



Product Brief

Intel® IOP341/ IOP342
I/O Processors
Storage Processing

Intel® IOP341 and IOP342 I/O Processors featuring Intel XScale® technology

High performance, flexible I/O processors



Power Efficiency and Performance on a Single Chip

The next generation Intel® IOP341 I/O Processor and Intel® IOP342 I/O Processor deliver full-function IOP-based RAID in a flexible, open architecture. With either one (IOP341) or two (IOP342) power-efficient, high-performance Intel XScale® processors, these devices are ideal for solutions requiring embedded application flexibility and solution performance on a single chip. As members of a flexible family of storage processors, both devices accommodate a variety of product solutions and performance requirements.



Two Intel XScale® Processors for Optimized Performance

The Intel® IOP342 I/O Processor is a high-performance I/O device incorporating two integrated, power-efficient Intel XScale® processors. The IOP342 divides the load between the two processors, ideal for situations that require a dedicated processor for separate applications or split functionality. This ability enables users to optimize and tailor different types of solutions for maximum performance. For example, RAID calculations or near real-time functionality can be dedicated to one processor, leaving the second processor to handle computing functions that have different performance requirements such as a user interface. Distributed processing of independent tasks greatly reduces the time and power required of each processor, and customizes solutions for maximum processor utilization.

IOP-based RAID for Performance and Protection

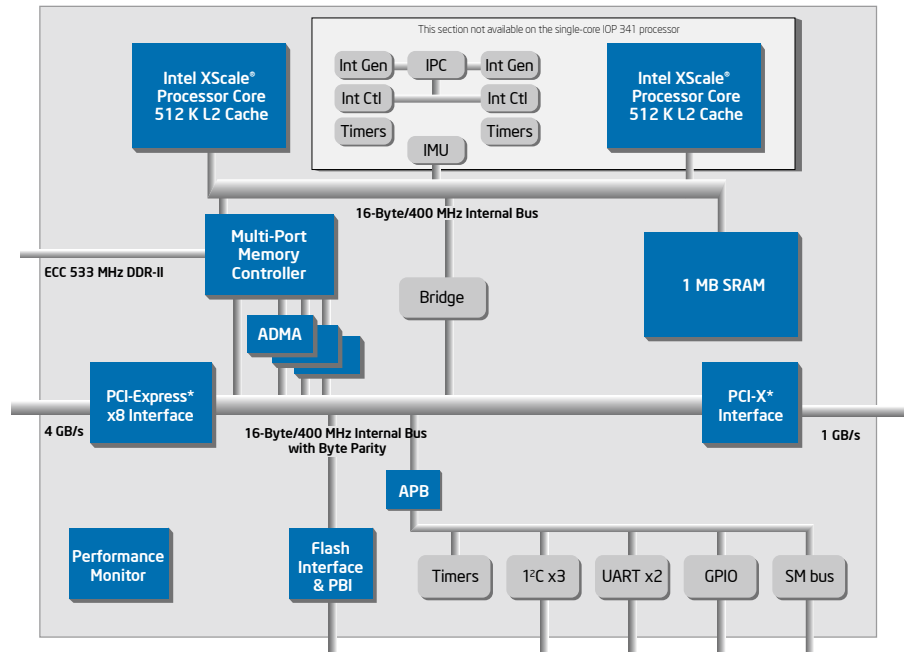
RAID technology is crucial for keeping today's business data completely protected and constantly accessible. The complex calculations required when running RAID array software in a host driver place a large load on the server CPU. Both the Intel® IOP341 I/O Processor and Intel® IOP342 I/O Processor offer hardware-embedded RAID acceleration, including enhanced hardware acceleration for RAID 6. By offloading RAID 6 calculations from the host CPU, overall system performance is pushed beyond the capabilities of previous-generation hardware. In addition to accelerated RAID, Intel® Block Protection Technology, byte parity on the data bus, and support for ECC memory provide extra layers of data protection, keeping critical storage systems safe and reliable.

Flexible Design for Tailored Solutions

The power-efficient, flexible design of the Intel® IOP341 I/O Processor and Intel® IOP342 I/O Processor supports both external storage and embedded technology applications. The open architecture supports many different controllers, including SAS/SATA or Fibre Channel devices. When combined with either PCI-Express* or PCI-X* controllers or connectivity devices, external storage solution architects can design a single base board that scales from entry level to enterprise level solutions. Within the family of Intel products, the PCI-Express interface can be used for high bandwidth connections to the Intel® IOC340 I/O Controller or Intel® IOP348 I/O Processor, leaving the PCI-X interface for iSCSI through Ethernet or NAS connectivity. Additionally, the Fibre Channel-based Emulex IOC 504 I/O Controller* can easily be incorporated with a few design changes from the IOC340 to enable multi-protocol solutions with minimal engineering effort. Alternatively, the PCI-X interface offers a balance of bandwidth and the design utility of a shared peripheral bus. The flexible architecture combined with the speed of PCI-Express and PCI-X presents an extremely versatile range of interface options.

