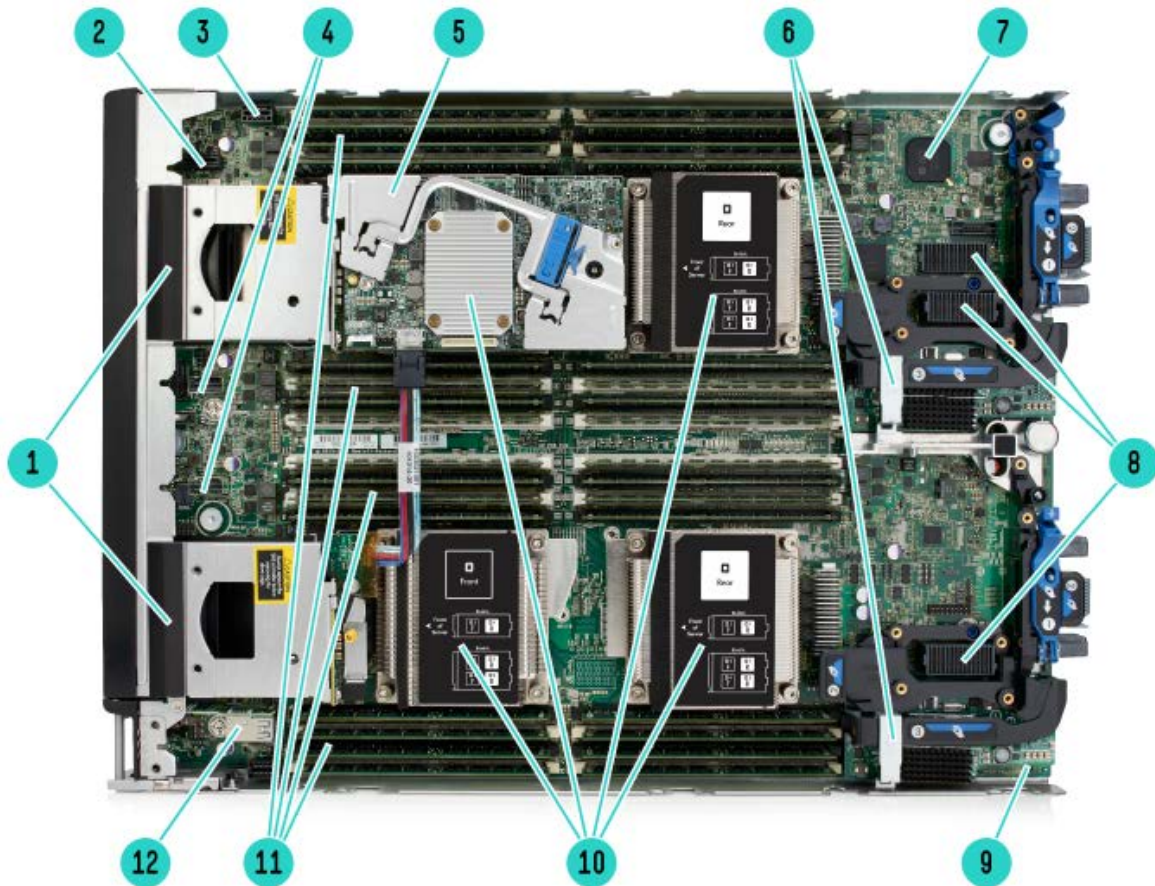


Overview

HPE ProLiant BL660c Gen9 Server Blade



HPE ProLiant BL660c Gen9 Server Blade – Internal View

1. Four hot-plug drive bays
2. M.2 Option Connector
3. HPE BLc 12W Smart Storage Battery connector
4. Embedded SATA Connectors
5. HPE Smart Array P246br Controller with 1GB FBWC
6. FlexibleLOM adapters
7. iLO Management Engine
8. Mezzanine Slots (x16 PCI 3.0)
9. Micro-SD slot
10. Two or Four Intel® Xeon® E5-4600 v3 or v4 family processors
11. Thirty two DDR4 DIMM slots (8 per processor)
12. USB 3.0 and TPM

What's New

- Support for the Intel E5-4600 v3 and v4 Product Family
- Support for 2 SFF NVMe SSDs
- Support for 120GB M.2 kit offerings
- Support for 2400MT/s DDR4 memory
- 4 SFF drive bays

Standard Features

NOTE: This document covers the HPE ProLiant BL660c Gen9 server blade only. For information on HPE BladeSystems c-Class Enclosures and HPE BladeSystem c-Class Interconnect and Mezzanine Components, please see the following:

HPE BladeSystem c-Class Enclosures QuickSpecs:

- HPE BladeSystem c3000 Enclosure QuickSpecs at <https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04123379>
NOTE: The c3000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future c-Class server blades will be supported in the existing enclosures.
- HPE BladeSystem c7000 Enclosure QuickSpecs at <https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04229580>
NOTE: The c7000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
- HPE BladeSystem c-Class Interconnect and Mezzanine Components at <http://h18004.www1.hp.com/products/blades/components/c-class-interconnects.html>
<http://h18004.www1.hp.com/products/blades/components/c-class-adapters.html>

NOTE: For optimal cooling and system performance the BL660c Gen9 Server Blade requires the c7000 enclosure to be configured with 10 fans and the c3000 enclosure to be configured with 6 fans.

NOTE: For proper BladeSystem operation, the minimum required versions of HPE Onboard Administrator and HPE Virtual Connect are required and available via the HPE Service Pack for ProLiant, please see <http://www.hp.com/go/spp/download>.

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

Processor

Two or four of the following depending on Model

E5-4600 v4 series Processors

HPE BL660c Gen9 Intel® Xeon® E5-4610v4 (1.8GHz/10-core/25MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4620v4 (2.1GHz/10-core/25MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4640v4 (2.1GHz/12-core/30MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4650v4 (2.2GHz/14-core/35MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4660v4 (2.2Hz/16-core/40MB/120W)
 HPE BL660c Gen9 Intel® Xeon® E5-4669v4 (2.2GHz/22-core/55MB/135W)
 HPE BL660c Gen9 Intel® Xeon® E5-4667v4 (2.2GHz/18-core/45MB/135W)
 HPE BL660c Gen9 Intel® Xeon® E5-4627v4 (2.6GHz/10-core/25MB/135W)
 HPE BL660c Gen9 Intel® Xeon® E5-4655v4 (2.5GHz/8-core/30MB/135W)

E5-4600 v3 series Processors

HPE BL660c Gen9 Intel® Xeon® E5-4610v3 (1.7GHz/10-core/25MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4620v3 (2.0GHz/10-core/25MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4640v3 (1.9GHz/12-core/30MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4650v3 (2.1GHz/12-core/30MB/105W)
 HPE BL660c Gen9 Intel® Xeon® E5-4660v3 (2.1Hz/14-core/35MB/120W)
 HPE BL660c Gen9 Intel® Xeon® E5-4669v3 (2.1GHz/18-core/45MB/135W)
 HPE BL660c Gen9 Intel® Xeon® E5-4667v3 (2.0GHz/16-core/40MB/135W)
 HPE BL660c Gen9 Intel® Xeon® E5-4627v3 (2.6GHz/10-core/25MB/135W)
 HPE BL660c Gen9 Intel® Xeon® E5-4655v3 (2.9GHz/6-core/30MB/135W)

NOTE: For the maximum supported memory speeds for each processor listed above, please reference the 'Memory Speed by Processor Model' table in the Memory section of the QuickSpecs.

NOTE: DDR4 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed.

Standard Features

NOTE: Supports 2 or 4 processors. Mixing different processor models is not supported.

NOTE: For the Intel® C610 Chipset E5-4600 v3 or v4 Series, the letter preceding the model number indicates the Product Line (E3, E5, E7); 4600x, 4 = number of CPUs in a Node, 6 is socket/segment designation, 00 = Processor SKU, and x = L for low power SKUs.

NOTE: All processors within the server must be identical.

NOTE: The processor model as well as the memory configuration determines the maximum speed memory can operate. Please see the see the "Memory" section later in this document.

NOTE: Intel® Hyper Threading is supported on all processors except E5-4627v3 and E5-4627v4

Cache Memory	55MB (1x55MB) L3 cache
One of the following depending on Model	NOTE: E5-4669v4 processors
	45MB (1x45MB) L3 cache
	NOTE: E5-4669v3 and E5-4667v4 processors
	40MB (1x40MB) L3 cache
	NOTE: E5-4667v3 and E5-4660v4 processors
	35MB (1x35MB) L3 cache
	NOTE: E5-4660v3 and E5-4650v4 processors
	30MB (1x30MB) L3 cache
	NOTE: E5-4640v3, E5-4650v3, E5-4655v3, E5-4640v4, and E5-4655v4 processors
	25MB (1x25MB) L3 cache
	NOTE: E5-4627v3, E5-4610v3, E5-4620v3, E5-4610v4, E5-4620v4, and E5-4627v4 processors

Chipset	Intel® C610 Series Chipset Intel® E5-4600v3 and v4 Processor Families
	NOTE: For more information regarding Intel chipsets, please see the following: http://www.intel.com/products/server/chipsets/ .

Upgradeability	Upgradeable to four (4) processors
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On System Management Chipset	HPE iLO (Firmware HPE iLO4 2.0), 4GB NAND with 1GB USB user space configurable via UEFI and accessible via iLO. Read and learn more in the iLO QuickSpecs .
	NOTE: For more information, visit: http://www.hp.com/go/ilo

Memory Protection	Advanced ECC Memory Online Spare Mode (Rank Spare Mode)
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Memory	Type	HPE SmartMemory
One of the following depending on Model		DDR4 Load Reduced (LRDIMM), or Registered (RDIMM)
	Standard (Pre-configured Models)	128GB (4 x 32GB) DDR4 2133MT/s RDIMMs at 1.2V 128GB (8 x 16GB) DDR4 2133 MT/s RDIMMs at 1.2V 64GB (4 x 16GB) DDR4 2133 MT/s RDIMMs at 1.2V 128GB (4 x 32GB) DDR4 2400MT/s LRDIMMs at 1.2V 64GB (4 x 16GB) DDR4 2400MT/s RDIMMs at 1.2V

Standard Features

Maximum (LRDIMM)	4TB (32 x 128GB) up to 2400MT/s at 1.2V NOTE: 128GB DIMMs available in summer 2016.
Maximum (RDIMM)	1TB (32 x 32GB) up to 2133 MT/s at 1.2V 512GB (32 x 16GB) up to 2400MT/s at 1.2V

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. HPE SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen9. For additional information, please see the HPE SmartMemory QuickSpecs at: <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111535>

NOTE: LRDIMM and RDIMM are distinct memory technologies and cannot be mixed within a server.

NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2400MT/s, 2133 MT/s, 1866 MT/s, or 1600 MT/s. Please see Memory Population Table or the Online Memory Configuration Tool.

Network Controller One of the following depending on Model	One (1) or two (2) 20Gb 2-port FlexFabric FLB, 10Gb 2-port HPE FlexFabric FLB, or 10Gb 2-port Ethernet FLB NOTE: Supports FCoE, TCP/IP offload engine, hardware-based accelerated iSCSI, iSCSI boot, and autosensing 10Gb/1Gb Ethernet. NOTE: Each port is autosensing the speed, and can interoperate with 1Gb HPE BladeSystem c-Class interconnect components. Both ports will operate at the same speed. NOTE: FlexFabric capabilities require the use of an HPE Virtual Connect FlexFabric or Flex10/10D module module.
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Fibre Channel over Ethernet (FCoE) is supported with HPE interconnects. Learn more at:

<http://www.hp.com/go/bladesystem/interconnects>

One (1) HPE FlexFabric 10Gb 2-port 536FLB FlexibleLOM
One (1) HPE FlexFabric 20Gb 2-port 650FLB FlexibleLOM

NOTE: FlexibleLOMs are not compatible with prior generation c-Class server blades

Standard iLO Network Controller:

One (1) 10/100 Mbps port for the HPE iLO 4 to Onboard Administrator link. The Onboard Administrator (with 10/100/1000 Mbps) to BladeSystem link is 1Gbps

Expansion Slots	<p>Three (3) I/O expansion mezzanine slots:</p> <ul style="list-style-type: none"> x16 PCIe 3.0 Type A (supports Type A mezzanine cards) (expansion slot 1). NOTE: This expansion slot supports dual-port mezzanine cards: one port is routed to interconnect module bay 3 and the other to bay 4. x16 PCIe 3.0 Type B (supports Type A and Type B mezzanine cards) (expansion slots 2 and 3). NOTE: This expansion slot supports dual-port and quad-port mezzanine cards. For dual-port cards, one port is routed to interconnect module bay 5 and the other to bay 6 (or interconnect module bays 5 and 6 for mezz slot 3). For quad-port cards, one port is routed to interconnect module bay 5, one to bay 6, one to bay 7, and one to bay 8. NOTE: Four processors must be installed to have access to the second expansion slot (expansion slot 2). <p>Mezzanine card options include:</p> <ul style="list-style-type: none"> Dual-port 20Gb FlexFabric, Dual-port 10Gb FlexFabric, 10GbE options, and quad-port 1Gb Ethernet server adapter mezzanine options for additional network ports. Dual-port 16Gb Fibre Channel HBA for SAN connectivity. QDR and FDR InfiniBand for low latency and high bandwidth server interconnectivity. I/O accelerator mezzanine options for high transaction rate local storage
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Standard Features

HPE Server ROM

HPE ROM (read only memory) is now digitally signed using the HPE Corporate Signing Service. This signature is verified before the flash process starts, reducing accidental programming and preventing malicious efforts to corrupt system ROM.

