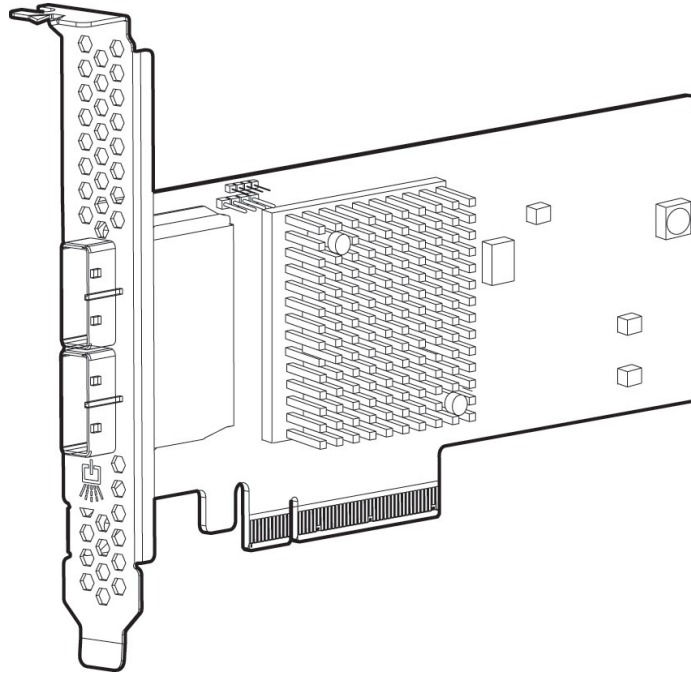## Overview

The HP H221 Host Bus Adapter is a 2X4 external ports HBA provides customers with the flexibility and speed they have come to expect from HP. The H221 HBA has been optimized for connection to the SAS based HP P2000 G3 SAS Modular Smart Array, D2000 and D6000 Disk Enclosures, and MSA2040 SAN Storage; and provides support for both 6 Gb SAS and SATA Hard Disk Drives. In addition, the H221 HBA controller provides support for SAS tape drives. This SAS HBA is ideal for driving cost-effective and reliable scalability in today's data centers.

What's New
- New HP221 PCIe 3.0 SAS HBA

Model

Host Bus Adapter	HP H221 Host Bus Adapter	650931–B21
	HP H221 PCIe 3.0 SAS Host Bus Adapter	729552-B21

Kit contents
- HP H221 Host Bus Adapter
- Low profile controller bracket

Compatibility

Servers

ProLiant DL (rack-optimized):

- HP ProLiant DL160 Gen8
- HP ProLiant DL320e Gen8
- HP ProLiant DL320e Gen8 v2
- HP ProLiant DL360e Gen8
- HP ProLiant DL360p Gen8
- HP ProLiant DL380e Gen8
- HP ProLiant DL380p Gen8
- HP ProLiant DL385p Gen8
- HP ProLiant DL560 Gen8

ProLiant ML (expansion-optimized):

- HP ProLiant ML310e Gen8
- HP ProLiant ML310e Gen8 v2
- HP ProLiant ML350e Gen8
- HP ProLiant ML350p Gen8

ProLiant SL (scalable line):

- HP ProLiant SL210t Gen8
- HP ProLiant SL270s Gen8
- HP ProLiant SL4540 Gen8 Server
- HP ProLiant SL4545 G7 Server

NOTE: This is a list of supported servers. Some may be discontinued.

