

## IBM @server pSeries 660 Model 6H1



IBM @server pSeries 660 Model 6H1 mounted in a 7014-T00 rack

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### Highlights

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- **Outstanding price/performance, scalability and packaging flexibility in a powerful SMP rack-mounted server**
- **World-class reliability, availability, serviceability features for critical e-business applications**
- **Rugged, NEBS Level 3 design ideal for telecommunications and Web farms**

### Expandable technology for high performance

The IBM @server pSeries 660 Model 6H1 is a rugged, high-performance rack-mounted UNIX® server with superior availability and expandability for growing e-business applications. It is part of the IBM @server brand – a new generation of servers featuring unmatched availability and scalability, broad support of open standards for development of portable new applications, and IBM @server Advantage™ offerings for managing the unprecedented demands of e-business.

The pSeries 660 Model 6H1 can run many Web-enabled e-business enterprise applications – including Enterprise Resource Planning (ERP), Supply Chain Management (SCM) and Customer Relationship Management (CRM) – to effectively integrate suppliers, business partners and customers for improved efficiency and customer service. And the Model 6H1 offers better price/performance with at least 50 percent greater performance than earlier IBM UNIX servers.

The combination of high performance, compliance with carrier-grade standards such as NEBS (Network Equipment Building System) Level 3, and ample peripheral attachment capability make the Model 6H1 particularly suitable for the complex demands of telecommunications providers or other companies, such as Internet Service Providers (ISPs) or Application Service Providers (ASPs).

The Model 6H1 offers large memory capacity and up to six advanced 64-bit RS64 IV microprocessors running at up to 668 MHz for new levels of performance and price/performance. For applications with less demanding performance requirements, the Model 6H1 also offers one-, two- and four-way 64-bit RS64 III microprocessors running at 450 MHz. The processors utilize innovative copper and silicon-on-insulator (SOI) technology.<sup>1</sup> The result is high performance with less power consumption and lower heat generation for higher levels of reliability and system availability.

The base 256MB of main memory can be expanded to 32GB for enhanced performance and exploitation of 64-bit addressing used in large database and enterprise applications. The entry-level, one-way system has either a 450 MHz or 600 MHz microprocessor with 2MB of Level 2 (L2) cache—a special memory subsystem in which frequently used data values are duplicated for quick access. Larger configurations with two-, four- or six-way processors at up to 668 MHz and up to 8MB of L2 cache per processor are available for even greater performance.

### **Designed for flexibility**

The rack-drawer design of the Model 6H1 provides ease of growth in processor as well as I/O and memory capacity. It includes a standard rack-mounted processor drawer and an I/O drawer with 14 hot-plug PCI slots for configuration flexibility. Up to two I/O drawers may be installed for a total of 28 PCI slots. Integrated 10/100 Mbps Ethernet, SCSI-2 F/W and Ultra2 SCSI controllers are standard in each I/O drawer, leaving all slots available for additional use.

In its maximum configuration, the Model 6H1 features one processor drawer with six 668 MHz processors and two I/O drawers for a total of 15 EIA units (U) of rack space. Depending on the number of attached I/O drawers, up to three pSeries 660 systems can be installed in an IBM 7014 T00 (36U) or T42 (42U) rack. As a result, customers benefit from significant power and capacity while saving valuable floor space.

The Model 6H1 is designed to meet the critical requirements of e-business for medium- and large-size organizations. With powerful processors, memory and data storage capacity and expandability, it is an excellent application server for ERP systems. Along with NEBS Level 3 standards compliance, the Model 6H1 offers other features that are of special value to telecommunications service providers, including redundant power supplies and -48v DC.

Also, the Model 6H1 fully supports accepted open industry standards that are critical for e-business. Used as either a standalone, multiuser application or database server, the Model 6H1 is designed to participate in most installed UNIX and PC networks, thus helping to leverage existing applications.

### **Clustering**

Clustering allows the interconnection of multiple computers into a single computing resource for improved availability, scalability, manageability and performance. Up to 32 Model 6H1 servers can participate in an AIX® cluster of pSeries and RS/6000® servers under the control of specialized IBM clustering software (Parallel System Support Programs—PSSP). An AIX cluster utilizing Model 6H1 servers is an excellent choice for an environment needing horizontal growth—that is, replication of the same application across multiple servers as business needs grow. It is also ideal for server consolidation where diverse workloads are consolidated and managed from a single point-of-control. And for optimal cluster performance, the Model 6H1 may be optionally switch-attached to an RS/6000 SP.<sup>TM</sup>