HPE ROM provides for essential initialization and validation of hardware components before control is passed to the customer-installed operating system. The ROM also provides the capability of booting from various fixed media (HDD, CD-ROM) and removable media (USB), to continue operation to the operating system. HPE ROM performs very early configuration of the video controller, to allow monitoring of initialization progress via an attached monitor. If configuration or hardware errors are discovered during this early phase of hardware initialization, suitable messages are now displayed on the connected monitor. Additionally, these configuration or hardware errors are logged to the Integrated Management Log (IML) to assist in diagnosis.

The HPE ProLiant ROM is used to configure the following:

- Processor and chipset status registers
- System memory, memory map, and memory initialization
- System hardware configuration (integrated PCI devices and optional PCIe cards).
- Customer-specific BIOS configuration using the HPE ROM-Based Setup Utility (RBSU).

NOTE: For further information, please refer to the [HPE RBSU \(ROM based setup utility\) user guide: http://www.hp.com/support/rbsu](http://www.hp.com/support/rbsu)

HPE Server UEFI /Legacy ROM

Unified Extensible Firmware Interface (UEFI) is an industry standard that provides better manageability and more secured configuration while interacting with your server at boot time. HPE ProLiant Gen9 platform defaults to UEFI and can be factory or field configured for Legacy BIOS Boot Mode.

NOTE: The UEFI System Utilities function is analogous to the HPE ROM-Based Setup Utility (RBSU) of legacy BIOS. For more information, please visit <http://www.hp.com/go/proliantuefi/docs>

UEFI enables numerous new capabilities specific to HPE ProLiant servers such as:

- Secure Boot
- Operating system specific functionality
- Support for > 2.2 TB (using GPT) boot drives
- USB 3.0 Stack
- Embedded UEFI Shell
- Mass Configuration Deployment Tool using HPE RESTful API
- PXE boot support for IPv6 networks
- Boot support for option cards that only support a UEFI option ROM

NOTE: For more information please visit <http://www.hp.com/go/proliant/uefi>

NOTE: For UEFI Boot Mode, boot environment and OS image installations should be configured properly to support UEFI.

NOTE: HPE UEFI FIO Setting (758959-B22) can be selected to configure the system in Legacy mode in the factory.

Storage Controller

All Pre-configured Models

One (1) HPE Smart Array P246br Controller with 1GB Flash-Backed Write Cache (FBWC) supporting RAID 0, 1, and 5.

NOTE: The HPE Smart Array P246br and the HPE B140i (chipset SATA). Support four (4) small form factor (SFF) hot plug drive bays.

Maximum Internal Storage

One of the following depending on Model

Hot Plug SFF SAS	8.0TB	4 x 2.0TB
Hot Plug SFF SATA	8.0TB	4 x 2.0TB
Hot Plug SFF SAS SSD	15.36TB	4 x 3.84TB
Hot Plug SFF SATA SSD	15.36TB	4 x 3.84TB

Standard Features

Hot Plug SFF NVMe SSD 4.0TB

2 x 2.0TB

NOTE: The ProLiant BL660c Gen9 server includes the HPE hot plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from previous generation servers (prior to Gen8) are not compatible with the ProLiant BL660c Gen9 drive bays.

NOTE: A maximum of two (2) NVMe drives are supported on the BL660c Gen9. When using these drives, the other two drive bays must remain unused.

Interfaces

Micro SDHC Slot

One (1) internal Micro Secure Digital High Capacity (Micro SDHC) card slot

USB 3.0 Port

Two (2) internal USB 3.0 connectors for USB flash media drive keys

NOTE: The above options are intended for integrated hypervisor virtualization environments.

Industry Standard Compliance

ACPI 2.0

Microsoft® Logo certifications

USB 3.0 Support

IPMI 2.0

Secure Digital 2.0

TPM 1.2 Support

IEEE (specific IEEE standards depending on Ethernet adapter card(s) installed)

Advanced Encryption Standard (AES)

Triple Data Encryption Standard (3DES)

SNMP

SSL 2.0

DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP)

Active Directory v1.0

PCIe 3.0

ASHRAE A3

FIPS 140-2 Level-2 certification pending

Operating Systems and Virtualization Software Support for ProLiant Servers

Microsoft Windows Server

Red Hat Enterprise Linux (RHEL)

SUSE Linux Enterprise Server (SLES)

VMware

NOTE: For more information on the HPE Certified and Supported ProLiant Servers for OS and Virtualization Software and latest listing of software drivers available for your server, please visit our Support Matrix at: <http://www.hpe.com/info/ossupport> and our driver download page: <http://www.hpe.com/support/BL660cGen9>

Enclosures

Hewlett Packard Enterprise offers two different c-Class server blade enclosures to meet your individual needs:

- The HPE BladeSystem c7000 rack enclosure is 10U high and holds up to eight (8) ProLiant BL660c Gen9 servers plugged vertically.
- The HPE BladeSystem c3000 rack enclosure is 6U high and holds up to four (4) HPE ProLiant BL660c Gen9 servers plugged horizontally.

Server blades, interconnect modules, power supplies, fans, and redundant Onboard Administrator modules are all designed to fit into the c3000 and c7000 enclosures.

NOTE: For additional enclosure information, please see:

<http://h18004.www1.hp.com/products/blades/components/enclosures/c-class/index.html>

Standard Features

Graphics	<p>Integrated Matrox G200eh video controller</p> <ul style="list-style-type: none"> • 1600 x 1200 (32 bpp) • 1920 x 1200 (16 bpp) <p>HPE iLO Management On System Management Memory</p> <ul style="list-style-type: none"> • 16 MB Flash Video Memory • 256 MB DDR 3 with ECC (112 MB after ECC and video)
Form Factor	HPE ProLiant BL660c Gen9 is a full-height server blade that plugs into the HPE BladeSystem c3000 and c7000 enclosures.
Embedded Management	<p>HPE Integrated Lights Out Monitor your servers for ongoing management, service alerting, reporting and remote management with iLO. Learn more at http://www.hp.com/go/ilo</p> <p>UEFI Configure and boot your servers securely with industry standard Unified Extensible Firmware Interface (UEFI). Learn more at http://www.hp.com/go/ProLiant/uefi</p> <p>HPE RESTful API RESTful API is an application programming interface. RESTful Web Service API served by iLO's web server. http://www.hp.com/go/restfulapi.</p> <p>Intelligent Provisioning Provision servers by discovering and deploying 1 to few servers with Intelligent Provisioning. Learn more at http://www.hp.com/go/intelligentprovisioning.</p>
Server Utilities	<p>HPE Smart Update Optimize firmware and driver updates with HPE Smart Update solutions. Learn more at http://www.hp.com/go/smartupdate.</p> <p>HPE OneView Standard HPE OneView Standard can inventory, monitor, alert, and report on your G6 thru Gen9 servers, with use of the REST API and HPE OneView user interface. Annual support is optionally available. Learn more at http://www.hp.com/go/oneview.</p> <p>HPE Systems Insight Manager (HPE SIM) HPE SIM allows you to monitor the health of your HPE ProLiant Servers and HPE Integrity Servers, and also provides you with basic support for non-Hewlett Packard Enterprise servers. HPE SIM also integrates with HPE SUM to provide quick and seamless firmware updates. Learn more at http://www.hp.com/go/sim.</p> <p>Scripting Tool Kit and Windows PowerShell Provision 1 to many servers using your own scripts to discover and deploy them with HPE Scripting Tool Kit for Windows and Linux or HPE Scripting Tools for Windows PowerShell. Learn more at http://www.hp.com/go/ProLiantSTK or http://www.hp.com/go/powershell.</p> <p>HPE RESTful Interface Tool HPE RESTful API tool is a scripting tool to provision servers using RESTful API Interface to discover and deploy servers at scale. Learn more at http://www.hp.com/go/restfulapi.</p> <p>HPE iLO Mobile Application Enables the ability to access, deploy, and manage your server anytime from anywhere from select smartphones and mobile devices. For additional information please visit: http://www.hp.com/go/ilo/mobileapp.</p>

Standard Features

HPE Insight Online

HPE Insight Online, available at no additional cost as part of your Hewlett Packard Enterprise warranty, Care Pack or contractual support agreement with Hewlett Packard Enterprise, is a personalized dashboard for simplified tracking of IT operations and support information from anywhere, anytime. Learn more at <http://www.hp.com/go/insightonline/info>.

Security

- Power-on password
- Administrator's password
- Keyboard password (QuickLock)
- HPE iLO Management On System Management Chipset with:
 - SSL encryption
 - Secure Shell version 2
 - Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser, CLP and XML scripting interface
 - AES and RC4 encryption of video
- External USB port enable/disable
- Network server mode
- Serial interface control
- TPM (Trusted Platform Module) 1.2 option
- Advanced Encryption Standard (AES)
- Intel® Advanced Encryption Standard-New Instructions (AES-NI)
- FIPS 140-2 Level-2 certification pending

Availability

Memory

- Advanced ECC uses single device data correction (SDDC) to detect and correct single and all multi-bit error that occurs within a single DRAM chip. Both x4 and x8 SDDC are supported (x8 requires lockstep mode).
- Memory online spare mode (also known as rank spare mode) detects a rank that is degrading and switches operation to the spare rank.
- Memory demand and patrol scrubbing to prevent accumulation of correctable errors and reducing the likelihood of unplanned downtime.
- Failed DIMM isolation improves the service time thus improving the overall system availability.
- Address parity protection available on RDIMMs and LRDIMMs detects address bit errors to improve service time and overall system availability.

Mezzanine options and I/O

- Support for two (2) FlexibleLOMs, providing four (4) (i.e. redundant) Ethernet ports
- Multiple mezzanine I/O expansion slots that support a wide variety of mezzanine cards each supporting multiple data paths routed to redundant interconnect modules.
- Network Adapter Teaming (bonding) provides network fault tolerance, transmit load balancing, and switch-assisted load balancing.

Storage

- Four (4) Small Form Factor hot-plug SAS/SATA HDD or SSD drive bays.
- Choice of the HPE Smart Array P246br Controller with 1GB FBWC/HPE or the HPE B140i (chipset SATA). RAID 0 and 1 support for both storage controller offerings.
- Optional dual-port Fibre Channel mezzanine card(s) for redundant SAN connections.

Processor/Chipset

- Processor internal sensors & thermal control protection against over-temperature conditions.
- Cache parity/ECC protects cache data from accidental data corruption.
- Machine Check Architecture (MCA) detects and captures hardware errors such as system bus, memory ECC, parity, and cache, and improves service time.

Standard Features

- Intel® QPI Protocol Protection allows detection of data errors using a checksum of 8-bits.
- Core Disable for FRB (fault resilient boot) allows a system to power-on despite a failing core-pair. It uses BIST (built-in self test) results to detect a failure and disables the target core-pair upon subsequent boot.

Server Blade Enclosure Infrastructure

- Pooled power for true N+N power redundancy through up to six (6) hot-plug, high-efficiency, common slot enclosure-based power supplies (configuration dependent).
- Up to ten (10) enclosure-based hot-plug HPE Active Cool fans that scale to meet future demands, optimize airflow, reduce power draw, and improve acoustic performance.
- Dual grid power providing redundant rack enclosure power feeds to the server blade enclosure.
- HPE Dynamic Power Saver Mode monitors the total enclosure power consumption in real time and automatically adjusts with change in demand for improved efficiency and reliability. HPE Dynamic Power Capping safely limits power usage without impacting performance by capping peak usage instead of average power usage, removes risk to electrical infrastructure with a fast-acting, hardware-based capping algorithm, and reclaims more power by dynamically controlling power limits based on workload demand.
- Up to eight interconnect modules per server blade enclosure providing four simultaneous redundant fabrics for FlexFabric, Virtual Connect Ethernet, Fibre Channel, InfiniBand, Pass Thru Ethernet, etc.
- Enclosure crosslinks between adjacent enclosures to provide interconnect module-to-module connections or as Virtual Connect module stacking links.
- Optional enclosure redundant Onboard Administrator system management module.

Warranty

This product is covered by a global limited warranty and supported by HPE Services and a worldwide network of Hewlett Packard Enterprise Authorized Channel Partners. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through HPE Care Pack services or customized service agreements. Certain restrictions and exclusions apply. Hard drives have either a one year or three year warranty; refer to specific hard drive QuickSpecs for details.

NOTE: Server warranty includes 3-year Parts, 3-year Labor, 3-year on-site support. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have Hewlett Packard Enterprise replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at

<http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>

Optional Features

Fibre Channel Support Up to three (3) optional Fibre Channel mezzanine HBAs are supported on the HPE ProLiant BL660c Gen9.

Compatible SAN HPE ProLiant BL660c Gen9 server blades are optimized for HPE MSA, EVA, 3PAR and XP.

HPE ProLiant BL660c Gen9 server blades are compatible with select 3rd party SANs.

Please see blade storage page for more details at

<http://h18004.www1.hp.com/products/blades/components/c-class-sans.html>

HPE Virtual Connect HPE Virtual Connect is an interconnect option for c-Class BladeSystem that simplifies server connectivity to data and storage networks, and reduces costs. Unique HPE Flex-10 technology makes maximum use of network bandwidths, provide dynamic tuning and enable extreme flexibility to meet individual server and infrastructure requirements by allocating up to 4 network connections per server port. Virtual Connect FlexFabric modules extend those capabilities to allocate one function per port to storage connections (FCoE).

HPE OneView's software-defined approach to infrastructure management enables central console to administer network connections and workloads for thousands of servers, see

<http://www.hp.com/go/oneviewd>

For more information on Virtual Connect Ethernet, Fibre Channel, Converged Network and management options, see <http://www.hp.com/go/virtualconnect>.

