

## IBM BladeCenter HS22

### IBM BladeCenter at-a-glance guide

The IBM® BladeCenter® HS22 is a two-socket blade server running Intel Xeon processors. It is ideal for mainstream business applications including as a virtualization engine, and is compatible with the IBM BladeCenter H, E, S, and HT chassis. The HS22 supports up to two Intel Xeon 5500 or 5600 series multi-core processors, 12 DIMMs modules, two hot-swap drives, two PCI Express connectors, and one internal USB connector for embedded virtualization.

The HS22 is shown in Figure 1.



Figure 1. IBM BladeCenter HS22

### Did you know?

IBM BladeCenter HS22 delivered leadership two-processor, single-node result for SPECjEnterprise2010 – 2,752.06 Enterprise jAppServer Operations Per Second (SPECjEnterprise2010 EjOPS). This score was achieved using the IBM BladeCenter HS22 as the application server running IBM WebSphere® Application Server V7 as the middle tier and the IBM System x3850 X5 as the database server running IBM DB2® 9.7 Enterprise Server. With this SPECjEnterprise2010 result, IBM demonstrates its ability to provide both software and hardware for an optimal solution in the middle tier and in the back-end database layer, and also to deliver a robust solution for clients' complex workloads.

## Locations of key components and connectors

Figure 2 shows the inside of the server indicating key components.

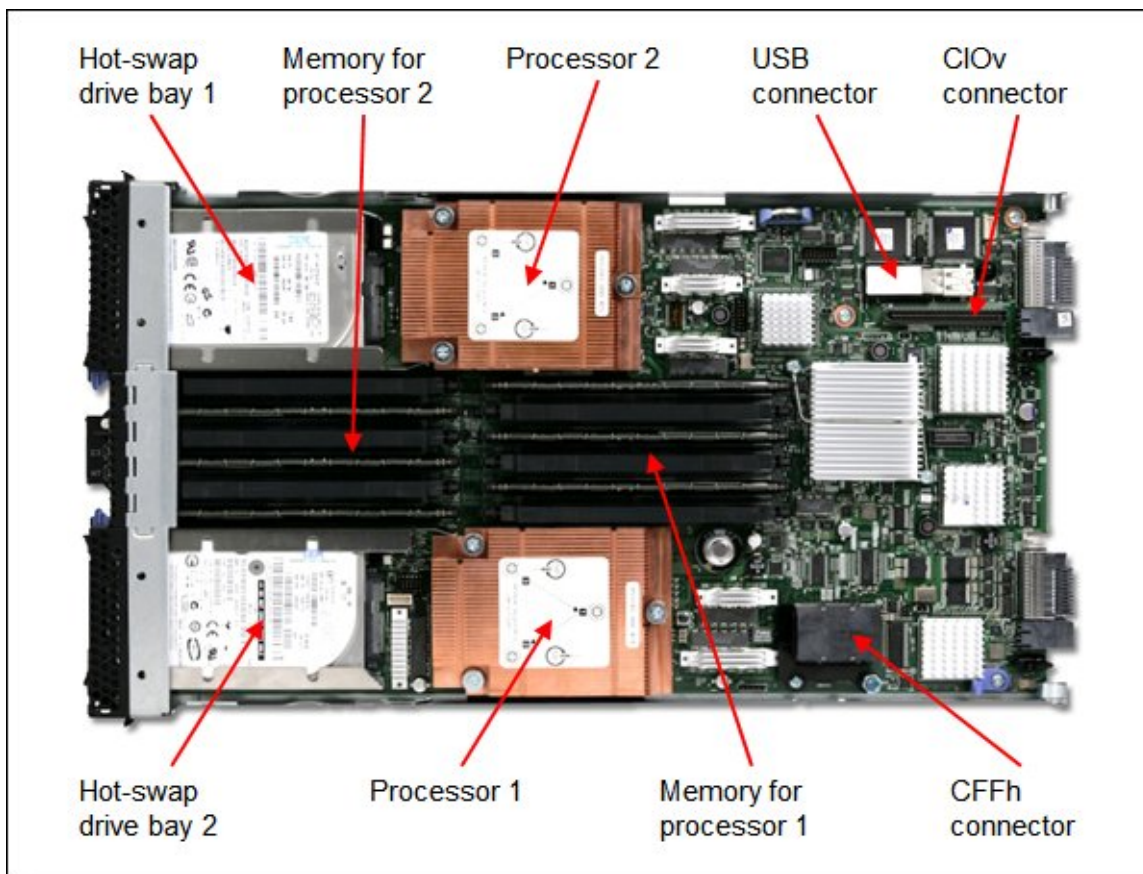


Figure 2. IBM BladeCenter HS22

## Standard specifications

Table 1 lists the standard specifications.

