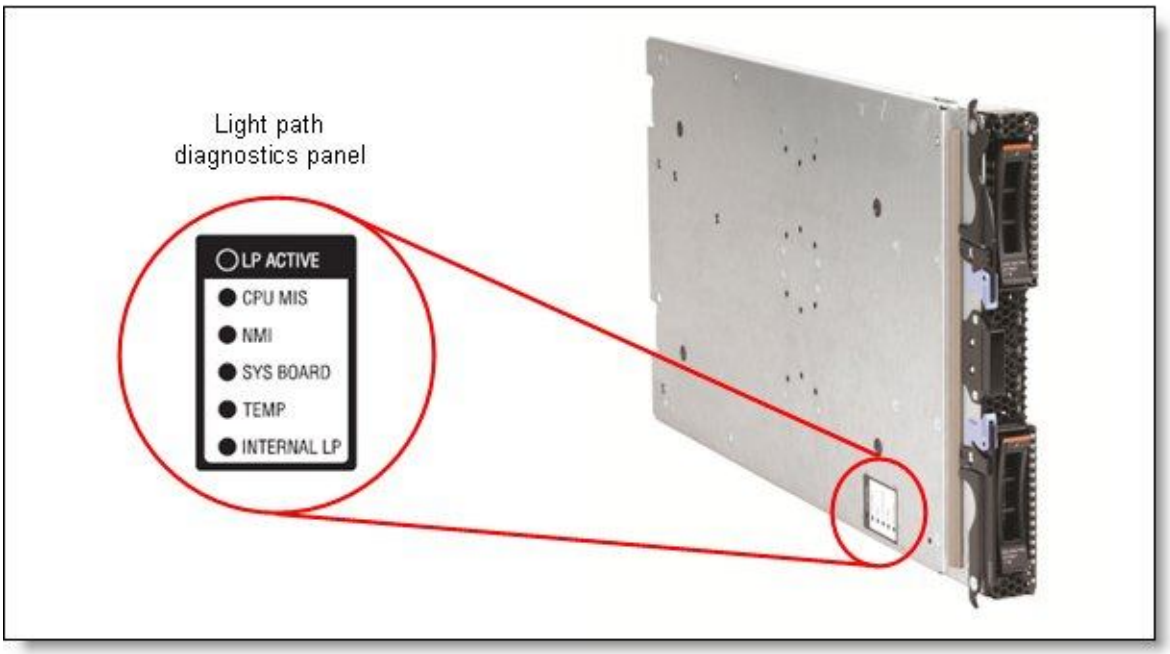

Figure 4. Bottom view of the IBM BladeCenter HS23 (shows light path diagnostics panel)

Standard specifications

Table 1 lists the standard specifications.

Table 1. Standard specifications (part 1)

Components	Specifications
Form factor	Single-wide (30 mm) blade server.
Chassis support	BladeCenter H, BladeCenter HT, BladeCenter S, BladeCenter E. (Some configurations might have restrictions. See Table 4 for compatibility details.)
Processor	Up to two Intel Xeon processor E5-2600 v2 product family CPUs with 12-core (up to 2.7 GHz), 10-core (up to 3.0 GHz), 8-core (up to 2.6 GHz), 6-core (up to 2.6 GHz), or 4-core (up to 3.5 GHz). Two QPI links up to 8.0 GT/s each. Up to 1866 MHz memory speed. Up to 30 MB L3 cache.
Chipset	Intel C600.
Memory	Up to 16 DDR3 DIMM sockets (8 DIMMs per processor) using Very Low Profile (VLP) DIMMs. Support for up to 1866 MHz memory speed depending on the processor. Four memory channels per processor (2 DIMMs per channel).
Memory maximums	Up to 512 GB with 16x 32 GB RDIMMs and two processors.
Memory protection	ECC, Chipkill, memory mirroring, and memory rank sparing.
Disk drive bays	Two 2.5" hot-swap SAS/SATA drive bays supporting SAS, SATA, and SSD drives.
Maximum internal storage	Up to 2.4 TB with 1.2 TB 2.5" SAS HDDs, or up to 2 TB with 1 TB 2.5" NL SAS/SATA HDDs, or up to 1.6 TB with 800 GB SATA SSDs, or up to 3.2 TB with 1.6 TB 2.5" SAS SSDs. Intermix of SAS and SATA HDDs and SSDs is supported.
RAID support	RAID 0, 1, 1E, and 10 with integrated LSI SAS2004 controller.
Network interfaces	Two Gigabit Ethernet ports and two 10 Gb Ethernet ports with integrated Emulex BladeEngine 3 (BE3) controller.
PCI Expansion slots	One CIOv slot (PCIe 3.0 x8) and one CFFh slot (PCIe 3.0 x16). Two additional PCIe 2.0 x8 standard form factor slots (slot 1 is full-height full-length, slot 2 is full-height half-length) with the optional PCI Express Gen 2 Expansion Blade II. One HS23 supports up to four PCIe expansion blades (8 slots). Up to four optional GPU expansion blades with either NVIDIA Tesla M2090, M2075, or M2070Q graphics processing units.
Ports	One internal USB port (for embedded hypervisor).
Hot-swap components	Hard drives.
Systems management	UEFI, IBM Integrated Management Module II (IMM2) with Renesas SH7757 controller, Predictive Failure Analysis, light path diagnostics, Automatic Server Restart, IBM Systems Director and IBM Systems Director Active Energy Manager, IBM ServerGuide.
Security features	Power-on password, administrator's password, Trusted Platform Module (TPM 1.2).

Table 1. Standard specifications (part 2)

Components	Specification
Video	Matrox G200eR2 video core with 16 MB video memory integrated into the IMM2. Maximum resolution is 1600x1200 at 75 Hz with 16 M colors (32 bits per pixel).
Operating systems supported	Microsoft Windows Server 2012 R2, 2012, 2008 R2, and 2008 (x64), Red Hat Enterprise Linux 5 (x64) and 6 (x86 and x64), SUSE Linux Enterprise Server 11 (for x86 and AMD64/EM64T), Oracle Solaris 10 and 11, and VMware vSphere 5.1 and 5.5.
Limited warranty	3-year customer-replaceable unit and onsite limited warranty with 9x5/next business day response time.
Service and support	Optional service upgrades are available through IBM ServicePacs®: 4-hour or 2-hour response time, 8-hour fix time, 1-year or 2-year warranty extension, remote technical support for IBM hardware and selected IBM and third-party (Microsoft, Linux, VMware) software.
Dimensions	Height: 245 mm (9.7 in), width: 29 mm (1.14 in), depth: 446 mm (17.6 in).
Weight	Maximum configuration (single-wide blade): 5.4 kg (12 lb).