Embedded Management **iLO Advanced for BladeSystem** HPE iLO Advanced for BladeSystem licenses offer smart remote functionality without compromise, for all HPE ProLiant servers. The license includes the full integrated remote console, virtual keyboard, video, and mouse (KVM), multi-user collaboration, console record and replay, and GUI-based and scripted virtual media and virtual folders. You can also activate the enhanced security and power management functionality. Learn more about HPE iLO Advanced at <http://www.hp.com/go/iloadvanced>

Server Management **HPE Insight Control** HPE Insight Control, lets you deploy, migrate, monitor, remote control, and optimize your IT infrastructure through a single, simple management console. For more information, see <http://www.hp.com/go/insightcontrol>.

HPE OneView Advanced HPE OneView Advanced is converged management that reduces infrastructure complexity with automation simplicity. This modern architecture accelerates your IT operations across servers, storage, and network resources using software-defined approaches and automation. Learn more at <http://www.hp.com/go/oneview>

HPE Matrix Operating Environment The HPE Matrix Operating Environment (Matrix OE) for ProLiant and Integrity servers is an integrated command center that helps you instantly adjust to dynamic business demands. This advanced infrastructure management software lets you reduce the cost of common data center tasks by up to 40 percent while keeping pace with your changing business. The HPE Matrix OE includes the automated provisioning, optimization, and recovery management capabilities for HPE CloudSystem Matrix, the ideal platform for private cloud and Infrastructure as

Optional Features

a Service (IaaS).

NOTE: For more information, visit: <http://www.hp.com/go/matrixoe>

HPE Insight Cluster Management Utility (CMU)

HPE Insight Cluster Management Utility is a Hyperscale management framework that includes software for the centralized provisioning, management and monitoring of nodes and infrastructure. Learn more at <http://www.hp.com/go/cmu>.

High Performance Clusters

HPE Cluster Platforms

HPE Cluster Platforms are specifically engineered, factory-integrated large-scale ProLiant clusters optimized for High Performance Computing, with a choice of servers, networks and software. Operating system options include specially priced offerings for Red Hat Enterprise Linux and SUSE Linux Enterprise Server, as well as Microsoft Windows HPC Server. A Cluster Platform Configurator simplifies ordering.

<http://www.hp.com/go/clusters>

HPE HPC Interconnects

High Performance Computing (HPC) interconnect technologies are available for this server as part of the HPE Cluster Platform portfolio. These high-speed InfiniBand and Gigabit interconnects are fully supported by Hewlett Packard Enterprise when integrated within an HPE cluster. Flexible, validated solutions can be defined with the help of configuration tools.

<http://www.hp.com/techservers/clusters/ucp/index.html>

Storage Software

Whether you need to solve a specific data protection, archiving, or storage command and control challenge, or deliver on strategic consolidation, compliance, or continuity initiatives, look no further than HPE storage software. Our storage software helps you reduce costs, simplify storage infrastructure, protect vital assets and respond faster to business opportunities.

Storage software that gets the job done:

- **Data Protection and Recovery Software**

Whether you're a large enterprise or a smaller business, HPE data protection and recovery software will cost-effectively protect you against disaster and ensure business continuity.

- **Data Archive and Migration Software**

The HPE storage software enables you to comply with data retention and retrieval requirements, improve application performance, and reduce costs by efficiently migrating infrequently accessed or less valuable data to lower cost storage.

- **Storage Resource Management Software (SRM)**

The HPE storage resource management software reduces operational costs and provides the command and control foundation you need to efficiently manage and visualize your physical and virtual environments.

- **Data Replication Software**

Hewlett Packard Enterprise offers array-based and host-based replication software for use in disaster recovery, testing, application development and reporting.

- **Storage Device Management Software**

Maximize your investment in HPE storage and networking with software that enables hardware-specific configuration, performance tuning and connectivity management.

- **HPE StoreVirtual VSA**

HPE StoreVirtual VSA allows you to create fully featured shared storage on a VMware vSphere or Microsoft Hyper-V virtualized server. This server model starting November 2013, includes a limited license for HPE StoreVirtual VSA software with 1TB of capacity. To download the license key and StoreVirtual VSA software, visit: <http://www.hp.com/go/unlockVSA>.

NOTE: You will need your server serial number in order to complete the registration form. Fully

Optional Features

functional, capacity-based licenses are available in 4TB, 10T and 50TB sizes. For more information and access to the 60-day free trial, visit: <http://www.hp.com/go/tryVSA>

NOTE: For more information available Storage Software including QuickSpecs, please see: <http://www.hp.com/go/storage/software>

Expansion Blade Support

Supports one (1) optional D2220sb storage or PCI expansion blade

NOTE: Expansion blade support requires the use of either the HPE Dynamic Smart Array B140i or the HPE Smart Array P246br controller.

NOTE: Expansion blade support requires server firmware versions from SPP 2015.04 or later

HPE Insight Online

HPE Insight Online is part of the HPE Support Center for one stop, secure access to product and HPE support information personalized to your IT environment. Insight Online can automatically display devices remotely monitored by HPE Remote Support tools. With Insight Online's easy navigation you can efficiently track your IT support contracts and device status from anywhere and at anytime.

<http://www.hp.com/go/insightonline>

Get connected to HPE

To get the most from your investment in Hewlett Packard Enterprise servers, get connected to Hewlett Packard Enterprise using our innovative remote support technology which provides system health monitoring, pre-failure alert notification and more. For details, visit

<http://www.hp.com/services/getconnected>

Factory Express Portfolio for Servers and Storage

HPE Factory Express offers configuration, customization, integration and deployment services for Hewlett Packard Enterprise servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging, and custom packaging. Hewlett Packard Enterprise products supported through Factory Express include a wide array of servers and storage: HPE Integrity, HPE ProLiant, HPE ProLiant Server Blades, HPE BladeSystem, HPE 9000 servers as well as the MSAxxxx, VA7xxx, EVA, XP, rackable tape libraries and configurable network switches. For more information on Factory Express services on your specific server model please contact your sales representative or go to: <http://www.hp.com/go/factory-express.html>

One Config Simple (SCE)

SCE is a guided self-service tool to help sales and non-technical people provide customers with initial configurations in 3 to 5 minutes. You may then send the configuration on for configuration help, or use in your existing ordering processes. If you require "custom" rack configuration or configuration for products not available in SCE, please contact the HPE Customer Business Center or an Authorized Partner for assistance.

<http://www.hp.com/products/configurator>

Service and Support

Service and Support

HPE Technology Services for BladeSystem

HPE Technology Services delivers confidence, reduces risk and helps customers realize agility and stability. Connect to Hewlett Packard Enterprise to help prevent problems and solve issues faster. Our support technology lets you to tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, any time.

Protect your business beyond warranty with HPE Care Pack Services

HPE Care Pack Services enable you to order the right service level, length of coverage and response time as you purchase your new server, giving you full entitlement for the term you select.

Optimized Support recommendation

HPE Proactive Care Advanced - 24x7 coverage, three year Care Pack Service

Achieve a higher return on your product investment with the personal attention from a locally assigned Account Support Manager who delivers recommendations designed to improve availability and performance. Leverage your system's ability to connect to Hewlett Packard Enterprise for automated problem detection and rapid critical event management to increase stability and reduce unplanned downtime. This recommendation provides 24x7 coverage with four-hour response for hardware and two-hour callback for supported software. Collaborative call management comes with Proactive Care Advanced or you may choose full support from Hewlett Packard Enterprise where we own all cases through to resolution. Hewlett Packard Enterprise is a leading provider of support services for most operating systems used on HPE BladeSystem with long, successful partnerships with vendors such as Microsoft, Red Hat, VMware, SUSE and others. Purchasing software support from Hewlett Packard Enterprise simplifies troubleshooting and shortens time to resolution with one call for hardware or software questions.

<https://www.hpe.com/h20195/V2/GetDocument.aspx?docname=4AA5-3259ENW&cc=us&lc=en>

Standard Support recommendation

HPE Proactive Care - 24x7 coverage, three year Care Pack Service

This service helps prevent problems and stabilize IT by utilizing secure, real-time, predictive analytics and proactive consultations when your products are connected to Hewlett Packard Enterprise. It combines three years' proactive reporting and advice with 24x7 four hour response coverage and enhanced escalation management. It also includes collaborative call management with two hour call back on software questions to reduce troubleshooting on hardware and industry leading software.

<http://h20195.www2.hpe.com/v2/GetPDF.aspx/4AA3-8855ENW.pdf>

Related Services

Data Center Platform Consulting Services

Choose HPE Technology Services Consulting to modernize and migrate your key systems. These services help fine tune your data center to improve security, management and efficiency across IT infrastructure, operations, and facilities and prepare you for the new style of IT. Hewlett Packard Enterprise understands the needs of the data center of the future and will serve as your guide for the journey.

<http://www.hp.com/services/consulting>

Data Privacy Services

Protect your data through better media management. HPE Data privacy services help manage and protect sensitive data to reduce the risk of unauthorized access to private information and help meet compliance requirements. Our retention services allow you to keep drives and other devices upon failure with Defective Media Retention and Comprehensive Defective Material Retention, our removal services provide convenient data sanitization and our recovery services allow you to safely retire IT assets and capture any remaining value from the hardware.

<http://www.hp.com/services/dataprivacy>

Factory Express for Servers and storage

HPE Factory Express offers configuration, customization, integration and deployment services for Hewlett

Service and Support

Packard Enterprise servers and storage products. Choose how your factory solutions are built, tested, integrated, shipped and deployed.

<http://www.hp.com/go/factory-express>

HPE ProLiant Blade Server Hardware Installation

This easy-to-buy, easy-to-use HPE Care Pack service helps ensure your new HPE BladeSystem hardware is installed smoothly, efficiently and with minimal disruption to your IT and business operations.

<http://www.hp.com/services/bladessystemservices>

Additional hardware Installation services for HPE BladeSystem

In addition to hardware installation of your Blade server, Hewlett Packard Enterprise offers installation and startup services for your BladeSystem and Network infrastructure.

<http://www.hp.com/services/bladessystemservices>

Connect your devices to HPE

Unlock all of the benefits of your technology investment by connecting your products to Hewlett Packard Enterprise. Achieve up to 77% reduction in down time, near 100% diagnostic accuracy and a single consolidated view of your environment. By connecting, you will receive 24x7 monitoring, pre-failure alerts, automatic call logging, and automatic parts dispatch. HPE Proactive Care Service and HPE Datacenter Care Service customers will also benefit from proactive activities to help prevent issues and increase optimization. All of these benefits are already available to you with your server storage and networking products, securely connected to Hewlett Packard Enterprise support.

Parts and Materials

Hewlett Packard Enterprise 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 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 Hewlett Packard Enterprise due to malfunction.

Pre-configured Models

NOTE: For the Standard Features shipped in the "Factory Integrated Models", please see the "Configuration Information - Factory Integrated Models" section.

NOTE: Pre-configured models ship with the configurations below. Options can be selected from the Core or Additional options section of this QuickSpecs.

NOTE: Hewlett Packard Enterprise does not allow factory integration of options into pre-configured models. Any additional options purchased will be shipped separately.

NOTE: If you desire a custom configuration please see "Configuration Information - Factory Integrated Models" section of this QuickSpecs.

NOTE: All Pre-configured Models come populated with some hard drive blanks installed.

E5-4600 v4 series Processors

HPE ProLiant BL660c Gen9 E5- 4650v4 2.2GHz 14- core 4-processor 128GB-L Server 844355-B21	Processor(s)	(4) Intel® Xeon® E5-4650 v4 (2.2GHz/14-core/35MB/9.6GT-s QPI/105W, DDR4-2400, HT, Turbo)
	Cache Memory	35MB (1x35MB) Level 3 cache
	Memory	128GB (4x 32GB) 2400-L (DDR4-2400) Load Reduced DIMMs at 1.2V) NOTE: Total of 32 DIMM slots.
	Network Controller	(2) HPE FlexFabric 20Gb 2-port 630FLB FlexibleLOM
	Storage Controller	HPE Smart Array P246br Controller with 1GB FBWC RAID 0,1,5
	Hard Drive	None ship standard Supports up to four (4) HPE hot-plug SFF SAS/SATA/SDD drives NOTE: NVMe SSDs are not supported on this model.
	Internal Storage	SAS: 8TB; SATA: 8TB; SAS SSD: 7.68TB; SATA SSD: 7.68TB
	Optical Drive Bay	None
	Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.
	Management	HPE iLO Management (standard) Optional: HPE OneView or HPE Insight Control
	Form Factor	Up to four (4) full-height blades supported in the HPE BladeSystem c3000 Enclosure Up to eight (8) full-height blades supported in HPE BladeSystem c7000 Enclosure
	Warranty	Server warranty includes 3-year Parts, 3-year Labor, 3-year on-site support.

HPE ProLiant BL660c Gen9 E5- 4610v4 1.8GHz 10- core 2-processor 64GB-R Server 844356-B21	Processor(s)	(2) Intel® Xeon® E5-4610 v4 (1.8GHz/10-core/25MB/6.4GT-s QPI/105W, DDR4-1866, HT)
	Cache Memory	25MB (1x25MB) Level 3 cache
	Memory	64GB (4x 16GB) 2400-R (DDR4-2400) Registered DIMMs at 1.2V) NOTE: Total of 32 DIMM slots.
	Network Controller	(2) HPE FlexFabric 10Gb 2-port 536FLB FlexibleLOM
	Storage Controller	HPE Smart Array P246br Controller with 1GB FBWC RAID 0,1,5
	Hard Drive	None ship standard Supports up to four (4) HPE hot-plug SFF SAS/SATA/SDD drives NOTE: NVMe SSDs are not supported on this model.
	Internal Storage	SAS: 8TB; SATA: 8TB; SAS SSD: 7.68TB; SATA SSD: 7.68TB
	Optical Drive Bay	None
	Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.