Standard Features

Performance	Designed to be as flexible as HP servers, HP H221 Host Bus Adapter provides support for the HP P2000 G3 MSA Array Systems. The HP adapter delivers exceptional system performance, with eight 6 Gb/s SAS ports providing up to 48 Gb/s total storage bandwidth.
HP Server Integration	Fully integrated and tested with ProLiant servers and management software.
Key Features	• SAS technology delivers high performance and data bandwidth up to 6 Gb/s per physical link • Mix-and-match SAS and SATA hard drives; deploy drive technology as needed • 8 GB/s bandwidth for HP H221 PCIe 3.0 SAS HBA and 4 GB/s bandwidth for HP H221 Host Bus Adapter • PCIe 3.0 x 8 capable on H221 PCIe 3.0 model or PCIe 2.0 x8 capable on H221 model
Ports	Eight (8) SAS physical links distributed across 2 x4 external SFF8088 Mini-SAS connectors
Performance	HP's High Performance Architecture sets new boundaries for industry performance expectations! • 6 Gb/s SAS (bandwidth per physical link) • 48 Gbps total available bandwidth (8 physical links x 6Gbps) • PCIe 3.0 host interface x8 (8 GT/s theoretical bandwidth) on H221 PCIe 3.0 model or PCIe 2.0 host interface x8 (5 GT/s theoretical bandwidth) on the H221 model
Capacity	Fulfilling the need for high performance and capacity expansion, the HP H221 SAS HBA offers: • Up to 280TB of external storage per controller with 1 x HP D6000 Disk Enclosure and 70 x 4TB LFF SAS hard drives • Up to 200 TB of external storage per controller with 8 x HP D2700 Disk Enclosures and 200 x 1TB SFF SATA hard drives • Up to 240TB of external storage per controller with 8 x HP D2700 Disk Enclosures and 200 x 1.2TB SFF SAS hard drives • Up to 384TB of external storage per controller with 8 x HP D2600 Disk Enclosure and 96 x 4TB LFF SAS or SATA hard drives • Up to 384TB of external storage per controller with 8 x HP P2000 G3 MSA and 96 x 4TB LFF SAS or SATA hard drives • Up to 179TB of external storage per controller with 1 x HP P2000 G3 MSA SFF plus 5 x HP D2700 Disk Enclosures and 149 x 1.2TB SFF SAS hard drives • Up to 48TB of external storage per controller with 1 x HP MSA2040 SAN Storage and 12 x 4TB LFF SAS hard drives • Up to 24TB of external storage per controller with 1 x HP MSA2040 SAN Storage and 24 x 1TB SFF SAS hard drives
Form Factor	• Either high-profile or low-profile. (parts included with option)

Standard Features

Supported Enclosures
- HP P2000 G3 MSA Array Systems
- HP D6000 Disk Enclosure
- HP D2000 Disk Enclosure

Operating Systems

Microsoft Windows Server 2012

Microsoft Windows Server 2008 SP2

Microsoft Windows Server 2008 R2 SP1

Red Hat Enterprise Linux 5 (x64 & x86)

Red Hat Enterprise Linux 6 (x64 & x86)

SUSE Linux Enterprise Server 10 (x64 & x86)

SUSE Linux Enterprise Server 11(x64 & x86)

VMware ESX 4.1 and ESXi 4.1

VMware ESXi 5.0, 5.1, 5.5

NOTE: For more Linux OS support & certification information, please visit our the ProLiant & BladeSystem Server Linux matrix: http://h18004.www1.hp.com/products/servers/linux/hplinuxcert.html

Warranty

The warranty for this device is 1 year parts only.

Warranty Upgrade Options

- Response - Upgrade on-site response from next business day to same day 4 hours
- Coverage - Extend hours of coverage from 9 hours x 5 days to 24 hours x 7 days
- Duration - Select duration of coverage for a period of 1, 3, or 5 years
- Warranty upgrade options can come in the form of Care Packs, which are sold at the HP System level this product attaches too

Service and Support

Service and Support	**HP Technology Services** Capitalizing on HP ProLiant server and HP BladeSystem capabilities requires a service partner who understands your increasingly complex business technology environment. That's why it makes sense to team up with the people who know HP infrastructure hardware and software best - the experienced professionals at HP Services **Protect your business beyond warranty with HP Care Pack Services** When you buy HP Options, it's also a good time to think about what level of service you may need. HP Care Pack services provide total care and support expertise with committed response choices designed to meet your IT and business need. HP Foundation Care services offer scalable reactive support-packages for HP servers and software. You can choose the type and level of service that is most suitable for your IT and business needs. HP Proactive Care delivers high levels of system availability through proactive service management and advanced technical response.