The IBM BladeCenter HS23 servers include the following items:

- Documentation CD
- Registration Flyer
- Statement of Limited Warranty
- Important Notices
- Technical Note Flyer

Standard models

Table 2 lists standard models.

Table 2. Standard models

Model*	Intel Xeon processor** (2 max)	Memory (std / max)	RAID controller	Drive bays	Disk drives	Standard NIC	I/O slots (used / total)
7875-A3x	1x E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	1x 8GB 1600MHz‡	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE#	0 / 2
7875-A4x	1x E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	1x 8GB 1600MHz‡	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE#	0 / 2
7875-B4x	1x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-B5x	1x E5-2630 v2 6C 2.6GHz 15MB 1600MHz 80W	1x 8GB 1600MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-B6x	1x E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	1x 8GB 1600MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-C9x	1x E5-2650 v2 8C 2.6GHz 20MB 1866MHz 95W	1x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-CAx	1x E5-2660 v2 10C 2.2GHz 25MB 1866MHz 95W	1x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-CBx	1x E5-2670 v2 10C 2.5GHz 25MB 1866MHz 115W	1x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-CCx	1x E5-2680 v2 10C 2.8GHz 25MB 1866MHz 115W	1x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-D2x	1x E5-2650L v2 10C 1.7GHz 25MB 1600MHz 70W	1x 8GB 1600MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-F2x	1x E5-2697 v2 12C 2.7GHz 30MB 1866MHz 130W	1x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-G3x	1x E5-2628L v2 8C 1.9GHz 20MB 1600MHz 70W	1x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 4x 10 GbE†§	1 / 2
7875-G4x	1x E5-2658 v2 10C 2.4GHz 25MB 1866MHz 95W	1x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 4x 10 GbE†§	1 / 2

* x in the Machine Type Model (MTM) represents a country-specific letter (for example, the EMEA MTM is 7875A3G, and the US MTM is 7875A3U). Ask an IBM representative for specifics.
** Processor detail: Model, cores, core speed, L3 cache, memory speed, thermal design power.
‡ For models A3x and A4x, the standard DIMM is rated at 1600 MHz, but operates at up to 1333 MHz to match the processor memory speed. Actual memory speed maximums depend on several factors, as described in "Memory options."
# Supports 10 GbE with the addition of the 10Gb Interposer Card for IBM BladeCenter HS23, 94Y8550.
† These models are standard with Emulex 10GbE VFA Advanced II for IBM BladeCenter HS23, 90Y9332.
§ These models are standard with IBM Virtual Fabric Advanced Software Upgrade (LOM), 90Y9310.

Express models

Table 3 lists Express models.

Table 3. Express models

Model	Intel Xeon processor* (2 max)	Memory (std / max)	RAID controller	Drive bays	Disk drives	Standard NIC	I/O slots (used / total)
United States, Canada, Latin America							
7875-E7U	2x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	2x 8GB 1600MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-E8U	2x E5-2650 v2 8C 2.6GHz 20MB 1866MHz 95W	8x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
7875-E9U	2x E5-2670 v2 10C 2.5GHz 25MB 1866MHz 115W	8x 8GB 1866MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE 2x 10 GbE	0 / 2
Asia Pacific (Japan only)							
7875-EAJ	1x E5-2609 v2 4C 2.5GHz 10MB Cache 1333MHz 80W	2x 8GB 1600MHz‡	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE#	0 / 2
7875-EBJ	1x E5-2630 v2 6C 2.6GHz 15MB Cache 1600MHz 80W	2x 8GB 1600MHz	Integrated SAS/SATA	2x 2.5" HS	Open bay	2x GbE#	0 / 2

* Processor detail: Model, cores, core speed, L3 cache, memory speed, thermal design power.
‡ For model EAJ, the standard DIMM is rated at 1600 MHz, but operates at up to 1333 MHz to match the processor memory speed. Actual memory speed maximums depend on several factors, as described in "Memory options."
# Supports 10 GbE with the addition of the 10Gb Interposer Card for IBM BladeCenter HS23, 94Y8550.

Chassis support

The HS23 (7875, E5-2600 v2) is supported in the various BladeCenter chassis listed in Table 4. The number of HS23 servers supported in each chassis depends on the thermal design power of the processors used in the servers. Table 4 uses the following conventions:

- A green cell means that the chassis can be filled with HS23 blade servers up to the maximum number of blade bays in the chassis (for example, 14 blades in the BladeCenter H).
- A yellow cell means that the maximum number of HS23 blades that the chassis can hold is fewer than the total available blade bays (for example, 12 in a BladeCenter E). Other bays in the chassis *must* remain empty. Consult the BladeCenter Interoperability Guide for specific details: http://www.redbooks.ibm.com/big

Notes:

- The HS23 is not supported in the BladeCenter E with power supplies smaller than 2000 W.
- The HS23 is not supported in the BladeCenter T.

Table 4. Chassis support - hidden for future

CPU TDP*	Maximum number of HS23 (7875, E5-2600 v2) supported in each chassis								
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (8852) (14 bays)				BC-HT AC§ (8750) (12 bays)	BC-HT DC§ (8740) (12 bays)
				2900W supplies		2980W supplies**			
	2000 W power supplies	2320 W power supplies		Standard blowers	Enhanced blowers†	Standard blowers	Enhanced blowers†		
Intel Xeon processors									
130W	None‡	None‡	6	None‡	14#	None‡	14#	5+5	5+5
115W	None‡	None‡	6	None‡	14	None‡	14	5+5	5+5
95W	None‡	None‡	6	None‡	14	None‡	14	12	12
80W	6+7††	14††	6	14††	14	14††	14	12	12
70W	None‡	None‡	6	None‡	14	None‡	14	12	12
60W	None‡	None‡	6	None‡	14	None‡	14	12	12
Intel Xeon robust thermal profile processors##									
95W	5+7***††	14***††	6	14***††	14	14***††	14	12	12
70W	14††	14††	6	14††	14	14††	14	12	12
50W	14	14	6	14	14	14	14	12	12