Pre-configured Models

Management	HPE iLO Management (standard) Optional: HPE OneView or HPE Insight Control
Form Factor	Up to four (4) full-height blades supported in the HPE BladeSystem c3000 Enclosure Up to eight (8) full-height blades supported in HPE BladeSystem c7000 Enclosure
Warranty	Server warranty includes 3-year Parts, 3-year Labor, 3-year on-site support.

E5-4600 v3 series Processors

HPE ProLiant BL660c Gen9 E5- 4650v3 128GB-R 4P Server Blade 728349-B21

Processor(s)	(4) Intel® Xeon® E5-4650 v3 (2.1GHz/12-core/30MB/9.6GT-s QPI/105W, DDR4-2133, HT, Turbo)
Cache Memory	30MB (1x30MB) Level 3 cache
Memory	128GB (4x 32GB) PC4-2133P-R (DDR4-2133) Load Reduced DIMMS at 1.2V) NOTE: Total of 32 DIMM slots.
Network Controller	(2) HPE FlexFabric 20Gb 2-port 630FLB FlexibleLOM
Storage Controller	HPE Smart Array P246br Controller with 1GB FBWC RAID 0,1,5
Hard Drive	None ship standard Supports up to four (4) HPE hot-plug SFF SAS/SATA/SDD drives NOTE: NVMe SSDs are not supported on this model.
Internal Storage	SAS: 8TB; SATA: 8TB; SAS SSD: 7.68TB; SATA SSD: 7.6TB
Optical Drive Bay	None
Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.
Management	HPE iLO Management (standard) Optional: HPE OneView or HPE Insight Control
Form Factor	Up to four (4) full-height blades supported in the HPE BladeSystem c3000 Enclosure Up to eight (8) full-height blades supported in HPE BladeSystem c7000 Enclosure
Warranty	Server warranty includes 3-year Parts, 3-year Labor, 3-year on-site support.

HPE ProLiant BL660c Gen9 E5- 4620v3 128GB-R 4P Server Blade 728350-B21

Processor(s)	(4) Intel® Xeon® E5-4620 v3 (2.0GHz/10-core/25MB/8.0GT-s QPI/105W, DDR4-1866, HT, Turbo)
Cache Memory	25MB (1x25MB) Level 3 cache
Memory	128GB (8x 16GB) PC4-2133P-R (DDR4-2133) Registered DIMMS at 1.2V) NOTE: Total of 32 DIMM slots.
Network Controller	(2) HPE FlexFabric 10Gb 2-port 536FLB FlexibleLOM
Storage Controller	HPE Smart Array P246br Controller with 1GB FBWC RAID 0,1,5
Hard Drive	None ship standard Supports up to four (4) HPE hot-plug SFF SAS/SATA/SDD drives NOTE: NVMe SSDs are not supported on this model.
Internal Storage	SAS: 8TB; SATA: 8TB; SAS SSD: 7.68TB; SATA SSD: 7.68TB
Optical Drive Bay	None
Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.
Management	HPE iLO Management (standard) Optional: HPE OneView or HPE Insight Control
Form Factor	Up to four (4) full-height blades supported in the HPE BladeSystem c3000 Enclosure

Pre-configured Models

	Warranty	Up to eight (8) full-height blades supported in HPE BladeSystem c7000 Enclosure Server warranty includes 3-year Parts, 3-year Labor, 3-year on-site support.
HPE ProLiant BL660c Gen9 E5-4610v3 64GB-R 2P Server Blade 728351-B21	Processor(s)	(2) Intel® Xeon® E5-4610 v3 (1.7GHz/10-core/25MB/6.4GT-s QPI/105W, DDR4-1600, HT, Turbo)
	Cache Memory	25MB (1x25MB) Level 3 cache
	Memory	64GB (4x 16GB) PC4-2133P-R (DDR4-2133 Registered DIMMs at 1.2V) NOTE: Total of 32 DIMM slots.
	Network Controller	(2) HPE FlexFabric 10Gb 2-port 536FLB FlexibleLOM
	Storage Controller	HPE Smart ArrayP246br Controller with 1GB FBWC RAID 0,1,5
	Hard Drive	None ship standard Supports up to four (4) HPE hot-plug SFF SAS/SATA/SDD drives NOTE: NVMe SSDs are not supported on this model.
	Internal Storage	SAS: 8TB; SATA: 8TB; SAS SSD: 7.68TB; SATA SSD: 7.68TB
	Optical Drive Bay	None
	Expansion Slots	3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.
	Management	HPE iLO Management (standard) Optional: HPE OneView or HPE Insight Control
	Form Factor	Up to four (4) full-height blades supported in the HPE BladeSystem c3000 Enclosure Up to eight (8) full-height blades supported in HPE BladeSystem c7000 Enclosure
	Warranty	Server warranty includes 3-year Parts, 3-year Labor, 3-year on-site support.

Configuration Information - Factory Integrated Models

NOTE: This section lists some of the steps required to configure a Factory Integrated Model (configure-to-order or CTO server). To ensure only valid configurations are ordered, Hewlett Packard Enterprise recommends the use of an Hewlett Packard Enterprise approved configurator. Contact your local sales representative for information on CTO product offerings and requirements.

NOTE: Configure-to-order server blades must start with a CTO Server Blade.

NOTE: FIO indicates that this option is only available as a factory installable option.

NOTE: All Factory Integrated Models will be populated with sufficient hard drive blanks based on the number of initial hard drives ordered with the server.

Step 1: Base Server Blade Configuration (Select a configurable Blade)

Models	HPE ProLiant BL660c Gen9 10/20GB FlexibleLOM Configure-to-Order Server	728352-B21
	HPE ProLiant BL660c Gen9 E5-v4 10Gb/20Gb FlexibleLOM Configure-to-order Server	844352-B21

Configurable Models ship with:

Two (2) FlexibleLOM connectors providing a choice for one or two of the supported 10Gb/20Gb FlexibleLOMs (see Step 2)

Four (4) HPE small form factor hot-plug SAS/SATA/ HDD or SSD hard drive bays

Three (3) x16 PCIe I/O expansion slots (one Type A, two Type A/B)

Two (2) integrated USB connector and one (1) MicroSDHC connector

One (1) TPM connector

HPE iLO Management (standard)

Step 2: Choose Required Options (one of the following from each list unless otherwise noted)

HPE Processors **NOTE:** All configure-to-order processor kits (i.e. xxxxxx-L21) contain two (2) processors.

NOTE: If four processors are desired, select one xxxxxx-L21 here in Step 2 and one xxxxxx-B21 in Step 4.

NOTE: The BL660c Gen9 supports two or four processors; one and three processor configurations are not supported.

E5-4600 v4 series Processors

HPE BL660c Gen9 Intel® Xeon® E5-4660v4 (2.5GHz/16-core/40MB/120W) FIO 2-Processor Kit	844371-L21
HPE BL660c Gen9 Intel® Xeon® E5-4650v4 (2.4GHz/14-core/35MB/105W) FIO 2-Processor Kit	844372-L21
HPE BL660c Gen9 Intel® Xeon® E5-4640v4 (2.3GHz/12-core/30MB/105W) FIO 2-Processor Kit	844373-L21
HPE BL660c Gen9 Intel® Xeon® E5-4620v4 (2.4GHz/10-core/25MB/105W) FIO 2-Processor Kit	844374-L21
HPE BL660c Gen9 Intel® Xeon® E5-4610v4 (1.8GHz/10-core/25MB/105W) FIO 2-Processor Kit	844375-L21
HPE BL660c Gen9 Intel® Xeon® E5-4669v4 (2.5GHz/22-core/55MB/135W) FIO 2-Processor Kit	844376-L21
HPE BL660c Gen9 Intel® Xeon® E5-4667v4 (2.5GHz/18-core/45MB/135W) FIO 2-Processor Kit	844377-L21
HPE BL660c Gen9 Intel® Xeon® E5-4627v4 (3.2GHz/10-core/25MB/135W) FIO 2-	844378-L21

Configuration Information - Factory Integrated Models

Processor Kit	
HPE BL660c Gen9 Intel® Xeon® E5-4655v4 (3.2GHz/8-core/30MB/135W) FIO 2-Processor Kit	844379-L21

E5-4600 v3 series Processors

HP BL660c Gen9 Intel® Xeon® E5-4610v3 (1.7GHz/10-core/25MB/105W) FIO 2-processor Kit	728378-L21
HP BL660c Gen9 Intel® Xeon® E5-4620v3 (2.0GHz/10-core/25MB/105W) FIO 2-processor Kit	728376-L21
HP BL660c Gen9 Intel® Xeon® E5-4640v3 (1.9GHz/12-core/30MB/105W) FIO 2-processor Kit	728374-L21
HP BL660c Gen9 Intel® Xeon® E5-4650v3 (2.1GHz/12-core/30MB/105W) FIO 2-processor Kit	728372-L21
HP BL660c Gen9 Intel® Xeon® E5-4660v3 (2.1GHz/14-core/35MB/120W) FIO 2-processor Kit	728370-L21
HP BL660c Gen9 Intel® Xeon® E5-4669v3 (2.1GHz/18-core/45MB/135W) FIO 2-processor Kit	728380-L21
HP BL660c Gen9 Intel® Xeon® E5-4667v3 (2.0GHz/16-core/40MB/135W) FIO 2-processor Kit	728382-L21
HP BL660c Gen9 Intel® Xeon® E5-4627v3 (2.6GHz/10-core/45MB/135W) FIO 2-processor Kit	728384-L21
HP BL660c Gen9 Intel® Xeon® E5-4655v3 (2.9GHz/6-core/30MB/135W) FIO 2-processor Kit	792028-L21

NOTE: For the maximum supported memory speeds for each processor listed above, please reference the 'Memory Speed by Processor Model' table in the Memory section of the QuickSpecs.

NOTE: Supports 2 or 4 processors. Mixing different processor models is not supported.

NOTE: For the Intel® C610 Chipset E5-6600 v3 Series, the letter preceding the model number indicates the Product Line (E3, E5, E7); 4600x, 4 = number of CPUs in a Node, 6 is socket/segment designation, 00 = Processor SKU, and x = L for low power SKUs.

NOTE: All processors within the server must be identical.

NOTE: Intel® Hyper Threading is supported on all processors except E5-4627v3 and E5-4627v4

HPE Memory

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. HPE SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen9. For additional information, please see the HPE SmartMemory QuickSpecs at:

<https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111535>

NOTE: LRDIMM and RDIMM are distinct memory technologies and cannot be mixed within a server.

NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2400MT/s, 2133 MT/s, 1866 MT/s, or 1600 MT/s. Please see Memory Population Table or the Online Memory Configuration Tool at:

<http://h22195.www2.hp.com/MemoryTool/Home/Legal>

HPE SmartMemory

Registered DIMMs (RDIMMs) - E5-4600 v4 series Processors

HP 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
HP 16GB (1x16GB) Single Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805349-B21
HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21

Configuration Information - Factory Integrated Models

HP 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit 805351-B21

Load Reduced DIMMs (LRDIMMs) - E5-4600 v4 series Processors

HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit 805353-B21

HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit 805358-B21

HPE 128GB (1x128GB) Octal Rank x4 DDR4-2400 CAS-20-18-18 Load Reduced Memory Kit 809208-B21

Registered DIMMs (RDIMMs) - E5-4600 v3 series Processors

HP 8GB (1x8GB) Dual Rank x8 DDR4-2133 CAS-15-15-15 Registered Memory Kit 759934-B21

HP 8GB (1x8GB) Single Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit 726718-B21

HP 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit 726719-B21

HP 32GB (1x32GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit 728629-B21

Load Reduced DIMMs (LRDIMMs) - E5-4600 v3 series Processors

HP 32GB (1x32GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit 726722-B21

HP 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit 726720-B21

HP 48GB (1x16GB +1x32GB) DDR4-2133 CAS-15-15-15 Load Reduced Memory FIO Kit 792278-B21

HP 64GB (1x64GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit 726724-B21

NOTE: For additional memory rules and guidelines, see the "Memory" section later in this document.

NOTE: For more information on ProLiant Energy Efficient Features, see:

<http://www.hp.com/go/proliant-energy-efficient>

HPE Networking FlexibleLOM Adapters

NOTE: The server requires one (1) FlexibleLOM that is installed in the FlexibleLOM connectors. All FlexibleLOMs are dual port: One port is routed to interconnect module bay 1 and the other to bay 2.

NOTE: Up to two (2) FlexibleLOMs can be used with either two (2) or four (4) processors.