<b>Feature</b>	<b>Benefits</b>
<b>Copper-based SMP processors</b>	<ul style="list-style-type: none"> <li>• Provide significant performance increases over non-copper technologies</li> <li>• Offer improved reliability over processors without copper</li> </ul>
<b>SOI technology (600 MHz/668 MHz only)</b>	<ul style="list-style-type: none"> <li>• Results in less power dissipated for cost savings and improved reliability</li> </ul>
<b>High system memory capacity (32GB)</b>	<ul style="list-style-type: none"> <li>• Enables complex e-business applications to execute quickly and efficiently</li> </ul>
<b>Chipkill Memory</b>	<ul style="list-style-type: none"> <li>• Significantly lowers number of memory failures that cause system outages, thus increasing system availability</li> <li>• Minimizes the potential for loss of business data</li> </ul>
<b>Rack-drawer configuration</b>	<ul style="list-style-type: none"> <li>• Allows for efficient utilization of floor space</li> <li>• Provides ease of growth in processor, I/O and storage capacity</li> </ul>
<b>Up to 28 hot-plug PCI slots</b>	<ul style="list-style-type: none"> <li>• Dramatically improve availability and provide uninterrupted growth in new adapters</li> <li>• Provide increased connectivity for e-business applications</li> </ul>
<b>Built-in service processor</b>	<ul style="list-style-type: none"> <li>• Automatically monitors system operations and takes preventive or corrective action</li> <li>• Allows diagnostics and maintenance to be performed remotely</li> </ul>
<b>Hot-plug redundant power supplies and cooling fans</b>	<ul style="list-style-type: none"> <li>• Allow uninterrupted operation if a power supply or fan becomes disabled</li> </ul>
<b>Dynamic Processor Deallocation</b>	<ul style="list-style-type: none"> <li>• Automatically reassigns workload when processor failure is detected so that applications continue to run uninterrupted</li> </ul>
<b>AIX clustering</b>	<ul style="list-style-type: none"> <li>• Provides centralized management of multiple systems</li> <li>• Provides ability to handle unexpected workload peaks by sharing resources</li> <li>• Allows for more granular growth so user demands can be readily satisfied</li> </ul>
<b>AIX operating system</b>	<ul style="list-style-type: none"> <li>• Supports full interoperability and coexistence between 32- and 64-bit applications with processes that may run concurrently or cooperatively</li> <li>• UNIX 98-compliant and first to achieve UNIX 98 Server registration</li> <li>• Provides an AIX binary compatible environment that helps assure continuing application availability across AIX releases when binary compatibility rules are observed</li> </ul>

### **High availability, all day, every day**

To help ensure that strategic applications remain available 24x7, the Model 6H1 features an integrated service processor—a computer within a computer—that constantly monitors the system's vital signs. In the event of a malfunction, the service processor is capable of “calling home” by automatically dialing out to an IBM service center, often before any problem is apparent to users or system administrators. In this fashion, the service technician may be able to correct the problem and restore system function remotely.

To maximize system availability, the Model 6H1 server has built-in fault and error correction functions. For the main memory, Chipkill™ Memory technology—developed by IBM for the S/390® enterprise server—detects multiple bit errors and corrects most of them transparently. If the error rate exceeds the critical threshold, a maintenance action is initiated automatically by the system to be resolved at the customer's convenience. IBM studies indicate that systems without Chipkill are 100 times more likely to experience an outage due to memory failure.<sup>2</sup>

In addition, the Model 6H1 uses ECC (error checking and correcting) memory technology to enhance reliability and error correction of L1 data cache and L2 cache memory as well as main memory. This approach has significant advantages over the industry-standard parity memory technology. ECC technology can detect single and double errors and correct all single bit errors. Parity memory can only detect, but not correct, single bit errors. Thus, double bit errors may be missed altogether, which can lead to a complete system shutdown. The use of these advanced memory technologies, Chipkill and ECC, on the Model 6H1 protects the server from memory failures that can cause costly, unscheduled downtime.

Another IBM-unique availability feature of the Model 6H1 is Dynamic Processor Deallocation. In the unlikely event that a processor indicates an impending failure, this feature works with the AIX operating system and service processor to dynamically take the processor offline. Its workload is reassigned automatically to other processors, and replacement can be scheduled during normal service to minimize system and application downtime.

Additional reliability and availability features include redundant hot-plug cooling fans and power supplies, which may be replaced without affecting system operations. Also available is a temperature monitoring capability that increases the fan speed in response to above-normal temperatures.

For near continuous availability, two Model 6H1 servers can be clustered in a single rack with High Availability Cluster Multiprocessing (HACMP) software from IBM, the leading UNIX-based disaster recovery clustering solution.<sup>3</sup> Combined with applications that meet IBM ClusterProven™ standards, this solution provides a superior base for high availability, an essential ingredient of e-commerce.