* TDP = Thermal Design Power.
§ Support shown is for non-NEBS environments.
** IBM BladeCenter H 2980W AC Power Modules, 68Y6601 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).
† IBM BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, 5Tx, and 9xx BC-H chassis models; optional with all other BC-H chassis models).
# Intel Xeon E5-2697 v2 and E5-2690 v2 processors throttle at Steady State at ambient temperature of 31 °C in the BladeCenter H chassis.
‡ Not supported.
†† When one blower fails, the HS23 (7875, E5-2600 v2) with specified processor TDP only supports ambient temperature of up to 28 °C when installed in the BladeCenter H chassis with the standard blower modules or BladeCenter E chassis.
Intel Xeon E5-2618L v2 (50 W), E5-2628L v2 (70 W), E5-2648L v2 (70 W), and E5-2658 v2 (95 W) are robust thermal profile processors used in HS23.
*** The HS23 (7875, E5-2600 v2) with the Intel Xeon processor E5-2658 v2 (95 W) only supports one DIMM per channel when installed in the BladeCenter H chassis with the standard blower modules or BladeCenter E chassis.

Processor options

The HS23 (7875, E5-2600 v2) supports the processor options listed in Table 5. The blade server supports one or two processors. Table 5 also shows which server models have each processor standard. If no corresponding *where used* model for a particular processor is listed, then this processor is available only through Configure to Order (CTO).

Table 5. Processor options

Part number	Feature code*	Description	Models where used
94Y5260	A4T5 / A4UR	Intel Xeon Processor E5-2603 v2 4C 1.8GHz 10MB Cache 1333MHz 80W	A4x
94Y5261	A4SU / A4US	Intel Xeon Processor E5-2609 v2 4C 2.5GHz 10MB Cache 1333MHz 80W	A3x
94Y5278	A4SQ / A4UT	Intel Xeon Processor E5-2618L v2 6C 2.0GHz 15MB Cache 1333MHz 50W#	-
94Y5262	A4SV / A4UU	Intel Xeon Processor E5-2620 v2 6C 2.1GHz 15MB Cache 1600MHz 80W	B4x
94Y5279	A4SR / A4UV	Intel Xeon Processor E5-2628L v2 8C 1.9GHz 20MB Cache 1600MHz 70W#	G3x
94Y5263	A4SW / A4UW	Intel Xeon Processor E5-2630 v2 6C 2.6GHz 15MB Cache 1600MHz 80W	B5x
94Y5274	A4SL / A4UX	Intel Xeon Processor E5-2630L v2 6C 2.4GHz 15MB Cache 1600MHz 60W	-
94Y5271	A4T3 / A4UY	Intel Xeon Processor E5-2637 v2 4C 3.5GHz 15MB Cache 1866MHz 130W	-
94Y5264	A4SX / A4UZ	Intel Xeon Processor E5-2640 v2 8C 2.0GHz 20MB Cache 1600MHz 95W	B6x
94Y5281	A4SS / A4V1	Intel Xeon Processor E5-2648L v2 10C 1.9GHz 25MB Cache 1866MHz 70W#	-
94Y5265	A4SY / A4V2	Intel Xeon Processor E5-2650 v2 8C 2.6GHz 20MB Cache 1866MHz 95W	C9x
94Y5275	A4SM / A4V3	Intel Xeon Processor E5-2650L v2 10C 1.7GHz 25MB Cache 1600MHz 70W	D2x
94Y5282	A4ST / A4V4	Intel Xeon Processor E5-2658 v2 10C 2.4GHz 25MB Cache 1866MHz 95W#	G4x
94Y5266	A4SZ / A4V5	Intel Xeon Processor E5-2660 v2 10C 2.2GHz 25MB Cache 1866MHz 95W	CAx
94Y5267	A4T0 / A4V6	Intel Xeon Processor E5-2670 v2 10C 2.5GHz 25MB Cache 1866MHz 115W	CBx
94Y5268	A4T1 / A4V7	Intel Xeon Processor E5-2680 v2 10C 2.8GHz 25MB Cache 1866MHz 115W	CCx
94Y5269	A4T2 / A4V8	Intel Xeon Processor E5-2690 v2 10C 3.0GHz 25MB Cache 1866MHz 130W	-
94Y5276	A4SN / A4V9	Intel Xeon Processor E5-2695 v2 12C 2.4GHz 30MB Cache 1866MHz 115W	-
94Y5277	A4SP / A4VA	Intel Xeon Processor E5-2697 v2 12C 2.7GHz 30MB Cache 1866MHz 130W	F2x

* The first feature code is for the first processor; the second feature code is for the second processor.
# Intel Xeon robust thermal profile processors.

Memory options

IBM DDR3 memory is compatibility tested and tuned for optimal IBM System x® and BladeCenter performance and throughput. IBM memory specifications are integrated into the light path diagnostics for immediate system performance feedback and optimum system uptime. From a service and support standpoint, IBM memory automatically assumes the IBM system warranty, and IBM provides service and support worldwide.

The BladeCenter HS23 (7875, E5-2600 v2) supports Very Low Profile (VLP) DDR3 memory RDIMMs. The server supports up to eight DIMMs when one processor is installed and up to 16 DIMMs when two processors are installed. Each processor has four memory channels, and there are two DIMMs per channel.

The following rules apply when selecting the memory configuration:

- Mixing 1.5 V and 1.35 V DIMMs in the same server is supported. In such a case all DIMMs operate at 1.5 V.
- The maximum number of ranks supported per channel is eight.
- The maximum quantity of DIMMs that can be installed in the server depends on the number of CPUs, DIMM rank, and operating voltage, as shown in the "Max. qty supported" row in Table 6.
- All DIMMs in all CPU memory channels operate at the same speed, which is determined as the lowest value of:
  - Memory speed supported by specific CPU
  - Lowest maximum operating speed for the selected memory configuration that depends on rated speed, as shown under the "Max. operating speed" section in Table 6.