20Gb FlexibleLOM Adapters

HPE FlexFabric 20Gb 2-port 630FLB FIO Adapter 700066-B21

HPE FlexFabric 20Gb 2-port 650FLB FIO Adapter 700764-B21

10Gb FlexibleLOM Adapters

HPE FlexFabric 10Gb 2-port 536FLB FIO Adapter 766491-B21

HPE Ethernet 10Gb 2-port 560FLB FIO Adapter 684214-B21

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:

<http://www.hp.com/go/ProLiantNICs>

Step 3: Choose Additional Factory Integration Options

HPE Insight Software	HPE Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Single Server FIO LTU	C6N36A
	HPE Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle FIO E-LTU	C6N36ABE

HPE OneView HPE OneView Advanced with HPE iLO Advanced & with rights-to-use HPE Insight

Configuration Information - Factory Integrated Models

Software for Converged Mgmt	Control (Server hardware required on the same purchase order)	
	HPE OneView for Blade Server including 3yr 24x7 Support FIO Bundle Physical 1-server LTU	F6Q89A
HPE Storage Controllers	HP Smart Array P246br/1GB FBWC 12Gb 4-ports Int FIO SAS Controller	749975-B21
	HP FIO Enable Smart Array B140i Setting	784308-B21
	HPE BL460c G9 Broadwell NVMe FIO Setting	825555-B21
	<p>NOTE: The HPE Gen9 Broadwell NVMe FIO Setting (825555-B21) is required to support up to 2 SFF NVMe SSDs within the system. This option disables SFF bays 3 and 4 and is not compatible with the HPE Smart Array P246br. Hewlett Packard Enterprise recommends the use of a dual M.2 solid state drive kit for boot when using this option.</p> <p>NOTE: The HPE Smart Array B140i Controller (chipset SATA) comes standard with the HPE BL660c Gen9 10Gb/20Gb FLB CTO Blade. If the HPE Smart Array P246br controller is not chosen, SATA cables will be provided to support SATA devices for the four internal drives. If RAID is required when using the B140i, please choose 'HPE FIO B140i RAID Enable Kit - BIOS Setting' (784308-B21).</p>	

Step 4: Choose Additional Options for Factory Integration from Core and Additional Options sections below.

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" section below. For additional options, including server blade enclosures interconnect, mezzanine options and power subsystem options; please see the Core Options and Additional sections below; or the following:

- HPE BladeSystem c3000 Enclosure QuickSpecs:
<https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04123379>
NOTE: The c3000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
- HPE BladeSystem c7000 Enclosure QuickSpecs:
<https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04229580>
NOTE: The c7000 HPE c-Class enclosures have full backwards and forwards compatibility, existing server blades are supported in the new enclosures and any future server blades will be supported in the existing enclosures.
- HPE BladeSystem c-Class Interconnect and Mezzanine Components:
<http://h18004.www1.hp.com/products/blades/components/c-class-interconnects.html> and
<http://h18004.www1.hp.com/products/blades/components/c-class-adapters.html>

NOTE: For optimal cooling and system performance the BL660c Gen9 Server Blade requires the c7000 enclosure to be configured with 10 fans and the c3000 enclosure to be configured with 6 fans.

Core Options

HPE Networking

NOTE: A 10 Gigabit Ethernet adapter supports linking at 1Gbps or 10Gbps when connected to an interconnect module with 10Gb Ethernet downlinks.

NOTE: A 10 Gigabit Ethernet adapter supports linking at only 1Gbps when connected to an interconnect module with 1Gb Ethernet downlinks.

NOTE: The 10 Gigabit Ethernet adapters on each server blade connect to a 10Gb interconnect in bays 3-6 (HPE BladeSystem c7000 Enclosure) or bays 2-4 (HPE BladeSystem c3000 Enclosure).

20 Gigabit Ethernet Mezzanine Cards

HP FlexFabric 20Gb 2-port 630M Adapter

700076-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04330587>

HPE FlexFabric 20Gb 2-port 650M Adapter

700767-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04380277>

10 Gigabit Ethernet Mezzanine Cards

HPE FlexFabric 10Gb 2-port 534M Adapter

700748-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at: <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111368>

HPE Ethernet 10Gb 2-port 560M Adapter

665246-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at: <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111406>.

1 Gigabit Ethernet Mezzanine Cards

HPE Ethernet 1Gb 4-port 366M Adapter

615729-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at: <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111456>

FlexibleLOM Adapters

NOTE: The server supports a maximum of two FlexibleLOMs that are installed in the FlexibleLOM connectors. Both can be used with either two (2) or four (4) processors.

20Gb FlexibleLOM Adapters

HPE FlexFabric 20Gb 2-port 630FLB Adapter

700065-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04330585>

HPE FlexFabric 20Gb 2-port 650FLB Adapter

700763-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04380276>

10Gb FlexibleLOM Adapters

HPE FlexFabric 10Gb 2-port 536FLB Adapter

766490-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04380266>

HPE Ethernet 10Gb 2-port 560FLB Adapter

655639-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111516>

Core Options

HPE InfiniBand Mezzanine Adapters

NOTE: When an InfiniBand adapter is installed in mezzanine slot 1, only one port is active (regardless of operating mode). When installed in mezzanine slot 2, both ports are active.

NOTE: InfiniBand QDR and FDR speeds are only supported on the HPE BladeSystem c7000 Enclosure. For additional information, please see the HPE BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at:

<https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04126044>

<https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04154440>

HP InfiniBand QDR/Ethernet 10Gb 2-port 544+M Adapter 764282-B21

NOTE: The QDR InfiniBand adapter may be installed in either mezzanine slot of the server.

HP InfiniBand FDR/Ethernet 10Gb/40Gb 2-port 544+M Adapter 764283-B21

NOTE: The FDR InfiniBand adapter must be installed in mezzanine slot 1 for FDR mode and may be installed in either mezzanine slot if operated in any other mode.

HP InfiniBand FDR 2-port 545M Adapter 702213-B21

HPE Fibre Channel HPE LPe1605 16Gb Fibre Channel HBA for BladeSystem c-Class 718203-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/QuickSpecs/14742_na/14742_na.html

HPE QMH2672 16Gb Fibre Channel Host Bus Adapter 710608-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04126962>

HPE LPe1205A 8Gb Fibre Channel Host Bus Adapter for BladeSystem c-Class 659818-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04163733>

HPE Processors **NOTE:** The BL660c Gen9 supports two or four processors; one and three processor configurations are not supported.

E5-4600 v4 series Processors

HPE BL660c Gen9 Intel® Xeon® E5-4660v4 (2.5GHz/16-core/40MB/120W) 2-Processor Kit 844371-B21

HPE BL660c Gen9 Intel® Xeon® E5-4650v4 (2.4GHz/14-core/35MB/105W) 2-Processor Kit 844372-B21

HPE BL660c Gen9 Intel® Xeon® E5-4640v4 (2.3GHz/12-core/30MB/105W) 2-Processor Kit 844373-B21

HPE BL660c Gen9 Intel® Xeon® E5-4620v4 (2.4GHz/10-core/25MB/105W) 2-Processor Kit 844374-B21

HPE BL660c Gen9 Intel® Xeon® E5-4610v4 (1.8GHz/10-core/25MB/105W) 2-Processor Kit 844375-B21

HPE BL660c Gen9 Intel® Xeon® E5-4669v4 (2.5GHz/22-core/55MB/135W) 2-Processor Kit 844376-B21

HPE BL660c Gen9 Intel® Xeon® E5-4667v4 (2.5GHz/18-core/45MB/135W) 2-Processor Kit 844377-B21

HPE BL660c Gen9 Intel® Xeon® E5-4627v4 (3.2GHz/10-core/25MB/135W) 2-Processor Kit 844378-B21

HPE BL660c Gen9 Intel® Xeon® E5-4655v4 (3.2GHz/8-core/30MB/135W) 2-Processor Kit 844379-B21

Core Options

E5-4600 v3 series Processors

HPE BL660c Gen9 Intel® Xeon® E5-4610v3 (1.7GHz/10-core/25MB/105W) 2-processor Kit	728378-B21
HPE BL660c Gen9 Intel® Xeon® E5-4620v3 (2.0GHz/10-core/25MB/105W) 2-processor Kit	728376-B21
HPE BL660c Gen9 Intel® Xeon® E5-4640v3 (1.9GHz/12-core/30MB/105W) 2-processor Kit	728374-B21
HPE BL660c Gen9 Intel® Xeon® E5-4650v3 (2.1GHz/12-core/30MB/105W) 2-processor Kit	728372-B21
HPE BL660c Gen9 Intel® Xeon® E5-4660v3 (2.1GHz/14-core/35MB/120W) 2-processor Kit	728370-B21
HPE BL660c Gen9 Intel® Xeon® E5-4669v3 (2.1GHz/18-core/45MB/135W) 2-processor Kit	728380-B21
HPE BL660c Gen9 Intel® Xeon® E5-4667v3 (2.0GHz/16-core/40MB/135W) 2-processor Kit	728382-B21
HPE BL660c Gen9 Intel® Xeon® E5-4627v3 (2.6GHz/10-core/45MB/135W) 2-processor Kit	728384-B21
HPE BL660c Gen9 Intel® Xeon® E5-4655v3 (2.9GHz/6-core/30MB/135W) 2-processor Kit	792028-B21

NOTE: For the maximum supported memory speeds for each processor listed above, please reference the 'Memory Speed by Processor Model' table in the Memory section of the QuickSpecs.

NOTE: Supports 2 or 4 processors. Mixing different processor models is not supported.

NOTE: For the Intel® C610 Chipset E5-4600 v3 Series, the letter preceding the model number indicates the Product Line (E3, E5, E7); 4600x, 4 = number of CPUs in a Node, 6 is socket/segment designation, 00 = Processor SKU, and x = L for low power SKUs.

NOTE: All processors within the server must be identical.

NOTE: Intel® Hyper Threading is supported on all processors except E5-4627v3 and E5-4627v4

HPE Memory

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. HPE SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen9. For additional information, please see the HPE SmartMemory QuickSpecs at:

<https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111535>

NOTE: LRDIMM and RDIMM are distinct memory technologies and cannot be mixed within a server.

NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2400MT/s, 2133 MT/s, 1866 MT/s, or 1600 MT/s. Please see Memory Population Table or the Online Memory Configuration Tool at:

<http://h22195.www2.hp.com/MemoryTool/Home/Legal>

HPE SmartMemory

Registered DIMMs (RDIMMs) - E5-4600 v4 series Processors

HP 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
HP 16GB (1x16GB) Single Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805349-B21
HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21
HP 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805351-B21

Load Reduced DIMMs (LRDIMMs) - E5-2600 v4 series Processors

Core Options

HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21
HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21
HPE 128GB (1x128GB) Octal Rank x4 DDR4-2400 CAS-20-18-18 Load Reduced Memory Kit	809208-B21

Registered DIMMs (RDIMMs) - E5-4600 v3 series Processors

HP 8GB (1x8GB) Dual Rank x8 DDR4-2133 CAS-15-15-15 Registered Memory Kit	759934-B21
HP 8GB (1x8GB) Single Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726718-B21
HP 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726719-B21
HP 32GB (1x32GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	728629-B21

Load Reduced DIMMs (LRDIMMs) - E5-4600 v3 series Processors

HP 32GB (1x32GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726722-B21
HP 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726720-B21
HP 48GB (1x16GB +1x32GB) DDR4-2133 CAS-15-15-15 Load Reduced Memory FIO Kit	792278-B21
HP 64GB (1x64GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726724-B21

NOTE: For additional memory rules and guidelines, see the "Memory" section later in this document.

NOTE: For more information on ProLiant Energy Efficient Features, see:

<http://www.hp.com/go/proliant-energy-efficient>

Solid State M.2 SATA Drives

NOTE: The solid state M.2 SATA drives plug directly into a connector on the system board and do not use a SFF drive cage slot.

NOTE: RAID 1, 0 are provided through the B140i in UEFI BIOS mode only

HP Dual 64GB Value Endurance Solid State M.2 Enablement Kit for ProLiant Blades	775588-B21
HP 64GB Value Endurance Solid State M.2 Enablement Kit for ProLiant Blades	785233-B21
HPE Dual 120GB Read Intensive-1 Solid State Drive M.2 Kit for ProLiant Blades	846497-B21
HPE 120GB Read Intensive-1 Solid State Drive M.2 Kit for ProLiant Blades	846495-B21

HPE Hard Drives

NOTE: The standard ProLiant BL660c Gen9 server includes the HPE hot-plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from generation G7 servers and before are not compatible with the BL660c Gen9 drive bays.

NOTE: The mixing of standard SAS drives with SAS SSD is supported within the server, but limits the RAID configuration to two separate RAID 0 volumes. Mixing of other drives types is not supported.

NOTE: HPE hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

NOTE: The hard drive options are not required when configuring a drive-less model.

NOTE: The HPE Gen9 Broadwell NVMe FIO Setting (825555-B21) is required to support up to 2 SFF NVMe SSDs within the system. This option disables SFF bays 3 and 4 and is not compatible with the HPE Smart Array P246br. Hewlett Packard Enterprise recommends the use of a dual M.2 solid state drive kit for boot when using this option.

NOTE: Hewlett Packard Enterprise has qualified the NVMe drive portfolio using the Operating System inbox drivers, full detail on the Solid State Drive QuickSpecs:

HPE NVMe PCIe Read Intensive SFF (2.5-inch) Solid State Drives

HP 2TB NVMe PCIe Read Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive	764908-B21
HP 1.2TB NVMe PCIe Read Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive	764906-B21

Core Options

HP 400GB NVMe PCIe Read Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive 764904-B21

HPE NVMe PCIe Mixed Use SFF (2.5-inch) Solid State Drives

HP 2TB NVMe PCIe Mixed Use SFF 2.5-in SC2 3yr Wty Solid State Drive 765044-B21

HP 1.6TB NVMe PCIe Mixed Use SFF 2.5-in SC2 3yr Wty Solid State Drive 765038-B21

HP 800GB NVMe PCIe Mixed Use SFF 2.5-in SC2 3yr Wty Solid State Drive 765036-B21

HP 400GB NVMe PCIe Mixed Use SFF 2.5-in SC2 3yr Wty Solid State Drive 765034-B21

HPE NVMe PCIe Write Intensive SFF (2.5-inch) Solid State Drives

HP 1.6TB NVMe PCIe Write Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive 764892-B21

HP 800GB NVMe PCIe Write Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive 736939-B21

HP 400GB NVMe PCIe Write Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive 736936-B21

6G SATA Hot Plug with SmartDrive SFF (2.5-inch) Midline (MDL) Drives

HP 2TB 6G SATA 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive 765455-B21

HP 1TB 6G SATA 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive 765453-B21

HP 1TB 6G SATA 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive 655710-B21

NOTE: Please see the QuickSpecs for technical specifications and additional information at <https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04111725>.