Recommended HP Care Pack Services for optimal satisfaction with your HP product

Optimized Care	**3-Year HP 6 hour Call to Repair Response, Proactive Care** Combined reactive and proactive support for hardware and software helping optimize your systems and delivering high levels of availability through proactive service management and advanced technical response. Hardware problem resolution to return the hardware in operating condition within 6 hours of the initial service request. A Technical Account Manager, as your single point of contact, will own your call or issue end to end until resolved. http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf **HP Installation of ProLiant Add On Options Service** This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware or software is installed smoothly, efficiently, and with minimal disruption of your IT and business operations.
Standard Care	**3-Year HP 24x7 4 hour response, Proactive Care Service** This service gives you combined reactive and proactive support including rapid access to our Advanced Solution Center to manage and prevent problems and a Technical Support Specialist with a broad level of technical knowledge that will engage with additional technical expertise as needed from HP's vast global resources. http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf **HP Installation of ProLiant Add On Options Service** This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware or software is installed smoothly, efficiently, and with minimal disruption of your IT and business operations.
Related Services	**HP Proactive Care Personalized Support - Environmental Option** The Personalized Support option provides an assigned Account Support Manager who can bring best practices from across the industry plus extra technical skills to your IT team. This option is only available as an add-on to HP Proactive Care Support. **HP Proactive Select Service** Provides a flexible way to purchase HP best-in-class consultancy and technical services. You can buy Proactive Select Service Credits when you purchase your hardware and then use the credits over the next 12 months.

Service and Support

http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENN.pdf

NOTE: Additional HP Care Pack services can be found at: http://hp.com/go/cpc

Insight Online/Insight Remote Support	HP Insight Remote Support provides 24 X 7 remote monitoring, proactive notifications, and problem resolution. This comes at no additional cost with your HP solution. Learn more about Insight Remote Support http://www.hp.com/go/insightremotesupport and Insight Online http://h18013.www1.hp.com/products/servers/management/insight-online/index.html.
HP Support Center	Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more http://www.hp.com/go/hpsc HP's Support Center Mobile App* allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime. HP Insight Remote Support and HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement. **NOTE:** HP's Support Center Mobile App is subject to local availability.
Parts and materials	HP will provide HP-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements. Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product QuickSpecs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services. The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by HP due to malfunction.
For more information	To learn more on services for HP ProLiant servers, please contact your HP sales representative or HP Authorized ServiceOne Channel Partner. Or visit: www.hp.com/services/proliant

Related Options

NOTE: This is a list of supported options. Some may be discontinued.

HP Disk Enclosures	**HP D2000 Disk Enclosures**	
	HP D2600 Disk Enclosure	AJ940A
	HP D2700 Disk Enclosure	AJ941A
	NOTE: Please see the QuickSpecs for additional information and a list of compatible hard drives: http://h18000.www1.hp.com/products/quickspecs/13404_div/13404_div.html (Worldwide)	
	HP D6000 Disk Enclosure	
	HP D6000 Dual I/O Module Disk Enclosure	QQ695A
	NOTE: Please see the supported Disk Enclosure QuickSpecs for a list of compatible hard drives: http://h18000.www1.hp.com/products/quickspecs/14419_div/14419_div.html	

HP Modular Smart Arrays	**HP MSA 2040 Storage**	
	HP MSA 2040 SAS Dual Controller LFF Storage	C8S54A
	HP MSA 2040 SAS Dual Controller SFF Storage	C8S55A
	NOTE: Please see the QuickSpecs for additional information and a list of compatible hard drives: http://h18000.www1.hp.com/products/quickspecs/14603_div/14603_div.html (Worldwide)	

