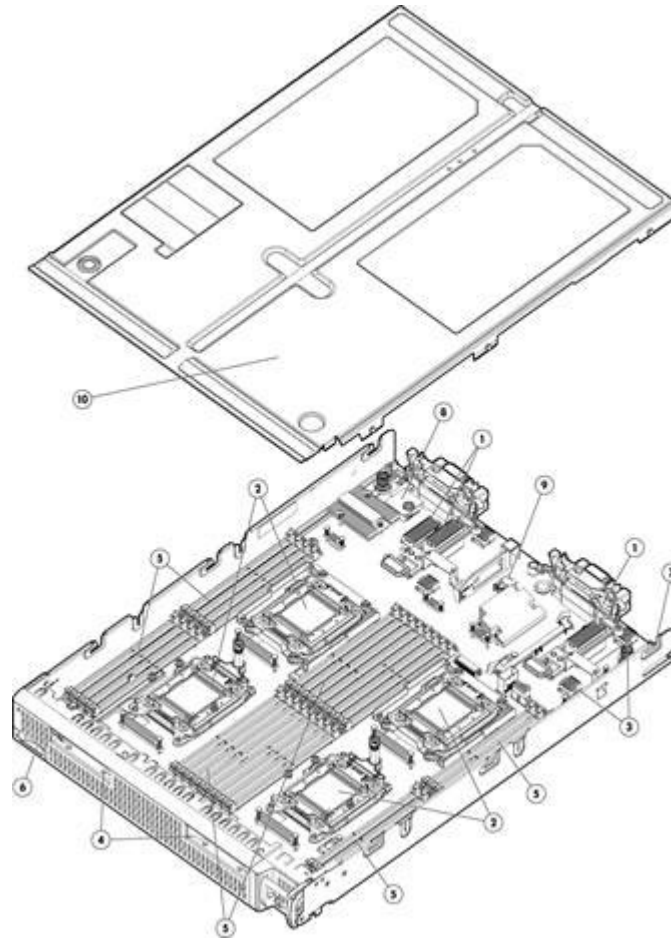


Overview



HP ProLiant BL660c Generation 8 (Gen8) Server Blade

1. Three (3) PCIe 3.0 mezzanine I/O expansion slots
2. Up to four (4) Intel® Xeon® E5-4600 and E5-4600v2 families of processors
3. Two FlexibleLOM connectors
4. Two (2) small form factor (SFF) hot-plug drive bays
5. Thirty-two (32) DDR3 DIMM memory slots (8 per processor)
6. HP c-Class Blade SUV (Serial, USB, VGA) connector
7. MicroSDHC card connector
8. Trusted Platform Module (TPM) connector
9. Internal USB 2.0 connector
10. Access panel

What's New

- Support for the Intel® Xeon® processor E5-4600v2 product family
- Support for DDR3-1600 1.35V memory.
- Support for DDR3-1866 1.5V memory.
- Support for 12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance and Enterprise Mainstream Solid State Drives

Standard Features

NOTE: This document covers the HP ProLiant BL660c Gen8 server blade only. For information on HP BladeSystems c-Class Enclosures and HP BladeSystem c-Class interconnect and mezzanine options, please see the following:

HP BladeSystem c-Class Enclosures QuickSpecs:

- HP BladeSystem c3000 Enclosure QuickSpecs at http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html
NOTE: The c3000 HP 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.
NOTE: The ProLiant BL660c Gen8 requires the c3000 Enclosure to be configured with 6 fans.
- HP BladeSystem c7000 Enclosure QuickSpecs at http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html
NOTE: The c7000 HP 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.
NOTE: The ProLiant BL660c Gen8 requires the c7000 Enclosure to be configured with 10 fans.
- HP BladeSystem c-Class interconnect and mezzanine options 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 proper BladeSystem operation, the minimum required versions of HP Onboard Administrator and HP Virtual Connect are required and available via the HP Service Pack for ProLiant, please see <http://www.hp.com/go/spp/download>.

Processor

One of the following depending on Model

E5-4600 v2 series Processors

HP BL660c Gen8 E5-4657Lv2 (2.4GHz/12-core/30MB/115W) Processor
HP BL660c Gen8 E5-4650v2 (2.4GHz/10-core/25MB/95W) Processor
HP BL660c Gen8 E5-4640v2 (2.2GHz/10-core/20MB/95W) Processor
HP BL660c Gen8 E5-4627Lv2 (3.3GHz/8-core/16MB/130W) Processor
HP BL660c Gen8 E5-4620v2 (2.6GHz/8-core/20MB/95W) Processor
HP BL660c Gen8 E5-4610v2 (2.3GHz/8-core/16MB/95W) Processor
HP BL660c Gen8 E5-4607v2 (2.6GHz/6-core/15MB/95W) Processor
HP BL660c Gen8 E5-4603v2 (2.2GHz/4-core/10MB/95W) Processor

E5-4600 series Processors

Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) Processor
Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) Processor
Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) Processor
Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) Processor
Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) Processor
Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) Processor
Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) Processor
Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) Processor

Standard Features

Cache Memory One of the following depending on Model	30MB Level 3 NOTE: E5-4657L v2 processor	
	25MB Level 3 NOTE: E5-4650 v2 processor	
	20MB Level 3 NOTE: E5-4650, E5-4650L, E5-4640, E5-4640 v2, E5-4620 v2 processors	
	16MB Level 3 NOTE: E5-4650, E5-4650L, E5-4640, E5-4640 v2, E5-4620 v2 processors	
	15MB Level 3 NOTE: E5-4617, E5-4610, E5-4607 v2 processors	
	12MB Level 3 NOTE: E5-4607 processor	
	10MB Level 3 NOTE: E5-4603, E5-4603 v2 processors	
	NOTE: All processor models above list the L3 Cache associated with that particular processor.	

Chipset	Intel® C600 Series Chipset NOTE: For more information regarding Intel chipsets, please see the following: http://www.intel.com/products/server/chipsets/ .
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Upgradeability	Upgradeable to four (4) processors. NOTE: Processor upgrade available from Intel® Xeon® Processors E5-4600 to E5-4600 v2. Please contact HP Technology Sales (http://www.hp.com/support), your local HP Re-seller, or reference the following Customer Advisory: ProLiant Servers-Instructions for Upgrading an HP ProLiant Gen8 Server from an Intel Xeon Processor E5-4600 to an Intel Xeon Processor E5-4600 v2, regarding critical details before upgrading. An explanation of requirements and limitations are provided.
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On System Management Chipset	HP iLO (Firmware: HP iLO 4) NOTE: For more information, visit: http://www.hp.com/go/ilo
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Memory Protection	Data bus ECC protection Advanced ECC / SDDC Rank sparring (on line spare) Lockstep mode DIMM address/control bus parity protection Failed DIMM isolation Demand scrubbing Patrol scrubbing Memory thermal control Memory mirroring inter-socket
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Memory One of the following depending on Model	Type	HP SmartMemory DDR3 Load Reduced (LRDIMM) and Registered (RDIMM)
	Maximum (LRDIMM)	1.0TB (32 x 32GB) up to 1866MHz at 1.5V
	Maximum (RDIMM)	512GB (32 x 16GB) up to 1600MHz at 1.35V 768GB (32 x 24GB) up to 1333MHz at 1.35V
NOTE: HP memory from previous generation servers are not qualified or warranted with this		

Standard Features

server. **NOTE:** HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at:

http://h18000.www1.hp.com/products/quickspecs/14225_div/14225_div.html

NOTE: LRDIMMs and RDIMMs 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 1866MHz, 1600MHz, 1333MHz, or 1066MHz. Please see Memory Population Table later in this document or the Online Memory Configuration Tool at: www.hp.com/go/ddr3memory-configurator.

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

Network Controller

Two (2) HP FlexibleLOM connectors for one or two dual-port FlexibleLOMs

NOTE: FlexibleLOM options include 10Gb FlexFabric, 10Gb Flex-10, and 10Gb Ethernet.

NOTE: FlexFabric capabilities require the use of an HP Virtual Connect FlexFabric module.

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

NOTE: The server supports one or two FlexibleLOMs.

NOTE: For Pre-configured Model configurations, two FlexibleLOMs are already included; no additional FlexibleLOMs are added.

NOTE: For a Factory Integrated Model configuration with one FlexibleLOM, it is added in the HP Networking section of "Step 2" in the Factory Integrated Models section.

NOTE: For a Factory Integrated Model configuration with two FlexibleLOMs, the second FlexibleLOM is a different part number. You must select the first FlexibleLOM in the "Step 2" HP Networking section and select the second FlexibleLOM in the "Step 4" HP Networking section.

NOTE: All FlexibleLOMs are dual port: one port is routed to interconnect module bay 1 and the other to bay 2.

Expansion Slots

Three (3) I/O expansion mezzanine slots:

- x8 PCIe 3.0 Type A (supports Type A mezzanine cards) (expansion slot 1).
- x16 PCIe 3.0 Type B (supports Type A and Type B mezzanine cards) (expansion slot 2).
- x16 PCIe 3.0 Type B (supports Type A and Type B mezzanine cards) (expansion slot 3).

Mezzanine card options include:

- Dual-port to quad-port (depending on the model) 10Gb FlexFabric, 10Gb Flex-10, 10Gb Ethernet, and 1Gb Ethernet for additional Ethernet network ports.
- Dual-port 20Gb Flex Fabric for additional Ethernet network ports.
- Dual-port 8Gb and 16GB Fibre Channel HBAs for SAN connectivity.
- QDR and FDR InfiniBand for low latency and high bandwidth server interconnectivity.
- HP Smart Array P721m Controller for direct attached SAS Storage
- HP I/O Accelerator Options for higher I/O performance and low latency access to storage, with the reliability of solid state

Standard Features

HP Server ROM

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

HP 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.