Table 6. Maximum memory speeds

Specification	**RDIMM**							
Rank	Single rank			Dual rank			Quad rank	
Part numbers	46W0684 (4 GB) 46W0700 (8 GB)		46W0696 (8 GB)	46W0692 (4 GB) 46W0708 (8 GB) 46W0716 (16 GB)		46W0688 (4 GB) 46W0704 (8 GB) 46W0712 (16 GB)	00D5008 (32 GB)	
Rated speed	1600 MHz		1866 MHz	1600 MHz		1866 MHz	1333 MHz	
Rated voltage	1.35 V		1.5 V	1.35 V		1.5 V	1.35 V	
Operating voltage	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V	1.5 V	1.35 V	1.5 V
Max. qty supported*	16	16	16	16	16	16	16	16
Largest DIMM	8 GB	8 GB	8 GB	16 GB	16 GB	16 GB	32 GB	32 GB
Max. memory capacity*	128 GB	128 GB	128 GB	256 GB	256 GB	256 GB	512 GB	512 GB
Max. memory at rated speed*	N/A	128 GB	64 GB	N/A	256 GB	128 GB	N/A	N/A
Maximum operating speed								
1 DIMM per channel	1333 MHz	1600 MHz	1866 MHz	1333 MHz	1600 MHz	1866 MHz	800 MHz	1066 MHz
2 DIMMs per channel	1333 MHz	1600 MHz	1600 MHz	1333 MHz	1600 MHz	1600 MHz	800 MHz	800 MHz

* Maximum quantity supported is shown for two processors installed. When one processor is installed, the maximum quantity supported is half of what is shown.

The following memory protection technologies are supported:

- ECC
- Chipkill
- Memory mirroring
- Memory rank sparing

If memory mirroring is used, then DIMMs must be installed in pairs (minimum of one pair per CPU), and both DIMMs in a pair must be identical in type and size. The effective memory available to the system is only half of that installed.

If memory rank sparing is used, then two single-rank or dual-rank DIMMs must be installed per populated channel (the DIMMs do not need to be identical). In rank sparing mode, one rank of a DIMM in each populated channel is reserved as spare memory. The size of a rank varies depending on the DIMMs installed.

Chipkill, memory mirroring, and memory rank sparing modes are mutually exclusive. Only one operational memory mode can be enabled on a server, and it is a system-wide setting.

Table 7 lists memory options available for the HS23 (7875, E5-2600 v2) server. DIMMs can be installed one at a time, but for performance reasons, install them in sets of four (one for each of the four memory channels).

Table 7. Memory options for the HS23 (7875, E5-2600 v2)

Part number	Feature code	Description	Maximum supported	Standard models where used
1866 MHz DIMMs				
46W0688	A4G0	4GB (1x4GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	16 (8 per processor)	-
46W0696	A4G1	8GB (1x8GB, 1Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	16 (8 per processor)	-
46W0704	A4G2	8GB (1x8GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	16 (8 per processor)	C9x, CAx, CBx, CCx, F2x, G3x, G4x
46W0712	A4G3	16GB (1x16GB, 2Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz VLP RDIMM	16 (8 per processor)	-
1600 MHz DIMMs				
46W0684	A4FV	4GB (1x4GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	16 (8 per processor)	-
46W0692	A4FW	4GB (1x4GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	16 (8 per processor)	-
46W0700	A4FX	8GB (1x8GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	16 (8 per processor)	-
46W0708	A4FY	8GB (1x8GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	16 (8 per processor)	A3x, A4x, B4x, B5x, B6x, D2x
46W0716	A4G9	16GB (1x16GB, 2Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz VLP RDIMM	16 (8 per processor)	-
1333 MHz DIMMs				
00D5008	A3KN	32GB (1x32GB, 4Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333MHz VLP RDIMM	16 (8 per processor)	-

Internal storage options

The HS23 server has two hot-swap drive bays accessible from the front of the blade server. These bays are connected to the integrated 4-port LSI SAS2004 6 Gbps SAS/SATA RAID-on-Chip (ROC) controller.

The integrated LSI SAS2004 ROC has the following features:

- Four-port controller with 6 Gbps throughput per port
- PCIe x4 Gen 2 host interface
- Two SAS ports routed internally to the two hot-swap drive bays
- Two ports can be routed externally to the chassis I/O bays 3 and 4 with SAS Connectivity Card (CIOv)
- Supports RAID levels 0 (Integrated Striping), 1 (Integrated Mirroring), 10 (Integrated Mirroring and Striping), and 1E (Integrated Mirroring Enhanced)
- Supports up to 14 drives (up to 12 integrated RAID drives and up to two hot-spare drives) for integrated RAID configurations
- Supports up to 10 integrated RAID drives per integrated volume
- Supports up to two integrated volumes
- Supports volumes greater than 2 TB for RAID 0, 10, and 1E
- Supports SAS and SATA HDDs and SSDs
- Supports connectivity to the disk storage modules in the BladeCenter S chassis
- Support connectivity to the tape drives and external storage systems

Table 8 lists the hard drive options that are available for internal storage.

Table 8. Drive options for internal storage (Part 1)

Part number	Feature code	Description	Maximum supported
SAS HDDs			
90Y8926	A2XB	IBM 146GB 15K 6Gbps SAS 2.5" SFF G2HS HDD	2
90Y8877	A2XC	IBM 300GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	2
81Y9670	A283	IBM 300GB 15K 6Gbps SAS 2.5" SFF HS HDD	2
90Y8872	A2XD	IBM 600GB 10K 6Gbps SAS 2.5" SFF G2HS HDD	2
00AJ300	A4VB	IBM 600GB 15K 6Gbps SAS 2.5" G2HS HDD	2
81Y9650	A282	IBM 900GB 10K 6Gbps SAS 2.5" Slim-HS HDD	2
00AD075	A48S	IBM 1.2TB 10K 6Gbps SAS 2.5" G2HS HDD	2
SAS Hybrid HDDs			
00AD102	A4G7	IBM 600GB 10K 6Gbps SAS 2.5" G2HS Hybrid	2
NL SAS HDDs			
90Y8953	A2XE	IBM 500GB 7.2K 6Gbps NL SAS 2.5" SFF G2HS HDD	2
81Y9690	A1P3	IBM 1TB 7.2K 6Gbps NL SAS 2.5" SFF Slim-HS HDD	2
NL SATA HDDs			
81Y9722	A1NX	IBM 250GB 7.2K 6Gbps SATA 2.5" SFF Slim-HS HDD	2
81Y9726	A1NZ	IBM 500GB 7.2K 6Gbps SATA 2.5" SFF Slim-HS HDD	2
81Y9730	A1AV	IBM 1TB 7.2K 6Gbps SATA 2.5" SFF Slim-HS HDD	2

