IBM @server BladeCenter and BladeCenter HS20 — The Future of Blade-Thin, Application Servers Is Ready for Your Enterprise

Overview
BladeCenter and BladeCenter HS20 blades take application serving to the cutting edge of performance, density, and scalability. At your command are powerful, two-way SMP-capable Intel® Xeon processors, high-speed memory, gigabit Ethernet controllers, and advanced high-availability and systems management features. Best of all, they provide a new economic approach to the deployment of large numbers of powerful servers using reduced space and power resources.

Powerful Blade-Thin Computing: The BladeCenter and BladeCenter HS20 are the key components to build your blades configuration. Optionally available Ethernet and Fibre Channel (FC) switch and power modules support advanced configurations.

BladeCenter — Rock-Solid Foundation for Business-Critical Applications
• Rack-optimized, 7 U modular design enclosure — Holds up to 14 hot-swap BladeCenter HS20 blades with up to six enclosures in a 42 U rack
• Contains high-availability ePlane supporting hot-swap of individual blades
• Two 1,200-watt, hot-swap power modules and support for two optional 1,200-watt power modules — Provides redundancy and power for robust configurations
• Two hot-swap 325 CFM blowers and thermal sensors throughout to monitor and alert over-temperature conditions
• Management module — Lets you manage and control components in the enclosure
• Optional hot-swap, redundant Ethernet and FC switch modules — Supports up to four network switch modules

• Control panel — Contains universal serial bus (USB) port and status LEDs
BladeCenter HS20 — Performance and Highly Scalable
• Choose 2.0 or 2.4 GHz Xeon processors with quad-pumped 400 MHz front-side bus (FSB) and full-speed 512 KB ECC L2 caches
• Standard 512 MB system memory with Chipkill™ ECC support — Supports 8 GB maximum²
• Dual Broadcom Gigabit Ethernet controllers with teaming and failover support
• Integrated management processor — Monitors critical components on each blade for remote and local systems management
• ATA-100 IDE controller — Economical interface for up to two optional 40 GB¹ IDE HDDs
• SCSI expansion connector — Supports optional storage unit containing an Ultra320 RAID 1 SCSI controller and backplane support for two hot-swap HDDs

Service and Support Perfected for e-business
• IBM Director V4.1 and Remote Deployment Manager (RDM)
• ServerProven® compatibility testing and Web support
• Three-year, on-site⁵, limited warranty⁶

Key Prerequisites
• Monitor, keyboard, and mouse for setup
• Network switch module
• HDD
• Rack

Planned Availability Date
• November 2002, Systems and options
• January 2003, FC card and switch options

At a Glance
BladeCenter and BladeCenter HS20 blades revolutionize the economics of xSeries™ application server deployment while fulfilling the promise to deliver power, scalability, control, and serviceability.

BladeCenter
• High-density, 7 U high modular design
  - Holds up to 14 BladeCenter HS20 blades with up to 28 processors
  - Up to six BladeCenter enclosures per 42 U rack
• Hot-swap and redundant components — Minimizes single points of failure
• Two 1,200-watt power modules
• Supports redundant, hot-swap Ethernet and Fibre Channel (FC) switch modules
• Systems management module, IBM Director V4.1, and Remote Deployment Manager (RDM)
• 24x10x CD-ROM¹ and 1.44 MB diskette drives on hot-swap media tray, one USB port on front panel, and keyboard, video, and mouse (KVM) ports on the management module

BladeCenter HS20
• 2.0 or 2.4 GHz² Intel Xeon processors with MicroBurst architecture and hyperthreading technology
• High-speed 512 MB Double Data Rate (DDR) ECC SDRAM memory
• Dual Gigabit Ethernet controllers with failover support
• Support for FC or additional Ethernet connections
• Integrated management processor
• Integrated IDE controller and connectors for two IDE HDDs
Description

For detail, refer to the Related Options section in the Additional Information section.

BladeCenter and BladeCenter HS20 Description

High-Performance Blade-Server Subsystems: The BladeCenter HS20 blades are high-throughput, two-way, SMP-capable Xeon-based network blade servers, highly scalable by adding memory and a second processor. These flip-chip, pin grid array 2 (FC-PGA2) processors feature advanced transfer L2 caches that are integrated onto the processor core and run at the same clock speed as the processor core. The advanced transfer cache is a result of a “backside bus” that is 256 bits wide. It features a quad-wide cache line that can transfer four 64-bit cache line segments at one time to deliver full-speed capability. The cache is eight-way set associative.

Two Intel Xeon connectors are standard on the blade board to support installation of a second processor. High-speed, PC2100 DDR SDRAM is synchronized for up to 400 MHz processor-to-memory subsystem performance with current processors.