Table 1. Standard specifications

Components	Specification
Form factor	Single-wide (30 mm)
Processor (max)	Intel Xeon 5500 series processors Intel Xeon 5600 series processors
Number of processors	1 standard / 2 maximum
Memory DIMM sockets	12x DDR-3 VLP DIMM slots
Maximum memory	Models with Intel Xeon 5600 series processors: 192 GB using 16GB DIMMs Models with Intel Xeon 5500 series processors: 96 GB using 8GB DIMMs
Expansion slots	One CIOv slot: 2 ports One CFFh slot: 4 ports
Disk bays (total/hot-swap)	Two hot-swap bays supporting SAS HDDs or solid-state drives
Maximum internal storage	Up to 1.2 TB total internal storage
Network interface	2x 1Gb Ethernet using a Broadcom 5709S onboard NIC Some models also include a 2-port 10Gb controller installed in the CFFh slot
Hot-swap components	Internal storage bays
RAID support	RAID-0, -1 and -1E (optional RAID-5 with battery-backed cache)
Systems management	Unified Extensible Firmware Interface (UEFI), IBM Integrated Management Module (IMM), Predictive Failure Analysis, optional embedded hypervisor for virtualization, IBM Systems Director Active Energy Manager™, light path diagnostics, IBM Systems Director and IBM ServerGuide
Security	Trusted Platform Module (TPM), Power-on password, administrator password, unattended boot, selectable boot, unattended start mode
Operating systems supported	Microsoft® Windows®, Red Hat Enterprise Linux®, SUSE Linux Enterprise, VMware, Oracle Solaris
Limited warranty	Three-year customer replaceable unit and on-site and off-site limited warranty

The IBM BladeCenter HS22 includes the following items:

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

## Standard models

Table 2 lists standard models. It uses std (standard), max (maximum), Eth (Ethernet).

Table 2. Standard models

Model	Intel Xeon Processor (model, cores, core speed, L3 cache, memory speed, power) (2 max)	Memory (std / max)	Std Eth†	SAS RAID	Bays (used / max)	Disk drives	Slots (used / max)
Models with Intel Xeon 5500 Series Processors 4-core and 2-core							
7870-A4x	1x E5507 4C 2.26GHz 4MB 800MHz	3x 1GB / 96GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-C4x	1x X5570 4C 2.93GHz 8MB 1333MHz	2x 2GB / 96GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-M2x	1x L5518 4C 2.13GHz 8MB 1066MHz	2x 2GB / 96GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-D3x	1x E5503 2C 2.00GHz 4MB 800MHz	3x 1GB / 96GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
Models with Intel Xeon 5600 Series Processors - 4-core							
7870-A5x	1x E5603 4C 1.60GHz 4MB 1066MHz	1x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-A7x	1x E5607 4C 2.26GHz 8MB 1066MHz	1x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-G2x	1x E5620 4C 2.40GHz 12MB 1066MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-G4x	1x E5640 4C 2.66GHz 12MB 1066MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-GCx	1x E5640 4C 2.66GHz 12MB 1066MHz	3x2GB / 192GB	2x 1Gb 2x 10Gb	Yes	0 / 2	Open	1 / 2
7870-B5x	1x X5647 4C 2.93GHz 12MB 1066MHz	3x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-H5x	1x X5667 4C 3.06GHz 12MB 1333MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-C5x	1x X5672 4C 3.20GHz 12MB 1333MHz	3x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-F3x	1x X5677 4C 3.46GHz 12MB 1333MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-C7x	1x X5687 4C 3.60GHz 12MB 1333MHz	3x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
Models with Intel Xeon 5600 Series Processors - 6-core							
7870-N2x	1x L5640 6C 2.26GHz 12MB 1333MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-B6x	1x E5649 6C 2.53GHz 12MB 1333MHz	3x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-H2x	1x X5650 6C 2.66GHz 12MB 1333MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-HAx	1x X5650 6C 2.66GHz 12MB 1333MHz	3x2GB / 192GB	2x 1Gb 2x 10Gb	Yes	0 / 2	Open	1 / 2
7870-H4x	1x X5670 6C 2.93GHz 12MB 1333MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-C6x	1x X5675 6C 3.06GHz 12MB 1333MHz	3x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-F2x	1x X5680 6C 3.33GHz 12MB 1333MHz	3x2GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2
7870-C8x	1x X5690 6C 3.46GHz 12MB 1333MHz	3x4GB / 192GB	2x 1Gb	Yes	0 / 2	Open	0 / 2

† All models contain an onboard 2-port Gigabit Ethernet controller. Model GCx also includes Broadcom 10Gb Gen2 2-port Ethernet Expansion Card (CFFh) installed in the CFFh expansion slot. Model HAx also includes the Emulex 10Gb Virtual Fabric Adapter (CFFh) installed in the CFFh expansion slot.