Table 8. Drive options for internal storage (Part 2)

Part number	Feature code	Description	Maximum supported
SATA SSDs			
00W1125	A3HR	IBM 100GB SATA 2.5" MLC HS Enterprise SSD	2
49Y5839	A3AS	IBM 64GB SATA 2.5" MLC HS Enterprise Value SSD	2
90Y8648	A2U4	IBM 128GB SATA 2.5" MLC HS Enterprise Value SSD	2
90Y8643	A2U3	IBM 256GB SATA 2.5" MLC HS Enterprise Value SSD	2
49Y5844	A3AU	IBM 512GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ355	A56Z	IBM 120GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ360	A570	IBM 240GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ365	A571	IBM 480GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ370	A572	IBM 800GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ000	A4KM	S3500 120GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ005	A4KN	S3500 240GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ010	A4KP	S3500 480GB SATA 2.5" MLC HS Enterprise Value SSD	2
00AJ015	A4KQ	S3500 800GB SATA 2.5" MLC HS Enterprise Value SSD	2
41Y8331	A4FL	S3700 200GB SATA 2.5" MLC HS Enterprise SSD	2
41Y8336	A4FN	S3700 400GB SATA 2.5" MLC HS Enterprise SSD	2
41Y8341	A4FQ	S3700 800GB SATA 2.5" MLC HS Enterprise SSD	2
SAS SSDs			
49Y6129	A3EW	IBM 200GB SAS 2.5" MLC HS Enterprise SSD	2
49Y6134	A3EY	IBM 400GB SAS 2.5" MLC HS Enterprise SSD	2
49Y6139	A3F0	IBM 800GB SAS 2.5" MLC HS Enterprise SSD	2
49Y6195	A4GH	IBM 1.6TB SAS 2.5" MLC HS Enterprise SSD	2

Internal tape drives

The server does not support an internal tape drive. However, it can be attached to external tape drives using SAS or Fibre Channel connectivity (Table 26).

Optical drives

The server does not support an optical drive option. However, it does interface to the optical drive installed in the BladeCenter chassis media tray if one is installed there.

I/O expansion options

The HS23 server offers the following PCI Express 3.0 slots:

- CIOv expansion slot: PCIe 3.0 x8
- CFFh expansion slot: PCIe 3.0 x16

The CIOv I/O expansion connector provides I/O connections through the midplane of the chassis to modules located in bays 3 and 4 of a supported BladeCenter chassis. The CFFh I/O expansion connector provides I/O connections to high-speed switch modules that are located in bays 7, 8, 9, and 10 of a BladeCenter H or BladeCenter HT chassis.

Table 9 shows the connections between adapters installed in the HS23 blade server to the switch bays in the chassis.

Table 9. Adapter to I/O bay correspondence

I/O adapter slot in the HS23	Port on the adapter	Corresponding I/O module bay in the chassis		
		BladeCenter E	BladeCenter H, HT	BladeCenter S
Integrated 1 GbE	Port 1	I/O bay 1	I/O bay 1	I/O bay 1
	Port 2	I/O bay 2	I/O bay 2	I/O bay 1
Integrated 10 GbE	Port 1	Not supported	I/O bay 7†	I/O bay 2*
	Port 2	Not supported	I/O bay 9†	I/O bay 2*
CIOv slot	Port 1	I/O bay 3	I/O bay 3	I/O bay 3
	Port 2	I/O bay 4	I/O bay 4	I/O bay 4
CFFh slot	Port 1	Not supported	I/O bay 7	I/O bay 2
	Port 2	Not supported	I/O bay 9	I/O bay 2
	Port 3	Not supported	I/O bay 8	Not supported
	Port 4	Not supported	I/O bay 10	Not supported

† Requires the 10Gb LOM Interposer Card or Emulex 10GbE Virtual Fabric Adapter II for HS23 be installed in HS23.
* Requires the 10Gb LOM Interposer Card be installed in HS23. Both 10 GbE ports are routed to the I/O bay 2 of the BladeCenter S chassis and operate at 1 Gbps speed.

The HS23 optionally supports the PCI Express Gen 2 Expansion Blade II listed in Table 10.

The expansion blade provides the capability to attach selected PCI Express cards to the HS23. This capability is ideal for many applications that require special telecommunications network interfaces or hardware acceleration using a PCI Express card. The expansion blade provides one full-height and full-length PCI Express x16 (x8-wired) Gen 2 slot and one full-height and half-length PCI Express x16 (x8-wired) Gen 2 slot with a maximum power usage of 75 watts for each slot. It integrates PCI Express card support capability into the BladeCenter architecture. Up to four expansion blades can be attached to an HS23. Each expansion blade occupies a bay in the BladeCenter chassis.

Table 10. PCIe expansion blades

Part number	Feature code	Description	Maximum supported
68Y7484	A247	IBM BladeCenter PCI Express Gen 2 Expansion Blade II	4

The HS23 server optionally supports GPU Expansion Blade expansion units listed in Table 11. This capability is ideal for many applications written to take advantage of acceleration and visualization performance advantages that are offered in general-purpose computing on GPUs. This product is integrated with one NVIDIA Tesla M2090, one NVIDIA Tesla M2075, or one NVIDIA Tesla M2070Q GPU. The stacking capability of the IBM BladeCenter GPU Expansion Blade II allows you to connect up to four of them to a single blade server. In addition, you can still use a CFFh I/O expansion card adapter by installing it in the top-most expansion blade. Each expansion blade occupies a bay in the BladeCenter chassis.

