

## ServeRAID-4 Ultra160 SCSI Controllers



---

### Highlights

---

- ***New Intel® 100MHz<sup>1</sup> processor<sup>2</sup> and 66MHz PCI controller improve overall server performance***
- ***Robust data checking improves data protection***
- ***Hardware and software reliability supports controller failover and clusters for higher availability***
- ***Supports up to 4TB<sup>3</sup> of stored data; multiple controllers can scale up to incredible proportions***

### The right RAID for your needs

Two new ServeRAID™-4 Ultra160 SCSI controllers—ServeRAID-4Lx and ServeRAID-4Mx—have joined the IBM ServeRAID-4 Ultra160 SCSI controller family. These new ServeRAID-4 controllers deliver higher performance and offer a choice of power and performance to match your data protection requirements:

**NEW!**

- ServeRAID-4Lx is an industry-leading, entry-level controller featuring 66MHz/64-bit PCI bus performance, one Ultra160 SCSI channel and 32MB of ECC cache.

**NEW!**

- ServeRAID-4Mx is a midrange controller featuring 66MHz/64-bit PCI bus performance, two Ultra160 SCSI channels and 64MB of battery-backed ECC cache.
- ServeRAID-4H is a high-performance controller with extra high-reliability features, four Ultra160 SCSI channels and 128MB ECC, removable, battery-backed cache.

### Technology for performance and reliability

With a data transfer rate of up to 160MBps, Ultra160 SCSI outperforms Ultra2 SCSI (up to 80MBps). Ultra160 SCSI also uses a more robust data checking capability, called Cyclic Redundancy Check (CRC), for better data protection. Both Ultra160 and Ultra2 hard disks<sup>4</sup> can be used side by side with ServeRAID-4 controllers, letting you phase in some of the costs of upgrading to higher performance Ultra160 drives.

ServeRAID-4Lx and -4Mx deliver increased power and performance for your server with 66MHz PCI bus speed and the Intel 100MHz processor. ServeRAID-4H relies on an IBM

### Get it now

---

go to **ibm.com/eserver/xseries** or call 1 888 **ShopIBM** to buy direct or to locate an IBM reseller.

PowerPC 750™ processor to help make the controller more reliable and maintain lower temperatures and voltages. All three ServeRAID-4 controllers support Active™ PCI (hot-plug, hot-add) on select operating systems, so you can install new or replace existing controllers without system downtime. FlashCopy and Logical Drive Migration further enhance server availability with ServeRAID-4 controllers.

### **Superior scalability**

Each ServeRAID-4 Ultra160 SCSI channel can support up to 14 devices each at up to 160MBps data throughput—as much as 4TB of data with the four-channel ServeRAID-4H controller. Install more than one controller in an IBM @server xSeries or Netfinity® server and add EXP300 Storage Expansion Units to expand protected storage on a massive, large-enterprise scale.

For high-availability environments, IBM ServeRAID-4 controllers are certified with Microsoft® Cluster Service (MSCS) for use in two-node clustering environments. All ServeRAID-4 controllers support adapter failover under Windows NT®.

### **RAID levels enhance flexibility**

In addition to RAID levels 0, 1 and 5, you can also choose exclusive IBM Enhanced RAID-1 (1E) or Enhanced RAID-5 (5E). RAID-1E lets you mirror your data with three or more disks—odd or even. RAID-5E uses the hot spare as an active participant in the array, improving performance. ServeRAID-4 controllers also support striping of multiple RAID-0, 1, 1E or 5 arrays into spanned arrays, which allow the capacity of two or more arrays to be combined into a single storage array. These spanned array configurations use RAID levels 00, 10, 1E0 and 50. FlashCopy, an IBM software feature, lets you back up logical drives instantly without shutting down your applications.

### **Superior usability and control**

IBM ServeRAID Manager software provides the flexibility needed for small installations or large enterprise storage networks. ServeRAID Manager works smoothly with IBM Director systems management software for integration with larger systems. The easy-to-use FlashMan applet detects the need for new BIOS or firmware on any ServeRAID platform in the system.

IPSSSEND makes configuring and rolling out large numbers of servers simple. With IPSSSEND, you can copy and distribute ServeRAID controller configurations and data images across multiple servers, saving valuable time and resources.

### **Protect your data, your investment and your business**

All ServeRAID-4 controllers support Active PCI (on select operating systems), allowing you to add a new controller or replace an existing one while the system is running. ServeRAID Manager software recognizes the new controller and works with the operating system to configure the controller and bring it online—without rebooting the system. Logical Drive Migration enables ServeRAID-4 controllers to handle capacity changes in background mode and allows new RAID logical drives to be added while your server continues to operate.

ServeRAID-4 controllers store critical RAID configuration information in three different places—Flash ROM, nonvolatile RAM on the controller and in a reserved area on the attached disk. Triple redundancy for the most crucial portion of your RAID subsystem data helps you recover more quickly and easily from a disaster.