The BladeCenter HS20 uses the fourth-generation ServerWorks Grand Champion Low End (GCLE) SystemSet chipset that includes:

- Grand Champion Memory and I/O Controller (GMIC-LE)
- Champion South Bridge 5 (CSB5)
- Champion IO Bridge (CIOBX2)

The CMIC-LE controls two main functional units:

- The high-performance main memory subsystem — Maximizes throughput from processors to memory
- The Inter Module Bus (IMB) — Maximizes throughput from the processor bus to the I/O busses

The CSB5 provides PCI function and integrates the following key I/O functions:

- IDE controller and HDDs
- USB — Supports four USB ports
- Power management logic
- Systems management bus (SMBus) — Supports Phillips I2C two-wire protocol interface
- LPC interface for POST/Bios EEPROM

The CIOBX2 provide high-performance data flow between the IMB and two 64-bit PCI-X interfaces supporting 1.6 GB/s bandwidths for Dual Gigabit Ethernet controllers and optional SCSI expansion.

Standard BladeCenter HS20 Configurations

<table>
<thead>
<tr>
<th>Models</th>
<th>Processor</th>
<th>L2 Cache</th>
<th>Memory</th>
<th>Ethernet</th>
<th>HDD</th>
</tr>
</thead>
<tbody>
<tr>
<td>8678-21X</td>
<td>2.0 GHz Xeon</td>
<td>512 KB</td>
<td>512 MB ECC</td>
<td>Dual Gigabit</td>
<td>Open</td>
</tr>
<tr>
<td>8678-41X</td>
<td>2.4 GHz Xeon</td>
<td>512 KB</td>
<td>512 MB ECC</td>
<td>Dual Gigabit</td>
<td>Open</td>
</tr>
</tbody>
</table>

Additional Features

- BladeCenter HS20 system board containing four DIMM connectors supporting currently available 256 MB, 512 MB, or 1 GB DIMM options.
  - Supports up to 8 GB\(^2\) of system memory.
  - Memory is two-way interleaved (must be installed in matched pairs).
  - Memory sizes can be mixed.
  - Supports Chipkill function.

- Supports optional HS20 SCSI Storage Expansion Unit — 64-bit, Ultra320 SCSI PCI controller (LSI53C1020 Ultra320 SCSI controller) supporting high-speed (320 Mbps), Low-Voltage Differential SCSI (LVDS) RAID 1 internal storage solutions

- Dual-channel EIDE (ATA-100) controller — Supports economical EIDE data storage up to 80 GB (two 40 GB HDDs)

- Two full-duplex, Broadcom 5703 Gigabit Ethernet PCI controllers — High-speed network communications to LAN clients

The BladeCenter HS20 are designed for high throughput from processor, to memory, and bus I/O. These features combined with SMP capability and blade-thin density, make it an excellent choice for space-constrained environments used for:

- Web caching
- Collaboration
- Terminal Serving
- Dynamic Web serving
- Firewall
- Telecommunications
- Active directory services
- Scientific and technical computing
- Linux clustering

High-Availability and Serviceability Features: The BladeCenter and BladeCenter HS20 products deliver on reliability and serviceability.

BladeCenter

- Hot-swap blades — Enable easy access to each blade server

102-257 - 2-
• Two hot-swap 1,200-watt redundant power modules — Optional BladeCenter 1200W Power Supply Modules providing two additional power modules for robust configurations

• Two hot-swap, 325 CFM redundant blower assemblies and thermal monitors in critical locations

• Hot-swap module bays for support of optional Ethernet and FC switch modules — Minimizes point-of-failure for high levels of reliability and uptime

• Management module — Interfaces with each blade server and enables single systems management control

• Control panel with status LEDs — Provides visual indications of system well being

• Light Path Diagnostics and on-board diagnostics — Provides an LED map to a failed or failing component, helping reduce downtime, and service costs

BladeCenter HS20 Features

• ECC DIMMs combined with an integrated ECC memory controller correcting soft and hard single-bit memory errors, while minimizing disruption of service to LAN clients

• Chipkill memory — Designed to provide correction for up to four bits per DIMM — Helps keep your blade server up and running

• Memory hardware scrubbing, designed to correct soft memory errors automatically without software intervention

• ECC L2 cache processors — Help improve data reliability and reduce downtime

• CPU failure recovery in SMP configurations:
  - Forces failed processor offline
  - Automatically re-boots server
  - Generates alerts
  - Continues operations with the working processor

• PFA on SCSI HDD options, memory, and processors — Alerts the system administrator of an imminent component failure

• Dual Broadcom 5703 Gigabit Ethernet controllers support:
  - Failover — Adapter Fault Tolerance (AFT)
  - PXE 2.0 Boot Agent
  - Wake on LAN®
  - Load balancing, or teaming

• An integrated management processor supports diagnostic, reset, POST, and auto recovery functions and monitors temperature and voltage — Alerts generated when thresholds are exceeded (refer to the Limitations section for restrictions)

Expandability and Growth: The BladeCenter and BladeCenter HS20 products are designed for extremely high-density rack environments where space is at a premium or just doesn’t exist. Every component has been designed or selected to pack the highest levels of function into the smallest space, yet maintain high levels of reliability.

