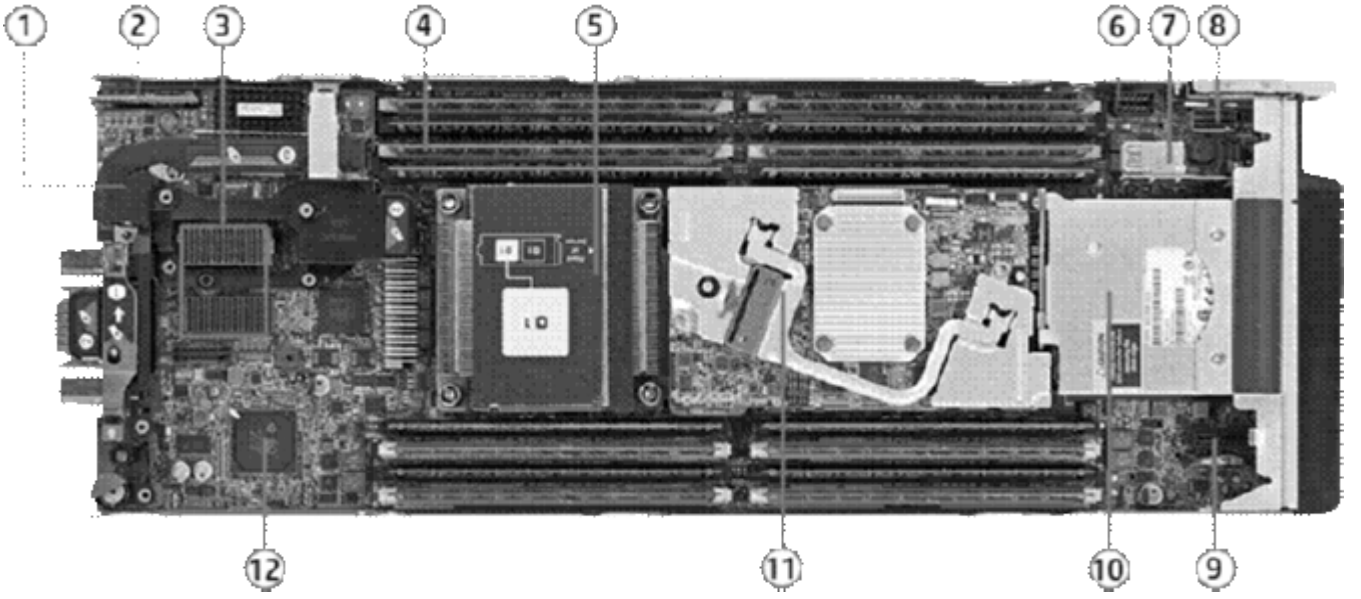
Overview

HPE ProLiant BL460c Gen9 Server Blade - NEBS (GR-63 & GR-1089) and ETSI 300 386-2 Certified



HPE ProLiant BL460c Gen9 Server Blade - Internal View

1. FlexibleLOM adapter
2. Nand Flash & Micro SD
3. Mezzanine Slots (x16 PCI 3.0)
4. Sixteen (16) DDR4 DIMM memory slots (8 per processor)
5. Up to two (2) Intel® Xeon® E5-2600 v3 family processors
6. HPE BLc 12W Smart Storage Battery connector
7. USB 3.0 and TPM
8. Embedded SATA Connector
9. Solid State Device Connector
10. Two hot-plug drive bays
11. HPE Smart Array P244br Controller with 1GB FBWC
12. iLO Management Engine

What's New

- Flexible Controller Options
- Support for 2133MHz DDR4 memory
- Support for 12Gb SAS internal hard drives and 12Gb SAS storage controller offerings
- Support for the Intel E5-2600 v3 Product Family

Recommended Support Services for BL460

NOTE: This document covers the HPE ProLiant BL460c 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
  http://www8.hp.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 at
  http://www8.hp.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 BL460c Gen9 Server Blade requires the c7000 enclosu 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.
NOTE: The following Processors are considered NEBS certified, either by testing or Compliant by Similarity