## IBM ServeRAID-4 Ultra160 SCSI controllers at a glance

Feature	<b>NEW!</b> ServeRAID-4Lx	<b>NEW!</b> ServeRAID-4Mx	ServeRAID-4H
<b>Part number</b>	P/N 06P5740	P/N 06P5736	P/N 37L6889
<b>Number of independent SCSI channels</b> (external/internal)	1/1	2/2	4/2
<b>Processor</b>	100MHz	100MHz	IBM PowerPC 750
<b>Cache memory</b>	32MB ECC	64MB ECC	128MB ECC
<b>Battery-backed cache</b>	No	Yes	Yes
<b>Host bus interface</b>	64-bit Universal PCI	64-bit Universal PCI	64-bit Universal PCI
<b>SCSI interface</b>	Ultra160 SCSI	Ultra160 SCSI	Ultra160 SCSI
<b>Host bus speed</b>	66MHz	66MHz	33MHz
<b>SCSI data transfer rate</b>	up to 160MBps	up to 160MBps	up to 160MBps
<b>Number of drives supported</b>	Up to 14	Up to 28	Up to 56
<b>Storage capacity</b>	Up to 1TB	Up to 2TB	Up to 4TB
<b>RAID levels supported</b>	0, 1, 1E, 5, 5E, 00, 10, 1E0, 50	0, 1, 1E, 5, 5E, 00, 10, 1E0, 50	0, 1, 1E, 5, 5E, 00, 10, 1E0, 50
<b>Clustering support</b>	Yes	Yes	Yes
<b>Adapter failover</b> (Windows NT)	Yes	Yes	Yes
<b>Logical Drive Migration</b>	Yes	Yes	Yes
<b>FlashCopy</b>	Yes	Yes	Yes
<b>External connectors</b>	0.83mm VHDCI	0.83mm VHDCI	0.83mm VHDCI
<b>Internal connectors</b>	One 68-pin	Two 68-pin	Two 68-pin
<b>ServerAID management features</b>	ServeRAID Manager: easy-to-use interface that provides configuration, monitoring and maintenance IPSEND ServeRAID Command Line: allows you to perform many configuration functions from a command-line interface		
<b>Operating systems supported for ServeRAID-4 controllers</b>	Microsoft Windows NT, Microsoft Windows® 2000, Novell NetWare, Linux®, SCO UnixWare, OpenServer <sup>5</sup> and OS/2® Warp		

## RAID levels at a glance

RAID	<b>0</b>	<b>1</b>	<b>1E</b>	<b>5</b>	<b>5E</b>	<b>00</b>	<b>10</b>	<b>1E0</b>	<b>50</b>
<b>Known as</b>	Striping	Mirroring	Mirroring with an odd or even number of drives	Striping with distributed parity	Striping with distributed hot spare and parity	Striping across multiple RAID-0 arrays	Striping across multiple RAID-1 arrays	Striping across multiple RAID-1E arrays	Striping across multiple RAID-5 arrays
<b>Fault tolerance</b>	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
<b>Redundancy type</b>	None	Duplicate	Duplicate	Parity	Parity	None	Duplicate	Duplicate	Parity
<b>Hot spare option</b>	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
<b>Disks required</b>	1 or more	2	3 or more	3 or more	4 or more	2 or more	4 or more	6 or more	6 or more



© Copyright IBM Corporation 2000

Printed in the USA  
5-01  
All Rights Reserved

<sup>1</sup>MHz measures only internal clock speed, not application performance. Many factors affect application performance.

<sup>2</sup>Intel 80303 processor.

<sup>3</sup>When referring to storage capacity, a terabyte means 1 trillion bytes. Total user accessible capacity may vary depending on operating environments.

<sup>4</sup>Each disk operates at its designated data rate.

<sup>5</sup>Visit the ServerProven Web site at [ibm.com/pc/ww/eserver/xseries/serverproven](http://ibm.com/pc/ww/eserver/xseries/serverproven) for operating system support updates.

<sup>6</sup>For terms and conditions or copies of the IBM Statement of Limited Warranty, call 1 800 772-2227 in the U.S. and in Canada, call 1 800 426-2255. Limited warranty includes International Warranty Service in those countries where this product is offered. Telephone support may be subject to additional charges.

IBM reserves the right to change specifications or other product information without notice. This publication could include technical inaccuracies or typographical errors. References herein to IBM products and services do not imply that IBM intends to make them available in other countries. IBM PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions; therefore, this disclaimer may not apply to you.

xSeries and Netfinity systems are assembled in the U.S., Great Britain, Japan, Australia and Brazil and are comprised of U.S. and non-U.S. components.

IBM, the IBM logo, the e-business logo, Active PCI, Netfinity, OS/2, PowerPC 750, ServeRAID and xSeries are trademarks of IBM Corporation in the United States and/or other countries.

Intel is a registered trademark of Intel Corporation. Linux is a registered trademark of Linus Torvalds. Microsoft, Windows, Windows NT and the Windows logo are trademarks of Microsoft Corporation. Other company, product and service names may be trademarks or service marks of others.



Printed on recycled paper containing 10% recovered post-consumer fiber.

---

## Need more information?

---

### World Wide Web

[ibm.com/pc/ww/eserver/xseries/scsi\\_raid.html](http://ibm.com/pc/ww/eserver/xseries/scsi_raid.html)

---

### IBM at your service

The IBM three-year, onsite limited warranty<sup>6</sup> on select xSeries servers extends to cover the ServeRAID-4H, -4Mx and -4Lx Ultra160 SCSI controllers—saving you time and trouble if maintenance is ever required. So, why IBM? From system startup throughout its life cycle, whether you have a worldwide deployment or a lone server in your home office, IBM offers a wealth of flexible services and support offerings to help you find solutions to the IT challenges you face. With an IBM xSeries or Netfinity server, you're never "on your own."