BladeCenter Features

• 7 U high, rack optimized design for 19-inch wide industry-standard rack cabinets — Supported in the NetBAY42 SR and ER, NetBAY25, and NetBAY11

• Keyboard/Video/Mouse (KVM) support for each blade through a single management module — Supports 14 blade servers from 1 console

• Support up to 14 blade servers containing up to:
  - 28 high-performance Xeon processors
  - 112 GB of memory
  - 28 Ethernet controllers
  - 1.12 Terabytes of disk storage
  - 14 ATI Rage XL controllers each with 8 MB of video memory

• Four network switch module bays support both Ethernet and FC connections

• Hot-swap media tray containing 24x-10x IDE CD-ROM and 1.44 MB diskette drive

Systems Management

IBM Director V4.1

The BladeCenter features IBM Director V4.1, a powerful, highly integrated, systems management software solution built on industry standards and designed for ease of use. Exploit your existing enterprise or workgroup management environments and use the Internet to securely access and manage physically dispersed IT assets more efficiently. It can help reduce costs through:

• Reduced downtime
• Increased productivity of IT personnel and end users
• Reduced service and support costs

IBM Director lets IT administrators view the hardware configuration of remote systems in detail and monitor the usage and performance of critical components such as processors, HDDs, and memory.

IBM Director includes IBM Director Agent, a portfolio of server tools, that integrates into the IBM Director interface and works with the Remote Supervisor Adapter or other system management monitoring functions contained in xSeries servers. Typical functions and monitoring capabilities can include:

• PFA-enabled critical hardware components
• Temperature
• Voltage
• Fan speed
• Light Path Diagnostics

This gives the IT administrator comprehensive, virtual on-site control of xSeries servers through the ability to remotely:

• Access the server regardless of its status
• Inventory and display detailed system and component information
• View server bootup during POST
• Browse and delete logs of events and errors
• Reset or power cycle the server

• Monitor and set thresholds on server health including:
  - Operating system load
  - POST time-out
  - Voltage
  - Temperature

• Set proactive alerts for critical server events including PFA on:
  - Processors
  - Memory
  - Fans
For more information about Director V4.1, refer to:
- BMC Patrol
- Windows environments:
  - Microsoft
  - HP OpenView
  - IBM Director Agent
  - Computer Associates CA Unicenter TNG
  - Tivoli Enterprise and Tivoli NetView®
  - IBM Director Agent provides integration into leading workgroup and enterprise systems management environments, via Upward Integration Modules. This enables the advanced management capabilities built into xSeries servers to be accessed from:
    - Tivoli® Enterprise and Tivoli NetView®
    - Computer Associates CA Unicenter TNG
    - HP OpenView
    - Microsoft™ SMS
    - BMC Patrol
    - NetIQ

For more information about Director V4.1, refer to Hardware Announcement 202-246, dated September 24, 2002.

**RDM for BladeCenter**

The BladeCenter enclosure features an updated RDM 3.1.01 that enables the configuration and deployment of BladeCenter HS20 blades within a single BladeCenter. This highly flexible and powerful tool enables you to deploy system images to one or more blade servers at one time with various operating systems and configurations from a console on the network.

RDM operates in the following operating system environments:
- Windows® 2000
- Windows 2000 Advanced Server

RDM lets you:
- Customize scripting ability to add additional instructions for loading firmware or specific operating systems
- Deploy multiple blade servers in a BladeCenter at one time
- Store various images on the RDM server for target server installations
- Power restore technology for instant restoration of initial or incremental disk image locally with a keystroke
- Enjoy the ease-of-use user interface for drop and drag capability to deploy images

**BladeCenter Management Module**

The management module standard in the BladeCenter enables you to manage the BladeCenter and obtain vital system information of the installed BladeCenter HS20 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:
- Temperature
- Voltages
- Power supply status
- Memory status
- Fan status
- HDD status
- Error and status log

The management module allows you to receive status and control all blade servers within the BladeCenter. You can shutdown 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. This creates an easy and familiar way for administrators to monitor, control, and maintain highly-available BladeCenter installations.

**Product Positioning**

The BladeCenter and BladeCenter HS20 offerings are positioned as the highest density servers of the xSeries line. They are a new approach to the deployment of application servers where two-way, SMP-capable Xeon processing, high-availability design, and systems management and easy setup features are condensed into an extremely dense package.

The BladeCenter takes just 7 U of rack space. It is capable of containing up to 14 blade servers and providing the necessary I/O network switching, power, cooling, and control panel information to support these individual servers. When compared to the 1 U high servers, the BladeCenter can support twice the number of processing power in the same rack space.

In addition to initial cost savings, the BladeCenter and BladeCenter HS20 blades require less space and power resources due to 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:
- Citrix
- Lotus Notes®
- Microsoft Exchange
- WebSphere®
- Linux clusters

These innovative products enhance the xSeries line and are not intended to replace any current offerings.

**Reference Information**

1. Actual playback speed will vary and is often less than the maximum possible.
2. GHz and MHz denote the internal and/or external clock speed of the microprocessor only, not application performance. Many factors affect application performance. When and if 2 GB DIMMs become available.
3. When referring to hard drive or tape backup capacity, GB stands for one billion bytes. Total user capacity may vary depending on operating environments.
4. With respect to on-site service, IBM sends a technician after attempting to diagnose and resolve the problem remotely.

