White Paper



# LSI PCI Express MegaRAID®

Fault Tolerant Data Protection that Removes the I/O Bottleneck



## KEY PCI EXPRESS FEATURES

- Compatibility with current PCI enumeration and software device driver model
- Layered architecture enabling physical layer attachment to copper, optical, or emerging physical signaling media to allow for future encoding schemes
- Maximum bandwidth per pin for enabling unique and small form factors, reducing cost, simplifying board design and routing, and reducing signal integrity issues
- Embedded clocking scheme enables superior frequency scalability versus source synchronous clocking
- Bandwidth scalability with frequency and/or interconnect width
- Predictable low latency suitable for applications requiring isochronous data delivery
- Mechanisms to support embedded and communications applications
- Hot plug and hot swap capability
- Power management capabilities

RAID technology is widely used in the data center as a cost effective remote storage solution. As server performance continues to ramp at the pace of Moore's Law and storage capacity requirements continue a meteoric climb, the interconnect for a host server system's connections to storage arrays is emerging as a critical factor in RAID performance.

The industry's solution is PCI Express technology, the next generation, serial based I/O interconnect that removes any I/O bus bottleneck from server systems and lays a roadmap for performance improvements in line with expected storage interconnect improvements.

# LSI MegaRAID Solutions Powered by PCI Express

With superior bandwidth for component communications and a much simpler internal design, PCI Express-based MegaRAID storage adapters and RAID on motherboard (ROMB) solutions address the growing demand for higher storage device throughput and scalability requirements across midrange and enterprise class server platforms.

System builders can further leverage the industry leading performance of MegaRAID technology by removing the limitations of parallel bus architectures and by delivering high bandwidth with the fewest number of signals. This allows higher frequency scaling while maintaining cost effectiveness. Also, enhanced protocol error detection, correction, and reporting capabilities supported in the PCI Express specification address server-class data integrity requirements. These features will become essential as LSI begins to deploy serial attach SCSI (SAS) MegaRAID controllers in 2H04. These first-to-market solutions will require a new, high speed system interconnect that will fully exploit PCI Express bandwidth capability.

Figure 1. Fault Tolerant Data Protection that Removes the I/O Bottleneck



## Full-Featured Enterprise Storage Protection

LSI's first-to-market PCI-Express MegaRAID products will offer advanced hardware-based RAID features essential to high-performance server environments. By coupling its dual channel Ultra320 SCSI controller and Intel<sup>®</sup> Dobson integrated I/O processor this solution will take full advantage of its market leading software features, including RAID levels 0, 1, 5, 10, and 50, background initialization for Quick RAID 5 setup and auto resume during array rebuild or reconstruction if the system shuts down.

Powerful management and configuration utilities allow system administrators the most versatile array configuration and management options including online capacity expansion and RAID level migration and random logical drive deletion without bringing the system down. And with a wide assortment of caching policies for logical drives, variable stripe sizing and adjustable task rates for check consistency and rebuild progress, IT managers can quickly and easily modify their storage arrays for to meet the needs of their business requirements.

## Market-Leading Fault Tolerance

LSI MegaRAID technology continues to raise the bar by offering the highest levels of fault tolerant data protection, including Microsoft Server Clustering Support (MSCS) - now with new enhanced cluster recovery features. LSI's innovative transportable battery backup unit (TBBU<sup>TM</sup>) for cached data protection allows system builders to protect cached data even during the most catastrophic system failures. Other Advanced fault tolerance features including Patrol Read for enhanced detection of physical device failure and Read Error Recovery from secondary drive failures during rebuilds further extend MegaRAID technology as the preeminent solution for mission critical server environments.

#### Intel PCI Express I/O Processor

Intel's first PCI Express based I/O processor code named Dobson is a highly integrated system on chip solution ideal for high performance RAID on Motherboard (ROMB) or PCI-Express RAID HBA (Host-based Adapter) applications. Dobson uses PCI Express to connect directly to the Lindenhurst chipset, thereby reducing system power, latency and overall cost. I/O processor based RAID applications offer improved overall server performance and added data protection.