Processor One of the following depending on Model	**E5-2600 v3 series Processors** HPE BL460c Gen9 Intel® Xeon® E5-2680v3 (2.5GHz/12-core/30MB/120W) HPE BL460c Gen9 Intel® Xeon® E5-2670v3 (2.3GHz/12-core/30MB/120W) HPE BL460c Gen9 Intel® Xeon® E5-2660v3 (2.6GHz/10-core/25MB/105W) HPE BL460c Gen9 Intel® Xeon® E5-2650v3 (2.3GHz/10-core/25MB/105W) HPE BL460c Gen9 Intel® Xeon® E5-2640v3 (2.6GHz/8-core/20MB/90W) HPE BL460c Gen9 Intel® Xeon® E5-2683v3 (2GHz/14-core/35MB/120W) HPE BL460c Gen9 Intel® Xeon® E5-2630v3 (2.4GHz/8-core/20MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2620v3 (2.4GHz/6-core/15MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2609v3 (1.9GHz/6-core/15MB/85W) HPE BL460c Gen9 Intel® Xeon® E5-2695v3 (2.3GHz/14-core/35MB/120W) **NOTE:** DIMM slots 4 and 5 are not accessible when either the E5-2699 v3, the E5-2697 v3, the E5-2643 v3, the E5-2637 v3, or the E5-2667 v3 is used. In a 2 processor configuration, there ar twelve (12) total available DIMM slots. **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:** HT indicates that the processor model supports Intel® Hyper-Threading Technology. **NOTE:** Turbo indicates the maximum potential frequency when using Intel® Turbo Boost Technology. The frequency boost increment is dependent on the processor SKU and the

number of active cores. In general, a higher boost increment is obtained when fewer cores are active.
NOTE: DDR4 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed.
NOTE: Supports 1 or 2 processors. Mixing different processor models is not supported.
NOTE: For the Intel® C610 Chipset E5-2600 v3 Series, the letter preceding the model number indicates the Product Line (E3, E5, E7); 2600x, 2 = number of CPUs in a Node, 6 is socket/segment designation, 00 = Processor SKU, and x = L for low power SKUs.
NOTE: The BL460c Gen9 includes two I/O mezzanine expansion slots. A processor must be installed in processor slot 1 for access to the first mezzanine expansion slot (expansion slot 1). processor must be installed in processor slot 2 for access to the second mezzanine expansion slot (expansion slot 2).
NOTE: All processors within the server must be identical.
NOTE: All processors support Intel® Hyper-Threading and Intel® Turbo Boost Technologies except the E5-2603 v3 and E5-2609 v3.
NOTE: The letter "L" following the model number indicates denotes lower wattage.
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.

Cache Memory
One of the following depending on Model

45MB (1x45MB) L3 cache
NOTE: For Eighteen-core processors.

40MB (1x40MB) L3 cache
NOTE: For Sixteen-core processors.

35MB (1x35MB) L3 cache
NOTE: For Fourteen-core processors.

30MB (1x30MB) L3 cache
NOTE: For Twelve-core processors.

25MB (1x25MB) L3 cache
NOTE: For Ten-core processors.

20MB (1x20MB) L3 cache
NOTE: For Six or Eight-core processors.

15MB (1x15MB) L3 cache
NOTE: For Quad or Six-core processors.

10MB (1x10MB) L3 cache
NOTE: For Quad-core processors.

Chipset

Intel® C610 Series Chipset

Intel® E5-2600v3 Processor Family

NOTE: For more information regarding Intel chipsets, please see the following: **http://www.intel.com/products/server/chipsets/**.

Upgradeability Upgradeable to two (2) processors

Recommended Support Services for BL460

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)

Memory One of the following depending on Model	Type	HPE SmartMemory DDR4 Load Reduced (LRDIMM), or Registered (RDIMM)
	Standard (Pre-configured Models)	128GB (4 x 32GB) DDR4 2133MHz RDIMMs at 1.2V 64GB (4 x 16GB) DDR4 2133MHz RDIMMs at 1.2V 32GB (2 x 16GB) DDR4 2133MHz RDIMMs at 1.2V 32GB (2 x 16GB) DDR4 2133MHz RDIMMs at 1.2V 16GB (2 x 8GB) DDR4 2133MHz RDIMMs at 1.2V 16GB (2 x 8GB) DDR4 2133MHz RDIMMs at 1.2V
	Maximum (LRDIMM)	1TB (16 x 64GB) up to 2133MHz at 1.2V
	Maximum (RDIMM)	512GB (16 x 32GB) up to 2133MHz at 1.2V

NOTE: Support for 64GB LRDIMM and 32GB RDIMM available in earl 2015.
NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this serv HPE SmartMemory is required to realize the memory performance improvements and enhance 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 2133MHz, 1866MHz, or 1600MHz. Please see Memory Population Table or the Online Memory Configuration Tool at: **http://h22195.www2.hp.com/MemoryTool/Home/Legal**

Network Controller One of the following depending on Model	One (1) 20Gb 2-port FlexFabric FLB, 10Gb 2-port HPE FlexFabric FLB, or 10Gb 2-port Etherne 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 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. 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

Two (2) I/O expansion mezzanine slots:

- 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 slot 2).
  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. 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: A second processor must be installed (in processor slot 2) to have access to the second expansion slot (expansion slot 2).