Alternatively, this information is also available by contacting your IBM representative or reseller. Copies are available upon request.

Requires 2 GB memory DIMM if and when they become available.

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The switch module contains an Ethernet connection to the management module, used for:

- Initialization
- Configuration
- Monitoring of switches

In addition, an I2C interface between the switch and the management module collects status and other system management information from the switch modules.

BladeCenter Two-Port Fibre Channel Switch Module (48P7062) is similar to the Ethernet switch, but contains two FC connections capable of supporting up to 2 Gb/s transmissions. This switch option is required when an HS20 Fibre Channel Expansion Card is installed in one or more BladeCenter HS20 servers.

Each HS20 Fibre Channel Expansion Card contains two FC connections supported through installation of either one or two FC switch modules. Installation of two BladeCenter two-port Fibre Channel Switch Module options provides failover redundancy. The FC switches are installed in the BladeCenter network switch module bays three and four due to the routing of signals from the FC card interface to the switch module bays.

The FC switch contains two small form factor pluggable (SFP) receptacles that support optionally available long- or short-wave SFP modules and appropriate FC cabling. A BladeCenter SAN Utility is provided for switch management.

HS20 Fibre Channel Expansion Card (48P7061) contains a single FC controller supporting two independent ports each capable of up to two Gbs transmissions. Installing this option requires installation of one or two BladeCenter two-port Fibre Channel Switch Module options.

HS20 SCSI Storage Expansion Unit (48P7058) contains the following:

- CIOB-X2 chipset — I/O control through the IMB connector to the blade-server memory controller
- LSI 53C1020 SCSI controller — Supports Ultra320 or Ultra160 HDDs and integrated RAID 1 function
- SCSI accessed fault-tolerant enclosure (SAF-TE) interface — Industry standard for monitoring the SCSI subsystem
- Power interface
- SCSI bus with two SCA-2 connectors — Support two 3.5-inch, slim-high, hot-swap LVDS HDDs

The storage expansion option is attached directly to the BladeCenter HS20 IMB connector blade forming a two-bay-wide blade server. The expansion option obtains power from the ePlane connector. SCSI signals are routed through the CIOB-X2 to the IMB connector of the blade server, while system management signals are directed through the I2C bus to the management processor.
HS20 40 GB 5400-rpm ATA-100 HDD (48P7063) is a high-density, 2.5-inch, slim-high EIDE HDD. This 5,400-rpm, ATA-100 HDD is installed directly onto one of the two BladeCenter HS20 blade IDE connectors to support internal data storage solutions of up to 80 GB.

BladeCenter Acoustic Attenuation Module (49P2694) is a sound reduction option that is installed on the rear housing of the BladeCenter. This option is designed to minimize sound emissions for noise sensitive environments.

Product Customization Services

IBM can preconfigure your BladeCenter enclosure at the factory through our Product Customization Services program. By selecting one or more of these services, your BladeCenter enclosure can arrive preconfigured with hardware, software, or pre-installed in an IBM rack cabinet.

Product Customization Services are a range of flexible offerings providing pre-delivery work performed by skilled IBM configuration experts at our ISO-9001 certified factories. Key IBM services include:

- Asset Tagging
- Hardware Integration
- Software Imaging
- Product Distribution

By ordering your BladeCenter preconfigured, you can cost-effectively deploy new systems configured with consistency and high quality throughout your enterprise, whether it be in one location or worldwide.

For more information on these services, including ordering information and charges, refer to Services Announcement 602-023, dated September 24, 2002.

Publications

The following publications and CD-ROMs are shipped with the BladeCenter:

- Installation Guides and Documentation CD-ROMs containing an introduction to the computer, installation and setup, installing options, reference information, and problem determination. The installation guides have easy-to-use text and pictorials to enable users to quickly set up these products.
- Director V4.1 software on CD-ROM is included to support systems management and control of BladeCenter and BladeCenter HS20 products.

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

The BladeCenter and BladeCenter HS20 Installation Guides and Hardware Maintenance Manuals (HMM), in U.S. English versions, are available from our Web site:

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

Technical Information

### Physical Specifications

#### BladeCenter

| 8677-1XX |
|------------------|------------------|
| Blade bays (type) | High availability ePlanes |
| Blades standard | 0 |
| Blades maximum | 14 |
| Video | none |
| PCI slots | 0 |
| Switch module bays | 4 |
| Ethernet switches | Optional |
| FC switches | Optional |
| Management module bays | 2 |
| Standard | 1 |
| CD-ROM (IDE) | 24x-10x |
| Diskette drive | 1.44 MB |
| Power supply modules | 1200 W |
| Number standard | 2 |
| Maximum | 4 |
| Hot-swap | Yes |
| Redundant power | Standard⁸ |
| Auto restart | Yes |
| Cooling | 2 blowers |
| Redundant | Yes |
| Hot-swap | Yes |