See the Standard specifications section for information about standard features of the server.

## Chassis support

The HS22 is supported in the various BladeCenter chassis as listed in Table 3.

Table 3. Chassis support

Description	BC-E (8677)	BC-T	BC-S (8886)	BC-H (8852)	BC-HT AC (8750)	BC-HT DC (8740)
HS22 with 130W processors	No	No	Some limits*	Some limits*	Some limits*	Some limits*
HS22 with up to 95W processors	Some limits*	No	Full	Full	Full	Full

\* See Table 4 for details

The number of HS22 servers supported in each chassis depends on the thermal design power of the processors used in the servers, as shown in Table 4. The table uses the following conventions:

- A green cell means the chassis can be filled with HS22 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 HS22 blades that the chassis can hold is fewer than the total available blade bays (for example, 12 in a BladeCenter H). Other bays in the chassis *may* or *may not* be occupied by servers other than HS22 and HS22V depending on the combination and some bays must remain empty. Consult the BladeCenter Interoperability Guide for specifics: <http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5073016>

**Note:** The HS22 is not supported in the BladeCenter E with power supplies smaller than 2000 W.

Table 4. Chassis support (detailed)

CPU TDP*	Maximum number of HS22 servers supported in each chassis									
	BC-E with AMM (8677) (14 bays)		BC-S (8886) (6 bays)	BC-H (models other than 4Tx) (14 bays)				BC-H (-4Tx) (14 bays)	BC-HT AC (8750) (12 bays)	BC-HT DC (8740) (12 bays)
	2000 W power supplies	2320 W power supplies		2900W supplies		2980W supplies**				
				Standard blowers	Enhanced blowers†	Standard blowers	Enhanced blowers†			
130W	None‡	None‡	5	None‡	12	None‡	14	14	10	10
95W	6	14	6	14	14	14	14	14	12	12
80W	12	14	6	14	14	14	14	14	12	12
60W	13	14	6	14	14	14	14	14	12	12
40W	14	14	6	14	14	14	14	14	12	12

\* Thermal Design Power

\*\* IBM BladeCenter H 2980W AC Power Modules, 68Y6601 (standard in 4Tx, optional with all other BC-H chassis models)

† IBM BladeCenter H Enhanced Cooling Modules, 68Y6650 (standard in 4Tx, optional with all other BC-H chassis models)

‡ Not supported

## Processor options

The HS22 supports the processor options listed in Table 5. The server supports one or two processors. The table 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 1)

Part number	Intel Xeon processor description	Models where used
Intel Xeon 5600 Series Processors: 4-core		
81Y9323	Xeon E5603 4C 1.60GHz 4MB 1066MHz 80w	A5x
81Y9324	Xeon E5606 4C 2.13GHz 8MB 1066MHz 80w	-
81Y9325	Xeon E5607 4C 2.26GHz 8MB 1066MHz 80w	A7x
59Y5705	Xeon E5620 4C 2.40GHz 12MB 1066MHz 80w	G2x
59Y5707	Xeon E5630 4C 2.53GHz 12MB 1066MHz 80w	-
59Y5708	Xeon E5640 4C 2.66GHz 12MB 1066MHz 80w	G4x, GCx
49Y5184	Xeon L5609 4C 1.86GHz 12MB 1066MHz 40w	-
59Y5704	Xeon L5630 4C 2.13GHz 12MB 1066MHz 40w	-
81Y9326	Xeon X5647 4C 2.93GHz 12MB 1066MHz 130w	B5x
59Y5712	Xeon X5667 4C 3.06GHz 12MB 1333MHz 95w	H5x
81Y9328	Xeon X5672 4C 3.20GHz 12MB 1333MHz 95w	C5x
59Y5714	Xeon X5677 4C 3.46GHz 12MB 1333MHz 130w	F3x
81Y9330	Xeon X5687 4C 3.60GHz 12MB 1333MHz 130w	C7x
Intel Xeon 5600 Series Processors: 6-core		
68Y8125	Xeon E5645 6C 2.40GHz 12MB 1333MHz 80w	-
81Y9327	Xeon E5649 6C 2.53GHz 12MB 1333MHz 80w	B6x
68Y8124	Xeon L5638 6C 2.0GHz 12MB 1333MHz 60w	-
59Y5706	Xeon L5640 6C 2.26GHz 12M 1333MHz 60w	N2x
59Y5709	Xeon X5650 6C 2.66GHz 12M 1333MHz 95w	H2x, HAx
59Y5710	Xeon X5660 6C 2.80GHz 12MB 1333MHz 95w	-
59Y5711	Xeon X5670 6C 2.93GHz 12MB 1333MHz 95w	H4x
81Y9329	Xeon X5675 6C 3.06GHz 12MB 1333MHz 95w	C6x
59Y5713	Xeon X5680 6C 3.33GHz 12MB 1333MHz 130w	F2x
81Y9331	Xeon X5690 6C 3.46GHz 12MB 1333MHz 130w	C8x