### **Advanced UNIX operating system**

An unlimited user license of AIX—the high-performance UNIX operating system from IBM—is included in the base price of the Model 6H1. Providing real value in reliability, availability and security, AIX is tuned for e-business application performance and is widely recognized as state of the art in systems and network management.

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## pSeries 660 Model 6H1 at a glance

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### Processor 5U rack drawer

Microprocessor:	1-way 450 MHz RS64 III or 1-way 600 MHz RS64 IV
Level 1 (L1) cache:	128KB data (ECC)/128KB instruction
Level 2 (L2) cache:	2MB (ECC)
RAM (memory):	256MB (ECC)
Memory bandwidth:	2.4GB per second
System bus:	Two busses, each 128 bits wide

### I/O 5U rack drawer

I/O slots:	14 hot-plug PCI slots
I/O bus width:	10 64-bit, 4 32-bit
I/O bus speed:	10@66 MHz(3.3v)/4@33 MHz(5v)
I/O bandwidth:	1GB per second—aggregate peak
Storage options:	Boot capability from externally attached disk drawers, or optionally, two internal boot disks that require two I/O slots

### Standard features

Integrated ports:	Keyboard, mouse, four serial, one parallel
Integrated bays:	Diskette drive, CD-ROM, one additional media bay
Integrated controllers:	SCSI-2 F/W (internal), Ultra2 SCSI (external), 10/100 Mbps Ethernet

### System expansion

Processor:	2- or 4-way (450 MHz) RS64 III SMP; 2- or 4-way (600 MHz) or 6-way (668 MHz) RS64 IV SMP
Level 2 (L2) cache:	4MB/processor (2- or 4-way) or 8MB/processor (6-way)
RAM:	Up to 32GB (Chipkill)
I/O:	Second 5U rack drawer (600 MHz, 668 MHz systems; available as RPQ on 450 MHz systems), 14 hot-plug PCI slots and 2 media bays additional
External Storage:	IBM 2104 Expendable Storage Plus (Ultra3 SCSI), IBM 7133 Serial Disk System (SSA), IBM 2105 Enterprise Storage Server
Attachment:	SP System Attachment feature for use as SP-attached server

<b>Operating system</b>	AIX 4.3.3 (unlimited user license) or AIX 5.1 (unlimited user license)
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<b>Power requirements</b>	220v AC/-48v DC
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<b>Warranty</b>	Onsite 24x7 for one year (limited) at no additional cost
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AIX delivers Java™ technology, Web performance and scalability enhancements for managing advanced e-business installations. Web-based remote management tools control the system and monitor key resources such as network availability, file system status and processor workload. AIX also incorporates Workload Manager, which can help ensure that critical applications remain responsive even during periods of peak system demand.

The latest release of AIX, AIX 5L Version 5.1, adds new functionality to further improve security and system availability, enhance Workload Manager and improve Java scalability and performance. In addition, support is available so that popular applications developed on LINUX® can be run on AIX with minimal change.

### Application availability

As a powerful and affordable server solution, the Model 6H1 delivers industry-leading technology and performance, reliability, availability, flexible power options and ease of serviceability. Working in partnership with leading independent software vendors (ISVs), IBM offers an enriched portfolio of software solutions needed to effectively manage a company's e-business infrastructure. In fact, more than 13,000 AIX applications have been developed around the world. Additionally available are IBM @server Solution Offerings that tailor pSeries server and software

solutions to suit individual customer requirements. In providing a better way to implement e-business solutions, these offerings include pre-configured, pre-tested applications.

### Tools for e-business

The Model 6H1 is backed by the IBM @server Advantage, which includes a number of innovative tools for managing an end-to-end e-business infrastructure. Included are servers, storage, software and services, which provide customers with new ways to manage growth, risks and costs. Customers can also implement a greater choice of new applications with high-performance IBM technology, reliability and security.

In addition, IBM Global Services experts can help companies gain a competitive edge with business and IT consulting, business transformation and total systems management services, as well as customized e-business solutions. Backed by worldwide service and support, our commitment is to provide the highest possible customer satisfaction with every system.

### For more information

To learn more about the pSeries 660 Model 6H1, contact your IBM marketing representative, IBM Business Partner or visit the following Web sites:

**ibm.com/eserver/pseries**  
**ibm.com/ibmlink**



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All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

<sup>1</sup> SOI not available on 450 MHz processors

<sup>2</sup> For more information, visit: [ibm.com/pc/us/techlink/wtpapers/chipkill.html](http://ibm.com/pc/us/techlink/wtpapers/chipkill.html).

<sup>3</sup> Competitive Analysis of UNIX HA Functionality, D.H. Brown Associates, Inc., March 2000.