#### BladeCenter HS20

<table>
<thead>
<tr>
<th>8678-21X</th>
<th>8678-41X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Xeon</td>
</tr>
<tr>
<td>Int. speed</td>
<td>2.0 GHz</td>
</tr>
<tr>
<td>Ext. speed</td>
<td>400 MHz (QP)</td>
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<td>Number standard</td>
<td>1</td>
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<td>Maximum</td>
<td>2</td>
</tr>
<tr>
<td>L2 cache (full speed)</td>
<td>512 KB</td>
</tr>
<tr>
<td>Memory (PC2100 DDR)</td>
<td>512 MB ECC</td>
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<tr>
<td>DIMMs</td>
<td>2x256 MB</td>
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<tr>
<td>DIMM sockets</td>
<td>4</td>
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<tr>
<td>Capacity</td>
<td>8 GB⁸</td>
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<tr>
<td>Video</td>
<td>SVGA</td>
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<tr>
<td>Memory</td>
<td>8 MB</td>
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<td>IDE controller</td>
<td>ATA-100</td>
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<td>Channels</td>
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<td>HDD</td>
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<td>Connectors</td>
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<td>PCI Slots</td>
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<td>Management proc.</td>
<td>Standard</td>
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<td>Ethernet controller</td>
<td>Dual Gigabit</td>
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<tr>
<td>FC card</td>
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<tr>
<td>Storage expansion</td>
<td>Optional</td>
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<tr>
<td>SCSI interface</td>
<td>Ultra320</td>
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<td>HDD support</td>
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<tr>
<td>Internal capacity</td>
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<td>CD-ROM (IDE)</td>
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<tr>
<td>Diskette drive</td>
<td>0</td>
</tr>
<tr>
<td>Power supply</td>
<td>0</td>
</tr>
</tbody>
</table>

⁸ To support power and redundancy, populating blade bays 7 through 14 requires the installation of the BladeCenter 1200 W Power Supply Modules.

¹⁰ Capacities are based on installation of two 40 GB IDE HDDs. For the latest information on supported HDD options, visit: http://www.ibm.com/pc/us/compat
24x-10x CD-ROM Drive Characteristics

- Formatted Capacity: 650 MB
- Average Access Time: 110 ms
- Burst data transfer rate — 16.6 MB/s (ATA PIO Mode 4)
- Technology: Full Constant Angular Velocity (CAV)
- Buffer size: 1 MB

11 24x-10x CD-ROM variable read rate. Actual playback speed will vary and is often less than the maximum possible.

40 GB 5400 rpm ATA-100 HDD

- Formatted capacity: 40 GB
- Rotational speed: 5400 rpm
- Average latency: 5.6 ms
- Typical average read seek time: 12 ms
- Data buffer (adaptive segmented): 8 MB

12 Actual performance varies based on many factors and is often less than the maximum possible.

13 Up to 192 KB reserved for drive firmware.

Video Subsystem

- ATI RageXL Graphics/Video Accelerator
- Integrated on the blade
- 8 MB SDRAM standard/maximum video memory

Supported BladeCenter HS20 Video Resolutions

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Maximum Refresh Rate</th>
<th>CRT Support</th>
<th>CRT ISO 9241.3 Support</th>
<th>Panel Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>640 x 480</td>
<td>85 Hz</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>800 x 600</td>
<td>85 Hz</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>1024 x 768</td>
<td>75 Hz</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>1280 x 1024</td>
<td>40 Hz</td>
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<td>No</td>
<td>Yes</td>
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<tr>
<td>1600 x 1200</td>
<td>28 Hz</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

Dimensions — BladeCenter

- 7 U Rack Drawer:
  - Width: 444.0 mm (17.5 in)
  - Depth: 711.2 mm (28.0 in)
  - Height: 304.2 mm (12.0 in)
  - Weight:
    - Minimum configuration: 209.0 kg (95.0 lb)
    - Maximum configuration: 517.0 kg (235 lb)

Electrical — BladeCenter

- 200-240 (nominal) V ac; 50 Hz or 60 Hz; 8 A (per power module)
- Input kilovolt-amperes (kVA) (approximately):
  - Minimum configuration: 0.40 kVA (two power supplies)
  - Maximum configuration: 2.82 kVA (four power supplies)

Btu output:
- Ship configuration — 1365 Btu/hr (400 watts)
- Full configuration — 9622 Btu/hr (2820 watts)

Acoustical noise emissions for a single BladeCenter configured with 14 BladeCenter HS20 servers:
- 7.4 bels (operating)
- 7.4 bels (idling)

Acoustical noise emissions for a single BladeCenter with a BladeCenter Acoustic Attenuation Module option installed and configured with 14 BladeCenter HS20 servers:
- 6.9 bels (operating)
- 6.9 bels (idling)

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

BladeCenter is intended for use as rack-drawer and is tested and designed to operate in a horizontal position.

Standards: These systems support or comply with the following standards:

- Multi Processor Specification (MPS) 1.4.
- Hardware-enabled to meet the International Organization for Standardization (ISO) 9241, Part 3.
- The primary and secondary PCI-X buss interfaces when in PCI mode comply with PCI Specification 2.2.

