



# Why SAS?

Serial Attached SCSI (SAS) Technology

**Storage Processing**

Serial Attached SCSI and the  
Intel® IOP34x Storage Processor Family



## The Digital Expanse

With digital data entering every aspect of life, the demand for efficient data storage pushes the limits of both business and technology. Business continuance and regulatory standards demand that data be secure, reliable, and readily available, while requirements for privacy, fraud, and identity theft protection mean businesses must manage data in high performance, complex systems. Not only does data change in complex systems, but the way data is used within those systems changes over time, evolving from frequently accessed data to data that is checked only occasionally. Throughout the entire life cycle of that data, it still must remain instantly available.

The demands for increasingly fast, flexible, and reliable data access have resulted in new evolutions of storage technologies. Now, with the entry of Serial Attached SCSI (SAS), storage solutions can meet the demands of today's business through improved flexibility and improved deployment topologies, while maintaining the legacy SCSI cost structure.

## High Performance Serial Interfaces

Parallel data transfer technologies that have been the standard for many years are rapidly transitioning to serial architectures to increase performance. SAS technology delivers the power and reliability of SCSI technology combined with the speed and ease-of-use of serial communication, delivering the performance and reliability required for enterprise-class storage. Instead of the common parallel interface used by previous generations of SCSI drives, SAS drives use a serial interface that provides better signal integrity, greater device addressability, and higher performance. The high-speed, point-to-point SAS technology currently operates at speeds up to 3 Gb/s, and is expected to operate at speeds of 6 Gb/s and 12 Gb/s in the future. In addition, SAS storage systems are typically compatible with SATA drives providing a wide variety of customer choice and possible storage system consolidation. As parallel interfaces are replaced with higher performance serial interfaces, SAS and SATA are fast becoming leading technologies.

## The Difference Between SAS and SATA

While the technologies of SAS and SATA are similar and compatible, they also have several differences. Disks with SAS interfaces tend to be targeted for enterprise-class environments and have the performance and reliability characteristics required for enterprise-class server arrays and RAID systems. SAS drives retain all of the reliability and performance advantages of traditional SCSI and while eliminating the weaknesses of the parallel interface.

In contrast, SATA products generally provide a lower cost, higher capacity solution than SAS devices, but are not typically used interchangeably. SATA drives are most often used in desktop computers and are increasingly being seen as a solution for tiered storage requirements such as regulatory compliance, reference data, backup archive, and bulk storage of critical data. Some file servers and print servers may also utilize SATA drives because of their relatively low cost and high capacity.

Other differences between SAS and SATA center on flexibility and design. SAS drive cables can extend up to six times the length of SATA drive cables, and SAS drives are dual ported while SATA drives can only communicate via one port. Another difference between SAS and SATA drives is that SAS drives are rated for continuous, i.e., enterprise, use, while SATA drives are typically rated for less than a 100% duty cycle.

### Cost Efficient, Enterprise Class Storage Solutions

The combination of SAS and SATA technologies provides powerful capabilities for business storage solutions because they are compatible and serve different purposes.

The ability to deploy either type of drive allows the overall storage solution to be optimized for specific application and cost requirements. Using the technologies together gives businesses a means for maximizing their current storage investments while still taking advantage of new, more efficient technology.

### The New Promise of SAS—the Intel® IOP34x Processor Family

To date, broad scale adoption of SAS has been slow due to the high costs and limited diversity of current solutions. But with the introduction of the Intel® IOP34x Storage Processor Family, Intel is delivering SAS with new levels of flexibility, performance, and reliability. Now enterprise-class storage technology is available at a cost that makes SAS affordable for businesses of all sizes. The Intel® IOP34x Processor Family delivers single chip IOP RAID processors with integrated SAS controllers as well as discrete I/O processors and discrete SAS controllers. The result is a first for the industry—a set of pin compatible, cost-effective and flexible storage products that enable a new level of performance in enterprise storage solutions.