HP 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.

HP'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 HP ROM-Based Setup Utility (RBSU).

NOTE: For further information, please refer to HP's RBSU (ROM based setup utility) user guide at www.hp.com/support/rbsu.

Storage Controller

All Models

One (1) embedded HP Smart Array P220i Controller

NOTE: The HP Smart Array P220i supports RAID 0 and 1. It includes 512MB flash-backed write cache (FBWC) on pre-configured models and is optional on factory integrated models. The FBWC is not required for RAID capability. The purpose of the cache is it can increase hard drive write performance and provides data protection in case the server loses power.

NOTE: The HP Smart Array P220i supports upgradeable firmware with recovery ROM.

NOTE: The HP Smart Array P220i supports two (2) small form factor (SFF) hot plug drive bays.

Available Options: Smart Array Advanced Pack 2.0 Software for enhanced performance, reliability, availability, and security of system data

Maximum Internal Storage

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	1.6TB	2 x 800GB

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

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

Standard Features

Interfaces

Micro SDHC Slot	One (1) internal Micro Secure Digital High Capacity (Micro SDHC) card slot
USB 2.0 Port	One (1) internal USB 2.0 connector for USB flash media drive keys

NOTE: The above options are for integrated hypervisor virtualization environments needing a low cost boot solution with the highest performance and reliability.

Industry Standard Compliance

ACPI 2.0
Microsoft® Logo certifications
USB 2.0 Support
IMPI 2.0
Secure Digital 2.0
TMP 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
SR-IOV capability (requires network adapter and operating system support)

Operating Systems and Virtualization Software Support for ProLiant Servers

[Microsoft Windows Server](#)
[Red Hat Enterprise Linux \(RHEL\)](#)
[SUSE Linux Enterprise Server \(SLES\)](#)
[Oracle Solaris](#)
[VMware](#)
[Citrix XenServer](#)

NOTE: For more information on HP'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/support/BL660cGen8>.

Enclosures

Enclosures HP offers two different c-Class server blade enclosures to meet your individual needs:

- The HP BladeSystem c7000 rack enclosure is 10U high and holds up to eight (8) ProLiant BL660c Gen8 servers plugged vertically.
- The HP BladeSystem c3000 rack enclosure is 6U high and holds up to four (4) HP ProLiant BL660c Gen8 servers plugged horizontally.
- Server blades, storage 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

Integrated Matrox G200 video standard

- 1280 x 1024 (32 bpp)
- 1920 x 1200 (16 bpp)

HP iLO 4 On System Management Memory

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

Form Factor

HP ProLiant BL660c Gen8 is a single-wide, full-height server blade that plugs into the HP BladeSystem c3000 and c7000 enclosures.

On System Management

HP iLO Management Engine

HP iLO Management Engine is a comprehensive set of embedded management features supporting the complete lifecycle of the server, from initial deployment, through ongoing management, to service alerting and remote support. HP iLO Management Engine comes standard on all HP ProLiant Gen8 servers. The HP iLO Management Engine portfolio includes:

- **HP iLO:** The HP iLO (Integrated Lights-Out) management processor is the core foundation for the HP iLO Management Engine
- **HP Agentless Management:** Provides built in server health monitoring and alerting capability without OS agents, that starts working the moment a power cord and an Ethernet cable are connected.
- **HP Active Health System:** Always on, continuous monitoring for increased stability and shorter downtimes; 100% configuration history; Health and service alerts and easy export and upload to Service and Support.
- **HP Intelligent Provisioning:** Lets customers provision and configure a single server without any separate media. No more SmartStart CDs or firmware DVDs are needed.
 - To start Intelligent Provisioning:
 - Press the F10 key during the ProLiant Gen8 server boot process (also known as power on self test or POST).
 - Please go to the Intelligent Provisioning website at www.hp.com/go/intelligentprovisioning for additional information and to view usage videos.
 - Use the Service Pack for ProLiant (SPP) at www.hp.com/go/spp to get firmware and software updates.
 - **HP iLO Mobile App:** Enables the ability to access, deploy, and manage your server anytime from anywhere from select smartphones and mobile devices. For additional information please visit: www.hp.com/go/ilo/mobileapp

NOTE: For more information, visit: <http://www.hp.com/go/ilo> or HP iLO Management Engine technologies whitepaper

Standard Features

HP Insight management software HP Service Pack for ProLiant (SPP)

HP Service Pack for ProLiant (SPP) and HP Smart Update Manager (HP SUM) provide a comprehensive approach to firmware and system software maintenance. Together they provide better operating stability and ensure maximum uptime. The SPP will be updated at a predictable cadence, typically coinciding with new HP server hardware launches. By enabling firmware to be updated online and integrating firmware and system software updates in one operation, HP SUM and the SPP offer faster updates of individual servers and dramatically faster updates of entire BladeSystem enclosures. Further improving system uptime and stability is the fact that HP provides 12 months of support for each Service Pack for ProLiant release.

The user experience around HP SUM and the SPP has been improved in several ways, starting with the web download. A single web page provides access to a single download containing both the latest version of HP SUM and the latest SPP. Optional smaller subsets with only specific types of servers or specific operating systems are offered to save on download time. The HP SUM application provides a straightforward, intuitive user interface that guides the user through the steps of discovery, analyses and update, providing comprehensive information on available updates, criticality and interdependencies. This information is also available in reports. By providing the option of multiple local or shared repositories which can be easily updated from hp.com, HP SUM provides the tools to optimize stability and consistency throughout the company. While HP SUM and the SPP recommend the combinations of firmware and system software that HP has found to be the best practice, the application gives customers the flexibility to set their own specific baseline.

The Service Pack for ProLiant has been rigorously tested with specific attention for interaction between firmware, drivers and agents both within the server as well as in interaction with the BladeSystem enclosure components (Onboard Administrator and Virtual Connect). This testing ensures the highest quality as well as providing the input for HP SUM to deploy updates taking into account all interdependencies, when determining the correct updates and order of update deployment.

NOTE: The Service Pack for ProLiant (which includes HP SUM) can be downloaded from www.hp.com/go/spp/download. More information can be found: <http://www.hp.com/go/SmartUpdate>, www.hp.com/go/spp and <http://www.hp.com/go/hpsum>

Standard Features

Security

- Power-on password
- Administrator's password
- Keyboard password (QuickLock)
- HP iLO 4 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)
- Intel TXT (require the TPM module option)

Availability

Memory

- Data Bus ECC protection provides automatic correction from a single data bit error and detection of double data error bits. Often called single error correction/double error detection (SEC/DED).
- 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. HP offers the rank sparing rather than DIMM sparing as rank sparing uses less spare memory resulting in reduced overhead.
- Memory lockstep mode is used to correct a single x8 DRAM device failure on a DIMM. The DIMMs in each paired memory channel must have identical HP part numbers.
- Memory demand and patrol scrubbing 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.
- Memory thermal control is used to prevent DIMMs from overheating. Achieved by slowing down the memory access rate per the temperature monitored by DIMM sensor.
- Memory mirroring inter-socket stores a copy of memory with dynamic failover in case of failure. Once a DIMM in a mirrored set is detected as failed, the mirror failover uses its mirrored DIMM.

Mezzanine options and I/O

- One or two FlexibleLOM connectors each supporting two (i.e. redundant) Ethernet ports routed to redundant interconnect modules.
- 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) hot-plug SAS/SATA/SSD drive bays.
- Integrated HP Smart Array P220i Controller with 512MB FBWC capability, RAID 0 and 1, and upgradeable firmware with recovery ROM capability.
NOTE: The 512MB flash-backed write cache (FBWC) is included on pre-configured models and is optional on factory integrated models. The FBWC is not required for RAID

Standard Features

capability. The purpose of the cache is it can increase hard drive write performance and provides data protection in case the server loses power.

- Up to eight optional HP D2200sb and/or D22020sb Storage Blades for attachment of up to 12 drives per Storage Blade (up to 96 drives total) within the c-Class enclosure.
- 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-efficiency, common slot enclosure-based power supplies (configuration dependent).
- Up to ten (10) redundant enclosure-based hot-plug HP Active Cool fans that scale to meet future demands and optimize airflow, reduce power draw, and improve acoustic performance.
- Dual grid power providing redundant rack enclosure power feeds to the server blade enclosure.
- HP Dynamic Power Saver Mode the total enclosure power consumption is monitored in real time and automatically adjusted with changes in demand for improved efficiency and reliability.
- HP 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 HP Services and a worldwide network of HP 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 HP 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 HP 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 HP ProLiant BL660c Gen8.

Compatible SAN HP ProLiant BL660c Gen8 server blades are optimized for HP MSA, EVA and XP.

HP ProLiant BL660c Gen8 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>.

HP Virtual Connect HP Virtual Connect is an interconnect option for BladeSystem c-Class that simplifies server connectivity to data and storage networks, and reduces costs. Unique HP 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. HP Virtual Connect Enterprise Manager (VCEM) provides server management software with a central console to administer network connections and workloads for thousands of servers. For more information on Virtual Connect Enterprise Manager, see <http://www.hp.com/go/vcem>. For more information on Virtual Connect Ethernet, Fibre Channel, Converged Network and management options, see <http://www.hp.com/go/virtualconnect>.