Equipment Approvals and Safety

- FCC — Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 3, Class A
- UL 1950
- CSA C22.2 No. 950
- NOM-019

14 This server is certified by the respective UL and NOM agencies.

Operating Environment

- Temperature:
  - 10 to 35°C (50 to 95°F) at 0 to 914 m (0 to 3,000 ft)
  - 10 to 32°C (50 to 90°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)

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 you should 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 HS20:

- Microsoft® — Windows® 2000 Advanced Server (requires SP 3) Windows 2000 Server (requires SP 3)
- Linux — Red Hat 7.3, SuSE 8.0

**Note:** Additional support, certification, and version information on network operating systems can be accessed at:


**Compatibility:** The BladeCenter HS20 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 BladeCenter HS20 and to maintain compatibility with many current software programs.

To view detailed information on the Internet about IBM and non-IBM devices, adapters, software, and network operating systems supported with xSeries™ Servers, enter:


Contact your IBM representative, IBM Business Partner, or refer to the IBM Sales Manual for information on the compatibility of hardware and software for xSeries servers. The Sales Manual is updated periodically as new features and options are announced that support these servers.

**Limitations**

- The BladeCenter HS20 blades contain four DIMM sockets. A maximum of 8 GB of system memory is supported by adding a 2 GB PC2100 CL2.5 ECC DDR SDRAM DIMM® in each of the 4 DIMM sockets. All supported system memory is addressable through direct memory access (DMA). The BladeCenter HS20 supports currently available 256 MB, 512 MB, and 1 GB DIMM options. Supported DIMMs can co-exist in the same server; however, memory DIMMs of the same capacity must be installed in matched pairs. Refer to the Planning Information section or the xSeries server Web page memory options.
- Microprocessor SMP upgrades must be of the same type and clock speed on each BladeCenter HS20. Mixing microprocessors of different speeds or cache size, or upgrading the base processor is not supported.
- The second IDE connector supporting an IDE HDD cannot be used when an HS20 Fibre Channel Expansion Card is installed due to mechanical reasons.
- Thirteen blade fillers are included with each BladeCenter to maintain proper cooling. These fillers must be left installed in blade bays not occupied by an BladeCenter HS20. They should also be retained for re-installation in the event a BladeCenter HS20 is removed for service, or is no longer required.
- Module and power supply fillers must remain installed in the module bays and power supply bays unoccupied by modules or power supplies. Power supply and blower modules must be replaced immediately to avoid over-temperature conditions.
- Operation of the USB ports controlling the KVM functionality and operation of the CD-ROM/diskette drives to each blade server cannot be run concurrently.

15 When and if 2 GB DIMMs become available.

Refer to the **Software Requirements** section for operating system limitations.

**Planning Information**

**Customer Responsibilities**

BladeCenter, BladeCenter HS20, and Related Options: These products are designated as customer setup. Customer setup instructions are shipped with the products.

**Configuration Information**

**BladeCenter Configuration**

The BladeCenter contains 14 blade server bays supporting up to 14 hot-swap BladeCenter HS20 blades. A control panel is located on the top left of the unit contain the following LEDs:

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

Two bays at the top to the right of the control panel contain the standard CD-ROM and 1.44 MB diskette drives.

The rear housing contains:

- Two hot-swap, redundant blower assemblies in the center, mounted one on top of the other
- Two standard power supply modules and module bays for two optional power supply modules on each side of the blower assembly
- One standard management module with an open interface
- Four hot-swap module bays on the left rear chassis, stacked in pairs, support the following installations:
  - One or two BladeCenter 4-port Gb Ethernet Switch Modules — Two provide redundancy
  - One or two BladeCenter 4-port Gb Ethernet Switch Modules and one or two BladeCenter 2-port Fibre Channel Switch Modules

**Memory Support**

The following memory options are supported with BladeCenter HS20:

- 256 MB PC2100 CL2.5 ECC DDR SDRAM DIMM (33L5037)
- 512 MB PC2100 CL2.5 ECC DDR SDRAM DIMM (33L5038)
- 1 GB PC2100 CL2.5 ECC DDR SDRAM DIMM (33L5039)
Rack Installations

BladeCenter 7 U, rack-drawer enclosure is designed to be installed in a 19-inch rack cabinet designed for 28-inch deep devices, such as the NetBAY42 ER, NetBAY42 SR, NetBAY25 SR, or NetBAY11.

If using a non-IBM rack, the cabinet must meet the EIA-310-D standards with a depth of at least 28 inches. Also, adequate space must be maintained for proper air flow and operation:

• Approximately two inches for the front bezel must be maintained from the rail assembly to the front door of the rack cabinet.
• Approximately three inches of space should be left between the rear of the BladeCenter and the rear door.
• If the optional BladeCenter Acoustic Attenuation Module is installed, approximately eight inches of space should be left from the BladeCenter to the rear door.