HP Disk Storage Systems	**HP P2000 G3 Modular Smart Array Systems**	
	P2000 G3 SAS Controller	
	HP P2000 G3 SAS MSA Array System Controller	AW592A
	P2000 Controller-less Chassis (AC-powered)	
	HP P2000 LFF Modular Smart Array Chassis	AP838A
	HP P2000 SFF Modular Smart Array Chassis	AP839A
	Configured Units, 6 Gb SAS Systems	
	HP P2000 G3 SAS MSA Dual Controller LFF Array System	AW593A
	HP P2000 G3 SAS MSA Dual Controller SFF Array System	AW594A
	SAS Cable for P2000 G3 Modular Smart Array Systems	
	HP External Mini SAS 2m Cable	407339-B21
	NOTE: Please see the QuickSpecs for additional part numbers and information at: http://h18000.www1.hp.com/products/quickspecs/13551_div/13551_div.html	

HP Tape Drives	**DAT Tape Drives**	
	HP StoreEver DAT 160 SAS Internal Tape Drive	Q1587A
	HP StoreEver DAT 160 SAS External Tape Drive	Q1588A
	LTO Ultrium Tape Drives	
	HP StoreEver LTO-2 Ultrium 448 SAS Internal Tape Drive	DW085B
	HP StoreEver LTO-2 Ultrium 448 SAS External Drive	DW086A
	HP StoreEver LTO-3 Ultrium 920 SAS Internal Tape Drive	EH847B
	HP StoreEver LTO-3 Ultrium 920 SAS External Tape Drive	EH848A

Related Options

HP StoreEver LTO-4 Ultrium 1760 SAS Internal WW Tape Drive	EH919B
HP StoreEver LTO-4 Ultrium 1760 SAS External Tape Drive	EH920A
HP LTO-4 Ultrium 1760 SAS (1) in 1U Rack-mount Kit	EH946A
HP StoreEver LTO-4 Ultrium 1840 SAS Internal Tape Drive	EH860B
HP StoreEver LTO-4 Ultrium 1840 SAS External Tape Drive	EH861A
HP StoreEver LTO-5 Ultrium 3000 SAS Internal Tape Drive	EH957B
HP StoreEver LTO-5 Ultrium 3000 SAS External Tape Drive	EH958B
HP StoreEver LTO-5 Ultrium 3000 SAS Tape Drive in 1U Rack-mount	EJ014B
HP StoreEver LTO-5 Ultrium 3280 SAS Internal Tape Drive	EH899B
HP StoreEver LTO-5 Ultrium 3280 SAS External Tape Drive	EH900B
HP StoreEver LTO-5 Ultrium 3280 SAS Tape Drive in 3U Rack-mount	EJ013B
HP StoreEver LTO-6 Ultrium 6650 SAS Internal Tape Drive	EH963A
HP StoreEver LTO-6 Ultrium 6650 SAS External Tape Drive	EH964A
HP StoreEver LTO-6 Ultrium 6250 SAS Internal Tape Drive	EH696A
HP StoreEver LTO-6 Ultrium 6250 External Tape Drive	EH970A
HP StoreEver LTO-6 Ultrium 6250 SAS Rack-mount - single drive 1U rack-mount kit	COL99A

NOTE: HP internal tape drives are only supported when installed in a Rack-mount Tape Drive Enclosure

Rack-mount Tape Drive Enclosures

HP 1U SAS Rack-mount Kit	AE459A

NOTE: The 1U SAS Rack-Mount Kit can support up to (2) half-height internal tape drives and is compatible with the DAT 160 SAS, LTO-2 Ultrium 448 SAS, LTO-3 Ultrium 920 SAS, LTO-4 Ultrium 1760 SAS, LTO-5 Ultrium 3000 and LTO-6 Ultrium 6250 tape drives.