Table 11. GPU expansion blades

Part number	Feature code	Description	Maximum supported
00D6881	A2VW	IBM BladeCenter GPU Expansion Blade II with NVIDIA Tesla M2090	4
68Y7478	A245	IBM BladeCenter GPU Expansion Blade II with NVIDIA Tesla M2075	4
68Y7479	A246	IBM BladeCenter GPU Expansion Blade II with NVIDIA Tesla M2070Q	4

For more information, see the following IBM Redbooks® Product Guides:

- *IBM BladeCenter PCI Express Gen 2 Expansion Blade and PCI Express Gen 2 Expansion Blade II*: http://www.redbooks.ibm.com/abstracts/tips0783.html?Open
- *IBM BladeCenter GPU Expansion Blade and GPU Expansion Blade II*: http://www.redbooks.ibm.com/abstracts/tips0798.html?Open

Network adapters

The HS23 offers two integrated Gigabit Ethernet ports and two integrated 10 Gb Ethernet ports with the integrated Emulex BladeEngine 3 (BE3) controller. Two Gigabit Ethernet ports are routed to the chassis I/O bays 1 and 2 (BladeCenter E, H or HT), and two 10 Gb Ethernet ports are routed to the chassis I/O bays 7 and 9 using either 10Gb LOM Interposer Card or Emulex Virtual Fabric Adapter II for HS23 (BladeCenter H or HT). With BladeCenter S, both GbE ports are routed to the chassis I/O bay 1, and both 10 GbE ports are routed to the chassis I/O bay 2 using the 10Gb LOM Interposer Card (if installed).

The integrated BE3 4-port NIC has the following features:

- Two Gigabit Ethernet ports and two 10 Gb Ethernet ports (1 Gb and 10 Gb auto-negotiation).
- Full-duplex (FDX) capability.
- 10 Gb ports operate in either a virtual NIC (vNIC) or physical NIC (pNIC) mode:
  - vNIC mode: Up to six vNICs (up to three vNICs per one 10 Gb port)
    - Virtual Fabric mode or Switch Independent operational mode.
    - Virtual port bandwidth allocation in 100 Mbps increments.
    - Up to two vNICs can be configured as an iSCSI or FCoE vNICs (one per port) with optional Advanced Upgrade (90Y9310).
  - pNIC mode: dual-port 1/10 Gb Ethernet adapter
- IPv4/IPv6 offload:
  - TCP, UDP checksum offload
  - Large send offload (LSO)
  - Large receive offload (LRO)
  - Receive side scaling (RSS)
- IPv4 TCP Chimney Offload.
- IEEE 802.1Q VLAN tagging.
- VLAN insertion and extraction.
- Jumbo frames up to 9000 bytes.
- Load balancing and failover teaming support, including adapter fault tolerance (AFT), switch fault tolerance (SFT), adaptive load balancing (ALB), and IEEE 802.3ad.
- Enhanced Ethernet (draft) support:
  - Enhanced Transmission Selection (ETS) (P802.1Qaz)
  - Priority-based Flow Control (PFC) (P802.1Qbb)
  - Data Center Bridging eXchange Protocol (DCBX) (P802.1Qaz)
- Supports Serial over LAN (SoL) and concurrent KVM (cKVM).
- Preboot Execution Environment (PXE) support.
- Wake On LAN support.
- PCIe x8 Gen 2 host interface.
- SR-IOV support.
- Message Signal Interrupt (MSI-X) support.

Table 12 lists the 10Gb LOM Interposer Card.

Table 12. 10Gb LOM Interposer Card

Part number	Feature code	Description	Maximum supported	Standard models where used
94Y8550	A244	10Gb LOM Interposer Card	1	All except A3x, A4x

Note: While the 10Gb LOM Interposer card does not consume a CFFh slot, you have to remove it if you plan to install a CFFh expansion card.

Table 13 lists additional supported network adapters and upgrades.

Table 13. Network adapters

Part number	Feature code	Description	Slots supported	Maximum supported
Virtual Fabric Adapters and Upgrades				
81Y3133	A1QR	Broadcom 2-port 10Gb Virtual Fabric Adapter	CFFh	1
90Y9310	A2TD	IBM Virtual Fabric Advanced Software Upgrade (LOM)	(License only)	1
81Y3120	A287	Emulex 10GbE Virtual Fabric Adapter II for HS23	CFFh†	1
90Y9350	A2ZP	Virtual Fabric Advanced FOD Upgrade	(License only)	1
90Y9332	A2ZN	Emulex 10GbE Virtual Fabric Adapter Advanced II for HS23	CFFh†	1
00Y3332	A4AC	QLogic 10Gb Virtual Fabric Adapter	CFFh	1
00Y5622	A4AE	QLogic 10Gb Virtual Fabric Advanced FoD Upgrade	(License only)	1
00Y5618	A4AD	QLogic 10Gb Virtual Fabric CNA	CFFh	1
Converged Network Adapters				
81Y1650	5437	Brocade 2 port 10GbE Converged Network Adapter (CFFh)	CFFh	1
00Y3280*	A3JB	QLogic 2-port 10Gb CNA (CFFh)	CFFh	1
10 Gb Ethernet				
46M6168	0099	Broadcom 10Gb Gen2 2-port Ethernet Expansion Card (CFFh)	CFFh	1
46M6164	0098	Broadcom 10Gb Gen2 4-port Ethernet Expansion Card (CFFh)	CFFh	1
42C1810	3593	Intel 10Gb 2-port Ethernet Expansion Card CFFh	CFFh	1
90Y3570	A1NW	Mellanox 2-port 10Gb Enet Expansion Card (CFFh)	CFFh	1
1 Gb Ethernet				
44W4479	5476	2/4 Port Ethernet Expansion Card (CFFh)	CFFh	1
44W4475	5477	Ethernet Expansion Card (ClOv)	ClOv	1
InfiniBand				
46M6001	0056	2-port 40Gb InfiniBand Expansion Card (CFFh)	CFFh	1

† With Emulex Virtual Fabric Adapters II for HS23 installed in a blade server, two 10 Gb Ethernet ports on the adapter itself are routed to the chassis I/O bays 8 and 10 (unlike other CFFh cards), and two 10 Gb Ethernet ports integrated on a blade itself are routed to the chassis I/O bays 7 and 9.
* Replaces 42C1830.

For more information, see the list of IBM Redbooks Product Guides in the Ethernet adapters category: http://www.redbooks.ibm.com/portals/BladeCenter?Open&page=pg&cat=ethadapters

Storage host bus adapters

Table 14 lists storage HBAs supported by the HS23 server.

Table 14. Storage adapters

Part number	Feature code	Description	Slots supported	Maximum supported
Fibre Channel				
46M6140	3598	Emulex 8Gb Fibre Channel Expansion Card (CIOv)	CIOv	1
00Y3270*	A3JC	QLogic Enet and 8Gb FC Exp Card (CFFh)	CFFh	1
44X1945	1462	QLogic 8Gb Fibre Channel Expansion Card (CIOv)	CIOv	1
46M6065	3594	QLogic 4Gb Fibre Channel Expansion Card (CIOv)	CIOv	1
SAS				
43W4068	1593	SAS Connectivity Card (CIOv)	CIOv	1

* Replaces 44X1940.