Power Considerations

BladeCenter enclosure contains two 1,200-watt 220 V ac power modules. These modules must be attached to a supported 220 V ac PDU. These standard power modules support blade bays 1-6 with power redundancy. When adding additional blade servers in bays 7-14, a BladeCenter 1200W Power Supply Module must be installed. This option provides both power and redundancy to these blade bays.

Cable Orders:

Each BladeCenter HS20 contains two Gigabit Ethernet controllers. An optional BladeCenter 4-port Gb Ethernet Switch Module must be installed in the BladeCenter to support Ethernet connections. This Ethernet switch contains four ports with RJ-45 connectors. The RJ-45 connectors provides a 10/100/1000 Base-T interface (either at half- or full-duplex) for connecting twisted-pair cable to the Ethernet network. Cabling is not included with the server. To connect the Ethernet controller to a repeater or switch, use an unshielded twisted pair (UTP) cable with RJ-45 connectors at both ends. For 100 Mbps or higher operation, Category 5 cabling must be used. For 10 Mbps operation, Category 3, or better, cabling must be used.

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

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

Installability: The BladeCenter requires approximately 20 minutes for installation. Each BladeCenter HS20 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

- System Unit Carton
  - BladeCenter Unit: 1
  - Publications/CD Package: 1
  - Rack kit: 1
  - Rails
  - 9-foot 220 V intra-rack cables: 2

Related Options

Processor Upgrades

- Xeon processor
- Heat sink
- Installation publications/warranty

BladeCenter 1200W Power Supply Modules

- Two 1,200-watt power modules
- Two intra-rack 9-foot cables
- Installation publications/warranty
- Safety flyer

BladeCenter 4-port Gb Ethernet Switch Module

- Ethernet switch module
- Installation publications/warranty

BladeCenter 2-port Fibre Channel Switch Module

- FC switch module
- Diagnostic wrap plug
- BladeCenter SAN Utility CD-ROM
- Installation publications/warranty

HS20 Fibre Channel Expansion Card

- FC card
- Device Driver Install Utility CD-ROM
- Installation publications/warranty

HS20 SCSI Storage Expansion Unit

- Card assembly
- HDD base hardware
- Installation publications/warranty

BladeCenter Acoustic Attenuation Module

- Acoustic muffler assembly
- Installation hardware
- Installation publications/warranty

Supplies: None

Security, Auditability, and Control

Security and auditability features include:

- A power-on password function provides control of who has access to the data and server setup program on the server.
• A 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 disk drive.

• A selectable boot sequence can be used to prevent unauthorized installation of software or removal of data from the diskette drive.

**Limitations:** The BladeCenter HS20 has no security intrusion detection; therefore, it should be installed in a rack environment that provides security through lockable doors or other security measures. It is a customer’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.

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**Terms and Conditions**

This product is available for purchase under the terms of the IBM Customer Agreement.

IBM hardware products are manufactured from new parts. In some cases, the hardware product may have been previously installed.

Regardless, IBM warranty terms apply.

**IBM Credit Corporation Financing:** Yes

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or call IBM. In the United States or Canada, call 800-IBM-SERV (426-7378).

**Warranty Period**

- System hardware — Three years on parts and labor
- Optional features — Three years

**Warranty Service:** System hardware: IBM On-Site Repair (IOR), 9 hours a day, Monday through Friday excluding holidays, next-business-day response.

Optional features:

- Customer Carry-in Exchange/Repair (CCE/CCR).
- Optional IBM features initially installed with an xSeries server carry the same warranty as the system. If installed after the initial system installation, they carry the balance of the system warranty or the optional feature warranty, whichever is greater.

Call 800-IBM-SERV (426-7378) in the U.S. to assist with problem isolation for hardware to determine if warranty service or parts exchange is required. Some parts of the system, such as the keyboard, mouse, and memory, are considered customer replaceable units.

**International Warranty Service (IWS):** IWS is available during the warranty period to customers who travel or relocate to countries where their computer is sold and serviced by IBM or IBM resellers authorized to perform warranty service. Eligible IBM computers are identified by their four-digit machine type.

You can obtain IWS through the method of service, such as depot, carry-in, or on-site, provided in the servicing country. Service methods and procedures vary by country, and some service or parts may not be available in all countries. Service centers in certain countries may not be able to service all models of a particular machine type. In addition, some countries may have fees and restrictions that apply at the time of service.

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

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

Click on the Warranty Lookup tab.

For more information on IWS, refer to Services Announcement 601-034, dated September 25, 2001.

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

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**Maintenance Services**

**ServiceElect and ServiceSuite™:** ServiceElect and ServiceSuite provide hardware warranty service upgrades, maintenance, and selected annuity support services in one agreement.

**Warranty Service Upgrade:** During the warranty period, warranty service upgrade provides an enhanced level of service for an additional charge. Parts are covered for three years by the original warranty.

The following warranty service upgrade options are available.