The Intel® IOP34x Storage Processor Family brings advancements in RAID and SAS technologies together to form a high-performance, power-efficient set of products built on an open architecture for maximum flexibility. The result is a best-in-class family that not only delivers RAID, SAS, and other storage innovations but is also flexible enough to accommodate a large range of end product customizations. With extensive support for SAS and SATA drives and hardware acceleration for RAID 5 and RAID 6, the Intel® IOP34x family is at home in a wide assortment of enterprise class products and solution topologies.



## Intel® IOP34x Storage Processor Family of Products

	Intel® IOP348 I/O Processor	Intel® IOP341/342 I/O Processor	Intel® IOC340 I/O Controller	Intel® IOP333 I/O Processor
<b>Intel XScale® Technology Application Cores</b>	1	1/2	0	1
<b>Core Speed</b>	667/800/1200 MHz	800/1200 MHz	800/1200 MHz	500/667/800 MHz
<b>RAID 5/6 offload solution Chip Count</b>	1	2	2	2
<b>SAS/SATA II Ports</b>	8	0	8	0
<b>Package Size</b>	37.5 mm x 37.5 mm FCBGA5	37.5 mm x 37.5 mm FCBGA5	37.5 mm x 37.5 mm FCBGA5	37.5 mm x 37.5 mm FCBGA3
<b>Integrated Host Bus Interfaces</b>	PCI-Express*, PCI-X* or both concurrently	Concurrent PCI-Express and PCI-X	PCI-Express or PCI-X	PCI-Express to PCI-X Bridge
<b>Memory Controller</b>	Multi-ported DDR2 400/533 MHz with ECC	Multi-ported DDR2 400/533 MHz with ECC	n/a	Dual-ported DDR 333 MHz/DDR2 400 MHz
<b>Internal Memory</b>	n/a	1 MB SRAM	n/a	n/a
<b>Max Memory</b>	2 GB	2 GB	n/a	2 GB (DDR 333) 1 GB (DDR2 400)
<b>Internal Bus</b>	128-bit, 400 MHz (up to 6.4 GB/s) Dual Bus. Byte parity on data bus	128-bit, 400 MHz (up to 6.4 GB/s) Dual Bus. Byte parity on data bus	128-bit, 400 MHz (up to 6.4 GB/s) Dual Bus. Byte parity on data bus	333 MHz (up to 2.7 GB/s) Bus
<b>Local Bus Width</b>	16 Bits (66 MHz)	16 Bits (66 MHz)	16 Bits (66 MHz)	8/16 Bits (66 MHz)
<b>DMA Buffer Size</b>	4096 Bytes	4096 Bytes	4096 Bytes	1024 Bytes
<b>ATU Buffer Size</b>	4096 Bytes	4096 Bytes	4096 Bytes	4096 Bytes
<b>I<sup>2</sup>C Bus Interface Unit</b>	3	3	1	2 Serial Units
<b>Hardware-based Application Accelerators</b>	XOR, P+Q, CRC32C	XOR, P+Q, CRC32C	n/a	XOR, P+Q, CRC32C
<b>UART</b>	2 (1 Available for the IOP)	2	1	(2) 4-Pin (16550)
<b>GPIO</b>	16 GPIO 2 SGPIO units capable of up to 8 devices on the target end	16 GPIO	8 GPIO 2 SGPIO units capable of up to 8 devices on the target end	8 GPIO
<b>External Interrupt Pins</b>	16 + 1 HPI	16 + 1 HPI	n/a	16 + 1 HPI

## Conclusion

SAS technology is enabling businesses to overcome continuously increasing storage requirements, while freeing them from the constant struggle of having to catch up. As every business is required to improve, optimize and enhance their storage systems, SAS answers the call with improved system performance, connectivity, and scalability. The architecture of SAS and compatibility with SATA promises flexible, enterprise-class storage solutions for businesses of all sizes—the Intel® IOP34x Storage Processor Family solves future storage problems today.

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