For more information, see the list of IBM Redbooks Product Guides in the Fibre Channel adapters category:
http://www.redbooks.ibm.com/portals/BladeCenter?Open&page=pg&cat=fcadapters

PCIe SSD adapters

The HS23 server supports the High IOPS SSD adapters listed in Table 15. The adapters must be installed in an IBM BladeCenter PCI Express Gen 2 Expansion Blade II. Up to eight High IOPS adapters supported per one HS23 (two per PCI Express Gen 2 Expansion Blade II and up to four PCI Expansion Blades per HS23).

Table 15. SSD adapters

Part number	Feature code	Description	Slots supported	Maximum supported (per exp. blade / per HS23)
46C9078	A3J3	IBM 365GB High IOPS MLC Mono Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8
46C9081	A3J4	IBM 785GB High IOPS MLC Mono Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8
90Y4377	A3DY	IBM 1.2TB High IOPS MLC Mono Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8
90Y4397	A3DZ	IBM 2.4TB High IOPS MLC Duo Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8
90Y4361	A3MZ	IBM 300GB High IOPS MLC Modular Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8
90Y4365	A3N0	IBM 600GB High IOPS MLC Modular Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8
90Y4369	A3N1	IBM 800GB High IOPS MLC Modular Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8
90Y4373	A3N2	IBM 300GB High IOPS SLC Modular Adapter	PCI Express Gen 2 Expansion Blade II (68Y7484)	2 / 8

For information about these adapters, see IBM Redbooks Product Guides:

- IBM High IOPS SSD PCIe Adapters
  http://www.redbooks.ibm.com/abstracts/tips0729.html
- IBM High IOPS MLC Adapters
  http://www.redbooks.ibm.com/abstracts/tips0907.html
- IBM High IOPS Modular Adapters
  http://www.redbooks.ibm.com/abstracts/tips0937.html

Power supplies

Blade server power is derived from the power supplies installed in the BladeCenter chassis. There are no server options regarding power supplies.

Integrated virtualization

The server supports VMware ESXi installed on a USB memory key. The key is installed in a USB socket inside the server. Table 16 lists the virtualization options.

Table 16. Virtualization options

Part number	Feature code	Description	Maximum supported
41Y8298	A2G0	IBM Blank USB Memory Key for VMWare ESXi Downloads	1
41Y8300	A2VC	IBM USB Memory Key for VMWare ESXi 5.0	1
41Y8307	A383	IBM USB Memory Key for VMware ESXi 5.0 Update1	1
41Y8311	A2R3	IBM USB Memory Key for VMWare ESXi 5.1	1
41Y8382	A4WZ	IBM USB Memory Key for VMWare ESXi 5.1 Update 1	1
41Y8385	A584	IBM USB Memory Key for VMWare ESXi 5.5	1

Remote management

The server contains an IBM Integrated Management Module II (IMM2), which is based on the Renesas SH7757 chip, and interfaces with the advanced management module in the BladeCenter chassis. The combination of these provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, LEDs on the system board are lit to help you diagnose the problem, the error is recorded in the event log, and you are alerted to the problem. A virtual presence capability comes standard for remote server management through the Advanced Management Module (AMM) in the BladeCenter chassis.

Remote server management is provided through industry-standard interfaces:

- Simple Network Management Protocol (SNMP) Version 3
- Systems Management Architecture for Server Hardware (SMASH)
- Web browser

The server also supports virtual media and remote control features, which provide the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO image files as virtual drives that are available for use by the server
- Capturing blue-screen errors

Supported operating systems

The server supports the following operating systems:

- IBM 4690 Operating System V6
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2012
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Web x86 Edition
- Microsoft Windows Server 2008 HPC Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server Edition
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- VMware vSphere 5.5 (ESXi)
- VMware vSphere 5.1 (ESXi)

See the IBM ServerProven® website for the latest information about the specific versions and service levels supported and any other prerequisites:
http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/ematrix.shtml

Physical specifications

Dimensions and weight (approximate, for single-wide blade):

- Height: 245 mm (9.7 in)
- Depth: 446 mm (17.6 in)
- Width: 29 mm (1.14 in)
- Maximum weight: 5.4 kg (12 lb)

Shipping dimensions and weight (approximate, for single-wide blade):

- Height: 330 mm (13.0 in)
- Depth: 600 mm (23.5 in)
- Width: 165 mm (6.5 in)
- Weight: 4.2 kg (9.4 lb)

Supported environment:

- Air temperature
  - Server on:
    - 10 to 35 °C (50 to 95 °F); altitude: 0 to 914 m (0 to 3,000 ft)
    - 10 to 32 °C (50 to 89.6 °F); altitude: 914 to 2133 m (3,000 to 7,000 ft)
  - Server off: 10 to 43 °C (50 to 109.4 °F)
  - Shipment: -40 to +60 °C (-40 to 140 °F)
- Humidity
  - Server on: 8 to 80%
  - Server off: 8 to 80%

Warranty options

The BladeCenter HS23 has a three-year on-site warranty with 9x5 next-business-day terms. IBM offers the warranty service upgrades through IBM ServicePac®, discussed in this section. The IBM ServicePac is a series of prepackaged warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

IBM ServicePac offerings are country-specific, that is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePac might be available in a particular country. For more information about IBM ServicePac offerings available in your country visit the IBM ServicePac Product Selector at https://www-304.ibm.com/sales/gss/download/spst/servicepac.

Table 17 explains warranty service definitions in more detail.

Table 17. Warranty service definitions

Term	Description
IBM on-site repair (IOR)	A service technician will come to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your customer's location within two hours after remote problem determination is completed. We provide 24-hour service, every day, including IBM holidays.
24x7x4 hour	A service technician is scheduled to arrive at your customer's location within four hours after remote problem determination is completed. We provide 24-hour service, every day, including IBM holidays.
9x5x4 hour	A service technician is scheduled to arrive at your customer's location within four business hours after remote problem determination is completed. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays. If after 1:00 p.m. it is determined that on-site service is required, the customer can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician will arrive by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your customer's location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. to 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding IBM holidays.