Mezzanine card options include:

- Dual-port 20Gb FlexFabric, Dual-port 10Gb FlexFabric, 10GbE options, and quad-port 1G Ethernet server adapter mezzanine options for additional network ports.
- I/O accelerator mezzanine options for high transaction rate local storage

HPE Server ROM

HPE ROM (read only memory) is now digitally signed using HPE's 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.

HPE's 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 HPE's RBSU (ROM based setup utility) user guide: **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 BTO Modelsd**	One (1) HPE Smart Array P244br Controller with 1GB Flash-Backed Write Cache (FBWC) supporting RAID 0 and RAID 1, or HPE H244br Smart HBA

NOTE: The HPE Smart Array P244br, the HPE H244br Smart HBA, and the HPE B140i (chipset SATA). Support two (2) small form factor (SFF) hot plug drive bays.
NOTE: The FBWC and battery will be disabled when the server inlet temperature exceeds 50C, the FBWC will be re-enabled when the temperature drops below 50C. The Smart Array P244 will continue to operate normally up to the short term operating maximum of 55C.

Maximum Internal Storage One of the following depending on Model	Hot Plug SFF SAS	2.4TB	2 x 1.2TB
	Hot Plug SFF SATA	2.0TB	2 x 1.0TB
	Hot Plug SFF SAS SSD	3.2TB	2 x 1.6TB
	Hot Plug SFF SATA SSD	1.6TB	2 x 800GB

NOTE: The ProLiant BL460c Gen9 server includes the HPE hot plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives fr previous generation servers (prior to Gen8) are not compatible with the ProLiant BL460c Gen9 drive bays.

Interfaces	Micro SDHC Slot	One (1) internal Micro Secure Digital High Capacity (Micro SDHC) card slo
	USB 3.0 Port	One (1) internal USB 3.0 connector for USB flash media drive keys

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

Industry Standard	ACPI 2.0 Microsoft® Logo certifications

Recommended Support Services for BL460

Compliance

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)
Canonical Ubuntu
Oracle Solaris
VMware

NOTE: For more information on HPE's 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.hp.com/go/ossupport** and our driver download page:
http://www.hp.com/servers/BL460cGen9

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 sixteen (16) ProLiant BL460c Gen9 servers plugged vertically.
- The HPE BladeSystem c3000 rack enclosure is 6U high and holds up to eight (8) HPE ProLiant BL460c 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

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Graphics

Integrated Matrox G200eh video controller

- 1600 x 1200 (32 bpp)
- 1920 x 1200 (16 bpp)

HPE iLO Management On System Management Memory

- 16 MB Flash Video Memory
- 256 MB DDR 3 with ECC (112 MB after ECC and video)

Recommended Support Services for BL460

Form Factor HPE ProLiant BL460c Gen9 is a half-height server blade that plugs into the HPE BladeSystem c3000 and c7000 enclosures.

Embedded Management	**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**
	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**.
	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** .
	Intelligent Provisioning	Provision servers by discovering and deploying 1 to few servers with Intelligent Provisioning. Learn more at **http://www.hp.com/go/intelligentprovisioning**.
Server Utilities	**HPE Smart Update**	Optimize firmware and driver updates with HPE Smart Update solutions. Learn more at **http://www.hp.com/go/smartupdate**.
	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 seemless firmware updates. Learn more at **http://www.hp.com/go/sim**.
	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**.
	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**.
	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**.
	HPE Insight Online	HPE Insight Online, available at no additional cost as part of your HPE warranty, Care Pack or contractual support agreement with HPE, 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**.

Recommended Support Services for BL460

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 ar 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 one (1) FlexibleLOM, providing two (2) (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

- Two (2) Small Form Factor hot-plug SAS/SATA HDD or SSD drive bays.
- Choice of the HPE Smart Array P244br Controller with 1GB FBWC/HPE, Smart HBA H244br, or theHP B140i (chipset SATA). RAID 0 and 1 support for all three 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.
- 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-efficienc common slot enclosure-based power supplies (configuration dependent).

Recommended Support Services for BL460

- 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 par fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel an 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 HPE 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**.

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 Blade Server.
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 BL460c Gen9 E5-v3 10Gb/20Gb FlexibleLOM Configure-to-order Blade Server	727021-B21
	Configurable Models ship with:	
	One (1) FlexibleLOM connector providing a choice for one (1) of the supported 10Gb/20Gb FlexibleLOMs (see Step 2) Two (2) HPE small form factor hot-plug SAS/SATA/ HDD or SSD hard drive bays Two (2) x16 PCIe I/O expansion slots (one Type A, one Type A/B) One (1) 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 one (1) processor.
NOTE: If two processors are desired, select one xxxxxx-L21 here in Step 2 and one xxxxxx-B21 in Step 4.

