

Overview

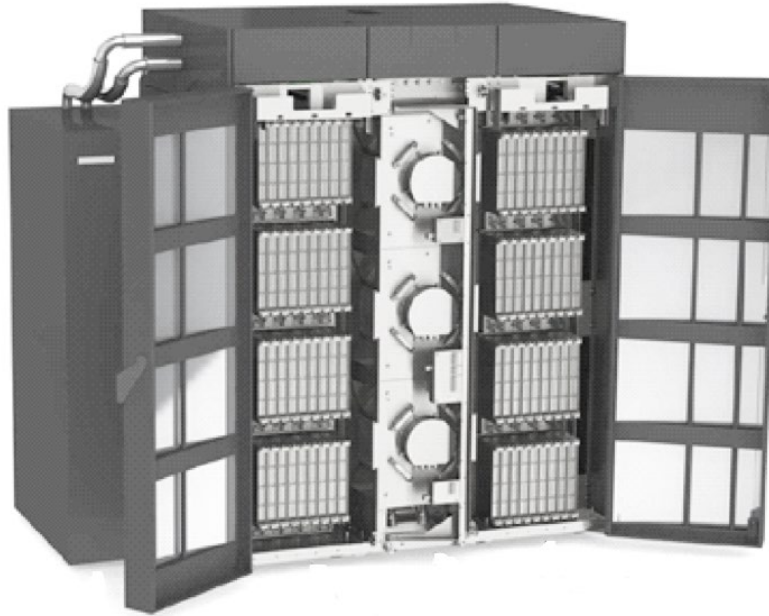
HPE SGI 8600 System

The HPE SGI 8600 System is a liquid cooled, tray-based, high-density clustered computer system designed from the ground up to deliver the utmost in performance, scale, and density. The basic building block of the HPE SGI 8600 System is the E-cell. The E-cell consists of two 42U high E-racks which are separated by a cooling rack. The E-cell is a sealed unit, uses closed-loop cooling technology, and does not exhaust heated air into the data center. A direct attached liquid cooled “cold sink” provides for efficient heat removal from high power devices including processors, GPUs, and switches via an auxiliary cooling distribution unit (CDU).



HPE SGI 8600 E-cell - Closed and With Trim

Overview



HPE SGI 8600 E-cell with CDU- Open and Without Cooling Rack Trim

Each E-rack contains up to four compute enclosures which provide power, cooling, system control, and network fabric for up to nine compute trays. An E-Cell therefore can contain up to 72 compute trays. An integrated midplane between compute trays and fabric switches delivers cableless infrastructure inside the enclosure.

E-Rack Detail

A single E-rack can accommodate up to 36 compute tray slots within four compute enclosures. The E-rack is not configured with any cooling fans. All the cooling needs for the E-rack are provided by the cooling rack. This approach to cooling provides greater efficiency for the rack-level cooling, decreases power costs associated with cooling (fewer blowers) and utilizes a single water source for two racks. The custom-designed 42U-high E-rack supports both indirect and direct cooling methods. The indirect method is where the conditioned air supplied by the cooling rack provides the cooling to the components in the E-rack. This method can be used for configurations that require a lower level of heat removal. The direct method is the addition of liquid-cooled cold sinks to the processors in the compute trays. This method is used in parallel with the indirect cooling when the indirect cooling method is not sufficient to remove all of the heat from the E-rack.

One 42U high, 60cm wide E-rack supports the following:

- Maximum of four 10.5U compute enclosures
- Maximum of 36 quad-node compute trays (up to 288 sockets)
- Maximum of sixteen IB switch blades
- Maximum of nine power supplies per compute enclosure - 36 total 3000W power supplies
- One AC input power raceway
- Maximum of two PDUs
- Maximum 221.184TB of memory (36 trays x 4 nodes/tray x 2 sockets x 6 channels x 128GB)



Overview

Compute Enclosure Detail

The compute enclosure is a 10.5U high chassis assembly that provides power, cooling, system control, and network fabric for up to nine compute tray slots via a midplane. A maximum of four enclosures can be placed in a single 42U high E-rack.