Table 5. Processor options (Part 2)

Part number	Intel Xeon processor description	Models where used
Intel Xeon 5500 Series Processors: 2-core		
59Y5692	Xeon E5503 2C 2.00GHz 4M 800MHz 80w	D3x
Intel Xeon 5500 Series Processors: 4-core		
44T1712	Xeon E5504 4C 2.00GHz 4MB 800MHz	-
43W5987	Xeon E5506 4C 2.13GHz 4MB 800MHz	-
59Y5695	Xeon E5507 4C 2.26GHz 4M 800MHz 80w	A4x
44T1736	Xeon E5520 4C 2.26GHz 8MB 1066MHz	-
44T1883	Xeon E5530 4C 2.40GHz 8MB 1066MHz	-
44T1884	Xeon E5540 4C 2.53GHz 8MB 1066MHz	-
49Y5052	Xeon L5518 4C 2.13GHz 8MB 1066MHz 60W	M2x
44T1887	Xeon X5570 4C 2.93GHz 8MB 1333MHz	C4x

## Memory options

The HS22 has six DIMM sockets per processor (12 DIMMs in total) and uses Double Data Rate-3 (DDR-3) very-low-profile (VLP) registered DIMMs. Servers with Intel Xeon 5600 series processors support 16GB DIMMs meaning a total of up to 192 GB of RAM is supported. Servers with Intel Xeon 5500 series processors support 8GB DIMMs meaning a total of up to 96 GB of RAM is supported. The memory DIMMs connects directly to one of the processors. With one processor installed, only six DIMMs can be accessed. To access memory in the other six DIMM connectors, the second processor must be installed.

Tables 6 and 7 list memory options available for HS22 server: one of 5500 series processors and one for 5600 series processors. DIMMs can be installed one at a time, but for performance reasons, install them in sets of three (one for each of the three memory channels).

Table 6. Memory options for servers with Xeon 5500 series processors

Part number	Description	Max support	Models where used
49Y1427	1 GB (1x 1 GB, 1Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	12	-
44T1485	1 GB (1x 1 GB) Single Rank PC3-10600 CL9 ECC DDR3-1333 VLP	12	A4x, D3x
49Y1428	2 GB (1x 2 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	12	-
49Y1429	2 GB (1x 2 GB, 1Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	12	-
44T1487	2 GB (1x 2 GB) Single Rank PC3-10600 CL9 ECC DDR3-1333 MHz	12	C4x
44T1486	2 GB (1x 2 GB) Dual Rank PC3-10600 CL9 ECC DDR3-1333 MHz	12	M2x
44T1594	2 GB (1x 2 GB, 1Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	12	-
46C0560	2 GB (1x 2 GB, 1Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz	12	-
49Y1430	4 GB (1x 4 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	12	-
44T1488	4 GB (1x 4 GB) Dual Rank PC3-10600 CL9 ECC DDR3-1333 MHz	12	-
44T1596	4 GB (1x 4 GB, 2Rx8, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	12	-
46C0563	4 GB (1x 4 GB, 1Rx4, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz	12	-
46C0564	4 GB (1x 4 GB, 2Rx8, 1.35 V) PC3L-10600 CL9 ECC DDR3 1333 MHz	12	-
49Y1431	8 GB (1x 8 GB, 2Rx4, 1.5 V) PC3-10600 CL9 ECC DDR3 1333 MHz	12	-
44T1579	8 GB (1x 8 GB) Dual Rank PC3-8500 CL7 ECC DDR3-1066 MHz	12	-
46C7451	8 GB (1x 8 GB, Dual Rankx4) PC3-10600 CL9 ECC DDR3-1333 MHz	12	-



