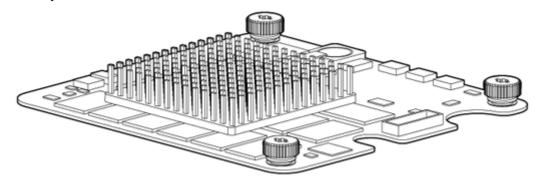## Overview

The HP IO Accelerator is part of a comprehensive solid state storage portfolio. This storage device is targeted for markets & applications requiring high transaction rates and real-time data access that will benefit from application performance enhancement. The HP IO Accelerator brings high random I/O performance and low latency access to storage, with the reliability of solid state technology and its low power and cooling requirements. This product, based on NAND flash technology is available in a mezzanine card form factor for HP BladeSystem c-Class.

What's New

New 365GB, 785 GB and 1.2 TB capacity added which are compatible only with Gen8 HP ProLiant BladeSystem

Benefits

Solid State Storage Technology can provide customer benefits in several different areas and with different architecture implementations. It offers high performance and reliability with no moving parts, low power and cooling requirements and improved environmental tolerance. Solid state storage technology has only recently become a popular topic in the market despite the fact that it has been used in some enterprise applications for a number of years, especially where the workloads benefit significantly from very low latency access, and application benefits exceed the costs associated with the solution.

Solid state storage technology benefits are best realized with latency-sensitive environments for both read- and write- intensive workloads. In addition, significant operational cost savings can be seen by the customer when this technology is applied to the right applications.

Some use cases are:

- Databases that historically were run in memory or across many disk spindles for performance reasons
- Seismic data processing
- Business Intelligence and Data mining
- Real-time financial data processing and verification
- Content caching for near-static data for file/web servers
- 3D animation/rendering
- CAD/CAM
- Virtual Desktop Infrastructure solution
- Hypervisor running a large number of virtual machines

Solid state technology can be implemented in various ways within a server. The two most common implementations are as an SSD (in a SATA or SAS form factor) or as an I/O card attached to the PCI Express bus.

As an I/O card, the IO Accelerator is not a typical SSD; rather it is attached directly to the server's PCI Express fabric to offer extremely low latency and high bandwidth. The card is also designed to offer high IOPs (I/O Operations Per Second) and nearly symmetric read/write performance. The IO Accelerator uses a dedicated PCI Express x4 link with nearly 1.3GB/s of usable bandwidth. Each mezzanine slot in the c-Class BladeSystem offers at least that amount of bandwidth, so by combining cards, you can easily scale the storage to match your application's bandwidth needs.

The HP IO Accelerator's driver and firmware provide a block-storage interface to the operating system that can easily be used in the place of legacy disk storage. The storage can be used as a raw disk device, or it can be partitioned and formatted with standard file systems. You can also combine multiple cards on select models using OS RAID (up to 3 cards with a full-height c-Class blade server) for increased reliability, capacity or performance in a single blade server.

A unique feature of the IO Accelerator is the ability for the customer to format it with a lower-than-stated capacity in order to achieve even greater sustained write performance. For instance, a 320GB drive could be formatted as a 160GB drive using the low-level fio-format tool. This will give improved write performance for some applications. Each customer's results may vary.

The HP IO Accelerator mezzanine card differs from other c-Class mezzanine cards in that it does not connect to any c-Class Interconnect Module. This allows the use of the IO Accelerator in any open mezzanine slot in a c-Class chassis (in any Type-B slot in Gen8 BladeServers) regardless of what types of Interconnect Modules might be installed.

The Remote Power Cut Module provides a higher level of protection in the event of a catastrophic power loss (for example, a user accidentally pulls the wrong server blade out of the slot). The Remote Power Cut Module ensures in-flight writes are completed to NAND flash in these catastrophic scenarios. Write performance will degrade without the remote power cut module. HP recommends attaching the remote power cut module for the AJ878B and BK836A SKUs.

NOTE: The Remote Power Cut Module is only available for the AJ878B and BK836A model. For QK761A, QK762A and QK763A models the Power Cut Module is embedded on the board.

Benefits

NOTE: QK761A, QK762A QK763A are Type B Mezzanine:

- When installed in the ProLiant BL420c Gen8 and BL460c Gen8, it is supported in mezzanine slot 2 for a total of one IO Accelerator per server. To gain access to mezzanine slot 2, the server blade requires two processors.
- When installed in the ProLiant BL465c Gen8, it is supported in mezzanine slot 2 for a total of one IO Accelerator per server.
- When installed in the ProLiant BL660c Gen8, it is supported in mezzanine slots 2 and 3 for a total of up to two IO Accelerators per server.