The features of the compute enclosure are as follows:

- Nine compute tray slots
 - Nine power supply slots
 - Four IB switch blade slots
 - One CMC slot
 - One power/signal midplane
-



Standard Features

Server Trays

Server trays have three basic sections: computation, memory, and I/O expansion and consume one tray slot in the compute enclosure. The following three server trays are designed for the HPE SGI 8600 System:

HPE XA730i “Saxon”- Quad Node

The features of this server tray are as follows

- Four Logical 2-socket nodes
 - Support for full Intel® Xeon® Processor Scalable family SKU stack
 - Support for Intel® Cascade Lake Refresh Processors
- Six DIMMs per socket
 - Up to 128 GB DIMMs (1.54 TB/node) at up to 2933 MT/s
- Four HCA Mezzanine Card Slots
 - Mellanox Connect-IB (FDR)
 - Mellanox ConnectX-5 (EDR)
 - Intel Omni-Path (OPA1)
- Extension Space options (per node)
 - Up to (2) 2.5 inch SATA HDD/SSD
 - (1) HDD/SSD and (1) x16 PCIe slot
- Processors are cooled with Cold Sink technology
- Dual or single port mezzanine cards are supported
- Four Board Management Controllers (BMC) - one per node

HPE XA780i “Plainfield” - Single Node with NVidia SXM2

The features of this server tray are as follows:

- One Logical 2-socket node
 - Support for full Intel® Xeon® Processor Scalable family SKU stack
 - Support for Intel® Cascade Lake Refresh Processors
- Eight DIMMs per socket
 - Up to 128GB DIMMs (1.54TB/node) at up to 2933 MT/s
 - Two DIMM slots reserved for Intel 3D XPoint Support (when available)
- Two HCA Mezzanine Card Slots
 - Mellanox Connect-IB (FDR)
 - Mellanox ConnectX-5 (EDR)
 - Intel Omni-Path (OPA1)
- Extension Space options (per node)
 - Up to (4) 2.5 inch SATA HDD/SSD
 - Two or four NVIDIA SXM2 Pascal GPUs with NVLink
- Cooled with Cold Sink technology
- One or two 2 x 1 port mezzanine cards are supported

HPE XA760i “Kendall” - Quad Node

The features of this server tray are as follows:

- Four self-hosted single-socket Intel® Xeon Phi™ Processor nodes
- Six DIMMs per socket
 - Up to 64GB DIMMs (384GB/node) at up to 2400 MT/s
- Four HCA Mezzanine Card Slots
 - Mellanox Connect-IB (FDR)
 - Mellanox ConnectX-5 (EDR)
 - Intel Omni-Path (OPA1)



Standard Features

- Extension Space options (per node)
 - Up to (4) 2.5 inch SATA HDD/SSD
 - Cooled with Cold Sink technology
 - Dual or single port mezzanine cards are supported
 - Four Board Management Controllers (BMC) - one per node
-

Switch Enclosure

The switch enclosure is 10.5U high and is mounted to the rear of the compute enclosure. The purpose of the switch enclosure is to provide a structure for mounting the switch blades and CMC to the compute enclosure. The switch enclosure supports a maximum of four switch blades.

The following Switch blade types are supported

- “Standard” FDR and EDR
- “Premium” FDR and EDR
- “Standard” Intel Omni-Path

The Standard FDR and EDR switch have a single 36-port ASIC with 18 ports connecting to compute nodes and 18 ports for connecting to external targets.

The Premium FDR and EDR switch has two 36-port ASICs with nine ports from each ASIC connecting to compute nodes and 18 ports from each ASIC for connecting to external targets. The additional ports routed to the bulkhead on the premium switch enable richer fabric across the system versus the standard switch.

The 48-port Intel Omni-Path standard switch blade contains a single 48-port Intel Omni-Path switch ASIC from Intel. Eighteen ports of the ASIC connect to the compute trays in the enclosure, and the other thirty ports connect to externally mounted QSFP ports.

The following mezzanine card types are supported

- Single and dual port InfiniBand with one Mellanox Connect-IB ASIC (FDR) or ConnectX-5 (EDR)
- Dual port InfiniBand with two Mellanox ConnectX-5 ASICs (EDR)
- Single and dual port Omni-Path with one Intel Wolf River ASIC

Single port mezzanine cards are used for single-plane topologies and are a cost reduced and lowest performance mezzanine card.

