

## LSI SAS 9211-4I

LSI has consistently been at the forefront of storage technology development and stretches its lead even further by delivering the industry's first 6Gb/sec SAS/SATA RAID controllers. The new SAS-2 standard is a significant development, as it now allows this disk interface technology to compete strongly with fibre channel in the enterprise storage space.

The SAS 9211-4i on review is one of a family of new 6Gb/sec controllers from LSI and directly targets rack server applications where internal space is always at a premium. The 9211-4i represents remarkable value, making it a top choice not only for rack applications, but also for mid to high-end servers and high performance workstations.

LSI may have a keen eye on value, but this doesn't come at the cost of features. The 9211-4i incorporates the latest LSI SAS2008 SAS controller and offers an internal 4-port mini-SAS SFF8087 on-board connector. Expansion potential is massive, as the use of SAS expanders allows the card to support up to 256 hard disks for non-RAID applications.

The SAS controller features an embedded 533MHz PowerPC 440 processor and LSI's Integrated RAID (IR), which offers a wide range of array options. LSI has aimed the card particularly at rack server deployments where RAID-5 and -6 arrays are not considered to be the most cost-effective use of internal storage. For these applications, mirrors and stripes are the

preferred choice, and the 9211-4i offers a unique range of features.

LSI's Integrated Mirroring Enhanced (IME) feature goes beyond traditional dual-drive mirrors, allowing from three to 10 drives to be used in one array, and includes options to use of an odd number of drives. The array can be protected further, as up to two global hot spare drives are supported.

Applications such as video streaming require a high storage throughput and the card supports standard RAID-1 striping across multiple volumes. However, redundancy is an option, as LSI's Integrated Mirroring and Striping feature allows you to protect a striped array by having it mirrored to another set of drives.

The 9211-4i is a compact low-profile, half-length PCI-Express 2.0 card, making it ideal for deployment in 1U and 2U rack servers which will undoubtedly increase its appeal to system integrators. The kit version of this card comes complete with a quick start guide, a low profile mounting bracket and a four-port fan-out SAS cable.

Installation is a simple process and LSI provides drivers for Linux, Sun Solaris and all versions of Windows. For testing, we used a Broadberry Data Systems Cyberserve 1U rack server, equipped with dual X5560 Xeons, and had no problems installing the card, which slotted neatly into its single PCI-Express riser card.

All array configuration is carried out via LSI's SAS2 BIOS Configuration Utility, which



is loaded during the system boot-up phase. This menu-driven utility provides easy access to the card's features, and allows you to view the adapter's status and SAS topology and create multiple RAID arrays.

Array creation is a swift process, as you simply select your member drives, choose an array type and leave the card to get on with building it in the background. Usefully, you can mix SAS and SATA drives on the same card, where it will automatically sense their interface speeds and configure itself accordingly.

LSI offers one of the most comprehensive ranges of RAID adapters on the market today and its early support for the latest 6Gb/sec SAS standard puts it in a league of its own. The 9211-4i looks an ideal choice for implementing high-performance RAID in low-profile rack servers and, costing a mere £129, it offers unbeatable value as well.

**Product:** SAS 9211-4i 4-Port 6Gb/s PCI Express SATA/SAS HBA  
**Supplier:** LSI  
**Tel:** 01344 413200  
**Web site:** www.lsi.com  
**Price:** £129

**VERDICT:** The 9211-4i represents remarkable value, making it a top choice not only for rack applications, but also for mid to high-end servers and high performance workstations.