Product Highlights

- > One or two Intel XScale® processors with speeds up to 1.2 GHz
- > 1 MB embedded SRAM on-chip
- > PCI-X* and eight lane PCI-Express* Interfaces
- > High-performance IOP-based RAID 5 and RAID 6 hardware acceleration
- > Pin compatibility with Intel® IOP348 I/O Processor, Intel® IOC340 I/O Controller, Emulex IOP 504 I/O Processor*, Emulex IOP 502M I/O Processor*, and Emulex IOC 504 I/O Controller*
- > Intel® Block Protection Technology delivering end-to-end data protection
- > Multi-ported 400/533 MHz DDR2 memory controller supporting up to 4 GB of 64-bit ECC protected memory
- > Three application DMA units with XOR, RAID 6 P+Q, CRC32C
- > Dual 128-bit/400 MHz internal buses, providing over 12 GB/s internal bandwidth



Customer Reference Boards (CRBs)

Customer Reference Boards (CRBs) are available in both Host Bus Adapter (HBA) and Micro-ATX board formats. Each has on-board GbE, Dual UARTs and JTAG connections, to enable flash programming and debug access. The HBA is a PCI-Express* plug-in form factor with one PCI-X* slot, and the ATX-style board has one PCI-Express slot and one PCI-X slot. Both the HBA and Micro-ATX form factors are shipped with a 1200 MHz IOP342, but can be run in single processor mode to emulate an IOP341 processor.

For more information about the boards, supported operating systems, or software development tools, please reference the following product codes:

IQ81342SC.Kit: PCI-Express Form Factor CRB

IQ81342MC.Kit: ATX Form Factor CRB

Features	Benefits
One or Two Intel XScale® Processors	Up to 1.2 GHz, 512 KB 8-way L2 cache with the option of one or two processors meets today's storage demands and guarantees compatibility with previous generations.
1 MB on Chip SRAM	High-performance data retrieval and processing with static memory.
Multi-ported Memory Controller	Dramatically increased performance with up to 4 GB of 533 MHz DDR2 ECC 64-bit memory and direct core-to-memory access.
Three Application DMA Units	XOR, P+Q, Scatter/Gather and CRC32C – Storage-specific integration in hardware improves performance and reduces CPU overhead.
Intel® Block Protection Technology	Data integrity checking based on T10-based protection information keeps data safe and available.
High-Speed Interfaces	Flexibility and performance for increased system concurrency with PCI-Express* configurable as x1, x2, x4, or x8; Non-transparent PCI-Express to PCI-X* bridge.
Dual Internal Buses	Dual 128-bit/400 MHz internal buses, providing over 12 GB/s internal bandwidth.

Intel® I/O Processor Comparison

	Intel® IOP348 I/O Processor	Intel® IOP341/342 I/O Processor	Intel® IOC340 I/O Controller	Intel® IOP333 I/O Processor
Intel XScale® Technology Application Cores	1	1/2	0	1
Core Speed	667/800/1 200 MHz	800/1 200 MHz	800/1 200 MHz	500/667/800 MHz
RAID 5/6 offload solution Chip Count	1	2	2	2
SAS/SATA II Ports	8	0	8	0
Package Size	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
Integrated Host Bus Interfaces	PCI-Express*, PCI-X* or both concurrently	Concurrent PCI-Express and PCI-X	PCI-Express or PCI-X	PCI-Express to PCI-X Bridge
Memory Controller	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
Internal Memory	n/a	1 MB SRAM	n/a	n/a
Max Memory	4 GB	4 GB	n/a	2 GB (DDR 333) 1 GB (DDR2 400)
Internal 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	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
Local Bus Width	16 Bits (66 MHz)	16 Bits (66 MHz)	16 Bits (66 MHz)	8/16 Bits (66 MHz)
DMA Buffer Size	4096 Bytes	4096 Bytes	4096 Bytes	1024 Bytes
ATU Buffer Size	4096 Bytes	4096 Bytes	4096 Bytes	4096 Bytes
I²C Bus Interface Unit	3	3	0	2 Serial Units
Hardware-based Application Accelerators	XOR, P+Q, CRC32C	XOR, P+Q, CRC32C	n/a	XOR, P+Q, CRC32C
UART	2 (1 Available for the IOP)	2	0	(2) 4-Pin (1 6550)
GPIO	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
External Interrupt Pins	16 + 1 HPI	16 + 1 HPI	n/a	16 + 1 HPI

Conclusion

The Intel® IOP341 I/O Processor and Intel® IOP342 I/O Processor deliver the next generation of storage power efficiency, performance, flexibility, and protection. By offering efficient I/O processor performance with the protection and reliability of RAID, these processors enable storage solutions that scale from entry level to the enterprise. In addition, the open, flexible architecture and power-efficiency of the single chip design allow a multitude of potential product designs to create customizable, embedded, and enterprise-class storage solutions. As part of a flexible family of products, the IOP341 and IOP342 enable businesses of all sizes to benefit from the next evolution of storage technology.

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