SAS Hot Plug with SmartDrive SFF (2.5-inch) Enterprise Drives

HP 1.2TB 6G SAS 10K rpm SFF (2.5-inch) SC Dual Port Enterprise 3yr Warranty Hard Drive 718162-B21

HP 900GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 652589-B21

HP 600GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 652583-B21

HP 450GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 652572-B21

HP 300GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 652564-B21

HP 300GB 6G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 652611-B21

HP 146GB 6G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 652605-B21

SAS Hot Plug SmartDrive SFF (2.5-inch) Midline Drives

HP 2TB 12G SAS 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive 765466-B21

HP 1TB 12G SAS 7.2K rpm SFF (2.5-inch) SC 512e 1yr Warranty Hard Drive 765464-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111744>.

12G SAS SFF (2.5in) RI-3 SC SSD

HPE 3.84TB 12G SAS Read Intensive-3 SFF 2.5-in SC 3yr Wty Solid State Drive 816576-B21

12G SAS SFF (2.5in) MU-3 SC SSD

HPE 800GB 12G SAS Mixed Use-1 SFF (2.5in) SC 3yr Wty Solid State Drive 846434-B21

HPE 1.6TB 12G SAS Mixed Use-1 SFF (2.5in) SC 3yr Wty Solid State Drive 846436-B21

12G SAS SFF (2.5in) MU-3 SC SSD

HPE 3.2TB 12G SAS Mixed Use-3 SFF 2.5-in SC 3yr Wty Solid State Drive 822567-B21

HPE 400GB 12G SAS Mixed Use-3 SFF 2.5-in SC 3yr Wty Solid State Drive 822555-B21

6G SATA Value Endurance SFF (2.5-inch) SC Enterprise Value M1 Solid State Drives

Core Options

HP 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764923-B21
HP 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764925-B21
HP 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764927-B21
HP 800GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive	764929-B21

6G SATA SFF (2.5in) RI-1 SC SSD

HPE 120GB 6G SATA Read Intensive-1 SFF 2.5-in SC 3yr Wty Solid State Drive	838404-B21
HPE 240GB 6G SATA Read Intensive-1 SFF 2.5-in SC 3yr Wty Solid State Drive	838406-B21
HPE 480GB 6G SATA Read Intensive-1 SFF 2.5-in SC 3yr Wty Solid State Drive	838408-B21
HPE 960GB 6G SATA Read Intensive-1 SFF 2.5-in SC 3yr Wty Solid State Drive	838410-B21
HPE 1.92TB 6G SATA Read Intensive-1 SFF 2.5-in SC 3yr Wty Solid State Drive	838412-B21

6G SATA 2.5in WI-PLP SC SSD

HP 1.2TB 6G SATA Write Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804677-B21
HP 800GB 6G SATA Write Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804671-B21
HP 400GB 6G SATA Write Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804665-B21
HP 200GB 6G SATA Write Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804639-B21

6G SATA 2.5in MU-PLP SC SSD

HPE 1.92TB SATA 6G MU SFF SC DS SSD	872352-B21
HP 1.6TB 6G SATA Mixed Use-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804631-B21
HPE 960GB SATA 6G MU SFF SC DS SSD	872348-B21
HP 800GB 6G SATA Mixed Use-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804625-B21
HP 480GB 6G SATA Mixed Use-2 SFF 2.5-in SC 3yr Wty Solid State Drive	832414-B21
HPE 480GB SATA 6G MU SFF SC DS SSD	872344-B21
HP 200GB 6G SATA Mixed Use-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804613-B21

6G SATA 2.5in RI-PLP SC SSD

HP 1.6TB 6G SATA Read Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804605-B21
HPE 1.6TB SATA 6G RI SFF SC DS SSD	869386-B21
HPE 960GB SATA 6G RI SFF SC DS SSD	869384-B21
HP 800GB 6G SATA Read Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804599-B21
HP 480GB 6G SATA Read Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804593-B21
HPE 480GB SATA 6G RI SFF SC DS SSD	869378-B21
HP 240GB 6G SATA Read Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804587-B21
HPE 240GB SATA 6G RI SFF SC DS SSD	869376-B21
HPE 150GB SATA 6G RI SFF SC DS SSD	869374-B21
HP 120GB 6G SATA Read Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804581-B21
HP 80GB 6G SATA Read Intensive-2 SFF 2.5-in SC 3yr Wty Solid State Drive	804575-B21

6G SATA Hot Plug MU-3 SFF (2.5-inch) SC Solid State Drives

HP 1.92TB 6G SATA Mixed Use-3 SFF 2.5-in SC 3yr Wty Solid State Drive	817011-B21
HP 960GB 6G SATA Mixed Use-3 SFF 2.5-in SC 3yr Wty Solid State Drive	816995-B21

Core Options

HP 480GB 6G SATA Mixed Use-3 SFF 2.5-in SC 3yr Wty Solid State Drive 816985-B21

6G SATA Hot Plug RI-3 SFF (2.5-inch) SC Solid State Drives

HP 3.84TB 6G SATA Read Intensive-3 SFF 2.5-in SC 3yr Wty Solid State Drive 816929-B21

HP 960GB 6G SATA Read Intensive-3 SFF 2.5-in SC 3yr Wty Solid State Drive 816909-B21

6G SATA Hot Plug RI SFF (2.5-inch) SC Solid State Drives

HPE 3.84TB SATA 6G RI SFF SC DS SSD 868830-B21

HPE 1.92TB SATA 6G RI SFF SC DS SSD 868826-B21

HPE 1.92TB 6G SATA Read Intensive SFF (2.5in) SC 1yr Warranty Solid State Drive 871770-B21

HPE 960GB SATA 6G RI SFF SC DS SSD 868822-B21

HPE 960GB 6G SATA Read Intensive SFF (2.5in) SC 1yr Warranty Solid State Drive 871768-B21

HPE 480GB SATA 6G RI SFF SC DS SSD 868818-B21

HPE 480GB SATA 6G RI SFF SC SSD 872855-B21

HPE 240GB SATA 6G RI SFF SC DS SSD 868814-B21

HPE 240GB SATA 6G RI SFF SC SSD 872853-B21

HPE 1.6TB SATA 6G WI SFF SC DS SSD 872363-B21

HPE 800GB SATA 6G WI SFF SC DS SSD 872359-B21

HPE 400GB SATA 6G WI SFF SC DS SSD 872355-B21

12G SAS 10K SFF (2.5in) SC HDD

HP 1.8TB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 512e 3yr Warranty Hard Drive 791034-B21

HPE 1.8TB SAS 10K SFF SC 512e DS HDD 872481-B21

HP 1.2TB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 781518-B21

HPE 1.2TB SAS 10K SFF SC DS HDD 872479-B21

HP 900GB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 785069-B21

HP 600GB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 781516-B21

HPE 600GB SAS 10K SFF SC DS HDD 872477-B21

HP 300GB 12G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive 785067-B21

HPE 300GB SAS 10K SFF SC DS HDD 872475-B21

12G SAS SFF (2.5in) RI-3 SC SSD

HP 1.92TB 12G SAS Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive 802891-B21

12G SAS SFF (2.5in) WI-1 SC SSD

HPE 1.6TB 12G SAS Write Intensive-1 SFF (2.5in) SC 3yr Wty Solid State Drive 846432-B21

HPE 800GB 12G SAS Write Intensive-1 SFF (2.5in) SC 3yr Wty Solid State Drive 846430-B21

HP 800GB 12G SAS Write Intensive SFF 2.5-in SC 3yr Wty Solid State Drive 802586-B21

HP 400GB 12G SAS Write Intensive SFF 2.5-in SC 3yr Wty Solid State Drive 802582-B21

HP 200GB 12G SAS Write Intensive SFF 2.5-in SC 3yr Wty Solid State Drive 802578-B21

12G SAS SFF (2.5in) MDL SC HDD

HPE 1TB 12G SAS 7.2K rpm SFF (2.5in) SC Midline 1yr Warranty Hard Drive 832514-B21

12G SAS 15K SFF (2.5in) SC 512e HDD

HP 600GB 12G SAS 15K rpm SFF (2.5-inch) SC 512e Enterprise 3yr Warranty Hard Drive 748387-B21

Core Options

HPE 600GB SAS 15K SFF SC 512e DS HDD	870763-B21
HPE 900GB SAS 15K SFF SC 512e DS HDD	870765-B21

12G SAS ME SFF (2.5-inch) SC Enterprise Mainstream H2 Solid State Drives

HP 200GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779164-B21
HP 400GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779168-B21
HP 800GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779172-B21
HP 1.6TB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive	779176-B21

12G SAS VE SFF (2.5-inch) SC EV Solid State Drives

HP 1.6TB 12G SAS Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	762263-B21
HP 800GB 12G SAS Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	762261-B21

SAS Hot Plug with SmartDrive SFF (2.5-inch) Enterprise Drives

HP 300GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	759208-B21
HPE 300GB SAS 15K SFF SC DS HDD	870753-B21
HP 450GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	759210-B21
HPE 600GB SAS 15K SFF SC DS HDD	870757-B21
HP 600GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive	759212-B21
HPE 900GB SAS 15K SFF SC DS HDD	870759-B22

NOTE: Please see the QuickSpecs for technical specifications and information at <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04154378>

Additional Options

HPE Insight software

HPE Insight Control

HPE Insight Control including 1yr 24x7 Technical Support and Updates 1-server LTU

C6N27A

HPE Insight Control including 1yr 24x7 TSU E-LTU

C6N28ABE

HPE Insight Management Media Kit

C6N31A

NOTE: HPE Insight Management Media Kit contains DVDs without licenses. Contains HPE Systems Insight Manager, HPE Insight Control, HPE Matrix Operating Environment, and Virtual Connect Enterprise Manager software. Uses an integrated installer to perform quick and accurate software installation and updates.

NOTE: Electronic and Flexible-Quantity licenses can be used to purchase multiple licenses with a single activation key.

NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HPE Software Technical Support Service.

NOTE: Licenses ship without media. The HPE Insight Management Media Kit can be ordered separately, or can be downloaded at <http://www.hp.com/go/insightupdates>

NOTE: For additional license kits, please see the QuickSpecs at:

<https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04123391>

Volume Software Options

Vertica for Hadoop

HPE Vertica for SQL on Hadoop 1-node 1yr Subscription 24x7 Support E-LTU

P9J18AAE

HPE iLO Advanced License

HPE Integrated Lights-Out (iLO) Advanced for ProLiant BladeSystem Remote Management

HPE iLO Advanced for BladeSystem including 3yr 24x7 Technical Support and Updates E-LTU

E6U63ABE

HPE iLO Advanced for BladeSystem including 3yr 24x7 Tech Support and Updates 1-server LTU

BD502A

HPE iLO Advanced for BladeSystem including 1yr 24x7 Technical Support and Updates E-LTU

E6U60ABE

HPE iLO Advanced for BladeSystem including 1yr 24x7 Support 1-server LTU

512488-B21

NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one or three years of 24 x 7 HPE Software Technical Support Service.

NOTE: For additional license kits, including electronic delivery options, please see the iLO QuickSpecs at <http://www.hp.com/go/iLO>

NOTE: Customer will receive a license entitlement certificate, which must be redeemed online or via fax in order to obtain the license activation key(s). Includes one or three year of 24 x 7 HPE Software Technical Support Service.

NOTE: For additional license kits, please see the QuickSpecs at:

<https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04154343>

HPE OneView Software for Converged Mgmt

HPE OneView Advanced (with HPE iLO Advanced and with rights-to-use HPE Insight Control)

HPE OneView including 3yr 24x7 Support Physical 1-server LTU

E5Y34A

HPE OneView including 3yr 24x7 Support Flexible Quantity E-LTU

E5Y35AAE

Additional Options

HPE OneView Physical Media Kit LTU E5Y37A

NOTE: Full licenses of HPE OneView Advanced also provide the right-to-use HPE Insight Control without additional charge.

NOTE: Server provisioning (via 'HPE Insight Control server provisioning') is licensed as part of HPE OneView Advanced and provides multi-server OS and driver provisioning. Media kit #BD883A can be ordered for a physical copy of this software (USB flash drive).

NOTE: Licenses ship without media. The HPE OneView Media Kit can be ordered separately, or can be downloaded at: <http://www.hp.com/go/oneview>

NOTE: Electronic and Flexible-Quantity licenses can be used to purchase multiple licenses with a single activation key.

NOTE: For additional license kits please see the QuickSpecs at <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111367>

High Performance Clusters HPE Cluster Management Utility

HPE Insight Cluster Management Utility 1yr 24x7 Flexible LTU QL803B

HPE Insight Cluster Management Utility 3yr 24x7 Flexible LTU BD476A

NOTE: These part numbers can be used to purchase one certificate for multiple licenses and support with a single activation key. Each license is for one node (server). Customer will receive a printed end user license agreement and license entitlement certificate via physical shipment. The license entitlement certificate must be redeemed online in order to obtain a license key. Customer also will receive a support agreement.