HP Insight management software

HP Insight Control

HP Insight Control, a product option, delivers essential infrastructure management that can help save time and money by making it easy to 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>.

HP Insight Control includes one year of 24 x 7 HP Software Technical Support and Update Service ensuring rapid access to HP support staff and proactive delivery of software updates. For more information about this service, see <http://www.hp.com/services/insight>.

HP Matrix Operating Environment

The HP 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 HP Matrix OE includes the automated provisioning, optimization, and recovery management capabilities for HP CloudSystem Matrix, the ideal platform for private cloud and Infrastructure as a Service (IaaS). For more information, see <http://www.hp.com/go/matrixoe>.

HP iLO Scale-Out

The HP iLO Scale-Out license ideal for web/hosting/cloud service providers and High Performance Computing environments. This license is a specific subset of iLO Advanced functionality, provides fast remote access through Text Console via SSH, lower operational cost with Dynamic power capping, and faster time to resolution through Email-based Alerting and proactive notifications. With this newly designed HP iLO Scale-Out license HPC customers now have a server management package solely design and priced for their massive data environments. HP iLO Scale-Out is available on all HP ProLiant Gen8 BL and SL platforms. For more information, see: www.hp.com/go/iLO/scale-out

HP iLO Advanced

HP Integrated Lights-Out Advanced License a product option, providing

Optional Features

smart remote server management without compromise. iLO Advanced unlocks the full set of remote administration functionality for all HP ProLiant servers by activating the full Virtual Keyboard Video and Mouse remote console, multi-user collaboration, console record and replay, GUI-based and scripted virtual media and virtual folders, and enhanced security and power management functionality. For more information, see: <http://www.hp.com/go/iloadvance>

HP OneView

The HP OneView architecture combines server, storage, and networking with control of datacenter environmentals into a single, integrated management platform. Architected to deliver lifecycle management for the complete Converged Infrastructure, it facilitates collaboration, removes friction, collapses cycle times, eliminates error-prone work, and accelerates time to value. HP OneView v1.0 combines management of servers and virtual connect with open integration to automate and customize existing tools and processes. With OneView, you'll work smarter-with greater visibility and control-and fully capitalize on the benefits of a Converged Infrastructure.

For more information on HP OneView management, see: <http://www.hp.com/go/oneview>

High Performance Clusters

HP Cluster Platforms	HP 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
HP HPC Interconnects	HP HPC Interconnects High Performance Computing (HPC) interconnect technologies are available for this server as part of the HP Cluster Platform portfolio. These high-speed InfiniBand and Gigabit interconnects are fully supported by HP when integrated within an HP cluster. Flexible, validated solutions can be defined with the help of configuration tools. http://www.hp.com/techservers/clusters/ucp/index.html
HP Insight Cluster Management Utility	HP Insight Cluster Management Utility (CMU) is an HP-licensed and HP-supported suite of tools that are used for lifecycle management of hyperscale clusters of Linux ProLiant systems. CMU includes software for the centralized provisioning, management and monitoring of nodes. CMU makes the administration of clusters user friendly, efficient, and effective. http://www.hp.com/go/cmu

Optional Features

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 HP 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, HP data protection and recovery software will cost-effectively protect you against disaster and ensure business continuity.
- **Data Archive and Migration Software**
HP's 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)**
HP's 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**
HP 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 HP storage and networking with software that enables hardware-specific configuration, performance tuning and connectivity management.
- **HP StoreVirtual VSA**
With HP StoreVirtual VSA you can use the power of virtualization to turn a set of heterogeneous and disconnected physical disk drives in your servers and storage devices into a single pool of logical storage capacity.

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

HP Insight Online

HP Insight Online is a new addition to the HP Support Center for one stop, secure access to product and HP support information personalized to your IT environment. Insight Online can automatically display devices remotely monitored by HP Insight Remote Support. 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>.

HP Proactive Insight experience

Prevent problems with innovative, automated monitoring tools and proactive services. The HP Proactive Insight experience consist of using Insight Online, Insight Remote Support, and Proactive Care Support Service as one integrated solution. The Proactive Insight experience provides you with expert advice and personalized, cloud-based automated IT support, helping to prevent unplanned down time and solve problems quickly. For more information, visit: www.hp.com/go/proactiveinsightexperience

Optional Features

Factory Express Portfolio for Servers and Storage

HP Factory Express offers configuration, customization, integration and deployment services for HP 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. HP products supported through Factory Express include a wide array of servers and storage: HP Integrity, HP ProLiant, HP ProLiant Server Blades, HP BladeSystem, HP 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>

HP Simple Configurator

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 HP's Customer Business Center or an Authorized Partner for assistance. <http://www.hp.com/products/configurator>

Service and Support

Service and Support **HP Technology Services for Industry Standard Servers and BladeSystem**
Capitalizing on HP ProLiant server and HP BladeSystem capabilities requires a service partner who understands your increasingly complex business technology environment. That's why it makes sense to team up with the people who know HP infrastructure hardware and software best - the experienced professionals at HP Services.

Protect your business beyond warranty with HP Care Pack Services

HP Care Pack services offer complete care and support expertise with committed response choices designed to meet your IT and business needs.

HP Foundation Care services offer scalable reactive support-packages for HP industry-standard servers and software. You can choose the type and level of service that is most suitable for your IT and business needs. HP Proactive Care delivers high levels of system availability through proactive service management and advanced technical response.

Recommended HP Care Pack Services for your HP product

Optimized Care **3-Year HP 6 hour Call to Repair Response, Proactive Care**
Combined reactive and proactive support for hardware and software helping optimize your systems and delivering high levels of availability through proactive service management and advanced technical response. Hardware problem resolution to return the hardware in operating condition within 6 hours of the initial service request. A Technical Account Manager, as your single point of contact, will own your call or issue end to end until resolved.
<http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf>

HP Install c-Class Server Blade Service
This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware is installed smoothly, efficiently, and with minimal disruption of your IT and business operations.

Standard Care **3-Year HP 24x7 4 hour response, Proactive Care Service**
This service gives you combined reactive and proactive support including rapid access to our Advanced Solution Center to manage and prevent problems and a Technical Support Specialist with a broad level of technical knowledge that will engage with additional technical expertise as needed from HP's vast global resources.
<http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855EEE.pdf>

HP Install c-Class Server Blade Service
This easy-to-buy, easy-to-use HP Care Pack service helps ensure that your new HP hardware is installed smoothly, efficiently, and with minimal disruption of your IT and business operations

Related Services **HP Proactive Care Personalized Support - Environmental Option**
The Personalized Support option provides an assigned Account Support Manager who can bring best practices from across the industry plus extra technical skills to your IT team. This option is only available as an add-on to HP Proactive Care Support.

HP Proactive Select Service

Provides a flexible way to purchase HP best-in-class consultancy and technical services. You can buy Proactive Select Service Credits when you purchase your hardware and then use the credits over the next 12 months. <http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-3842ENN.pdf>

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

Service and Support

Insight Online/Insight Remote Support HP Insight Remote Support provides 24 X 7 remote monitoring, proactive notifications, and problem resolution. This comes at no additional cost with your HP solution. Learn more about Insight Remote Support <http://www.hp.com/go/insightremotesupport> and Insight Online <http://www.hp.com/go/insightonline>

NOTE: Insight Remote Support is a prerequisite for Proactive Care. All blades within a single HP BladeSystem enclosure must be at the same service level.

HP Support Center Personalized online support portal with access to information, tools and experts to support HP business products. Submit support cases online, chat with HP experts, access support resources or collaborate with peers. Learn more <http://www.hp.com/go/hpsc>

HP's Support Center Mobile App allows you to resolve issues yourself or quickly connect to an agent for live support. Now, you can get access to personalized IT support anywhere, anytime. HP Insight Remote Support and HP Support Center are available at no additional cost with a HP warranty, HP Care Pack or HP contractual support agreement.

NOTE: HP Support Center Mobile App is subject to local availability.

Parts and Materials HP will provide HP-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by HP due to malfunction.

For more information To learn more on HP ProLiant servers and HP BladeSystem servers, please contact your HP sales representative or HP Authorized ServiceOne Channel Partner. Or visit: www.hp.com/services/bladestystem

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: HP 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: Not all Pre-configured Models are available in all regions. Check with your local country HP offices for availability.

E5-4600v2 series Processors

Performance Models

HP ProLiant BL660c Gen8 E5-4650v2 4P 128GB-R Server 727959-B21	Processor(s) Cache Memory Memory Network Controller Storage Controller Hard Drive Internal Storage Optical Drive Bay Expansion Slots Management Form Factor Warranty	<p>Four (4) Intel® Xeon® E5-4650v2 (2.4GHz/10-core/25MB/95W)</p> <p>25MB Level 3 cache</p> <p>128GB (8x 16GB) PC3L-14900R (DDR3-1866) Registered DIMMs at 1.5V</p> <p>NOTE: Server supports a total of 32 DIMM slots.</p> <p>Two (2) HP FlexFabric 10Gb 2-port 534FLB FlexibleLOMs</p> <p>HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1</p> <p>None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives</p> <p>SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB</p> <p>None</p> <p>3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.</p> <p>HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control</p> <p>Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure</p> <p>Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.</p>
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Base Model

HP ProLiant BL660c Gen8 E5-4620v2 4P 128GB-R Server 727958-B21	Processor(s) Cache Memory Memory Network Controller Storage Controller Hard Drive Internal Storage Optical Drive Bay Expansion Slots Management	<p>Four (4) Intel® Xeon® E5-4620v2 (2.6GHz/8-core/20MB/95W)</p> <p>20MB Level 3 cache</p> <p>128GB (8x 16GB) PC3L-12800R (DDR3-1600) Registered DIMMs at 1.35V</p> <p>NOTE: Server supports a total of 32 DIMM slots.</p> <p>Two (2) HP FlexFabric 10Gb 2-port 534FLB FlexibleLOMs</p> <p>HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1</p> <p>None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives</p> <p>SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB</p> <p>None</p> <p>3 standard - Slot 1 supports Type A mezzanine Cards. Slots 2 and 3 support Type A and Type B mezzanine cards.</p> <p>HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control</p>
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Pre-configured Models

Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure
Warranty	Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.