HP 3U SAS Rack-mount Kit	AG576A

NOTE: The 3U Rack-mount Kit can support up to (2) full-height or (4) half-height internal tape drives and compatible with multiple SAS tape drives including DAT 160 SAS, LTO-2 Ultrium 448 SAS, LTO-3 Ultrium 920 SAS, LTO-4 Ultrium 1760 SAS, LTO-4 Ultrium 1840 SAS, LTO-5 Ultrium 3000 SAS, LTO-5 Ultrium 3280 SAS, LTO-6 Ultrium 6250 and LTO-6 Ultrium 6650 tape drives.

Tape Autoloaders

HP StoreEver 1/8G2 LTO-6 Ultrium 6250 SAS Tape Autoloader	COH18A
HP StoreEver 1/8 G2 LTO-4 Ultrium 1760 SAS Tape Autoloader	AK377B
HP StoreEver 1/8 G2 LTO-5 Ultrium 3000 SAS Tape Autoloader	BL536B

Tape Libraries

HP StoreEver MSL2024 1 LTO-6 Ultrium 6250 SAS Tape Library	COH20A
HP StoreEver MSL2024 2 LTO-6 Ultrium 6250 SAS Tape Library	COH21A
HP MSL2024 1 LTO-5 Ultrium 3000 SAS Tape Library	BL537B
HP MSL2024 1 LTO-4 Ultrium 1760 SAS Tape Library	AK378B
HP StoreEver MSL4048 2 LTO-6 Ultrium 6250 SAS Tape Library	COH23A
HP MSL4048 2 LTO-5 Ultrium 3000 SAS Tape Library	BL538B
HP MSL4048 2 LTO-4 Ultrium 1760 SAS Tape Library	AK380B
HP MSL4048 0-Drive Tape Library	AK381A
HP MSL8048 0-drive Tape Library	AU300A
HP StoreEver MSL8096 2 LTO-6 Ultrium 6250 SAS Tape Library	COH25A
HP MSL8096 2 LTO-5 Ultrium 3000 SAS Tape Library	BL539B

SAS Cables for Tape Drives and Automation

Related Options

HP SAS Min-Min 1x-2M Cable Assembly Kit	AE470A

NOTE: Use this cable to connect HP SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.

HP SAS MIN-MIN 1X-4M Cable Assembly Kit	AE465A

NOTE: Use this cable to connect HP SAS external tape devices to HP SAS controllers with external Mini-SAS (SFF8088) connectors.

HP SAS MIN-MIN 3X1X-5M Cable Assembly Kit	AG452A

NOTE: This split cable connects internally to SAS Hard Drive Cage (3 channels) and externally to the tape drive (1channel) with other connector attaching to the controller. The external cable, for the drive, requires a PCI slot to exit the server.

HP 2m External Mini-SAS to 4x1 Mini-SAS Cable	AN975A

NOTE: One cable is required for every four drives. Use this cable to connect HP MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.

HP 4m External Mini-SAS to 4x1 Mini-SAS Cable	AN976A

NOTE: One cable is required for every four drives. Use this cable to connect HP MSL SAS Tape Libraries to Mini-SAS (SFF8088) ports.

Technical Specifications

Dimensions (excluding bracket)	6.6 x 2.7 x 0.6 in (16.8 x 6.86 x 1.6 cm)
Disk Drive and Enclosure Protocol Support	6 Gbps SAS (Serial Attached SCSI) 6 Gbps SATA (Serial Advanced Technology Attachment)
Architecture	Serial Attached SCSI (SAS) Serial Advanced Technology Attachment (SATA)
SAS Connectors	2x4 external SFF-8088 (Mini-SAS)
Data Transfer Method	600 MB/s bandwidth (1200 MB/s, full duplex) per port for combined throughput of up to 48 Gb/s
PCIe Bus Speed	PCIe 3.0 x8 (8 GT/s maximum theoretical bandwidth) or PCIe 2.0 x8 (5 GT/s maximum theoretical bandwidth) depending on the model
Port Transfer Rate	24 Gb/s per x4 Wide SAS Port (4 x 6 Gb/s)
Memory Addressing	64-bit, supporting servers memory greater than 4 GB
Upgradeable Firmware	4-MB flashable ROM online/offline

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.