HPE Insight Cluster Management Utility Media BD477A

NOTE: For additional license kits please see the QuickSpecs at <https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111735>

HPE I/O Accelerator Options

HPE 1.2TB Read Intensive Mezzanine PCIe Workload Accelerator for BladeSystem c-Class 794603-B21

HPE 1.6TB Read Intensive Mezzanine PCIe Workload Accelerator for BladeSystem c-Class 794605-B21

HPE Security

HP Trusted Platform Module Option 488069-B21

HP Trusted Platform Module 2.0 Kit 745823-B21

NOTE: The TPM (Trusted Platform Module) is a microcontroller chip that can securely store artifacts used to authenticate the server platform. These artifacts can include passwords, certificates and encryption keys. Windows® BitLocker™ Drive Encryption (BitLocker) is a data protection feature available in Windows Server® 2008 R2. BitLocker leverages the enhanced security capabilities of a Trusted Platform Module (TPM) version 1.2. The TPM works with BitLocker to help protect user data and to ensure that a server running Windows Server 2008 R2 has not been tampered with while the system was offline.

NOTE: For more information about TPM, including a white paper, go to <http://www.hp.com/go/TPM>

NOTE: ProLiant OS pre-installed units will come with the partition required for TPM deployment.

NOTE: The TPM key is unique to every TPM deployed server and must be retained. Misplacing or losing the key could result in data loss.

HPE Storage Controllers

HPE Smart Array P246br/1GB FBWC 12Gb 4-ports Int SAS Controller 726793-B21

Additional Options

HPE InfiniBand Mezzanine Adapters	<p>NOTE: When an InfiniBand adapter is installed in mezzanine slot 1, only one port is active (regardless of operating mode). When installed in any other mezzanine slot, both ports are active.</p> <p>NOTE: InfiniBand QDR and FDR speeds are only supported on the HPE BladeSystem c7000 Enclosure. For additional information, please see the HPE BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04126044 https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04154440</p>	
	HP InfiniBand QDR/Ethernet 10Gb 2-port 544+M Adapter	764282-B21
	NOTE: The QDR InfiniBand adapter may be installed in any mezzanine slot of the server.	
	HP InfiniBand FDR/Ethernet 10Gb/40Gb 2-port 544+M Adapter	764283-B21
	NOTE: The FDR InfiniBand adapter must be installed in mezzanine slot 1 for FDR mode and may be installed in any mezzanine slot if operated in any other mode.	
	HP InfiniBand FDR 2-port 545M Adapter	702213-B21
<hr/>		
HPE Flash Media Kits for USB Drives	HPE Flash Media Kits for USB Drives	
	HPE Enterprise Mainstream Flash Media Kits for Memory Cards	
	HP 8GB USB Enterprise Mainstream Flash Media Drive Key Kit	737953-B21
	HPE 8GB microSD Enterprise Mainstream Flash Media Kit	726116-B21
	HPE 32GB microSD Mainstream Flash Media Kit	700139-B21
	HP Dual 8GB microSD Enterprise Midline USB Kit	741279-B21
	NOTE: Please see the QuickSpecs for Technical Specifications and additional information: https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04123175	
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HPE Care Pack Services	Proactive Care Services	
	HPE 3 year Proactive Care 24x7 BL4xxc Gen9 Service	U7BN8E
	HPE 3 year Proactive Care 24x7 with DMR BL4xxc Gen9 Service	U7BN9E
	HPE 3 year Proactive Care Advanced 24x7 BL4xxc Gen9 Service	U7BT6E
	HPE 3 year Proactive Care Advanced 24x7 with DMR BL4xxc Gen9 Service	U7CF8E
	HPE 3 year Proactive Care 24x7 BL660c Gen9 Service	U8LQ2E
	HPE 3 year Proactive Care 24x7 with DMR BL660c Gen9 Service	U8LQ3E
	HPE 3 year Proactive Care Advanced 24x7 BL660c Gen9 Service	U8LQ5E
	HPE 3 year Proactive Care Advanced 24x7 with DMR BL660c Gen9 Service	U8LQ6E
	Installation Services	
	HPE Install c-Class Server Blade Service	UE493E
	NOTE: Additional HPE Care Pack services can be found at: http://www.hp.com/go/cpc	

Memory

For detailed memory configuration rules and guidelines, please use the Online DDR4 Memory Configuration Tool:

<http://h22195.www2.hp.com/MemoryTool/Home/Legal>

Memory Subsystem Architecture

Each Intel® Xeon® E5-4600 v4 family or Intel® Xeon® E5-4600 v3 family processor socket contains four memory channels that support two DIMMs each for a total of eight (8) DIMM per installed processor or a grand total of thirty two DIMMs for the server. Up to 64GB capacity DIMMs are supported for 2TB of memory (32 DIMM slots x 64GB per DIMM).

Memory Population Rules and Guidelines:

- A minimum of one DIMM is required per processor.
- Install DIMMs only if the corresponding processor is installed.
- If only two processors are installed in a four processor system, only half of the DIMM slots are available.
- DIMM sizes can be mixed in channel. To maximize performance, it is recommended to balance the total memory capacity between all installed processors and to load the channels similarly whenever possible.
- LRDIMM and RDIMMs are all distinct memory technologies and cannot be mixed within a server. The majority of ProLiant Gen9 servers support RDIMM and LRDIMM.
- DIMMs of different speeds may be mixed in any order; the server will select a common optimal speed.
- The maximum memory speed is a function of the memory type, memory configuration, and processor model.
- The maximum memory capacity is a function of the memory type and number of installed processors.
- HPE memory from previous generation servers is not compatible with the BL660c Gen9 Server Blade.
- To realize the performance memory capabilities listed in this document, HPE SmartMemory is required. For additional information, please see the HPE SmartMemory QuickSpecs at:

<https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111535>

- For memory population rules and additional memory guidelines, please see the BL660c Gen9 user guide at <http://www.hp.com/support>.

Supported Memory Bandwidth on Intel® Xeon® E5-4600 v4 series Processors

DIMM Rank	Registered DIMMs (RDIMMs)				Load Reduced (LRDIMM)	
	Single Rank (1R)		Dual Rank (2R)		Dual Rank (2R)	Quad Rank (4R)
DIMM Capacity	8GB	16GB	16GB	32GB	32GB	64GB
Voltage	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V
SLOTS THAT CAN BE POPULATED						
2P Server	16	16	16	16	16	16
4P Server	32	32	32	32	32	32
MAXIMUM CAPACITY (GB)						
2P Server	128	256	256	512	512	1024
4P Server	256	512	512	1024	1024	2048
POPULATED DIMM SPEED (MT/s)						
1 DIMM per Channel	2400	2400	2400	2400	2400	2400
2 DIMM per Channel	2400	2400	2400	2400	2400	2400

Memory Speed by E5-4600 v4 Series Processor Model

Processor Models	Supported Memory Speeds
E5-4627 v4, E5-4655 v4, E5-4650 v4, E5-4660 v4, E5-4667 v4, E5-4669 v4	2400MT/s
E5-4620 v4, E5-4640 v4	2133MT/s

Memory

E5-4610 v4	1866MT/s
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Standard and Maximum Memory Capacity (Pre-configured Models) for E5-4600 v3 Series

Pre Configured Models	Standard Memory	Maximum Memory Plus Optional Memory	Standard Memory Replaced with Optional Memory
Intel Xeon E5-4650 v4	128GB (4x 32GB)	1.875TB (4x 32GB + 28x 64GB)	2TB (32x 64GB)
Intel Xeon E5-4610 v4	64GB (4x 16GB)	832GB (4x 16GB + 12x 64GB)	1TB (16x 64GB)

Supported Memory Bandwidth on Intel® Xeon® E5-4600 v3 series Processors

DIMM Rank	Registered DIMMs (RDIMMs)				Load Reduced (LRDIMM)		
	Single Rank	Dual Rank (2R)			Dual Rank (2R)	Quad Rank (4R)	
DIMM Capacity	8GB	16GB	8GB	32GB	16GB	32GB	64GB
Voltage	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V	Std Voltage 1.2V
SLOTS THAT CAN BE POPULATED							
2P Server	16	16	16	16	16	16	16
4P Server	32	32	32	32	32	32	32
MAXIMUM CAPACITY (GB)							
2P Server	128	256	128	512	256	512	1024
4P Server	256	512	256	1024	512	1024	2048
POPULATED DIMM SPEED (MT/s)							
1 DIMM per Channel	2133	2133	2133	2133	2133	2133	2133
2 DIMM per Channel	2133	2133	2133	2133	2133	2133	2133

Memory Speed by E5-4600 v3 Series Processor Model

Processor Models	Supported Memory Speeds
E5-4627 v3, E5-4655 v3, E5-4650 v3, E5-4660 v3, E5-4667 v3, E5-4669 v3	2133 MT/s
E5-4620 v3, E5-4640 v3	1866 MT/s
E5-4610 v3	1600 MT/s

Standard and Maximum Memory Capacity (Pre-configured Models) for E5-4600 v3 Series

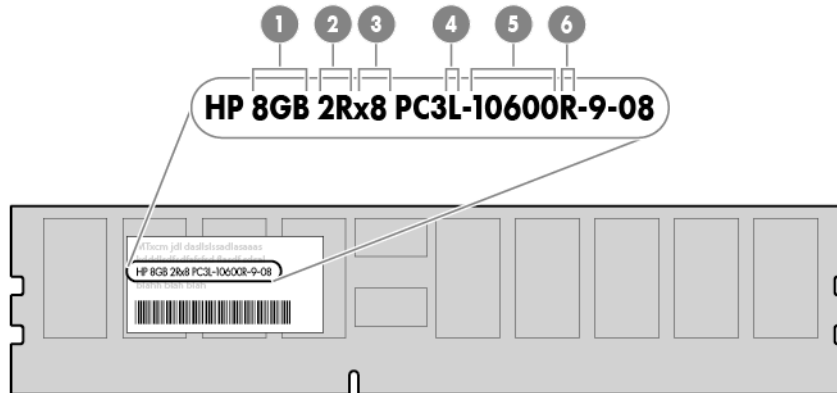
Pre Configured Models	Standard Memory	Maximum Memory Plus Optional Memory	Standard Memory Replaced with Optional Memory
Intel Xeon E5-4650 v3	128GB (4x 32GB)	1.875TB (4x 32GB + 28x 64GB)	2TB (32x 64GB)
Intel Xeon E5-4660 v3	64GB (4x 16GB)	1.812TB (4x 16GB + 28x 16GB)	2TB (32x 64GB)
Intel Xeon E5-4650 v3, E5-4640 v3	32GB (2x 16GB)	256GB (2x 16GB + 14x 16GB)	1TB (16x 64GB)
Intel Xeon E5-4620 v3, E5-4609 v3	16GB (2x 8GB)	240GB (2x 8GB + 14x 16GB)	1TB (16x 64GB)

NOTE: Capacity references are rounded to the common gigabyte (GB) values.

Memory

- 2GB = 2,048MB
- 4GB = 4,096MB
- 8GB = 8,192MB
- 16GB = 16,384MB
- 32GB = 32,768MB

Memory options part number decoder



Item	Description	Definition
1	Capacity	8 GByte 16 GByte 32 GByte
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Memory generation	DDR4
5	Max. Memory speed	2133MT/s
6	CasLatency	P = 15
6	DIMM type	R = RDIMM (registered) L = LRDIMM (load reduced)

Following are memory options available from Hewlett Packard Enterprise:

HPE Memory

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this server. HPE SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen9. For additional information, please see the HPE SmartMemory QuickSpecs at:

<http://www8.hp.com/h20195/v2/GetHTML.aspx?docname=c04111535>

NOTE: LRDIMM and RDIMM are distinct memory technologies and cannot be mixed within a server.

NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2400MT/s, 2133 MT/s, 1866 MT/s, or 1600 MT/s. Please see Memory

Memory

Population Table or the Online Memory Configuration Tool at:
<http://h22195.www2.hp.com/MemoryTool/Home/Legal>

HPE SmartMemory

Registered DIMMs (RDIMMs) - E5-4600 v4 series Processors

HP 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
HP 16GB (1x16GB) Single Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805349-B21
HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21
HP 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805351-B21

Load Reduced DIMMs (LRDIMMs) - E5-4600 v4 series Processors

HPE 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805353-B21
HPE 64GB (1x64GB) Quad Rank x4 DDR4-2400 CAS-17-17-17 Load Reduced Memory Kit	805358-B21

Registered DIMMs (RDIMMs) - E5-4600 v3 series Processors

HP 8GB (1x8GB) Dual Rank x8 DDR4-2133 CAS-15-15-15 Registered Memory Kit	759934-B21
HP 8GB (1x8GB) Single Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726718-B21
HP 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	726719-B21
HP 32GB (1x32GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Registered Memory Kit	728629-B21

Load Reduced DIMMs (LRDIMMs) - E5-4600 v3 series Processors

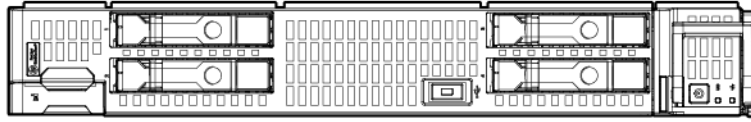
HP 48GB (1x16GB +1x32GB) DDR4-2133 CAS-15-15-15 Load Reduced Memory FIO Kit	792278-B21
HP 32GB (1x32GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726722-B21
HP 16GB (1x16GB) Dual Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726720-B21
HP 64GB (1x64GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726724-B21

NOTE: For additional memory rules and guidelines, see the "Memory" section later in this document.