Dual port mezzanine cards with one ASIC is a higher performance FDR and EDR option for customers that want a dual-plane topology. It is the highest performance Omni-Path option as it is connected to the compute node via two x16 Gen3 PCIe channels of the Wolf River ASIC.

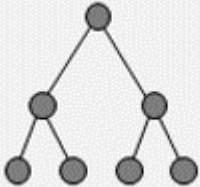
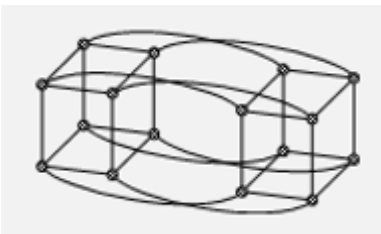
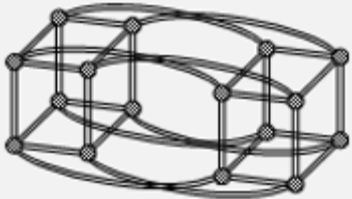
Dual port EDR mezzanine cards with two ASIC are the highest performance EDR option as it is connected to the compute node via two x16 Gen3 PCIe channels.



Standard Features

Topology

There are four topologies supported in the HPE SGI 8600: All-to-All, Hypercube, Enhanced Hypercube and Fat tree. The chart below provides a high level depiction of each topology including a summary of their use cases.

Fat Tree		• Strong general purpose fabric, Effective for small systems. Expensive for large systems • Can provide rich path fabrics and consistent hop counts resulting in predictable job latency. • Cost does not scale linearly; switching/cabling becomes increasingly expensive with size
All to All		• Ideal for apps that are highly sensitive to Message Passing Interface (MPI) latency • Limited by port counts in switches to smaller systems • Multi Dimensional All to All – under investigation – for larger systems • Max switch hop count = $D+1$ (where D = dimensions of all to all)
Hypercube		• Lightest weight fabric at the lowest cost, Rich I/O and live integration options • Switching / cabling scales linearly to extremely large systems, Hop count and latency scales linearly with system doubling. Max switch hop count = $D+1$ (where D = dimensions of the Hypercube). • RfPs written for minimum bi section bandwidth – defined for use w //Fat- Trees- do not capture full capability, Best captured by “aggregate bisection” of all dimensions
Enhanced Hypercube		• All the benefits of Hypercube, Added redundant links in each dimension improve interconnect bandwidth • Same as Hypercube with RfP's are written for Minimum bi-section bandwidth

Standard Features

Cooling Tower

One cooling rack is required for every two E-racks in a full E-cell. In a full E-cell the cooling rack is positioned between two E-racks.

Notes: A half E-cell is supported. A half E-cell consists of one E-rack (the left side E-rack) and a cooling rack.

The cooling rack has three large blowers that pull conditioned air from the front of the E-rack to the rear (this is a suction based system). In a standard configuration, the cooling rack has a maximum cooling capacity of approximately 72 kW. The input fluid temperature range is between 5 and 32 degrees C non-condensing.

The mechanical dimensions, weight, and power of the cooling rack are as follows:

- Dimensions (HxWxD): 93 x 23.53 x 47.24 in (236.2 x 60 x 120 cm)
- Weight: 995 lb (635 kg)
- Power: 400 – 480VAC, 3.2 to 6.7 kW

CDU (Cooling Distribution Unit)

The cooling distribution unit (CDU) is a liquid-to-liquid heat exchanger that is used to remove heat from processors, network ASICs, and GPU ASICs via cold sinks. The CDU uses a secondary loop to circulate a heat transfer liquid to the cold sinks. The heat captured in the secondary loop is transferred to the facilities primary loop via a liquid-to-liquid heat exchanger.

The CDU is designed to circulate and control the heat transfer fluid to the manifolds that are in each enclosure in the E-rack. The CDU is rated for 305kW (1040.6 BTU/H) of cooling. One CDU supports a maximum of four E-racks (two E-cells).

The CDU consists of a cabinet that includes a heat exchanger, circulating pump(s), control valve, sensors, controller, valves, and piping. The CDU monitors room conditions and prevents condensation by maintaining the secondary loop at a temperature above the room's dew point.

All functions, such as switching pumps (if applicable), controlling water temperature, etc., are managed by the controller using user defined settings.