Table 7. Memory options for servers with Xeon 5600 series processors

Part number	Description	Supports 2DPC @1333*	Max suppt	Models where used
Standard DIMMs (1.5 V)				
49Y1427	1GB (1x 1GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
49Y1428	2GB (1x 2GB, 2Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	F2x, F3x, G2x, G4x, GCx, H2x, H4x, H5x, HAx, N2x
49Y1429	2GB (1x 2GB, 1Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
44T1594	2GB (1x 2GB, 1Rx8, 1.5V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
49Y1430	4GB (1x 4GB, 2Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
49Y1431	8GB (1x 8GB, 2Rx4, 1.5V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
Low Power DIMMs (1.35 V)				
46C0560	2GB (1x 2GB, 1Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333	Yes	12	-
46C0561	2GB (1x 2GB, 1Rx4, 1.35V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
46C0563	4GB (1x 4GB, 1Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333	Yes	12	A5x, A7x, B5x, B6x, C5x, C6x, C7x, C8x
46C0564	4GB (1x 4GB, 2Rx8, 1.35V) PC3L-10600 CL9 ECC DDR3 1333	Yes	12	-
46C0567	4GB (1x 4GB, 2Rx4, 1.35V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
46C0568	8GB (1x 8GB, 2Rx4, 1.35V) PC3-10600 CL9 ECC DDR3 1333	Yes	12	-
46C0569	8GB (1x 8GB, 2Rx4, 1.35V) PC3-8500 CL7 ECC DDR3 1066	No	12	-
46C0599	16GB (1x16 GB, 2Rx4, 1.35V) PC3L-10600 CL9 ECC DDR3 1333	Yes	12	-

\* Supports two DIMMs per channel at a memory speed of 1333 MHz

Note that although the maximum speed at which the memory channel runs on the HS22 is 1333 MHz, this depends on a combination of three items:

- Processor memory speed: The processor has a maximum memory speed of 1333, 1066, or 800 MHz depending on the processor model. Only the X (Advanced) range of Xeon 5500 and 5600 series processors supports a maximum memory channel speed of 1333 MHz. See the processor options (Table 5) for the maximum memory speed.
- Memory DIMM: Most but not all DIMMs listed in Tables 6 and 7 support running at 1333 MHz. Some only run at 1066 MHz. This is noted in the description of the DIMM.
- Number of DIMMs installed: The HS22 implements memory so that 2 DIMMs are on each of the three memory channels of the processor. If only 1 DIMM is installed to each channel (that is, 3 DIMMs per processor) then the DIMMs can operate at the lower of the DIMM rated speed and processor memory channel rated speed, up to 1333 MHz. However at 2 DIMMs per channel (6 DIMMs per processor), memory can only operate at 1333 MHz if Xeon 5600 X (Advanced) range of processors (models X56nn) are installed. All other processors (all 5500, L56nn, and E56nn) cannot drive the memory channel at 1333 MHz if there are 2 DIMMs per channel.

In summary, to ensure DIMMs operate at 1333 MHz, select a Xeon X56nn processor and use DIMMs that are rated at 1333 MHz, and support running at 2 DIMMs per channel at 1333 MHz,

The following memory protection technologies are supported:

- ECC
- ChipKill
- Memory Mirroring
- Memory Sparing

## Internal disk storage options

The HS22 blade server features an onboard LSI Logic 53C1064E 3 Gbps SAS controller with two hot-swap drives bay accessible from the front of the blade server. The LSI Logic 53C1064E SAS controller provides RAID 0 or RAID 1 capability and supports up to two internal hot-swap SAS or SATA HDDs or two internal hot swap solid-state drives.

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

Table 8. Disk drive options for internal disk storage

Part number	Description	Maximum quantity supported
SAS disk drives		
42D0672	IBM 73GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	2
42D0632	IBM 146GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	2
42D0677	IBM 146GB 15K 6Gbps SAS 2.5" SFF Slim-HS HDD	2
42D0637	IBM 300GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	2
42D0707	IBM 500GB 7200 6Gbps NL SAS 2.5" SFF Slim-HS HDD	2
49Y2003	IBM 600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	2
SATA disk drives		
42D0747	IBM 160GB 7200 NL SATA 2.5" SFF Slim-HS HDD	2
42D0752	IBM 500GB 7200 NL SATA 2.5" SFF Slim-HS HDD	2
Solid state drives (SSD)		
43W7714	IBM 50GB SATA 2.5" SFF Slim-HS High IOPS SSD	2

## Internal tape drives

The server does not support an internal tape drive option.

## 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.

## External disk storage expansion

SAS Connectivity Modules (one or two) must be installed into chassis to support external disk storage expansion. SAS Connectivity Module is listed in Table 9.

Table 9. SAS Connectivity Modules

Part number	Description	Maximum quantity supported per one chassis
39Y9195	SAS Connectivity Module	2

The external disk storage expansion enclosure listed in Table 10 is supported with HS22.