- IOR, 9 hours a day, Monday through Friday excluding holidays, 4-hour average response
- IOR, 24 hours a day, 7 days a week, 4-hour average response
- IOR, 24 hours a day, 7 days a week, 2-hour average response

**Maintenance Service**

- IOR, 9 hours a day, Monday through Friday excluding holidays, next-business-day response
- IOR, 9 hours a day, Monday through Friday excluding holidays, 4-hour average response
- IOR, 24 hours a day, 7 days a week, 4-hour average response
- IOR, 24 hours a day, 7 days a week, 2-hour average response

**Maintenance Service (ICA)**

Maintenance services are available for ICA legacy contracts. The preferred go-to-market offerings are ServiceElect. However, ICA legacy contracts will still be available for current customers until they are withdrawn.

**Alternative Service (Warranty Service Upgrades):** During the warranty period, warranty service upgrade provides an enhanced level of service for an additional charge. This enhanced level of service includes a higher level of on-site service labor during the original warranty period.

The following warranty service upgrade option is available.

IOR, 24 hours a day, 7 days a week, 4-hour average response
Maintenance Service

- IOR, 9 hours a day, Monday through Friday excluding holidays, next-business-day response
- IOR, 24 hours a day, 7 days a week, 4-hour average response

Mid-Range System Option: These products are eligible machines for the Mid-Range System Option of the ICA.

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<tr>
<th>Eligible Type</th>
<th>Discount</th>
<th>Three-Year</th>
<th>Five-Year</th>
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<tbody>
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<td>17%</td>
<td>22%</td>
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</tr>
<tr>
<td>8678</td>
<td>17%</td>
<td>22%</td>
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</table>

Corporate Service Option: The announced product is eligible for the Corporate Service Option of the ICA.

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<tr>
<th>Discount</th>
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<td>System</td>
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</table>

Extended Maintenance Option: No

Central Facility Maintenance Service (CFMS) Option: No

Non-IBM Parts Support

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

Warranty Service Upgrades and Maintenance Services: Under certain conditions, IBM Integrated Technology Services repairs selected non-IBM parts at no additional charge for IBM machines that are covered under a warranty service upgrade or maintenance services.

IBM Service provides hardware problem determination on non-IBM parts (adapter cards, PCMCIA cards, disk drives, memory, and so forth) installed within IBM systems covered under warranty service upgrade or maintenance services and provide the labor to replace the failing parts at no additional charge. If IBM has Technical Service Agreements with the manufacturers of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing parts at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or maintenance services.

IBM Hourly Service Rate Classification: One

ServicePac® Offerings

Warranty and Maintenance Options: The announced products may be eligible for ServicePacs for Warranty and Maintenance Options, convenient prepackaged offerings for warranty service upgrades and maintenance services.

Installation Services: The announced products may be eligible for ServicePacs for Installation Services, convenient prepackaged offerings for installation services. Refer to the Prices section for information on the availability of ServicePac offerings.

For additional ServicePac information, visit:

Rental Offering: No

Field-Installable Features: Yes

Model Conversions: No

Customer Setup: Yes

Graduated Charges: No

Educational Allowance

Prices

<table>
<thead>
<tr>
<th>Description</th>
<th>Machine Type/ Model</th>
<th>Part Number</th>
<th>IBM List Price¹⁶</th>
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<td>BladeCenter</td>
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<td>BladeCenter</td>
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<td>867841X</td>
<td>2,279</td>
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<td>2.4 GHz/512 KB, 512 MB</td>
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<tr>
<td>Processor Upgrade with 2.4 GHz 400 MHz 512 KB L2 Cache Xeon Processor</td>
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<tr>
<td>HS20 SCSI Storage Expansion Module</td>
<td>48P7058</td>
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<td>HS20 Fibre Channel Expansion Card</td>
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<td>HS20 40 GB 5400-rpm ATA-100 HDD</td>
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<td>BladeCenter 1200W Power Supply Modules</td>
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<td>BladeCenter 4-port Gb Ethernet Switch Module</td>
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<td>BladeCenter Acoustic Attenuation Module</td>
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<td>199</td>
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</table>

¹⁶ IBM List Price does not include tax or shipping and is subject to change without notice. Reseller prices may vary.

¹⁷ Estimated Retail Price

To order direct, call IBM at 877-999-7115 and select option 4.

For the name of the nearest IBM representative or Business Partner, call 800-IBM-4YOU (426-4968).
### ServicePac for Warranty Service Upgrade and Maintenance Charges

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<th>Description</th>
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**Machine Type/Model: 8678**

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### Maintenance Service (Legacy) (IOR) Charges

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<tr>
<th>Description</th>
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<td><strong>Alternative Service (Warranty Service Upgrades)</strong></td>
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<tr>
<td>Machine Type/Model</td>
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### Maintenance Service

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For ServiceElect (ESA) Maintenance Service Charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

**Customer Financing:** IBM Global Financing offers attractive financing to credit-qualified commercial and government customers and Business Partners to assist them in acquiring IT solutions. Offerings, rates, terms, and availability can vary by country. Contact your local IBM Global Financing organization or visit the Web at: [http://www.ibm.com/financing](http://www.ibm.com/financing)

Use the select a country menu, to find a contact in your location or country.

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