E5-2600 v3 series Processors

HP BL460c Gen9 Intel® Xeon® E5-2680v3 (2.5GHz/12-core/30MB/120W) FIO Processor Kit	726988-L21
HP BL460c Gen9 Intel® Xeon® E5-2670v3 (2.3GHz/12-core/30MB/120W) FIO Processor Kit	726989-L21
HP BL460c Gen9 Intel® Xeon® E5-2660v3 (2.6GHz/10-core/25MB/105W) FIO Processor Kit	726990-L21
HP BL460c Gen9 Intel® Xeon® E5-2650v3 (2.3GHz/10-core/25MB/105W) FIO Processor Kit	726991-L21
HPE BL460c Gen9 Intel® Xeon® E5-2640v3 (2.6GHz/8-core/20MB/90W) FIO Processor Kit	726992-L21
HP BL460c Gen9 Intel® Xeon® E5-2683v3 (2GHz/14-core/35MB/120W) FIO Processor Kit	726993-L21
HP BL460c Gen9 Intel® Xeon® E5-2630v3 (2.4GHz/8-core/20MB/85W) FIO Processor Kit	726994-L21
HP BL460c Gen9 Intel® Xeon® E5-2620v3 (2.4GHz/6-core/15MB/85W) FIO Processor Kit	726995-L21

Configuration Information - Factory Integrated Models

HP BL460c Gen9 Intel® Xeon® E5-2609v3 (1.9GHz/6-core/15MB/85W) FIO Processor Kit	726997-L21
HP BL460c Gen9 Intel® Xeon® E5-2695v3 (2.3GHz/14-core/35MB/120W) FIO Processor Kit	727003-L21

E5-2600 v4 series Processors

HPE BL460c Gen9 Intel® Xeon® E5-2695v4 (2.1GHz/18-core/45MB/120W) FIO Processor Kit	819853-L21
HPE BL460c Gen9 Intel® Xeon® E5-2680v4 (2.4GHz/14-core/35MB/120W) FIO Processor Kit	819842-L21
HPE BL460c Gen9 Intel® Xeon® E5-2640v4 (2.4GHz/10-core/25MB/90W) FIO Processor Kit	819839-L21

NOTE: All processors within the server must be identical.
NOTE: DIMM slots 4 and 5 are not accessible when the E5-2699 v4, E5-2697 v4, E5-2697A v4, E5-2667 v4, E5-2643 v4, E5-2637 v4, E5-2699 v3, the E5-2697 v3, the E5-2643 v3, the E5-2637 v3, or the E5-2667 v3 is used. In a 2 processor configuration, there are twelve (12) total available DIMM slots.
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: All processors support Intel® Hyper-Threading and Intel® Turbo Boost Technologies except the E5-2609 v4, E5-2603 v4, E5-2603 v3 and E5-2609 v3.
NOTE:DDR4 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed.
NOTE: Supports 1 or 2 processors. Mixing different processor models is not supported.
NOTE: For the Intel® C610 Chipset E5-2600 v3 and v4 Series, the letter preceding the model number indicates the Product Line (E3, E5, E7); 2600x, 2 = number of CPUs in a Node, 6 is socket/segment designation, 00 = Processor SKU, and x = L for low power SKUs.
NOTE: The BL460c Gen9 includes two I/O mezzanine expansion slots. A processor must be installed in processor slot 1 for access to the first mezzanine expansion slot (expansion slot 1). A processor must be installed in processor slot 2 for access to the second mezzanine expansion slot (expansion slot 2).
NOTE: The letter "L" following the model number indicates denotes lower wattage.

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 2133MHz, 1866MHz, or 1600MHz. 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) - E5-2600 v3 series Processors

Configuration Information - Factory Integrated Models

	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
	Load Reduced DIMMs (LRDIMMs) - E5-2600 v3 series Processors	
	HP 32GB (1x32GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726722-B21
	Registered DIMMs (RDIMMs) - E5-2600 v4 series Processors	
	HP 32GB (1x32GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805351-B21
	HPE 16GB (1x16GB) Dual Rank x4 DDR4-2400 CAS-17-17-17 Registered Memory Kit	836220-B21
	HP 8GB (1x8GB) Single Rank x8 DDR4-2400 CAS-17-17-17 Registered Memory Kit	805347-B21
	NOTE: All DDR4 memory option kits consist of one DIMM per kit. For detailed memory configuration rules and guidelines, please use the Online DDR4 Memory Configuration Tool. **NOTE:** Depending on the memory configuration and processor model, 2133MHz memory may operate at a lower speed. Please see the see the "Memory" section later in this document for details. **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.	
	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
Converged Infrastructure Management	**HPE OneView with iLO Advanced - Server hardware required on same purchase order**	
	HPE OneView including 3yr 24x7 Support Flexible Quantity E-LTU	E5Y35AAE