Table 10. External storage expansion enclosures

Part number	Description	Maximum quantity supported per one blade server
172701X	IBM System Storage® EXP3000	1

The hard disk drives listed in Table 11 are supported with external expansion enclosures.

Table 11. Hard drive options for external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
EXP3000 Hot-Swap SATA 3.5" Hard Drives		
43W7630	1000 GB Dual Port Hot Swap SATA	12
49Y1940	IBM 2 TB 7200 Dual Port SATA 3.5" HS HDD	12
EXP3000 Hot-Swap SAS 3.5" Hard Drives		
44W2234	IBM 300 GB 15K 6 Gbps SAS 3.5" Hot-Swap HDD	12
44W2239	IBM 450 GB 15K 6 Gbps SAS 3.5" Hot-Swap HDD	12
44W2244	IBM 600 GB 15K 6 Gbps SAS 3.5" Hot-Swap HDD	12

The RAID controller listed in Table 12 is supported with external expansion enclosures.

Table 12. RAID controllers for external storage expansion enclosures

Part number	Description	Maximum quantity supported
46C7167	ServeRAID-MR10ie (CIOv) Controller with battery	1

**Note:** If the ServeRAID MR10ie is installed, the battery is installed in DIMM slot 7. Therefore DIMM slot 7 cannot be used for memory. This will limit the total amount of memory that will be able to be installed.

The ServerRAID MR10ie Controller has the following specifications:

- Two SAS ports routed internally to the chassis I/O bays 3 and 4
- Supports RAID levels 0, 1, 5, 6, 10, 50, and 60
- Provides 256 MB of ECC DDR-2 battery-backed cache
- 3 Gbps throughput per port
- PCI Express 1.0 x4 host interface
- Based on the LSI 1078 controller
- Supports up to 26 disk drives.
- Support for on-board and external disk drives
- Supports connectivity to the EXP3000 storage expansion enclosures

The external SAS cables listed in the following table are supported with external expansion enclosures and MR10ie RAID controllers connected to SAS Connectivity Modules.

Table 13. External SAS cables for external storage expansion enclosures

Part number	Description	Maximum quantity supported per enclosure
39R6531	IBM 3 m SAS Cable	1
39R6529	IBM 1 m SAS Cable	1

## External tape backup

The server supports the external tape attachment options listed in Table 14.

Table 14. External tape options

Part number	Description
Tape libraries	
3572-Sxx	IBM System Storage TS2900 Tape Autoloader
3573-xxx	IBM System Storage TS3100/TS3200 Tape Library (all models)
3576-xxx	IBM System Storage TS3310 Modular Tape Library (all models)
3580-S3x	IBM System Storage TS2230 Tape Drive Express Model
3580-S4x	IBM System Storage TS2240 Tape Drive Model S4E
3584-xxx	IBM System Storage TS3500 Tape Library (all models)

## I/O expansion options

The HS22 server offers the following PCI Express 2.0 slots, neither of which is hot-swap.

- CIOv expansion slot
- CFFh expansion slot

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. It is a PCIe 2.0 x8 slot.

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, or to switch bay 2 in a BladeCenter S chassis. The CFFh slot is a PCIe x16 slot.

The HS22 optionally supports the IBM BladeCenter PCIe Gen 2 Expansion Blade. The expansion blade provides the capability to attach selected PCI Express cards to the HS22. This capability is ideal for many applications that require special telecommunications network interfaces or hardware acceleration using a PCI Express card. See Table 15.

The expansion blade provides one full height and full length PCI Express slot and one full height and half length PCI Express 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 HS22. Each expansion blade occupies a bay in the BladeCenter chassis.

The server also supports IBM BladeCenter PCI Express I/O Expansion Unit (PCI Express Gen 1). A maximum of one unit can be attached to a single blade.

Table 15. Expansion blades

Part number	Description	Maximum quantity supported
46M6730	IBM BladeCenter PCI Express Gen 2 Expansion Blade	4
43W4391	IBM BladeCenter PCI Express I/O Expansion Unit	1

For details, see the *IBM BladeCenter PCI Express Gen 2 Expansion Blade at-a-glance guide*, available from: <http://www.redbooks.ibm.com/abstracts/tips0783.html?Open>

## Network adapters

The HS22 offers two integrated Gigabit Ethernet ports, based on the Broadcom BCM5709S controller.

- Failover, adapter fault tolerance
- PXE 2.0 Boot Agent
- Wake on LAN
- Load balancing or teaming

Table 16 lists additional supported network adapters.