Models

Models compatible with G7 and previous generation Blade Servers Only

HP 320GB IO MLC Accelerator for BladeSystem c-Class	AJ878B
HP 640GB IO MLC Accelerator for BladeSystem c-Class	BK836A

Models Compatible with Gen8 Blade Servers only

HP 365GB IO MLC Accelerator for BladeSystem c-Class	QK761A
HP 785GB IO MLC Accelerator for BladeSystem c-Class	QK762A
HP 1.2 TB IO MLC Accelerator for BladeSystem c-Class	QK763A

Standard Features

NOTE: For a brief, printer friendly data sheet that describes this product and informs you of the essential capabilities and specifications, please visit: www.hp.com

What is an IO Accelerator? The IO Accelerator is an advanced storage device that uses solid state storage technology directly on the PCIe bus, assuring high read and write data rates and accelerated application performance. The associated application performance improvements will have a positive impact on business results and the ability to make decisions quickly, resulting in significant cost and time savings.

IO and Read/Write Performance

HP IO Accelerator for BladeSystem c-Class offers superior IO performance (up to 530,000 IOPs), and high read (up to 1.5 GB/s) and write (up to 1.3 GB/s) performance with MLC models.

For AJ878B and BK836A Models

	320GB	640GB
NAND Type	MLC (Multi Level Cell)	MLC (Multi Level Cell)
Read Bandwidth (64kB)	735 MB/s	750 MB/s
Write Bandwidth (64kB)	510 MB/s	550 MB/s
Read IOPS (512 Byte)	100,000	93,000
Write IOPS (512 Byte)	141,000	145,000
Mixed IOPS (75/25 r/w)	67,000	74,000
Access Latency (512 Byte)	30 µs	30 µs
Bus Interface	PCI-Express x4	

For QK761A, QK762A and QK763A Models

	365GB	785GB	1.2 TB
NAND Type	MLC (Multi Level Cell)	MLC (Multi Level Cell)	MLC (Multi Level Cell)
Read Bandwidth (1MB)	900 MB/s	1.5 GB/s	1.5 GB/s
Write Bandwidth (1MB)	575 MB/s	1.1 GB/s	1.3 GB/s
Read IOPS (Seq. 512 Byte)	415,000	443,000	443,000
Write IOPS (Seq. 512 Byte)	530,000	530,000	530,000
Read IOPS (Rand. 512 Byte)	136,000	141,000	143,000
Write IOPS (Rand. 512 Byte)	475,000	475,000	475,000
Read Access Latency	68µs	68µs	68µs
Write Access Latency	15µs	15µs	15µs
Bus Interface	PCI-Express Gen2 x4		

Latency

HP IO Accelerator offers very low latency access to data (as low as 50 microseconds to read a 4K block), in other words a virtually zero seek time compared to rotating magnetic media.

Standard Features

Supported ProLiant server blades	**For AJ878B and BK836A** BL2x220c G6, HP ProLiant BL280c G6, BL460c G6, BL465c G6, BL685c G6, BL490c G6, BL495c G6, BL465c G7, BL685c G7, BL460c G7, BL490c G7, BL620c G7, BL680c G7. **For QK761A, QK762A and QK763A*** BL420c Gen8, BL460c Gen8, BL465c Gen8, BL660c Gen8 *For QK761A, QK762A and QK763A, the IO Accelerator has to be used in full fan configuration for both c3000 and c7000 enclosures.

RAM Requirements

The HP IO Accelerator drivers use RAM for fast access to the storage metadata. The amount of RAM required is a fraction of the actual storage in use. It is important to ensure that the driver will have free RAM available as storage usage is increased. The amount of free RAM required by the driver is directly related to the size of the blocks used when writing to the drive. When smaller blocks are used, RAM usage increases. Here are the guidelines for memory needed based on the capacity of IO Accelerator and the Block Size of the write:

Average Block Size (bytes)	Minimum System RAM requirement for 320GB Mezz IO Accelerator*	Minimum System RAM requirement for 365GB Mezz IO Accelerator*	Minimum System RAM requirement for 640GB Mezz IO Accelerator*	Minimum System RAM requirement for 785GB Mezz IO Accelerator*	Minimum System RAM requirement for 1.2TB Mezz IO Accelerator*
8,192	1 GB	1.02 GB	2 GB	2.2 GB	3.4 GB
4,096	1.6 GB	1.9 GB	3.2 GB	4.2 GB	6.4 GB
2,048	3 GB	3.8 GB	6 GB	8.1 GB	12.4 GB
1,024	5.8 GB	7.3 GB	11.6 GB	15.7 GB	24 GB
512	11.4 GB	14.5 GB	22.8 GB	31.2 GB	47.6 GB

NOTE: For IO Accelerator use only, additional RAM needed for system OS and application

Manageability

Command Line Utilities: Command Line (CLI) tools for both Linux and Windows to configure, monitor, and upgrade firmware

GUI: IO Accelerator ioManager GUI for Windows and Linux, System Management Homepage for Windows and Linux*

SNMP Support: SNMP Agent and System Management Homepage provided for Linux and Windows*

HP System Insight Manager (HP-SIM), minimum revision 6.1*

*Footnote - requires SNMP agent to be installed with IO Accelerator software. System Management Homepage also requires IO Accelerator web templates to be installed which are available on the IO Accelerator product page download software page. IO Accelerator software and firmware is currently not part of a PSP due to the size of the IO Accelerator software.

IO Accelerator Product Software Download Page

QuickSpecs

Standard Features

PCI IDs	For AJ878B and BK836A Vendor & Device ID 1AED:1003; Subsystem Vendor & Device ID 103C:324D For QK761A, QK762A and QK763A Vendor & Device ID 1AED:2001; Subsystem Vendor & Device ID 1590:005C

Upgradability

The IO Accelerator's controller can be upgraded in the future with new firmware. Online firmware update tools are available for all supported operating systems. A reboot is required to utilize the new firmware

Wear-leveling

Capacity	Lifetime due to Wear-Out in PB	Lifetime in years based on 3.65 TB write & erase per day usage model
320 GB	4 PBW	3 yrs
640 GB	10 PBW	7.5 yrs
365 GB	4 PBW	3 yrs
785 GB	11 PBW	8.25 yrs
1.2 TB	17 PBW	12.75 yrs

NOTE: Solid State Drives may be subject to Maximum Usage Limitations: The maximum amount of data that can be written to the device. Parts and components that HP determines have reached or exceeded their Maximum Usage limitations will not be provided, repaired, or replaced under warranty or HP service offerings.

Data Integrity

Using advanced ECC techniques, the IO Accelerator is designed, with a design target of a 1 in 1020 probability of uncorrectable data.

OS Support

The HP IO Accelerator is supported for use in the following operating environments:

For AJ878B and BK836A
Red Hat Enterprise Linux 4 (AMD64/EM64T)
Red Hat Enterprise Linux 5 (AMD64/EM64T)
Red Hat Enterprise Linux 6 (AMD64/EM64T)
SUSE LINUX Enterprise Server 10 (AMD64/EM64T)
SUSE LINUX Enterprise Server 11 (AMD64/EM64T)
Windows Server® 2003 (x86_64-bit only) SP2
Windows Server® 2008 (x86_64-bit only) R1 with SP2 or higher
Windows Server® 2008 (x86_64-bit only) R2
Windows Server® 2012 (x86_64-bit only)
VMware ESX 4.0 Update 1 and VMware ESX 4.1 (note 1,2)
VMware ESXi 4.1(note 1,2), VMware ESXi 5.0(note 1,2) and VMware ESXi 5.1(note 1,2)

For QK761A, QK762A and QK763A
Red Hat Enterprise Linux 5.7, 5.8 (AMD64/EM64T)
Red Hat Enterprise Linux 6 (AMD64/EM64T)
Red Hat Enterprise Linux 6.1, 6.2, 6.3 (AMD64/EM64T)
SUSE LINUX Enterprise Server 10 (AMD64/EM64T)
SUSE LINUX Enterprise Server 11 (AMD64/EM64T)
Windows Server® 2008 (x86_64-bit only) R1 with SP2 or higher

Standard Features

Windows Server® 2008 (x86_64-bit only) R2
Windows Server® 2012 (x86_64-bit only)
Windows Hyper-V, R2 with SP1
VMware ESXi 4.1(note 1,2), VMware ESXi 5.0(note 1,2) and VMware ESXi 5.1(note 1,2)

NOTE 1: Partner supported on select OS versions;

NOTE 2: CIM provider or SNMP provider are currently not available

IMPORTANT: All operating systems must be 64-bit architecture.