Software Stack

Hewlett Packard Enterprise offers customers complete software stack for HPE SGI 8600 so they can choose the right mix of software solutions to fit their needs – from system software to application and software development tools.

Operating systems

- SUSE Enterprise Linux Server 12, 15
- Red Hat Enterprise Linux 7, 8
- CentOS 7, 8
- TOSS 7

Fabric software

- Mellanox UFM
- Intel Omni-Path Fabric Software



Standard Features

System management

HPE Performance Cluster Manager – complete integrated cluster management software for all HPE HPC clusters offering: system setup, hardware monitoring and management and cluster health management, image management and software updates as well as power management. The software also integrates with leading HPC ISV and open source software solutions.

Workload Management and Orchestration

- Altair® PBS Professional
 - Adaptive Computing Moab® HPC Suite
 - Slurm Workload Manager
 - Containers: Singularity & Docker
 - Kubernetes
-

Software Development Tools (Programming languages, debuggers, libraries)

- HPE Message Passing Interface (MPI)
 - Open MPI
 - PGI Compilers
 - Intel® Parallel Studio XE (w/Intel® MPI)
 - PGI® Professional Edition
 - GNU Compiler Collection
 - Rogue Wave Software® TotalView®
 - Arm® Forge Professional
 - Arm Allinea Studio
 - Mellanox HPC-X
 - OpenHPC
 - NVIDIA CUDA Toolkit, OpenCL, OpenACC
-

Remote Visualization

NICE DCV & EnginFrame

For more information about software solutions for HPE SGI 8600 visit:

<https://www.hpe.com/global/h22150/50272cbe-0563-4ed5-8f07-1ff0ecf06b88/index.html/>



Service and Support

HPE Services

No matter where you are in your digital transformation journey, you can count on HPE Services to deliver the expertise you need when, where and how you need it. From planning to deployment, ongoing operations and beyond, our experts can help you realize your digital ambitions.

<https://www.hpe.com/services>

Consulting Services

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<https://www.hpe.com/services/consulting>

HPE Managed Services

HPE runs your IT operations, providing services that monitor, operate, and optimize your infrastructure and applications, delivered consistently and globally to give you unified control and let you focus on innovation.

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Operational services

Optimize your entire IT environment and drive innovation. Manage day-to-day IT operational tasks while freeing up valuable time and resources. Meet service-level targets and business objectives with features designed to drive better business outcomes.

<https://www.hpe.com/services/operational>

HPE Complete Care Service

HPE Complete Care Service is a modular, edge-to-cloud IT environment service designed to help optimize your entire IT environment and achieve agreed upon IT outcomes and business goals through a personalized experience. All delivered by an assigned team of HPE Services experts. HPE Complete Care Service provides:

- A complete coverage approach -- edge to cloud
- An assigned HPE team
- Modular and fully personalized engagement
- Enhanced Incident Management experience with priority access
- Digitally enabled and AI driven customer experience

<https://www.hpe.com/services/completecure>

HPE Tech Care Service

HPE Tech Care Service is the operational support service experience for HPE products. The service goes beyond traditional support by providing access to product specific experts, an AI driven digital experience, and general technical guidance to not only reduce risk but constantly search for ways to do things better. HPE Tech Care Service delivers a customer-centric, AI driven, and digitally enabled customer experience to move your business forward. HPE Tech Care Service is available in three response levels. Basic, which provides 9x5 business hour availability and a 2-hour response time. Essential which provides a 15-minute response time 24x7 for most enterprise level customers, and Critical which includes a 6-hour repair commitment where available and outage management response for severity 1 incidents.

<https://www.hpe.com/services/techcare>



Service and Support

HPE Lifecycle Services

HPE Lifecycle Services provide a variety of options to help maintain your HPE systems and solutions at all stages of the product lifecycle. A few popular examples include:

- Lifecycle Install and Startup Services: Various levels for physical installation and power on, remote access setup, installation and startup, and enhanced installation services with the operating system.
- HPE Firmware Update Analysis Service: Recommendations for firmware revision levels for selected HPE products, taking into account the relevant revision dependencies within your IT environment.
- HPE Firmware Update Implementation Service: Implementation of firmware updates for selected HPE server, storage, and solution products, taking into account the relevant revision dependencies within your IT environment.
- Implementation assistance services: Highly trained technical service specialists to assist you with a variety of activities, ranging from design, implementation, and platform deployment to consolidation, migration, project management, and onsite technical forums.
- HPE Service Credits: Access to prepaid services for flexibility to choose from a variety of specialized service activities, including assessments, performance maintenance reviews, firmware management, professional services, and operational best practices.