Table 16. Network adapters

Part number	Description	Slots supported	Maximum supported
10 Gb Ethernet			
46M6168	Broadcom 10Gb Gen2 2-port Ethernet Expansion Card (CFFh)	CFFh	1
46M6164	Broadcom 10Gb Gen2 4-port Ethernet Expansion Card (CFFh)	CFFh	1
81Y1650	Brocade 2 port 10GbE Converged Network Adapter for IBM BladeCenter	CFFh	1
49Y4275	Emulex 10GbE Virtual Fabric Adapter Advanced for IBM BladeCenter	CFFh	1
49Y4265	Emulex 10GbE Virtual Fabric Advanced Upgrade for IBM BladeCenter	(license only)	1
49Y4235	Emulex Virtual Fabric Adapter (CFFh)	CFFh	1
42C1810	Intel 10Gb 2-port Ethernet Expansion Card CFFh	CFFh	1
42C1830	QLogic 2-pt 10Gb Converged Network Adapter (CFFh)	CFFh	1
1 Gb Ethernet			
44W4479	2/4 Port Ethernet Expansion Card (CFFh) for IBM BladeCenter	CFFh	1
44W4475	Ethernet Expansion Card (CIOv) for IBM BladeCenter	CIOv	1
Combination Ethernet and Fibre Channel			
44X1940	QLogic Eth and 8Gb Fibre Channel Exp Card (CFFh)	CFFh	1

## Storage host bus adapters

Table 17 lists storage HBAs supported by HS22 server.

Table 17. Storage adapters

Part number	Description	Slots supported	Maximum quantity supported
Combination Ethernet and Fibre Channel			
44X1940	QLogic Eth and 8Gb Fibre Channel Exp Card (CFFh)	CFFh	1
Fibre Channel			
46M6140	Emulex 8Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter	CIOv	1
46M6065	QLogic 4Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter	CIOv	1
44X1945	QLogic 8Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter	CIOv	1
InfiniBand			
46M6001	2-port 40Gb InfiniBand Expansion Card (CFFh) for IBM BladeCenter	CFFh	1
43W4423	4X InfiniBand DDR Expansion Card (CFFh) for IBM BladeCenter	CFFh	1
SAS			
46C7167	ServeRAID-MR10ie (CIOv) Controller for IBM BladeCenter	CIOv	1
43W4068	SAS Connectivity Card (CIOv)	CIOv	1
Converged Network Adapters (CNAs)			
42C1830	QLogic 2-pt 10Gb Converged Network Adapter (CFFh)	CFFh	1
81Y1650	Brocade 2 port 10GbE Converged Network Adapter for IBM BladeCenter	CFFh	1

## PCIe SSD adapters

The HS22 server supports the High IOPS SSD adapters listed in Table 18. The adapters must be installed in an IBM BladeCenter PCI Express Gen 2 Expansion Blade or PCI Express I/O Expansion Unit depending on adapter used.

Table 18. SSD adapters

Part number	Description	Slots supported	Max quantity
46M0878	IBM 320GB High IOPS SD Class SSD PCIe Adapter	PCIe Gen 2 Expansion Blade (46M6730)	2
46M0877	IBM 160GB High IOPS SS Class SSD PCIe Adapter	PCI Express I/O Expansion Unit (43W4391)	2
46M0898	IBM 320GB High IOPS MS Class SSD PCIe Adapter	PCI Express I/O Expansion Unit (43W4391)	2
81Y4519	640GB High IOPS MLC Duo Adapter	PCI Express I/O Expansion Unit (43W4391)	2

For information about this adapter, see the *IBM High IOPS SSD PCIe Adapters at-a-glance guide*: <http://www.redbooks.ibm.com/abstracts/tips0729.html?Open>

## Power supplies

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 19 lists the virtualization options.

Table 19. Virtualization options

Part number	Description	Maximum quantity supported
41Y8269	IBM USB Memory Key for VMware Hypervisor (ESXi 3.5 U4)	1
41Y8283	IBM USB Memory Key for VMware Hypervisor (ESXi 3.5 U5)	1
41Y8278	IBM USB Memory Key for VMware Hypervisor (ESXi 4.0)	1
41Y8287	IBM USB Memory Key for VMware Hypervisor (ESXi 4.1)	1



## Remote management

The server contains an IBM Integrated Management Module (IMM), which interfaces with the advanced management module in the BladeCenter chassis. The combination of these two 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, records the error in the event log, and alerts you to the problem. A virtual presence capability is also available for remote server management capabilities.