Configurations

Gen 6, 7 Proliant blades (for AJ878B, BK836A): Mixing of capacities is allowed. SW OS RAID supported.Up to 2 cards in Half-Height blades, 3 in most Full-Height blades and 6 in the BL680c G7

Gen 8 Proliant blades (for QK761A, QK762A, QK763A): only 1 card in Half-Height blades

NOTE: RAID 5 and RAID 6 are not supported
All IO Accelerators in the same system must run the same firmware version and software.

Support

3/0/0 warranty; Customer Self Repair (CSR)

Service and Support, HP Care Pack, and Warranty Information

Service and Support	**Technology Services for increased uptime, productivity and ROI** TRUST HP storage technology experts for every level of service and support. Our integrated portfolio of Services for storage help customers reduce costs, optimize data, streamline storage management, and improve backup and recovery. Capitalizing on HP Storage Systems' capabilities requires a service partner who understands your increasingly complex environment. Team with the people who know HP infrastructure hardware and software best-the experienced professionals at HP Services. **Protect your business beyond warranty** Warranty protects against manufacturer defects, however warranty uplifts, such as HP Care Pack Services protect the business-by reducing downtime risks and providing operational consistency for mission-critical and standard business computing. **What HP Storage Technology Services can do for you** HP Storage Technology Services can help you design, deploy, test, integrate, support, and manage IT and infrastructure solutions. HP storage lifecycle support services offers a full spectrum of customer care-from technology support to complex migrations to complete managed services. **Choose the right level of support, deployment and integration services** HP support recommendations are designed to help you enhance technology operations and lower risk-and make it easier for you to seek the right balance between affordability and service-level commitments. Depending on your individual support needs, choose from three levels of care that cover the entire lifecycle to better address your needs-Optimized Care, Standard Care, and Basic Care. If none of our support recommendations meet your needs, we can tailor a service solution for your unique support requirements. Only HP brings together deep expertise, proactive and business critical support and a strong partner network-plus, a full set of infrastructure services designed to power a Converged Infrastructure.
Optimized Care- delivers best performance and stability through deployment and proactive management practices	**HP 24x7 Proactive Care-** for a higher return on your storage investment, Proactive Care delivers hardware and software support services designed specifically for your technology; rapid access to Advanced Solution Center Specialists plus, Firmware/Software management and best practice advice. Customers can optimize the return on their IT investment and realize the advantage of running their business critical applications on virtualized/x86 infrastructure
Standard Care-maintains high level of uptime, along with expert help to cut the cost and complexity of implementation and support	**HP 24x7 Proactive Care-** for a higher return on your storage investment, Proactive Care delivers hardware and software support services designed specifically for your technology; rapid access to Advanced Solution Center Specialists plus, Firmware/Software management and best practice advice. Customers can optimize the return on their IT investment and realize the advantage of running their business critical applications on virtualized/x86 infrastructure

Service and Support, HP Care Pack, and Warranty Information

Basic Care-Minimum recommended support	**Onsite Hardware Support**-HP Services delivers comprehensive Hardware Support for organizations of all sizes and environments of all type. Hardware Support Services are increasingly important criteria in the buying process, and customers need to know they are buying the best the market has to offer. HP experts can help your customer improve the performance, reliability, and availability of their storage environment with the most comprehensive support line in the storage industry, including availability guarantees and data protection. HP Care Pack services for storage offers a complete range of services for multivendor networked storage environments and data-intensive applications, all based on our proven, time-tested services methodology. Whether their needs are basic hardware and software support, 24 x 7 support, or mission critical storage support, HP has the service that meets their needs. HP Hardware Support Onsite Service data sheet: http://h71028.www7.hp.com/ERC/downloads/5982-6547EN.pdf http://athp.hp.com/portal/go/5982-6547
Implement right from the start	**HP Installation for Storage Installation for Blade System -** HP Installation and Startup Service for HP BladeSystem Infrastructure provides for an integrated hardware and software implementation that includes: remote service planning, onsite deployment of hardware and software, installation verification testing, and customer orientation. Professional integrated hardware and software implementation for small/midsize businesses and enterprise satellite locations
	HP Proactive Select: Accelerate the ROI of your technology investment HP Proactive Select is a flexible way to purchase services to fit your particular environment or situation. Working with an HP Account Support Manager, you select a 'package' of services, from a wide range of proactive services offered by HP spanning many technologies and processes-- such as onsite firmware upgrades, health checks, assessments, and education. You tailor the service delivery to improve time-to-production, optimize performance, or build in continuous improvements The link to the datasheet is as follows: http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-3842ENW.pdf
Remote Support Tools	**HP Insight Remote Support-** Available at no additional cost to all warranty, HP Care Pack Service and service agreement customers, uses proven technology to deliver secure, reliable 24x7 remote monitoring, diagnosis and problem resolution. http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-4676ENW.pdf
Additional services to meet your needs	HP Proactive Select HP Proactive Select is a flexible way to purchase services to fit your particular environment or situation. Working with an HP Account Support Manager, you select a 'package' of services, from a wide range of proactive services offered by HP spanning many technologies and processes-- such as onsite firmware upgrades, health checks, assessments, and education. You tailor the service delivery to improve time-to-production, optimize performance, or build in continuous improvements http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-3842ENW.pdf
For more information	www.hp.com/services/storage To learn more on HP Storage Services, please contact your HP sales representative or HP Authorized Channel Partner
	HP Care Pack Services are sold by HP and HP Authorized Service Partners: ' Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools. ' Customers purchasing from a commercial reseller can find HP Care Pack Services at