Configuration Information - Factory Integrated Models

Software	HPE OneView for Blade Server including 3yr 24x7 Support FIO Bundle Physical 1-server LTU	F6Q89A
HPE Storage Controllers	HP Smart Array P244br/1GB FBWC 12Gb 2-ports Int FIO SAS Controller	761871-B21
	HPE H244brSmart HBA Controller	761878-B21
	HPE FIO B140i RAID Enable Kit - BIOS Setting	784308-B21
	NOTE: The HPE Smart Array B140i Controller (chipset SATA) comes standard with the HPE BL460c Gen9 10Gb/20Gb FLB CTO Blade (727021-B21). If neither the HPE Smart Array P244br nor the HPE H244br controllers are chosen, a SATA cable will be provided to support SATA devices for the two internal drives. If RAID is required when using the B140i, please choose 'HPE FIO B140i RAID Enable Kit - BIOS Setting' (784308-B21).	

Step 4: Choose Additional Options for Factory Integration

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:
  http://www8.hp.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:
  http://www8.hp.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 BL460c Gen9 Server Blade requires the c7000 enclosu 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 **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04312720**

HPE FlexFabric 20Gb 2-port 650M Adapter 700767-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04347342**

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 one (1) FlexibleLOM that is installed in the FlexibleLOM connectors and is already included in the pre-configured models. However, it must be added in Step 2 for Configure-to-Order Models. The FlexibleLOM options below are used to change these original FlexibleLOMs.

20Gb FlexibleLOM Adapters

HPE FlexFabric 20Gb 2-port 630FLB Adapter 700065-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04312719**

HPE FlexFabric 20Gb 2-port 650FLB Adapter 700763-B21

Core Options

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04347341**

10Gb FlexibleLOM Adapters

HPE FlexFabric 10Gb 2-port 536FLB Adapter	766490-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04347246**

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**

HPE Processors

E5-2600 v3 series Processors

HPE BL460c Gen9 Intel® Xeon® E5-2680v3 (2.5GHz/12-core/30MB/120W) Processor Kit	726988-B21
HPE BL460c Gen9 Intel® Xeon® E5-2670v3 (2.3GHz/12-core/30MB/120W) Processor Kit	726989-B21
HPE BL460c Gen9 Intel® Xeon® E5-2660v3 (2.6GHz/10-core/25MB/105W) Processor Kit	726990-B21
HPE BL460c Gen9 Intel® Xeon® E5-2650v3 (2.3GHz/10-core/25MB/105W) Processor Kit	726991-B21
HPE BL460c Gen9 Intel® Xeon® E5-2640v3 (2.6GHz/8-core/20MB/90W) Processor Kit	726992-B21
HPE BL460c Gen9 Intel® Xeon® E5-2683v3 (2GHz/14-core/35MB/120W) Processor Kit	726993-B21
HPE BL460c Gen9 Intel® Xeon® E5-2630v3 (2.4GHz/8-core/20MB/85W) Processor Kit	726994-B21
HPE BL460c Gen9 Intel® Xeon® E5-2620v3 (2.4GHz/6-core/15MB/85W) Processor Kit	726995-B21
HPE BL460c Gen9 Intel® Xeon® E5-2609v3 (1.9GHz/6-core/15MB/85W) Processor Kit	726997-B21
HPE BL460c Gen9 Intel® Xeon® E5-2695v3 (2.3GHz/14-core/35MB/120W) Processor Kit	727003-B21

E5-2600 v4 series Processors

HPE BL460c Gen9 Intel® Xeon® E5-2695v4 (2.1GHz/18-core/45MB/120W) FIO Processor Kit	819853-L21
HPE BL460c Gen9 Intel® Xeon® E5-2680v4 (2.4GHz/14-core/35MB/120W) FIO Processor Kit	819842-L21
HPE BL460c Gen9 Intel® Xeon® E5-2640v4 (2.4GHz/10-core/25MB/90W) FIO Processor Kit	819839-L21

NOTE: DIMM slots 4 and 5 are not accessible when either the E5-2699 v3, the E5-2697 v3, the E5-2643 v3, the E5-2637 v3, or the E5-2667 v3 is used. In a 2 processor configuration, there are twelve (12) total available DIMM slots.