Remote server management is provided through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Common Information Model (CIM)
- 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, 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 and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive
- Capture blue-screen errors

## Physical specifications

Dimensions:

- Height: 245 mm (9.7 in)
- Depth: 446 mm (17.6 in)
- Width: 58 mm (2.28 in)

Maximum weight: 5.4 kg (12 lb) (depending on the configuration when options are added)

## Regulatory compliance

The server conforms to the following international standards:

- Australia and New Zealand C-Tick Mark, Class A
- CE Mark (EN55022:1998 Class A, EN60950, EN55024:1998, EN61000-3-2 and EN61000-3-3)
- CISPR 22, Class A
- CSA C22.2 No.60950 Safety of Information Technology Equipment 60950
- Canada ICES-003, issue 3, Class A
- China GB 9254-1998, GB17625.1-1998, GB17625.2-1999
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- IEC-60950 (CB Certificate and CB Test Report)
- Japan VCCI, Class A
- Korea MIC
- NOM-019 Seguridad de Equipo de Procesamiento de Datos within 30 days of planned availability
- TUV-GS (EN60950/ISO 9241-3/ISO 9241-8)
- Taiwan BSMI CNS13438, Class A
- UL 60950 Safety of Information Technology Equipment

## Warranty options

The BladeCenter HS22 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 20 explains warranty service definitions in more detail.

Table 20. 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, the types of IBM ServicePac are as follows:

- Warranty and maintenance service upgrades
  - One, two, three, four, or five years of 9x5 or 24x7 service coverage
  - On-site repair from 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 9x5 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

## Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Compute Cluster Server 2003
- Microsoft Windows Essential Business Server 2008 Premium Edition
- Microsoft Windows Essential Business Server 2008 Standard Edition
- Microsoft Windows HPC Server 2008
- Microsoft Windows Server 2003 Compute Cluster Edition
- Microsoft Windows Server 2003, Enterprise Edition with Microsoft Cluster Service (MSCS)
- Microsoft Windows Server 2003, Enterprise Edition (64 bit) with Microsoft Cluster Service (MSCS)
- Microsoft Windows Server 2003, Web Edition
- Microsoft Windows Server 2003/2003 R2, Datacenter Edition
- Microsoft Windows Server 2003/2003 R2, Datacenter x64 Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise x64 Edition
- Microsoft Windows Server 2003/2003 R2, Standard Edition
- Microsoft Windows Server 2003/2003 R2, Standard x64 Edition
- Microsoft Windows Server 2008 HPC Edition
- 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 Small Business Server 2003/2003 R2 Premium Edition
- Microsoft Windows Small Business Server 2003/2003 R2 Standard Edition
- Microsoft Windows Small Business Server 2008 Premium Edition
- Microsoft Windows Small Business Server 2008 Standard Edition
- Red Hat Enterprise Linux 4 AS for AMD64/EM64T
- Red Hat Enterprise Linux 4 AS for x86
- Red Hat Enterprise Linux 4 ES for AMD64/EM64T
- Red Hat Enterprise Linux 4 ES for x86
- Red Hat Enterprise Linux 4 WS/HPC for AMD64/EM64T
- Red Hat Enterprise Linux 4 WS/HPC for x86
- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 5 Server Edition with Xen
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise MRG 1.0 Realtime (x64)
- Solaris 10 Operating System
- SUSE LINUX Enterprise Real Time 10 AMD64/EM64T
- SUSE LINUX Enterprise Real Time 11 AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for x86
- SUSE LINUX Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 with Xen for x86
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 3.5

- VMware ESX 4.0
- VMware ESX 4.1
- VMware ESXi 3.5
- VMware ESXi 4.0
- VMware ESXi 4.1

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/matrix.shtml>

## Related publications and links

For more information, see the following resources:

- IBM BladeCenter HS22 product page  
<http://ibm.com/systems/bladecenter/hardware/servers/hs22>
- IBM BladeCenter Information Center  
<http://publib.boulder.ibm.com/infocenter/bladectr/documentation>
- IBM BladeCenter HS22 Installation and User's Guide  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5079689>
- IBM BladeCenter HS22 Problem Determination and Service Guide  
<http://ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5079687>
- ServerProven hardware compatibility page for the HS22  
<http://ibm.com/systems/info/x86servers/serverproven/compat/us/blade/7870.html>
- ServerProven compatibility page for operating system support  
<http://ibm.com/systems/info/x86servers/serverproven/compat/us/nos/ematrix.shtml>
- BladeCenter Interoperability Guide  
<http://www.ibm.com/support/docview.wss?uid=psg1MIGR-5073016>
- At-a-glance guides for IBM BladeCenter servers and options  
<http://www.redbooks.ibm.com/portals/bladecenter?Open&page=atagance>
- Configuration and Option Guide  
<http://www.ibm.com/systems/xbc/cog/>
- xRef - IBM System x Reference Sheets  
<http://www.redbooks.ibm.com/xref>
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