Entry Model

**HP ProLiant BL660c
Gen8 E5-4607v2 2P
64GB-R Server**
727957-B21

Processor(s)	Two (2) Intel® Xeon® E5-4607v2 (2.6GHz/6-core/15MB/95W)
Cache Memory	15MB Level 3 cache
Memory	64GB (4x 16GB) PC3L-12800R (DDR3-1600) Registered DIMMs at 1.35V NOTE: Server supports a total of 32 DIMM slots.
Network Controller	Two (2) HP FlexFabric 10Gb 2-port 534FLB FlexibleLOMs
Storage Controller	HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1
Hard Drive	None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives
Internal Storage	SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB
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	HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control
Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure
Warranty	Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.

E5-4600 series Processors

Performance Models

**HP ProLiant BL660c
Gen8 E5-4650 4P
128GB-R Server**
679114-B21

Processor(s)	Four (4) Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W)
Cache Memory	20MB Level 3 cache
Memory	128GB (16x 8GB) PC3-12800R (DDR3-1600) Registered DIMMs at 1.5V NOTE: Total of 32 DIMM slots.
Network Controller	Two (2) HP FlexFabric 10Gb 2-port 554FLB FlexibleLOMs
Storage Controller	HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1
Hard Drive	None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives
Internal Storage	SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB
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	HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control

Pre-configured Models

Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure
Warranty	Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.

HP ProLiant BL660c Gen8 E5-4620 4P 128GB-R Server 679115-B21

Processor(s)	Four (4) Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W)
Cache Memory	16MB Level 3 cache
Memory	128GB (16x 8GB) PC3L-10600R (DDR3-1333) Registered DIMMs at 1.35V NOTE: Server supports a total of 32 DIMM slots.
Network Controller	Two (2) HP FlexFabric 10Gb 2-port 554FLB FlexibleLOMs
Storage Controller	HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1
Hard Drive	None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives
Internal Storage	SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB
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	HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control
Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP BladeSystem c7000 Enclosure
Warranty	Server warranty includes 3 year parts, 3 year labor, 3-year on-site support.

HP ProLiant BL660c Gen8 E5-4617 4P 128GB-R Server 679116-B21

Processor(s)	Four (4) Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W)
Cache Memory	15MB Level 3 cache
Memory	128GB (16x 8GB) PC3-12800R (DDR3-1600) Registered DIMMs at 1.5V NOTE: Server supports a total of 32 DIMM slots.
Network Controller	Two (2) HP FlexFabric 10Gb 2-port 554FLB FlexibleLOMs
Storage Controller	HP Smart Array P220i Controller with 512MB FBWC and RAID 0, 1
Hard Drive	None ship standard; includes 2 SFF hard drive blanks Supports up to two (2) HP hot-plug SFF SAS/SATA/SDD drives
Internal Storage	SAS: 2.4TB; SATA: 2.0TB; SAS SSD: 1.6TB; SATA SSD: 1.6TB
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	HP iLO Management Engine (standard) Optional: HP iLO Scale-Out or HP Insight Control
Form Factor	Up to four (4) full-height server blades supported in the HP BladeSystem c3000 Enclosure Up to eight (8) full-height server blades supported in HP 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 or configure-to-order (CTO) server. To ensure only valid configurations are ordered, HP recommends the use of an HP 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 CTO (Configure to Order) systems 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	HP ProLiant BL660c Gen8 10Gb FlexibleLOM Configure-to-order Blade Server	679118-B21
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Each configurable model ships with:

Two (2) FlexibleLOM connectors providing a choice of supported FlexibleLOMs (see Step 2)

One (1) embedded HP Smart Array P220i Controller with RAID 0, 1

Optional HP Smart Array P220i Controller 512MB FBWC (listed in step 4)

Two (2) HP small form factor hot-plug SAS/SATA/SSD hard drive bays

Three (3) PCIe Gen 3.0 I/O expansion slots (one x8 Type A, two x16 Type B)

One (1) integrated USB connector and one (1) MicroSDHC connector

One (1) TPM connector

HP iLO Management Engine (standard)

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

HP Processors

NOTE: The BL660c Gen8 supports two or four processors; one and three processor configurations are not supported.

NOTE: All processor kits contain two (2) processors.

NOTE: If four processors are desired, select one 2P xxxxxx-L21 processor kit here in Step 2 and one xxxxxx-B21 2P processor kit in Step 3.

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.

E5-4600v2 series Processors

HP BL660c Gen8 Intel® Xeon® E5-4657Lv2 (2.4GHz/12-core/30MB/115W) FIO 2-processor Kit	727590-L21
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HP BL660c Gen8 Intel® Xeon® E5-4650v2 (2.4GHz/10-core/25MB/95W) FIO 2-processor Kit	727576-L21
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HP BL660c Gen8 Intel® Xeon® E5-4640v2 (2.2GHz/10-core/20MB/95W) FIO 2-processor Kit	727578-L21
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HP BL660c Gen8 Intel® Xeon® E5-4627v2 (3.3GHz/8-core/16MB/130W) FIO 2-processor Kit	727588-L21
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HP BL660c Gen8 Intel® Xeon® E5-4620v2 (2.6GHz/8-core/20MB/95W) FIO 2-processor Kit	727580-L21
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HP BL660c Gen8 Intel® Xeon® E5-4610v2 (2.3GHz/8-core/16MB/95W) FIO 2-processor Kit	727582-L21
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HP BL660c Gen8 Intel® Xeon® E5-4607v2 (2.6GHz/6-core/15MB/95W) FIO 2-processor Kit	727584-L21
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HP BL660c Gen8 Intel® Xeon® E5-4603v2 (2.2GHz/4-core/10MB/95W) FIO 2-processor Kit	727586-L21
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E5-4600 series Processors

HP BL660c Gen8 Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) FIO 2-processor Kit	679098-L21
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Configuration Information - Factory Integrated Models

HP BL660c Gen8 Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) FIO 2-processor Kit	679110-L21
HP BL660c Gen8 Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) FIO 2-processor Kit	679100-L21
HP BL660c Gen8 Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) FIO 2-processor Kit	679102-L21
HP BL660c Gen8 Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) FIO 2-processor Kit	679112-L21
HP BL660c Gen8 Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) FIO 2-processor Kit	679104-L21
HP BL660c Gen8 Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) FIO 2-processor Kit	679106-L21
HP BL660c Gen8 Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) FIO 2-processor Kit	679108-L21

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server.

NOTE: HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document. For additional information, please see the HP SmartMemory QuickSpecs at:

http://h18000.www1.hp.com/products/quickspecs/14225_div/14225_div.html

NOTE: LRDIMMs and RDIMMs are all distinct memory technologies and cannot be mixed within a server.

NOTE: A minimum of one DIMM is required per processor.

NOTE: Depending on the memory configuration and processor model, 1866MHz, 1600MHz and 1333MHz memory may operate at a lower speed. Please see the "Memory" section later in this document and the Online Memory Configuration Tool for details at www.hp.com/go/ddr3memory-configurator.

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

HP SmartMemory

Registered DIMMs (RDIMMs) - E5-4600 v2 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713981-B21
HP 4GB (1x4GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708637-B21
HP 8GB (1x8GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	731765-B21
HP 8GB (1x8GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	731761-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713985-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708641-B21
HP 24 GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kit	716324-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21

Registered DIMMs (RDIMMs) - E5-4600 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21

Configuration Information - Factory Integrated Models

HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21
HP 24 GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kit	716324-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21

NOTE: When HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kits are used, all DIMM slots for the associated processor sockets must be fully populated with these 24GB DIMMs. If two processor sockets are populated, all 16 DIMM slots must be populated with 24GB DIMMs. If all four processor sockets are populated, all 32 DIMM slots must be populated with 24GB DIMMs.

Load Reduced DIMMs (LRDIMMs) - E5-4600 v2 series Processors

HP 32GB (1x32GB) Quad Rank x4 PC3-14900L (DDR3-1866) Load Reduced CAS-13 Memory Kit	708643-B21
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Load Reduced DIMMs (LRDIMMs) - E5-4600 series Processors

HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21
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HP Networking

FlexibleLOM Adapters

NOTE: The ProLiant BL660c Gen8 supports one or two FlexibleLOMs.

NOTE: For a single FlexibleLOM Factory Integrated Model configuration, select the option here in the "Step 2" HP Networking section.

NOTE: For a two FlexibleLOM Factory Integrated Model configuration, the second FlexibleLOM is a different part number. When two FlexibleLOMs are needed you must select the first FlexibleLOM here in the "Step 2" HP Networking section and the second FlexibleLOM from "Step 4" HP Networking section.

NOTE: All FlexibleLOMs are dual port: one port is routed to interconnect module bay 1 and the other to bay 2.