NOTE: For more information on ProLiant Energy Efficient Features, see:

<http://www.hp.com/go/proliant-energy-efficient>

Storage



Technical Specifications

System Unit	<p>Dimensions (H x W x D) (with bezel) 366.27mm (14.42") x 56.54mm (2.23") x 516.67mm (20.34")</p> <p>Weight (approximate)</p> <p>Maximum: 4 processors, 2 FlexibleLOMs, 32 DIMMs, 4 hard drives, 3 mezzanine cards, and 1 flash cache batteries installed 14.00 lb (6.33 kg)</p> <p>Minimum: 2 processors, 1 FlexibleLOM, and 2 DIMMs installed 10.50 lb (4.75 kg)</p>				
Power Specifications	<p>For power specifications including input requirements, BTU rating, and power supply output, please see the:</p> <ul style="list-style-type: none"> • HPE BladeSystem c3000 Enclosure QuickSpecs at http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04128340 • HPE BladeSystem c7000 Enclosure QuickSpecs at http://www8.hp.com/h20195/v2/GetHTML.aspx?docname=c04228339 <p>To review typical system power ratings use the HPE Power Advisor which is available via the online tool located at http://www.hp.com/go/hppoweradvisor.</p> <p>NOTE: For optimal cooling and system performance the BL660c Gen9 Server Blade requires the c7000 enclosure to be configured with 10 fans and the c3000 enclosure to be configured with 6 fans.</p>				
System Inlet Temperature	<table border="0"> <tr> <td style="vertical-align: top;">Operating</td> <td>10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1,000 ft) above sea level to a maximum of 3,050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).</td> </tr> <tr> <td style="vertical-align: top;">Non-operating</td> <td>-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).</td> </tr> </table>	Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1,000 ft) above sea level to a maximum of 3,050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).	Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).
Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1,000 ft) above sea level to a maximum of 3,050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).				
Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).				
Extended Ambient Operating Support	<p>For Approved hardware configurations, the supported system inlet range is extended to be:</p> <p>5° to 10°C (41° to 50°F) and 35° to 40°C (95° to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 900 m (2953 ft) to a maximum of 3050 m (10,000 ft)</p> <p>NOTE: Qualifications for extended ambient configurations are detailed at: https://www.hp.com/servers/ASHRAE</p>				
Relative Humidity (non-condensing)	<table border="0"> <tr> <td style="vertical-align: top;">Operating</td> <td>10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.</td> </tr> <tr> <td style="vertical-align: top;">Non-operating</td> <td>5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.</td> </tr> </table>	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.	Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.				
Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.				

Technical Specifications

Altitude	Operating	3,050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1,500 ft/min).
	Non-operating	9,144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1,500 ft/min).

Acoustic Noise	For acoustic noise specifications, please see the HPE BladeSystem c-Class Enclosures QuickSpecs located at:	
	<ul style="list-style-type: none"> HPE BladeSystem c3000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/QuickSpecs/12790_div/12790_div.html HPE BladeSystem c7000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/QuickSpecs/12810_div/12810_div.html 	

HPE Smart Array P246br Controller	Disk Drive Interface	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	Server Interface	x8 PCIe 3.0 provides 8GB/s maximum bandwidth
	Cache Memory	1GB flash backed write cache (FBWC) cache standard
	Logical Drives Supported	64 (with included 1GB cache)
	Host Memory Addressing	64-bit, supporting servers memory space greater than 4GB
	RAID Support	RAID 1 (mirroring), RAID 0 (striping), RAID 5, RAID 10
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)

HPE Dynamic Smart Array B140i Controller	Disk Drive Interface	6Gb/s SATA (Serial ATA)
	Server Interface	Embedded x4 PCIe 2.0
	SAS Connectors	4 internal SATA ports
	Cache Memory	None
	SAS Speed	6Gb/s SATA links
	Logical Drives Supported	Up to 10 logical volumes (4 physical drives)
	Host Memory Addressing	64-bit, supporting greater than 4GB server memory space
Hot Plug Support	Yes	
RAID Support	RAID 1 (Mirroring) RAID 0 (Striping) RAID 5	
Other	Upgradeable firmware with recovery ROM	

HPE FlexFabric 10Gb	Type	Integrated dual-port KR 10Gb FlexibleLOM with FlexFabric (Flex-10, FCoE, hardware-based iSCSI, iSCSI boot, TCP/IP offload engine, and autosensing 1Gb/10Gb Ethernet capability)
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Technical Specifications

2-port 536FLB FlexibleLOM	Network Processor	QLogic 57840S with integrated MAC/PHY
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 20Gbps full duplex; 40Gbps aggregate full duplex theoretical bandwidth NOTE: Each port is autosensing 1Gb/10Gb, and can interoperate with 1Gb or 10Gb HPE BladeSystem c-Class interconnect components. Both ports will operate at the same speed. NOTE: Each port on the 554FLB adapter transmits from the server at 20Gbps (theoretical) full duplex.
	IEEE Compliance	802.1p, 802.1q, 802.1qau, 802.3ad, 802.3ae, 802.3ap (10GBase-KX4) and 802.3x
	Standard Features	Full hardware offload of iSCSI and FCoE storage protocol processing for highest performance converged Ethernet data and storage networks. Dual-port 10GbE Flex-10 FlexibleLOM network adapter that provides the flexibility to choose the type of LOM to meet growing infrastructure needs Industry-leading throughput and latency performance Supports the HPE Flex-10 blade interconnect technology User configurable bandwidth settings when combined with the 10Gb Flex-10 Virtual Connect module. From 100Mb/s to 10Gb/s on up to four "Physical Function" NICs per port, in increments of 100Mb/s for NIC. The combined bandwidth of NICs cannot exceed port bandwidth i.e. 10 Gb. Up to 40Gb/s bi-directional near line rate throughput Hardware acceleration and offloads for stateless TCP/IP, TCP Offload Engine (TOE) Improved small packet performance Support for Preboot eXecution Environment (PXE) Integrated PHY and MAC Supports for SR-IOV Support for Network Partitioning (NPAR)
HPE FlexFabric 20Gb 2-port 650FLB FlexibleLOM	Type	Integrated dual-port KR2 20Gb FlexibleLOM with FlexFabric (Flex-20, FCoE, RoCE, Tunnel Offload with VXLAN/NVGRE, hardware-based iSCSI, iSCSI boot, TCP/IP offload engine, and autosensing Ethernet speed capability)
	Network Processor	Emulex XE-104
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 40 Gbps bi-directional; 80 Gbps aggregate bi-directional theoretical bandwidth
	IEEE Compliance	802.3ae, 802.1Q, 802.3x, 802.1p, 802.3ad/LACP, 802.1AB(LLDP), 802.1Qbg, 802.1Qbb, 802.1Qaz, 802.3ap
	Standard Features	Dual 20Gb ports provide up to 80Gb bi-directional per adapter Multi-speed adapter operates at either 20GbE or 10GbE Converges FCoE or RoCE with LAN traffic on a single Ethernet wire Tunnel Offload support for VXLAN and NVGRE RDMA over Converged Ethernet (RoCE) for greater server efficiency and lower latency (6125XLG only) Advanced storage offload processing freeing up valuable CPU cycles Supports UEFI and legacy boot options Mixed Storage – supports NIC + FCoE on one port, and NIC + iSCSI on the other

Technical Specifications

Concurrent Storage – concurrently supports NIC, FCoE, and iSCSI storage functions on the same port (NIC + FCoE + iSCSI)

Industry-leading throughput and latency performance

Supports the HPE Flex-20 blade interconnect technology

Over eight million small packets/s, ideal for web/mobile applications, mobile messaging, and social media

User configurable bandwidth settings when combined with the 20Gb Flex-20 Virtual Connect module. From 100Mb/s to 10Gb/s on up to four "Physical Function" NICs per port, in increments of 100Mb/s for NIC. The combined bandwidth of NICs cannot exceed port bandwidth i.e. 20 Gb/s.

Greater bandwidth with PCIe 3.0

Jumbo Frames support

Supports Wake On LAN (WOL)

Support for Preboot eXecution Environment (PXE)

Support for Microsoft Windows SMB Direct

Optimized host virtualization density with SR-IOV support

Environment-friendly Products and Approach

End-of-life Management and Recycling

Hewlett Packard Enterprise offers end-of-life Hewlett Packard Enterprise product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: <http://www.hpe.com/info/recycle>. To recycle your product, please go to: <http://www.hpe.com/info/recycle> or contact your nearest Hewlett Packard Enterprise sales office. Products returned to Hewlett Packard Enterprise 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 Enterprise web site at: <http://www.hpe.com/info/recycle>. These instructions may be used by recyclers and other WEEE treatment facilities as well as Hewlett Packard Enterprise OEM customers who integrate and re-sell Hewlett Packard Enterprise equipment.

Summary of Changes

Date	Version History	Action	Description of Change
13-Feb-2017	From Version 11 to 12	Changed	Information was updated in QuickSpecs.
		Added	SKUs were added: 872355-B21, 872359-B21, 872363-B21, 870753-B21, 870757-B21, 870759-B22, 870763-B21, 870765-B21, 872475-B21, 872477-B21, 872479-B21, 872481-B21, 872344-B21, 872348-B21, 872352-B21, 869374-B21, 869376-B21, 869378-B21, 869384-B21, 869386-B21.
		Removed	Obsolete SKUs were deleted: 652749-B21
28-Nov-2016	From Version 10 to 11	Changed	Sections in QuickSpecs were updated.
		Added	SKUs added: 868830-B21, 868826-B21, 871770-B21, 868822-B21, 871768-B21, 868818-B21, 872855-B21, 868814-B21, 872853-B21, 809208-B21.
		Removed	Turn-off SKUs were deleted: 816562-B21, 816568-B21, 816572-B21, 816879-B21, 816883-B21, 816889-B21, 816893-B21, 816899-B21, 816903-B21, 816913-B21, 816919-B21, 816923-B21, 816965-B21, 816969-B21, 816975-B21, 816979-B21, 817015-B21, 822559-B21, 822563-B21. Obsolete SKUs were deleted: 651281-B21, 655708-B21, 652745-B21, 757339-B21, 789145-B21, BD883A.
20-Jun-2016	From Version 9 to 10	Changed	Error corrected in Overview section.
20-Jun-2016	From Version 8 to 9	Changed	Overview, Standard Features, Configuration Information - Factory Integrated, Core Options, Additional Options, and Memory sections were updated.
		Added	SKUs added in Configuration Information, Core Options, Additional Options, and Memory section: 844352-B21, 844371-L21, 844372-L21, 844373-L21, 844374-L21, 844375-L21, 844376-L21, 844377-L21, 844378-L21, 844379-L21, 805347-B21, 805349-B21, 836220-B21, 805351-B21, 805353-B21, 805358-B21, 684214-B21, 825555-B21, 665246-B21, 844371-B21, 844372-B21, 844373-B21, 844374-B21, 844375-B21, 844376-B21, 844377-B21, 844378-B21, 844379-B21, 775588-B21, 785233-B21, 846497-B21, 846495-B21, 764908-B21, 764906-B21, 764904-B21, 765044-B21, 765038-B21, 765036-B21, 765034-B21, 764892-B21, 736939-B21, 736936-B21.
31-Mar-2016	From Version 7 to 8	Changed	Overview, Standard Features, Configuration Information - Factory Integrated Models, and Additional Options sections were updated.
		Added	SKUs added in Core Options and Additional Options sections: 846430-B21, 846432-B21, 846434-B21, 846436-B21, 838404-B21, 838406-B21, 838408-B21, 838410-B21, 838412-B21, P9J18AAE.
		Removed	Obsolete SKU deleted: 756601-B21
16-Feb-2016	From Version 6 to 7	Changed	Standard View and Core Options sections were updated.
		Added	SKUs added in Core Options section: 846495-B21, 846497-B21, 832514-B21.
		Removed	Obsolete SKU was deleted: 789135-B21
11-Dec-2015	From Version 5 to 6	Changed	Pre-Configured Models, Configuration Information - Factory Integrated Models, Core Options, Additional Options, and Memory sections were updated.
		Added	SKUs added: 816562-B21, 816568-B21, 816572-B21, 816576-B21, 822555-B21, 822559-B21, 822563-B21, 822567-B21.

Summary of Changes

		Removed	Obsolete SKUs were deleted: 789155-B21, D8S85AAE, D8S84A
28-Sep-2015	From Version 4 to 5	Added	SKU added: 726724-B21, 745823-B21
		Changed	HPE Hard Drives updated
28-Aug-2015	From Version 3 to 4	Changed	Information in Core Options section was updated
10-Jul-2015	From Version 2 to 3	Changed	Standard Features and Optional Features sections were updated.
		Removed	SKUs removed from Core Options section: 741155-B21, 741151-B21, 741146-B21, 717965-B21, 734360-B21, 717973-B21, 739898-B21, 717971-B21, 739888-B21, 717969-B21, 691868-B21, 691868-B21, 691866-B21, 691862-B21, 756636-B21, 756621-B21, 748387-B21, 791034-B21, 781518-B21, 785069-B21, 781516-B21, 785067-B21, 684214-B21, 665246-B21, 665639-B21, 684214-B21
		Added	SKU added in Core Options Section. 779176-B21
19-Jun-2015	From Version 1 to 2	Changed	Information in Additional Options and Configuration information - Factory Integrated Models section were updated.
		Removed	Obsolete SKU removed: 741146-B21
		Added	SKUs were added in Additional Options Section: U8LQ2E, U8LQ3E, U8LQ5E, U8LQ6E, 659818-B21, 651281-B21



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

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