Core Options

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: HT indicates that the processor model supports Intel® Hyper-Threading Technology.
NOTE: Turbo indicates the maximum potential frequency when using Intel® Turbo Boost Technology. The frequency boost increment is dependent on the processor SKU and the number of active cores. In general, a higher boost increment is obtained when fewer cores are active.
NOTE: DDR4 speed is the maximum memory speed of the processor. Actual memory speed may depend on the quantity and type of DIMMs installed.
NOTE: Supports 1 or 2 processors. Mixing different processor models is not supported.
NOTE: For the Intel® C610 Chipset E5-2600 v3 Series, the letter preceding the model number indicates the Product Line (E3, E5, E7); 2600x, 2 = number of CPUs in a Node, 6 is socket/segment designation, 00 = Processor SKU, and x = L for low power SKUs.
NOTE: The BL460c Gen9 includes two I/O mezzanine expansion slots. A processor must be installed in processor slot 1 for access to the first mezzanine expansion slot (expansion slot 1). A processor must be installed in processor slot 2 for access to the second mezzanine expansion slot (expansion slot 2).
NOTE: All processors within the server must be identical.
NOTE: All processors support Intel® Hyper-Threading and Intel® Turbo Boost Technologies except the E5-2603 v3 and E5-2609 v3.
NOTE: The letter "L" following the model number indicates denotes lower wattage.
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.

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 2133MHz, 1866MHz, or 1600MHz. 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) - E5-2600 v3 series Processors

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

Load Reduced DIMMs (LRDIMMs) - E5-2600 v3 series Processors

Core Options

	HP 32GB (1x32GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726722-B21
	NOTE: Depending on the memory configuration and processor model, 2133MHz memory may operate at a lower speed. Please see the see the "Memory" section later in this document and the Online Memory Configuration Tool for details at **http://h22195.www2.hp.com/MemoryTool/Home/Legal** .	

HPE Hard Drives

NOTE: The ProLiant BL460c 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 BL460c 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.

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
HPE 1.8TB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty 512e HDD	791034-B21
HPE 1.2TB SAS 12G Enterprise 10K SFF (2.5in) SC 3yr Wty HDD	781518-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

6G SATA ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

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: 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.
HPE 64GB Value Endurance Solid State M.2 Enablement Kit for ProLiant Blades

Core Options

HPE 64GB SATA Read Intensive 2242 3yr Wty Dual M.2 Kit	775588-B21

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

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

16G SATA Hot Plug RI uFF (2.5-inch) Solid State Drives

HPE 340GB SATA 6G Read Intensive UFF 3yr Wty Dual M.2 Kit	815605-B21

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 Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle FIO E-LTU	C6N36ABE
	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**	
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**	
Converged	**HPE OneView**	

Additional Options

Infrastructure Management Software	**HPE OneView with iLO Advanced**	
	HPE OneView including 3yr 24x7 Support Physical 1-server LTU	E5Y34A
	HPE OneView including 3yr 24x7 Support Flexible Quantity E-LTU	E5Y35AAE
	HPE OneView Physical Media Kit LTU	E5Y37A
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 Security	HP Trusted Platform Module Option	488069-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 P244br/1GB FBWC 12Gb 2-ports Int SAS Controller	749680-B21
	HPE H244br 12Gb 2-ports Int Smart Host Bus Adapter	726809-B21
	NOTE: The FBWC and battery will be disabled when the server inlet temperature exceeds 50C, the FBWC will be re-enabled when the temperature drops below 50C. The Smart Array P244 will continue to operate normally up to the short term operating maximum of 55C.	
	HPE QMH2672 16Gb Fibre Channel Host Bus Adapter	710608-B21
	NOTE: Please see QuickSpecs for technical specifications and additional information at http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04126962	

Additional Options

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

NOTE: Please see the QuickSpecs for Technical Specifications and additional information:**https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04123175**

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

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® E5-2600 v3 family or Intel® Xeon® E5-2600 v3 family processor socket contains four memor channels that support two DIMMs each for a total of eight (8) DIMM per installed processor or a grand total of sixteen (16) DIMMs for the server. Up to 64GB capacity DIMMs are supported for 1TB of memory (16 DIMM slots 64GB per DIMM).
NOTE: 64GB DIMM support available in earl 2015.

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 one processor is installed in a two 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 BL460c 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 BL460c Gen9 user guide at **http://www.hp.com/support**.