10/20GbE Ethernet FlexibleLOMs

HP Flex Fabric 20Gb 2-port 630FLB FIO Adapter	700066-B21
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NOTE: For a two FlexibleLOM configuration, the HP FlexFabric 20Gb 2-port 630FLB FIO Adapter may be configured with the HP FlexFabric 20Gb 2-port 630FLB Adapter (700066-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).

HP Flex-10 10Gb 2-port 530FLB FIO Adapter	684211-B21
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NOTE: For a two FlexibleLOM configuration, the HP Flex-10 10Gb 2-port 530FLB FIO Adapter may be configured with the HP Flex-10 10Gb 2-port 530FLB Adapter (656590-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).

HP FlexFabric 10Gb 2-port 534FLB FIO Adapter	700742-B21
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NOTE: For a two FlexibleLOM configuration, the HP FlexFabric 10Gb 2-port 534FLB FIO Adapter may be configured with the HP FlexFabric 10Gb 2-port 534FLB Adapter (700741-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).

Configuration Information - Factory Integrated Models

<p>HP FlexFabric 10Gb 2-port 554FLB FIO Adapter NOTE: For a two FlexibleLOM configuration, the HP FlexFabric 10Gb 2-port 554FLB FIO Adapter may be configured with the HP FlexFabric 10Gb 2-port 554FLB Adapter (647586-B21) or the HP 10Gb 2-port 560FLB Adapter (655639-B21).</p>	684212-B21
<p>HP Ethernet 10Gb 2-port 560FLB FIO Adapter NOTE: For a two FlexibleLOM configuration, the HP 10Gb 2-port 560FLB FIO Adapter may be configured with the HP 10Gb 2-port 560FLB Adapter (655639-B21).</p>	684214-B21

HP Storage Controllers Optional Upgrades

<p>HP 512MB FBWC for BL660c FIO Kit NOTE: Please see the Smart Array Advanced Pack 2.0 QuickSpecs for Technical Specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/13200_div/13200_div.html. (Smart Array Advanced Pack)</p>	694033-B21
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Step 3: Choose Additional Factory Integration Options

HP Insight Software	HP Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle Single Server FIO License	C6N36A
Converged Infrastructure Management Software	<p>HP OneView with iLO Advanced - Server hardware required on same purchase order</p> <p>HP OneView for ProLiant DL Server incl 3yr 24x7 Supp FIO Bundle Physical 1 Svr Lic</p>	E5Y43A
	HP OneView incl 3yr 24x7 Supp Bundle 1 Svr E-LTU	E5Y43AAE
	HP OneView for Blade Server incl 3yr 24x7 Supp FIO Bundle Physical 1 Svr Lic	F6Q89A
	HP OneView for Blade Server incl 3yr 24x7 Supp FIO Bundle 1 Svr E-LTU	F6Q89AAE
HP Storage Blades	<p>HP D2220sb Configure-to-order Storage Blade NOTE: The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s) that directly connect to the server via the enclosure midplane NOTE: Please see the QuickSpecs for technical specifications and additional information at http://h18006.www1.hp.com/storage/bladesystem/index.html</p>	QW918A

Step 4: Choose Additional Options for Factory Integration

NOTE: 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:

- HP BladeSystem c3000 Enclosure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html
NOTE: The c3000 HP 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.
NOTE: The ProLiant BL660c Gen8 requires the c3000 Enclosure to be configured with 6 fans.
- HP BladeSystem c7000 Enclosure QuickSpecs:
http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html
NOTE: The c7000 HP 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.
NOTE: The ProLiant BL660c Gen8 requires the c7000 Enclosure to be configured with 10 fans.
- HP 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>

Core Options

HP Networking

10/20Gb Ethernet Mezzanines

NOTE: All 10Gb Ethernet adapters are Type A mezzanine cards that can be installed in any of the BL660c Gen8 mezzanine slots.

NOTE: Each 10 Gigabit Ethernet adapter requires a minimum of 2GB of server memory.

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 (HP BladeSystem c7000 Enclosure) or bays 2-4 (HP BladeSystem c3000 Enclosure).

HP FLExFabric 20Gb 2-port 630M Adapter 700076-B21

HP Ethernet 10Gb 2-port 560M Adapter 665246-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at:

http://h18004.www1.hp.com/products/quickspecs/14478_div/14478_div.html.

HP FlexFabric 10Gb 2-port 554M Adapter 647590-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at:

http://h18000.www1.hp.com/products/quickspecs/14221_div/14221_div.html.

HP Flex-10 10Gb 2-port 552M Adapter 674764-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at:

http://h18000.www1.hp.com/products/quickspecs/14218_div/14218_div.html.

HP FlexFabric 10Gb 2-port 534M Adapter 700748-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at:

http://h18000.www1.hp.com/products/quickspecs/14617_div/14617_div.html

HP Flex-10 10Gb 2-port 530M Adapter 631884-B21

NOTE: Please see QuickSpecs for technical specifications and additional information at:

http://h18000.www1.hp.com/products/quickspecs/14217_div/14217_div.html.

10/20Gb Ethernet FlexibleLOM Adapters

NOTE: All 1Gb Ethernet adapters are Type A mezzanine cards that can be installed in any of the BL660c Gen8 mezzanine slots.

HP Ethernet 1Gb 4-port 366M Adapter 615729-B21

10Gb Ethernet FlexibleLOM Adapters

NOTE: The server supports one or two FlexibleLOMs.

NOTE: For Pre-configured Model configurations, two FlexibleLOMs are already included; no additional FlexibleLOMs are added.

NOTE: For a Factory Integrated Model configuration with one FlexibleLOM, it is added in the HP Networking section of "Step 2" in the Factory Integrated Models section earlier in this document; it is not added here.

NOTE: For a Factory Integrated Model configuration with two FlexibleLOMs, the second FlexibleLOM is a different part number. You must select the first FlexibleLOM earlier in this document in the "Step 2" HP Networking section and select the second FlexibleLOM here in the "Step 4" HP Networking section.

NOTE: The FlexibleLOMs here can also be used change the FlexibleLOM(s) that original came with the server.

NOTE: All FlexibleLOMs are dual port: one port is routed to interconnect module bay 1 and the other to bay 2.

HP Flex Fabric 20Gb 2-port 630FLB Adapter 700065-B21

Core Options

HP Flex-10 10Gb 2-port 530FLB Adapter	656590-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14216_div/14216_div.html .	
HP FlexFabric 10Gb 2-port 534FLB Adapter	700741-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14617_div/14617_div.html	
HP FlexFabric 10Gb 2-port 554FLB Adapter	647586-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14219_div/14219_div.html .	
HP Ethernet 10Gb 2-port 560FLB Adapter	655639-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14331_div/14331_div.html .	
1Gb Ethernet FlexibleLOM Adapters	
NOTE: The server supports one or two FlexibleLOMs. Two are already included in the Pre-configured Models and the first one is added per Step 2 for Factory Integrated Models. The 1GbE FlexibleLOM option below is used to change the original 10Gb FlexibleLOM(s) that originally came with the server.	
NOTE: For a two FlexibleLOM configuration, the two FlexibleLOMs must be identical.	
HP Ethernet 1Gb 2-port 361FLB Adapter	652500-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14333_div/14333_div.html	
HP 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 any other mezzanine slot, both ports are active.	
HP Infiniband QDR/Ethernet 10Gb 2-port 544M Adapter	644160-B21
NOTE: The QDR InfiniBand adapter may be installed in any mezzanine slot of the server.	
HP Infiniband FDR/Ethernet 10Gb/40Gb 2-port 544M Adapter	644161-B22
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
NOTE: InfiniBand QDR and FDR speeds are only supported on the HP BladeSystem c7000 Enclosure. For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: http://h18004.www1.hp.com/products/quickspecs/12586_div/12586_div.html http://h18000.www1.hp.com/products/quickspecs/13078_div/13078_div.html	

Core Options

HP Fibre Channel	<p>HP LPe1605 16Gb Fibre Channel HBA for BladeSystem c-Class NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14742_div/14742_div.html</p> <p>HP LPe1205A 8Gb Fibre Channel Host Bus Adapter for BladeSystem c-Class NOTE: This is a Type A mezzanine card that can be installed in any of the BL660c Gen8 mezzanine slots. NOTE: Please see QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/14338_div/14338_div.html</p> <p>HP QMH2572 8Gb Fibre Channel Host Bus Adapter for BladeSystem c-Class NOTE: This is a Type A mezzanine card that can be installed in any of the BL660c Gen8 mezzanine slots. NOTE: Please see QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/14230_div/14230_div.html</p> <p>HP QMH2672 16Gb Fibre Channel Host Bus Adapter NOTE: This is a Type A mezzanine card that can be installed in any of the BL660c Gen8 mezzanine slots. NOTE: Please see QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14622_div/14622_div.html</p>	<p>718203-B21</p> <p>659818-B21</p> <p>651281-B21</p> <p>710608-B21</p>
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HP Processors

NOTE: The BL660c Gen8 supports two or four processors; one and three processor configurations are not supported.
NOTE: All processor kits contain two (2) processors.
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.