Service and Support, HP Care Pack, and Warranty Information

www.hp.com/go/lookuptool

Technical Specifications

HP 320 GB IO Accelerator for BladeSystem c-Class AJ878B	**Usable Capacity**	320 GB		
	Technology	NAND Flash, MLC		
	Length x Width x Height	Imperial:	Width	4.460"
			Length	3.970"
			Height	0.543"
		Metric:	Width	11.33 cm
			Length	10.08 cm
			Height	1.38 cm
	Form factor	Type 1 c-Class Mezzanine		
	Bus Interface	PCI Express Gen-1 x4		
	Power (Nominal)	14 watts (70% read / 30% write ratio)		
	Operating Temperature	0° to 60° C		

HP 640 GB IO Accelerator for BladeSystem c-Class BK836A	**Usable Capacity**	640 GB		
	Technology	NAND Flash, MLC		
	Length x Width x Height	Imperial:	Width	4.460"
			Length	3.970"
			Height	0.543"
		Metric:	Width	11.33 cm
			Length	10.08 cm
			Height	1.38 cm
	Form factor	Type 1 c-Class Mezzanine		
	Bus Interface	PCI Express Gen-1 x4		
	Power (Nominal)	14 watts (70% read / 30% write ratio)		
	Operating Temperature	0° to 60° C		

Technical Specifications

HP 365 GB IO Accelerator for BladeSystem c-Class QK761A	**Usable Capacity**	365 GB		
	Technology	NAND Flash, MLC		
	Length x Width x Height	Imperial:	Width	5.100"
			Length	3.885"
			Height	0.563"
		Metric:	Width	12.96 cm
			Length	9.87 cm
			Height	1.43 cm
	Form factor	Type B c-Class Mezzanine		
	Bus Interface	PCI Express Gen-2 x4		
	Power (Nominal)	14 watts (70% read / 30% write ratio)		
	Operating Temperature	0° to 60° C		

HP 785 GB IO Accelerator for BladeSystem c-Class QK762A	**Usable Capacity**	785 GB		
	Technology	NAND Flash, MLC		
	Length x Width x Height	Imperial:	Width	5.100"
			Length	3.885"
			Height	0.563"
		Metric:	Width	12.96 cm
			Length	9.87 cm
			Height	1.43 cm
	Form factor	Type B c-Class Mezzanine		
	Bus Interface	PCI Express Gen-2 x4		
	Power (Nominal)	14 watts (70% read / 30% write ratio)		
	Operating Temperature	0° to 60° C		

HP 1.2 TB IO Accelerator for BladeSystem c-Class QK763A	**Usable Capacity**	1.2 TB		
	Technology	NAND Flash, MLC		
	Length x Width x Height	Imperial:	Width	5.100"
			Length	3.885"
			Height	0.563"
		Metric:	Width	12.96 cm
			Length	9.87 cm
			Height	1.43 cm
	Form factor	Type B c-Class Mezzanine		
	Bus Interface	PCI Express Gen-2 x4		
	Power (Nominal)	16 watts (70% read / 30% write ratio)		
	Operating Temperature	0° to 60° C		

Technical Specifications

Environment-friendly Products and Approach	**End-of-life Management and Recycling**	Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hp.com/go/green. To recycle your product, please go to: http://www.hp.com/go/green or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/green. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.