Supported Memory Bandwidth on Intel® Xeon® E5-2600 v3 series Processors

DIMM Rank	Register DIMM (RDIMM)			Load Reduced (LRDIMM)	
	Single Rank (1R)	Dual Rank (2R)		Dual Rank (2R)	Quad Rank (4R)
DIMM Capacity	8GB	16GB	8GB	16GB	32GB
Voltage	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					
12 slot servers	12	12	12	12	12
16 slot servers	16	16	16	16	16
MAXIMUM CAPACITY (GB)*					
12 slot servers	96	192	96	192	384
16 slot servers	128	256	128	256	512
POPULATED DIMM SPEED (MT/s)					
1 DIMM Per Channel	2133	2133	2133	2133	2133

Memory

2 DIMM Per Channel	2133	2133	2133	2133	2133

*Maximum Capacity will vary based on individual serve platform qualification schedule

Memory Speed by E5-2600 v3 Series Processor Model

Processor Models	Supported Memory Speeds
E5-2690 v3, E5-2695 v3, E5-2697 v3, E5-2698 v3, E5-2699 v3, E5-2687W v3, E5-2683 v3, E5-2680 v3, E5-2670 v3, E5-2667 v3 , E5-2660 v3, E5-2650 v3, E5-2650L, E5-2643 v3, E5-2637 v3	2133MHz
E5-2640 v3, E5-2630 v3, E5-2630L v3, E5-2623 v3, E5-2620 v3	1866MHz
E5-2609 v3, E5-2603 v3	1600MHz

Standard and Maximum Memory Capacity (Pre-configured Models) for E5-2600 v3 Series

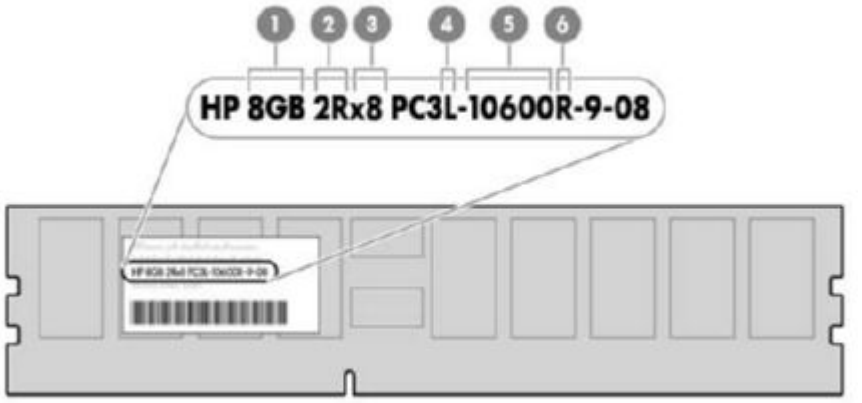
Pre Configured Models	Standard Memory	Maximum Memory Plus Optional Memory	Standard Memory Replaced with Optional Memory
Intel Xeon E5-2670 v3	128GB (4x 32GB)	896GB (4x 32GB + 12x 64GB)	1TB (16x 64GB)
Intel Xeon E5-2660 v3	64GB (4x 16GB)	256GB (4x 16GB + 12x 16GB)	1TB (16x 64GB)
Intel Xeon E5-2650 v3, E5-2640 v3	32GB (2x 16GB)	256GB (2x 16GB + 14x 16GB)	1TB (16x 64GB)
Intel Xeon E5-2620 v3, E5-2609 v3	16GB (2x 8GB)	240GB (2x 8GB + 14x 16GB)	1TB (16x 64GB)

NOTE: Support for 64GB LRDIMMs and 32GB RDIMMs to be available by early 2015.
NOTE: Capacity references are rounded to the common gigabyte (GB) values.

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

Memory options part number decoder

Memory



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 HPE:

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 2133MHz, 1866MHz, or 1600MHz.

HPE SmartMemory

Registered DIMMs (RDIMMs)

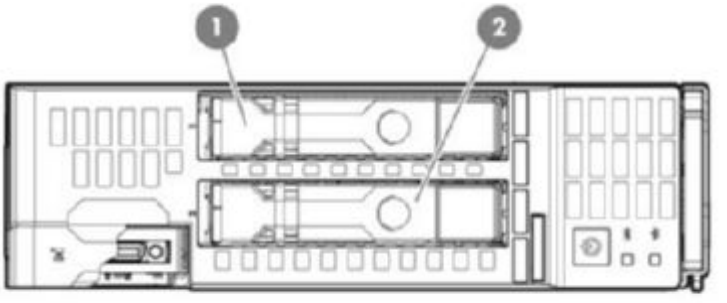
Registered DIMMs (RDIMMs) - E5-2600 v3 series Processors

Memory

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
Load Reduced DIMMs (LRDIMMs) - E5-2600 v3 series Processors	
HP 32GB (1x32GB) Quad Rank x4 DDR4-2133 CAS-15-15-15 Load Reduced Memory Kit	726722-B21

NOTE: Depending on the memory configuration and processor model, 2133MHz memory may operate at a lower speed. Please see the see the "Memory" section later in this document.