E5-4600 v2 series Processors

HP BL660c Gen8 Intel® Xeon® E5-4657Lv2 (2.4GHz/12-core/30MB/115W) 2-processor Kit	727590-B21
HP BL660c Gen8 Intel® Xeon® E5-4650v2 (2.4GHz/10-core/25MB/95W) 2-processor Kit	727576-B21
HP BL660c Gen8 Intel® Xeon® E5-4640v2 (2.2GHz/10-core/20MB/95W) 2-processor Kit	727578-B21
HP BL660c Gen8 Intel® Xeon® E5-4627v2 (3.3GHz/8-core/16MB/130W) 2-processor Kit	727588-B21
HP BL660c Gen8 Intel® Xeon® E5-4620v2 (2.6GHz/8-core/20MB/95W) 2-processor Kit	727580-B21
HP BL660c Gen8 Intel® Xeon® E5-4610v2 (2.3GHz/8-core/16MB/95W) 2-processor Kit	727582-B21
HP BL660c Gen8 Intel® Xeon® E5-4607v2 (2.6GHz/6-core/15MB/95W) 2-processor Kit	727584-B21
HP BL660c Gen8 Intel® Xeon® E5-4603v2 (2.2GHz/4-core/10MB/95W) 2-processor Kit	727586-B21

E5-4600 series Processors

HP BL660c Gen8 Intel® Xeon® E5-4650 (2.7GHz/8-core/20MB/130W) 2-processor Kit	679098-B21
HP BL660c Gen8 Intel® Xeon® E5-4650L (2.6GHz/8-core/20MB/115W) 2-processor Kit	679110-B21

Core Options

HP BL660c Gen8 Intel® Xeon® E5-4640 (2.4GHz/8-core/20MB/95W) 2-processor Kit	679100-B21
HP BL660c Gen8 Intel® Xeon® E5-4620 (2.2GHz/8-core/16MB/95W) 2-processor Kit	679102-B21
HP BL660c Gen8 Intel® Xeon® E5-4617 (2.9GHz/6-core/15MB/130W) 2-processor Kit	679112-B21
HP BL660c Gen8 Intel® Xeon® E5-4610 (2.4GHz/6-core/15MB/95W) 2-processor Kit	679104-B21
HP BL660c Gen8 Intel® Xeon® E5-4607 (2.2GHz/6-core/12MB/95W) 2-processor Kit	679106-B21
HP BL660c Gen8 Intel® Xeon® E5-4603 (2.0GHz/4-core/10MB/95W) 2-processor Kit	679108-B21

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document. For additional information, please see the HP SmartMemory QuickSpecs at:

http://h18000.www1.hp.com/products/quickspecs/14225_div/14225_div.html

NOTE: LRDIMMs and RDIMMs are all distinct memory technologies and cannot be mixed within a server.

NOTE: A minimum of one DIMM is required per processor.

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

HP SmartMemory

Registered DIMMs (RDIMMs) - E5-4600 v2 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713981-B21
HP 4GB (1x4GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708637-B21
HP 8GB (1x8GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	731765-B21
HP 8GB (1x8GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	731761-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713985-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708641-B21
HP 24 GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kit	716324-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21

Registered DIMMs (RDIMMs) - E5-4600 series Processors

HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21

Core Options

HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21
HP 24 GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kit	716324-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21
NOTE: When HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kits are used, all DIMM slots for the associated processor sockets must be fully populated with these 24GB DIMMs. If two processor sockets are populated, all 16 DIMM slots must be populated with 24GB DIMMs. If all four processor sockets are populated, all 32 DIMM slots must be populated with 24GB DIMMs.	
Load Reduced DIMMs (LRDIMMs) - E5-4600 v2 series Processors	
HP 32GB (1x32GB) Quad Rank x4 PC3-14900L (DDR3-1866) Load Reduced CAS-13 Memory Kit	708643-B21
Load Reduced DIMMs (LRDIMMs) - E5-4600 series Processors	
HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21

HP Hard Drives

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

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

HP SAS Hot Plug SmartDrive Carriers for Gen8 Servers only

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 1TB 6G SAS 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	652749-B21

Core Options

HP 500GB 6G SAS 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	652745-B21
NOTE: Please see QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/12244_div/12244_div.html .	
6G SATA Hot Plug with SmartDrive SFF (2.5-inch) Midline (MDL) Drives	
HP 1TB 6G SATA 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	655710-B21
HP 500GB 6G SATA 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive	655708-B21
NOTE: Please see the QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/13021_div/13021_div.html .	
12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives	
HP 800GB 12G SAS High Endurance SFF 2.5-in SC Enterprise Performance 3yr Wty Solid State Drive	741159-B21
NOTE: This drive supports Gen8 servers only.	
HP 400GB 12G SAS High Endurance SFF 2.5-in SC Enterprise Performance 3yr Wty Solid State Drive	741155-B21
NOTE: This drive supports Gen8 servers only.	
HP 200GB 12G SAS High Endurance SFF 2.5-in SC Enterprise Performance 3yr Wty Solid State Drive	741151-B21
NOTE: This drive supports Gen8 servers only.	
12G SAS Mainstream Endurance Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives	
HP 800GB 12G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	741146-B21
NOTE: This drive supports Gen8 servers only.	
HP 400GB 12G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	741142-B21
NOTE: This drive supports Gen8 servers only.	
HP 200GB 12G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive	741138-B21
NOTE: This drive supports Gen8 servers only.	
6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Boot Solid State Drives	
HP 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Boot 3yr Wty Solid State Drive	717965-B21
NOTE: This drive supports Gen8 servers only.	
HP 80GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Boot 3yr Wty Solid State Drive	734360-B21
6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Solid State Drives	
HP 800GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	717973-B21
NOTE: This drive supports Gen8 servers only.	
HP 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	717971-B21
NOTE: This drive supports Gen8 servers only.	
HP 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive	717969-B21
NOTE: This drive supports Gen8 servers only.	

Core Options

NOTE: Please see the QuickSpecs for technical specifications and information at:

http://h18000.www1.hp.com/products/quickspecs/14038_div/14038_div.html.

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Boot Solid State Drives

HP 600GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive 739898-B21

HP 300GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive 739888-B21

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

HP 800GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive 691868-B21

HP 400GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive 691866-B21

HP 200GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive 691864-B21

HP 100GB 6G SATA Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive 691862-B21

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

HP 800GB 6G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive 690829-B21

HP 400GB 6G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive 690827-B21

HP 200GB 6G SAS Mainstream Endurance SFF 2.5-in SC Enterprise Mainstream 3yr Wty Solid State Drive 690825-B21

6G SAS SLC Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives

HP 400GB 6G SAS SLC SFF (2.5-inch) SC Enterprise Performance 3yr Warranty Solid State Drive 653082-B21

HP 200GB 6G SAS SLC SFF (2.5-inch) SC Enterprise Performance 3yr Warranty Solid State Drive 653078-B21

NOTE: Please see the QuickSpecs for technical specifications and information at

http://h18000.www1.hp.com/products/quickspecs/14038_div/14038_div.html.

Additional Options

HP Insight Software	HP Insight Control	
	HP Insight Control including 1yr 24x7 Technical Support and Updates Single Server License	C6N27A
	HP Insight Control including 1yr 24x7 Technical Support and Updates Electronic License	C6N28ABE
	HP Insight Control including 1yr 24x7 Support ProLiant ML/DL/BL-bundle FIO Electronic License	C6N36ABE
	HP Insight Control Server Provisioning Media Kit	BD883A
	HP Insight Management Media Kit	C6N31A
	<p>NOTE: HP Insight Management Media Kit contains DVDs without licenses. Contains HP Systems Insight Manager, HP Insight Control, HP Matrix Operating Environment, and Virtual Connect Enterprise Manager software. Uses an integrated installer to perform quick and accurate software installation and updates.</p> <p>NOTE: HP Insight Control 7.2 introduces Insight Control server provisioning, a new capability ideal for multi-server OS and firmware provisioning to ProLiant and BladeSystem servers. Insight Control server provisioning is included and licensed as part of HP Insight Control. A media kit, "HP Insight Control server provisioning USB media kit" (# BD883A), including a USB, is available for customers who require a physical copy of the media loaded with Insight Control server provisioning software. Please note that this media kit is separate and in addition to the "HP Insight Management DVD media kit" (#C6N31A).</p> <p>NOTE: Electronic and Flexible-Quantity licenses can be used to purchase multiple licenses with a single activation key.</p> <p>NOTE: Customer will receive a license entitlement certificate. The license entitlement certificate must be redeemed online or via fax in order to obtain the license activation key(s). Includes one year of 24 x 7 HP Software Technical Support and Update Service.</p> <p>NOTE: Licenses ship without media. The HP Insight Management Media Kit can be ordered separately, or can be downloaded at: http://www.hp.com/go/insightupdates.</p> <p>NOTE: For additional license options please see the Insight Control QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/12631_div/12631_div.html</p>	

Converged Infrastructure Management Software	HP OneView	
	HP OneView with iLO Advanced	
	HP OneView incl 3yr 24x7 Supp Phys 1 Svr Lic	E5Y34A
	HP OneView incl 3yr 24x7 Supp Flex Qty E-LTU	E5Y35AAE
	HP OneView Media Kit Phys No Lic	E5Y37A
	HP OneView without iLO Advanced	
	HP OneView w/o iLO Adv incl 3yr 24x7 Supp Phys 1 Svr Lic	E5Y38A
HP OneView w/o iLO Adv inc 3yr 24x7 Supp Flex Qty E-LTU	E5Y39AAE	
	<p>NOTE: For additional license kits please see the QuickSpecs at http://h18004.www1.hp.com/products/quickspecs/14621_div/14621_div.html.</p>	

Additional Options

HP iLO Advanced License

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

HP iLO Advanced for BladeSystem including 3yr 24x7 Technical Support and Updates E-LTU	E6U63ABE
HP iLO Advanced Blade 1 Server License with 3yr 24x7 Tech Support and Updates	BD502A
HP iLO Advanced for BladeSystem including 1yr 24x7 Technical Support and Updates E-LTU	E6U60ABE
HP iLO Advanced for BladeSystem including 1yr 24x7 Support Single Server License	512488-B21
HP iLO Advanced for BladeSystem including 1yr 24x7 Support Eight Server License	512489-B21