Notes: To review the list of Lifecycle Services available for your product go to:

<https://www.hpe.com/services/lifecycle>

For a list of the most frequently purchased services using service credits, see the [HPE Service Credits Menu](#)

Other Related Services from HPE Services:

HPE Education Services

Training and certification designed for IT and business professionals across all industries. Broad catalogue of course offerings to expand skills and proficiencies in topics ranging from cloud and cybersecurity to AI and DevOps. Create learning paths to expand proficiency in a specific subject. Schedule training in a way that works best for your business with flexible continuous learning options.

<https://www.hpe.com/services/training>

Defective Media Retention

An option available with HPE Complete Care Service and HPE Tech Care Service and applies only to Disk or eligible SSD/Flash Drives replaced by HPE due to malfunction.

Consult your HPE Sales Representative or Authorized Channel Partner of choice for any additional questions and services options.

Parts and Materials

HPE will provide HPE-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 quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

How to Purchase Services

Services are sold by Hewlett Packard Enterprise and Hewlett Packard Enterprise Authorized Service Partners:

- Services for customers purchasing from HPE or an enterprise reseller are quoted using HPE order configuration tools.
- Customers purchasing from a commercial reseller can find services at <https://ssc.hpe.com/portal/site/ssc/>



Service and Support

AI Powered and Digitally Enabled Support Experience

Achieve faster time to resolution with access to product-specific resources and expertise through a digital and data driven customer experience

Sign into the HPE Support Center experience, featuring streamlined self-serve case creation and management capabilities with inline knowledge recommendations. You will also find personalized task alerts and powerful troubleshooting support through an intelligent virtual agent with seamless transition when needed to a live support agent.

<https://support.hpe.com/hpesc/public/home/signin>

Consume IT On Your Terms

HPE GreenLake edge-to-cloud platform brings the cloud experience directly to your apps and data wherever they are—the edge, colocations, or your data center. It delivers cloud services for on-premises IT infrastructure specifically tailored to your most demanding workloads. With a pay-per-use, scalable, point-and-click self-service experience that is managed for you, HPE GreenLake edge-to-cloud platform accelerates digital transformation in a distributed, edge-to-cloud world.

- Get faster time to market
- Save on TCO, align costs to business
- Scale quickly, meet unpredictable demand
- Simplify IT operations across your data centers and clouds

To learn more about HPE Services, please contact your Hewlett Packard Enterprise sales representative or Hewlett Packard Enterprise Authorized Channel Partner. Contact information for a representative in your area can be found at "Contact HPE"

<https://www.hpe.com/us/en/contact-hpe.html>

For more information

<http://www.hpe.com/services>



Technical Specifications

HPE SGI 8600 System E-Rack

Dimensions	89.6 x 24 x 48 in (H x W x D) 227.58 x 60.96 x 121.92 cm (H x W x D)
Compute tray enclosure	Up to four compute tray enclosures per rack with integrated compute trans, switches, and power Up to 8 + 1 redundant 3000W power supplies per compute tray enclosure
Cooling	Closed-loop airflow with direct liquid cooling for high wattage components and room neutral up to 32°C data center supply water.

Compute Tray Options – HPE XA730i Gen10 Server

Form factor	HPE XA730i is a single-slot tray for the HPE SGI 8600 System compute enclosure assembly
Processors	Intel Xeon Processor Scalable Family (support for full SKU stack); Intel Cascade Lake Refresh
Compute nodes/Tray	Four 2-socket CPU nodes
Memory/Node	Up to 1536 GB per node, 12 DIMM slots (6 per CPU socket) per node
Memory technology	8, 16, 32, 64, and 128 GB DDR4 2933 MT/s ECC Registered DIMMs
Extension space options (per node)	Up to (2) 2.5" SATA HDD/SSD (1) HDD/SSD and (1) x16 low profile PCIe slot
Fabric options (via Mezzanine Card) (per node)	Single or dual port Mellanox Connect-IB (FDR) Single or dual port Mellanox ConnectX-5 (EDR) Single or dual port Intel Omni-Path