Storage



1-2 2 x SFF hot-plug SAS, SATA, SAS SDD, and SATA SSD hard drives

Technical Specifications

System Unit	**Dimensions** (H x W x D) (with bezel)	7.11 x 2.18 x 20.37 in (18.07 x 5.54 x 51.76 cm)	
	Weight (approximate)	Maximum: all processors, 16 DIMMs, hard drives, mezzanine cards, and two flash cache batteries installed)	14.00 lb (6.33 kg)
		Minimum: one processor and 2 DIMMs installed	10.50 lb (4.75 kg)
	Power Specifications	For power specifications including input requirements, BTU rating, and power supply output, please see the: • HPE BladeSystem c3000 Enclosure QuickSpecs at **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=c04123379** • HPE BladeSystem c7000 Enclosure QuickSpecs at **https://www.hpe.com/h20195/v2/GetHTML.aspx?docname=c04229580** 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**. **NOTE:** For optimal cooling and system performance the BL460c Gen9 Server Blade requires the c7000 enclosure to be configured with 10 fans an the c3000 enclosure to be configured with 6 fans.	
	System Inlet Temperature	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	For Approved hardware configurations, the supported system inlet range is extended to be: 5° to 10°C (41° to 50°F) and 35° to 40°C (95° to 104°F) at sea level with ar altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft) above 90 m (2953 ft) to a maximum of 3050 m (10,000 ft) **NOTE:** Qualifications for extended ambient configurations are detailed at: **https://www.hp.com/servers/ASHRAE**	
	Relative Humidity	Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-

Technical Specifications

	(non-condensing)		condensing.
		Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non condensing.
	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: • 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 P244br Controller	**Disk Drive Interface**	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	Server Interface	x8 5G 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 10
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)

HPE Smart HBA H244br Controller	**Disk Drive Interface**	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	Server Interface	x8 5G PCIe 3.0 provides 8GB/s maximum bandwidth
	Cache Memory	None
	Logical Drives Supported	64
	Host Memory Addressing	64-bit, supporting servers memory space greater than 4GB
	RAID Support	RAID 1 (mirroring) and RAID 0 (striping)
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)

HPE Dynamic	**Disk Drive**	6Gb/s SATA (Serial ATA)

Technical Specifications

Smart Array B140i Controller	**Interface**	
	Server Interface	Embedded x4 PCIe 2.0
	SAS Connectors	2 internal SATA ports
	Cache Memory	None
	SAS Speed	6Gb/s SATA links
	Logical Drives Supported	Up to 10 logical volumes (2 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)
	Other	Upgradeable firmware with recovery ROM

HPE FlexFabric 10Gb 2-port 536FLB FlexibleLOM	**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)
	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 w 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 HPE's Flex-10 blade interconnect technology User configurable bandwidth settings when combined with the 10Gb Flex-1(Virtual Connect module. From 100Mb/s to10Gb/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)

Technical Specifications

		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 Concurrent Storage - concurrently supports NIC, FCoE, and iSCSI storage functions on the same port (NIC + FCoE + iSCSI) Industry-leading throughput and latency performance Supports HPE's 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-2(Virtual Connect module. From 100Mb/s to10Gb/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
10-Feb-2017	From Version 3 to 4	Changed	Configuration Information - Factory Integrated Models, and Core Options sections were updated.
		Added	SKUs were added to QuickSpecs: 819853-L21, 819842-L21, 819839-L21, 805351-B21, 836220-B21, 805347-B21, 819853-L21, 819842-L21, 819839-L21, 775588-B21, 762263-B21, 815605-B21.
		Removed	Obsolete SKUs were deleted: 691868-B21, 691866-B21, BD883A.
11-Mar-2016	From Version 2 to 3	Changed	Configuration Information - Factory Integrated Models and Core Options sections were updated.
		Added	SKUs added in Configuration Information - Factory Integrated Models and Core Options sections: 781518-B21, 791034-B21, 775588-B21, 700767-B21, 700764-B21, 710608-B21.
		Removed	Obsolete SKUs were deleted: F6Q89AAE, E5Y38A, E5Y39AAE, QK763A, QK762A, QK761A, D8S85AAE, D8S84A.
19-Jun-2015	From Version 1 to 2	Changed	Information updated and corrections to QS.