## MegaRAID SCSI 320-2E RAID Adapter Product Specifications

ADAFIER SPECIFICATIONS	
Half-Size PCI	Short card (6.875"x4.2")
PCI Express 1.0 A Compliant	– 2.5 Gigabits/sec per lane – x8 lane width (1x and 4x also supported)
One DIMM Socket	128MB PC333 DDR SDRAM transportable battery-backed DIMM module
<ul> <li>Dual channel LSI53C1030 Ultra320 SCSI controller</li> </ul>	– Two external P68 connectors (VHDC) – Two internal P68 connectors (UHD)
Intel® IOP3XX (Dobson) integrated I/O processor	Hardware XOR engine for parity
Support for PCI Hot Plug	
<ul> <li>Adapter interface</li> </ul>	Per PCI Express specifications
Power Requirements	Per PCI Express specifications
PCI Power Management	

### RAID FEATURES

RAID Levels Supported

0, 1, 5, 10, and 50

Background initialization for Quick RAID 5 setup

Full (standard) initialization of logical disks

- FlexRAID\*
- FlexRAID Power Fail Option
- Microsoft Server Clustering Support (MSCS<sup>™</sup>)
- Auto resume during array rebuild if the system shuts down

   'MSCS™)
   Hardware support

   MSCS support via unified firmware

   NEW: Enhanced Cluster recovery on failure

- Auto resume during reconstruction if the system shuts down

Online Capacity Expansion
 Online RAID Level Migration

- 40 logical drives per controller and 30 physical drives per array
- Random logical drive deletion without bringing the system down
- Variable stripe size for all logical drives
- Multiple cache policies setting on logical drive basis
   Adaptive-Read-Ahead, Read-Ahead, Write Delicies: Write Through Write Deck
  - Write Policies: Write Through, Write Back
     I/O Policies: Direct I/O, Cached I/O
  - Check consistency and rebuild progress

- CD-ROM, tape drives

- Boot from any Logical Drive
- Force Boot Option

Adjustable Task Rate

- Drive Roaming
- Drive Coercion
- Mixed capacity/speed drives in same enclosure and in the same array
- Non-Disk Device Support
- $\ensuremath{^{\ast}}$  Check with your local sales representative for feature availability schedule

#### FAULT TOLERANCE

- NEW: Patrol Read to detect physical device failure for advanced data integrity protection
- Transportable Battery Backup Unit (TBBU) for cache memory protection
- NEW: Read error recovery from secondary drive failure during rebuilds
- COD Configuration On Disk and NVRAM
- NEW: Enhanced run time event logging & boot time NVRAM logging
- Auto detection of failed drives
- Automatic and transparent rebuild of hot spare drives
- Hot swapping new drives w/o bringing system down
- Support for SAF-TE enclosure management
- S.M.A.R.T. support

#### OPERATING SYSTEM SUPPORT\*

- Microsoft\* Windows XP
  SuSE\* Linux\* 8.2
  Microsoft\* Windows 2000
  SuSE\* Linux\* Enterprise Server (SLES) 8
  Microsoft\* Windows 2003 (32-bit and 64-bit)
  SCO\* OpenServer 5.0.7
  Redhat\* Linux\* 8.0, 9.0
  SCO\* UNIXWare 7.1.3
  Redhat\* Linux\* Advanced Server 2.1
  United Linux Support
- Novell<sup>®</sup> NetWare<sup>®</sup> 5.1, 6.0, 6.5

\* Check with your local sales representative for individual driver release schedules



External SCSI Storage and PCI Express Based Server

ONLINE MANAGEMENT UTILITY OP	TIONS
Power Console® Plus for Windows NT/2000/XP/.NET	<ul> <li>Creates and manages multiple disk arrays, controls and monitors multiple RAID servers</li> <li>Configure and manage RAID storage from anywhere</li> <li>Event notification via SNMP support</li> </ul>
<ul> <li>MegaManager</li> </ul>	<ul> <li>Advanced character-based configuration and management utility for all OSs supported</li> </ul>
PRE-BOOT CONFIGURATION UTILIT	TY OPTIONS
■ WebBIOS <sup>™</sup> (CTRL H)	<ul> <li>Browser-based BIOS configuration utility for point- and-click MegaRAID configuration</li> <li>Array and logical drive configuration utility at the BIOS level</li> </ul>
CTRL M	<ul> <li>Hot key "Boot-up" configuration via BIOS</li> <li>Array and logical drive configuration utility at the BIOS level</li> </ul>

LSI PCI Express MegaRAID<sup>®</sup> -

Fault tolerant data protection that removes the I/O bottleneck





For more information and sales office locations, please visit the LSI web sites at: lsi.com lsi.com/contacts

**North American Headquarters** Milpitas, CA T: +1.866.574.5741 (within U.S.) T: +1.408.954.3108 (outside U.S.) LSI Europe Ltd. European Headquarters United Kingdom T: [+44] 1344.413200 LSI KK Headquarters Tokyo, Japan Tel: [+81] 3.5463.7165

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