HPE XA780i Gen10 Server

Form factor	HPE XA780i is a single-slot tray for the HPE SGI 8600 System compute enclosure assembly
Processors	Intel Xeon Processor Scalable Family; Intel Cascade Lake Refresh
Compute nodes/Tray	One 2-socket CPU node
Memory/Node	Up to 1536 GB per node, 14 DIMM slots (8 per CPU socket) per node
Memory technology	8, 16, 32, 64, and 128 GB DDR4 2933 MT/s ECC Registered DIMMs
GPU options	Up to 4 NVIDIA Tesla for SXM2 GPUs with NVLink
Extension space options (per node)	Up to 4 SSD per node
Fabric options (via Mezzanine Card) (per node)	Up to 4 high-speed connections per node (Mellanox Connect-IB [FDR], Mellanox ConnectX-5 [EDR], or Intel Omni-Path)

HPE XA760i Server

Form factor	HPE XA760i is a single-slot tray for the HPE SGI 8600 System compute enclosure assembly
Processors	Intel Xeon Phi Processor; Intel Cascade Lake Refresh
Compute nodes/Tray	Four 1-socket CPU nodes
Memory/Node	Up to 1536 GB per node, 12 DIMM slots (6 per CPU socket) per node
Memory technology	8, 16, 32, 64, and 128 GB DDR4 2400 MT/s ECC Registered DIMMs
Extension space options (per node)	Up to (2) 2.5 inch SATA HDD/SSD
Fabric options (via Mezzanine Card) (per node)	Single or dual port Mellanox Connect-IB (FDR) Single or dual port Mellanox ConnectX-5 (EDR) Single or dual port Intel Omni-Path

Integrated Switch Options

Standard InfiniBand	Single 36-port FDR or EDR InfiniBand switch with 18 ports external
Premium InfiniBand	Dual 36-port FDR or EDR InfiniBand switch with 36 port external
Intel Omni-Path	Single 48-port Intel Omni-Path switch with 30 ports external



Technical Specifications

System Software	
Operating systems	SUSE Linux Enterprise Server 12, 15 Red Hat Enterprise Linux 7, 8 CentOS 7, 8 TOSS 7
Fabric software	Mellanox UFM Intel Omni-Path Fabric Software
HPE management	HPE Performance Cluster Manager – complete integrated cluster management software for all HPE HPC clusters offering: system setup, hardware monitoring and management and cluster health management, image management and software updates as well as power management. The software also integrates with leading HPC ISV and open source software solutions.
Workload Management and Orchestration	Altair® PBS Professional Slurm Workload Manager Containers: Singularity & Docker Kubernetes
Software Development Tools (Programming languages, debuggers, libraries)	HPE Message Passing Interface (MPI) Open MPI PGI Compilers Intel® Parallel Studio XE (w/Intel® MPI) PGI® Professional Edition GNU Compiler Collection Rogue Wave Software® TotalView® Arm® Forge Professional Mellanox HPC-X OpenHPC NVIDIA CUDA Toolkit, OpenCL, OpenACC
Remote Visualization	NICE DCV & EnginFrame
For more information on software portfolio for HPE SGI 8600 systems, visit: https://www.hpe.com/global/h22150/50272cbe-0563-4ed5-8f07-1ff0ecf06b88/index.html/	



Summary of Changes

Date	Version History	Action	Description of Change
04-Dec-2023	Version 9	Changed	HPE Services Rebranding
15-Nov-2021	Version 8	Changed	Service and Support section was updated.
24-Feb-2020	Version 7	Changed	Update processors for server trays Update table on page 13 Standard Features and Technical Specification sections were updated.
07-Oct-2019	Version 6	Changed	Standard Features section was updated
15-Apr-2019	Version 5	Changed	Standard Features and Technical Specification sections were updated.
04-Sep-2018	Version 4	Changed	Technical Specifications was updated.
10-Oct-2017	Version 3	Changed	Update verbiage in some sections
24-Jul-2017	Version 2	Changed	Update sections throughout the QuickSpecs
11-Jul-2017	Version 1	New	New QuickSpecs



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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.

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