In general, these are the types of IBM ServicePacs:

- Warranty and maintenance service upgrades
  - One, two, three, four, or five years of 9x5 or 24x7 service coverage
  - On-site repair from the next business day to four or two hours
  - One or two years of warranty extension
- Remote technical support services
  - One or three years with 24x7 coverage (severity 1) or 9-5 next business day for all severities
  - Installation and startup support for System x servers
  - Remote technical support for System x servers
  - Software support - Support Line
    - Microsoft or Linux software
    - VMware
    - IBM Director

Regulatory compliance

The server conforms to the following standards:

- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 4, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1-03
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- Taiwan BSMI CNS13438, Class A
- Korea KN22, Class A; KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22-99, GOST R 51318.24-99, GOST R 51317.3.2-2006, GOST R 51317.3.3-99
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A

External disk storage expansion

The HS23 does not support external storage expansion units. It can be used with the BladeCenter S integrated storage or external storage systems listed in the "External disk storage systems" section.

The BladeCenter S integrated storage is supported by the integrated LSI SAS2004 ROC controller together with the SAS connectivity card installed in the CIOv slot of the HS23. Table 18 lists the connectivity card.

Table 18. SAS connectivity card for external storage expansion enclosures

Part number	Description	Maximum quantity supported
43W4068	SAS Connectivity Card (CIOv)	1

For more information about the BladeCenter S integrated storage, see the IBM BladeCenter S product guide:
http://www.redbooks.ibm.com/abstracts/tips0977.html

External disk storage systems

Table 19 lists the external storage systems that are supported by HS23 and that can be ordered through the System x sales channel. The HS23 blade may support other IBM disk systems that are not listed in this table. For further information, refer to the IBM System Storage® Interoperation Center: http://www.ibm.com/systems/support/storage/ssic

Table 19. External disk storage systems

Part number	Description
1746A2D	IBM System Storage DS3512 Express Dual Controller Storage System
1746A2S	IBM System Storage DS3512 Express Single Controller Storage System
1746A4D	IBM System Storage DS3524 Express Dual Controller Storage System
1746A4S	IBM System Storage DS3524 Express Single Controller Storage System
181494H	IBM System Storage DS3950 Model 94
181498H	IBM System Storage DS3950 Model 98
2072L2C	IBM Storwize® V3700 LFF Dual Control Enclosure
2072S2C	IBM Storwize V3700 SFF Dual Control Enclosure

For more information, see the list of IBM Redbooks Product Guides in the System Storage category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=externalstorage

External backup units

The server supports the external backup attachment options listed in Table 20. The HS23 blade may support other IBM tape backup systems that are not listed in this table. For further information, refer to the IBM System Storage Interoperability Center: http://www.ibm.com/systems/support/storage/ssic

Table 20. External backup options (part 1)

Part number	Description
External tape expansion enclosures for internal tape drives	
87651UX	1U Tape Drive Enclosure
8767HHX	Half High Tape Drive Enclosure
87651NX	1U Tape Drive Enclosure (with Nema 5-15P LineCord)
8767HNX	Half High Tape Drive Enclosure (with Nema 5-15P LineCord)
Tape enclosure adapters (with cables)	
44E8869	USB Enclosure Adapter Kit
40K2599	SAS Enclosure Adapter Kit
Internal backup drives supported by external tape enclosures	
46C5399	IBM DDS Generation 5 USB Tape Drive
39M5636	IBM DDS Generation 6 USB Tape Drive
43W8478	IBM Half High LTO Gen 3 SAS Tape Drive
44E8895	IBM Half High LTO Gen 4 SAS Tape Drive
49Y9898	IBM Half High LTO Gen 5 Internal SAS Tape Drive
00D8924	IBM Half High LTO Ultrium Gen 6 Internal SAS Tape Drive

Table 20. External tape options (part 2)

Part number	Description
External backup units*	
362532X	IBM RDX Removable Hard Disk Storage System - External USB 320 GB Bundle
362550X	IBM RDX Removable Hard Disk Storage System - External USB 500 GB Bundle
36251TX	IBM RDX Removable Hard Disk Storage System - External USB 1 TB Bundle
3628L3X	IBM Half High LTO Gen 3 External SAS Tape Drive (with US line cord)
3628L4X	IBM Half High LTO Gen 4 External SAS Tape Drive (with US line cord)
3628L5X	IBM Half High LTO Gen 5 External SAS Tape Drive (with US line cord)
3628N3X	IBM Half High LTO Gen 3 External SAS Tape Drive (without line cord)
3628N4X	IBM Half High LTO Gen 4 External SAS Tape Drive (without line cord)
3628N5X	IBM Half High LTO Gen 5 External SAS Tape Drive (without line cord)
3580S3V	System Storage TS2230 Tape Drive Express Model H3V
3580S4V	System Storage TS2240 Tape Drive Express Model H4V
3580S5E	System Storage TS2250 Tape Drive Express Model H5S
3580S5X	System Storage TS2350 Tape Drive Express Model S53
3572S4R	TS2900 Tape Library with LTO4 HH SAS drive and rack mount kit
3572S5R	TS2900 Tape Library with LTO5 HH SAS drive and rack mount kit
35732UL	TS3100 Tape Library Model L2U Driveless
35734UL	TS3200 Tape Library Model L4U Driveless
46X2682†	LTO Ultrium 5 Fibre Channel Drive
46X2683†	LTO Ultrium 5 SAS Drive Sled
46X2684†	LTO Ultrium 5 Half High Fibre Drive Sled
46X2685†	LTO Ultrium 5 Half High SAS Drive Sled
46X6912†	LTO Ultrium 4 Half High Fibre Channel Drive Sled
46X7117†	LTO Ultrium 4 Half High SAS DriveV2 Sled
46X7122†	LTO Ultrium 3 Half High SAS DriveV2 Sled

* Note: The external tape drives listed can be ordered through the System x sales channel. The server might support other IBM tape drives that are not listed in this table. Refer to IBM System Storage Interoperation Center for further information.

† Note: These part numbers are the tape drives options for 35732UL and 35734UL.

For more information, see the list of IBM Redbooks Product Guides in the Backup units category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape

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Related publications and links

For more information, see the following resources:

- IBM US Announcement Letter for HS23 (7875, E5-2600 v2)
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-196
- IBM BladeCenter HS23 product page
  http://ibm.com/systems/bladecenter/hardware/servers/hs23
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