HP Integrated Lights-Out (iLO)

HP iLO Scale Out

HP Integrated Lights-Out Scale-Out 3yr 24x7 Tech Support and Updates Flex Quantity License	BD776A
HP Integrated Lights-Out Scale-Out 1yr 24x7 Tech Support and Updates Flex Quantity License	BD778A
HP Integrated Lights-Out Scale-Out including 3yr 24x7 Tech Support and Updates Flex Qty E-LTU	BD776AAE
HP Integrated Lights-Out Scale-Out including 1yr 24x7 Tech Support and Updates Flex Qty E-LTU	BD778AAE
HP Integrated Lights-Out Scale-Out including 3yr 24x7 Tech Support and Updates Tracking License	BD777A
HP Integrated Lights-Out Scale-Out including 1yr 24x7 Tech Support and Updates Tracking License	BD779A

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 HP 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>

High Performance Clusters

HP Cluster Management Utility

HP Insight Cluster Management Utility 1yr 24x7 Flexible License	QL803B
HP Insight Cluster Management Utility 3yr 24x7 Flexible License	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.	
HP Insight Cluster Management Utility Media	BD477A
NOTE: For additional license kits please see the QuickSpecs at http://h18004.www1.hp.com/products/quickspecs/12612_div/12612_div.html .	

Additional Options

HP I/O Accelerator Options	<p>NOTE: The HP I/O Accelerator Options are Type B mezzanine cards that can be installed in BL660c Gen8 mezzanine slots 2 and 3.</p> <p>HP 1.2TB Multi Level Cell IO Accelerator for BladeSystem c-Class QK763A</p> <p>HP 785GB Multi Level Cell IO Accelerator for BladeSystem c-Class QK762A</p> <p>HP 365GB Multi Level Cell IO Accelerator for BladeSystem c-Class QK761A</p>
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HP Security	<p>HP Trusted Platform Module Option 488069-B21</p> <p>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. 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 has not been tampered with while the system was offline.</p> <p>NOTE: For more information about TPM, including a white paper, go to http://www.hp.com/go/TPM.</p> <p>NOTE: ProLiant OS pre-installed units will come with the partition required for TPM deployment.</p> <p>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.</p>
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HP Storage Controller	<p>HP Smart Array P731m Controller</p> <p>NOTE: The HP Smart Array P731m Controller is a Type B mezzanine card that can be installed in BL660c Gen8 mezzanine slots 2 and 3.</p> <p>NOTE: The BL660 has three installation locations for the "capacitor pack" that comes with the FBWC on Smart Array controllers. The first install location is for the embedded Smart Array P220i Controller. The second install location is for an optional Smart Array controller Type A or B mezzanine card with FBWC installed in mezzanine slot 3. The third install location is for an optional Smart Array controller mezzanine card with FBWC installed in either mezzanine slot 1 (Type A only) or slot 2 (Type A or B).</p> <p>HP Smart Array P731m/2GB FBWC 6Gb 4-ports Ext Mezzanine SAS Controller 698535-B21</p> <p>HP Smart Array P731m/512 FBWC 6Gb 4-ports Ext Mezzanine SAS Controller 698536-B21</p> <p>HP Smart Array P721m Controller</p> <p>NOTE: The HP Smart Array P721m Controller is a Type B mezzanine card that can be installed in BL660c Gen8 mezzanine slots 2 and 3.</p> <p>NOTE: The BL660 has three installation locations for the "capacitor pack" that comes with the FBWC on Smart Array controllers. The first install location is for the embedded Smart Array P220i Controller. The second install location is for an optional Smart Array controller Type A or B mezzanine card with FBWC installed in mezzanine slot 3. The third install location is for an optional Smart Array controller mezzanine card with FBWC installed in either mezzanine slot 1 (Type A only) or slot 2 (Type A or B).</p> <p>HP Smart Array P721m/2G FBWC 4-ports Ext Mezzanine SAS Controller 650072-B21</p> <p>HP Smart Array P721m/512 4-ports Ext Mezzanine SAS Controller 655636-B21</p> <p>NOTE: For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14626_div/14626_div.html. (Smart Array P731m Controller) http://h18000.www1.hp.com/products/quickspecs/14404_div/14404_div.html. (Smart Array P721M Controller)</p>
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Additional Options

HP Secure Encryption	HP Secure Encryption No Media E-LTU per Drive	D8S85AAE
	HP Secure Encryption No Media Flexible License per Drive	D8S84A

NOTE: HP Secure Encryption is supported on the HP Smart Array P731m and the P230i as an option. HP Secure Encryption licensing is based on the number of physical drives requiring encryption.

NOTE: For more information about HP Secure Encryption, go to www.hp.com/go/hpsecureencryption.

HP InfiniBand Mezzanines

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.

NOTE: InfiniBand QDR and FDR speeds are only supported on the HP BladeSystem c7000 Enclosure. For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at:
http://h18004.www1.hp.com/products/quickspecs/12586_div/12586_div.html
http://h18000.www1.hp.com/products/quickspecs/13078_div/13078_div.html

HP InfiniBand FDR 2-port 545M Adapter	702213-B21
HP Infiniband QDR/Ethernet 10Gb 2-port 544M Adapter	644160-B21

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

HP Infiniband FDR/Ethernet 10Gb/40Gb 2-port 544M Adapter	644161-B22
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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.

NOTE: InfiniBand QDR and FDR speeds are only supported on the HP BladeSystem c7000 Enclosure. For additional information, please see the HP BladeSystem c7000 Enclosure and InfiniBand QuickSpecs at:
http://h18004.www1.hp.com/products/quickspecs/12586_div/12586_div.html
http://h18000.www1.hp.com/products/quickspecs/13078_div/13078_div.html

HP Ultrium Tape Blades

NOTE: The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s)) that directly connect to the server via the enclosure midplane.

NOTE: For the above Ultrium tape drives, please see the QuickSpecs for technical specifications and additional information at:
http://h18000.www1.hp.com/products/quickspecs/12729_div/12729_div.html

HP StoreEver LTO-4 Ultrium SB1760c Tape Blade	AQ697B
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NOTE: LTO-4 Ultrium tape technology.

HP StoreEver LTO-5 Ultrium SB3000c Tape Blade	BS580B
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NOTE: LTO-5 Ultrium tape technology.

Additional Options

HP Storage Blades	<p>NOTE: The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s) that directly connect to the server via the enclosure midplane</p> <p>NOTE: Please see the QuickSpecs for technical specifications and additional information at: http://h18006.www1.hp.com/storage/bladesystem/index.html</p> <p>HP D2200sb PCIe Storage Blade AP880A</p> <p>HP D2220sb PCIe and StoreVirtual VSA Bundle QW914A</p> <p>HP D2220sb PCIe w/(12) 900 GB 6G SAS HDD Bundle QW915A</p> <p>HP D2220sb Build-to-order Storage Blade QW917A</p> <p>NOTE: For additional information, please see the QuickSpecs for technical specifications and additional information at: http://h18000.www1.hp.com/products/quickspecs/14507_div/14507_div.html</p>
<hr/>	
HP Expansion Blade	<p>HP BLc PCI Expansion Blade 448018-B21</p> <p>NOTE: The PCI Expansion Blade provides PCI card slots for an adjacent c-Class Server Blade.</p> <p>NOTE: The ProLiant BL660c Gen8 supports up to two expansion blades (Ultrium Tape Blade(s), HP D2200sb/D2220sb Storage Blade(s), and/or PCI Expansion Blade(s) that directly connect to the server via the enclosure midplane.</p> <p>NOTE: The PCI Expansion Blade ships with one pre-installed PCI-X connect board. Also includes one PCIe connect board which requires installation.</p> <p>NOTE: Please see the QuickSpecs for technical specifications and additional information at http://h18000.www1.hp.com/products/quickspecs/12753_div/12753_div.html</p>
<hr/>	
HP Flash Media Kits for USB Drives	<p>HP Enterprise Mainstream Flash Media Kits for Memory Cards</p> <p>HP 8GB USB Enterprise Mainstream Flash Media Drive Key Kit 737953-B21</p> <p>HP 8GB microSD Enterprise Mainstream Flash Media Kit 726116-B21</p> <p>HP 32GB microSD Enterprise Mainstream Flash Media Kit 700139-B21</p>
<hr/>	
HP Care Pack Services	<p>Proactive Care - Collaborative Support plus Proactive services delivered by the on shore/near shore Advanced Solution Center (ASC) and backed by the global delivery organization, end-to-end case ownership from a Technical Solution Specialists and Technical Account Manager who remotely delivers firmware/software revision management, proactive scans and incident trend reports. Recommended for customers running a virtualized infrastructure and/or customers who desire an enhanced call support experience.</p> <p>HP 3 year 4 hour 24x7 ProLiant BL6xxc Proactive Care Service U3B32E</p> <p>HP 3 year 4 hour 24x7 with Defective Media Retention ProLiant BL6xxc Proactive Care Service U3B35E</p> <p>HP 3 year 6 hour Call To Repair 24x7 ProLiant BL6xxc Proactive Care Service U3B38E</p> <p>HP 3 year 6hr Call To Repair 24x7 with Defective Media Retention ProLiant BL6xxc Proactive Care SVC U3B41E</p> <p>Proactive Care Personalized Support Environmental Option - to add an onsite Account Support Manager (ASM) to Proactive Care. ASM is an assigned resource who delivers support planning and brings technical expertise and best practices advice for the customer's environment.</p> <p>HP 3 year ISS ProactiveCare Personalized Support U6W98E</p> <p>Installation Services - reduce the time required to get your system up and running and help minimize disruptions to your business.</p>

Additional Options

HP Install c-Class Server Blade Service	UE493E
HP Hardware Installation during Non Standard Hours c-Class Server Blade Service	UG869E

Additional HP 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 DDR3 Memory Configuration Tool: www.hp.com/go/ddr3memory-configurator

Memory Subsystem Architecture

Each Intel® Xeon® E5-4600 and E5-4600v2 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 (32) DIMMs for the server. Up to 32GB capacity DIMMs are supported for 1.0TB of memory (32 DIMM slots x 32GB 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.
- DIMM slots attached to each processor socket are only available if a processor is installed in that socket.
- 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.
- RDIMMs operating at either 1.35V or 1.5V may be mixed in any order, but the system will power them at the higher voltage.
- LRDIMMs and RDIMMs are distinct memory technologies and cannot be mixed within a server.
- 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.
- HP memory from previous generation servers is not compatible with the BL660c Gen8 Server Blade.
- When HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kits are used, all DIMM slots for the associated processor sockets on the BL660c Gen8 must be fully populated with these 24GB DIMMs. If two processor sockets are populated, all 16 DIMM slots for those sockets must be populated with 24GB DIMMs. If four processor sockets are populated, all 32 DIMM slots must be populated with 24GB DIMMs.
- To realize the performance memory capabilities listed in this document, HP SmartMemory is required. For additional information, please see the HP SmartMemory QuickSpecs at: http://h18000.www1.hp.com/products/quickspecs/14225_div/14225_div.html.
- For memory population rules and additional memory guidelines, please see the BL660c Gen8 user guide at <http://www.hp.com/support>.

BL660c Gen8 Supported Memory Bandwidth																
DIMM Type	Registered DIMMS (RDIMMs)														Load Reduced (LRDIMMs)	
	Single Rank (1R)							Dual Rank (2R)							Three Rank (3R)	Quad Rank (4R)
DIMM Rank																
DIMM Capacity	4GB	4GB	4GB	4GB	8GB	8GB	8GB	8GB	8GB	16GB	16GB	16GB	16GB	24GB	32GB	32GB
DIMM Native Speed (MHz)	1333	1600	1600	1866	1600	1600	1866	1333	1600	1333	1600	1600	1866	1333	1333	1866
Voltage*	LV	Std	LV	Std	Std	LV	Std	LV	Std	LV	Std	LV	Std	LV	LV	Std
* LV= low voltage at 1.35V; Std = standard voltage at 1.5V.																
Slots That Can Be Populated	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Maximum Capacity (GB)	128	128	128	128	256	256	256	256	256	512	512	512	512	768	1024	1024

Memory

Populated DIMM Speed (MHz)																
1 DIMM Per Channel	1333	1600	1600	1866	1600	1600	1866	1333	1600	1333	1600	1600	1866	N/A	1333	1866
2 DIMM Per Channel	1333**	1600	1600	1866	1600	1600	1866	1333**	1600	1333**	1600	1600	1866	1333	1333***	1866

** Using HP SmartMemory, 1333MHz DIMMs operate at 1.35V for 2 DIMMs per channel (2DPC). Third party 1333MHz DIMM memory may only support 1.5V at 2DPC.

*** LRDIMM enables 3 DIMMs per channel. HP SmartMemory will support up to 3DPC@DDR3-1066 at 1.35V. Third party memory may only support 3DPC @DDR3-1066 at 1.5V.

NOTE: Memory speed is a function of the processor QPI bus speed; see the table below "Memory Speed by Processor Model".

Memory

Memory Speed by Processor Model

Processor Models	Supported Memory Speeds
E5-4650v2, E5-4640v2, E5-4627v2, E5-4650Lv2	1866/1600/1333/1066MHz
E5-4620v2, E5-4610v2, E5-4650, E5-4650L, E5-4640, E5-4617	1600/1333/1066MHz
E5-4607v2, E5-4603v2, E5-4620, E5-4617, E5-4610, E5-4607	1333/1066MHz
E5-4603, E5-4607	1066MHz

Memory

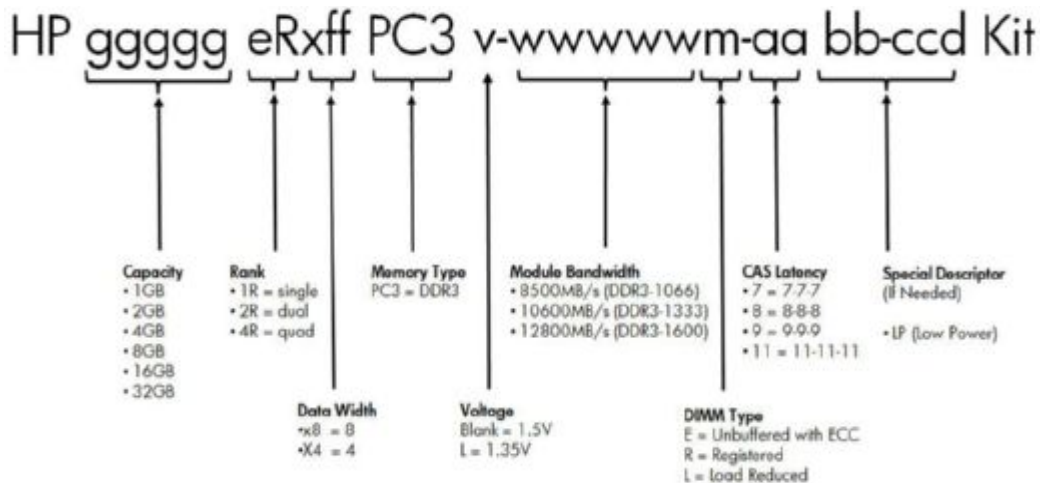
Standard and Maximum Memory Capacity (Pre-configured Models)

Pre Configured Models	Standard Memory	Maximum Memory Plus Optional Memory	Standard Memory Replaced with Optional Memory
Intel Xeon E5-4650v2, E5-4620v2	128GB (8x 16GB)	512GB (24x 16GB)	1024GB (32x 32GB)
Intel Xeon E5-4607v2	64GB (4x 16GB)	512GB (28x 16GB)	1024GB (32x 32GB)
Intel Xeon E5-4650, E5-4620, and E5-4617	128GB (16x 8GB)	384GB (16x 8GB + 16x 16GB)	1024GB (32x 32GB)

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

- 4GB = 4,096MB
- 8GB = 8,192MB
- 16GB = 16,384MB
- 24GB = 24,576MB
- 32GB = 32,768MB

Memory options part number decoder



Following are memory options available from HP:

HP Memory

NOTE: HP memory from previous generation servers are not qualified or warranted with this HP ProLiant Server. HP SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen8. For additional information, please see the HP SmartMemory QuickSpecs at:

http://h18000.www1.hp.com/products/quickspecs/14225_div/14225_div.html

NOTE: LRDIMM, RDIMM and UDIMMs are all distinct memory technologies and cannot be mixed within a server. The majority of ProLiant Gen8 servers support RDIMM, UDIMM and LRDIMM.

NOTE: A minimum of one DIMM is required per server.

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

HP SmartMemory

Registered DIMMs (RDIMMs) - E5-4600v2 series Processors

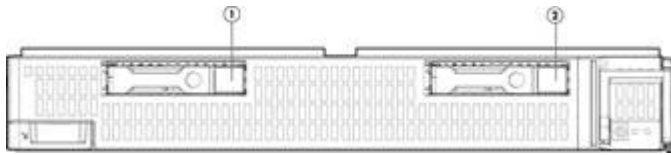
HP 4GB (1x4GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713981-B21
HP 4GB (1x4GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708637-B21

Memory

HP 8GB (1x8GB) Single Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	731765-B21
HP 8GB (1x8GB) Single Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	731761-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-12800R (DDR3-1600) Registered CAS-11 Low Voltage Memory Kit	713985-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-14900R (DDR3-1866) Registered CAS-13 Memory Kit	708641-B21
HP 24 GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kit	716324-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21
Registered DIMMs (RDIMMs) - E5-4600 series Processors	
HP 4GB (1x4GB) Single Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647893-B21
HP 4GB (1x4GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647895-B21
HP 8GB (1x8GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647897-B21
HP 8GB (1x8GB) Single Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	647899-B21
HP 8GB (1x8GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	690802-B21
HP 16GB (1x16GB) Dual Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	647901-B21
HP 16GB (1x16GB) Dual Rank x4 PC3-12800R (DDR3-1600) Registered CAS-11 Memory Kit	672631-B21
HP 24 GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage FIO Memory Kit	716324-B21
HP 24GB (1x24GB) Three Rank x4 PC3L-10600R (DDR3-1333) Registered CAS-9 Low Voltage Memory Kit	761501-B21
Load Reduced DIMMs (LRDIMMs) - E5-4600v2 series Processors	
HP 32GB (1x32GB) Quad Rank x4 PC3-14900L (DDR3-1866) Load Reduced CAS-13 Memory Kit	708643-B21
Load Reduced DIMMs (LRDIMMs) - E5-4600 series Processors	
HP 32GB (1x32GB) Quad Rank x4 PC3L-10600L (DDR3-1333) Load Reduced CAS-9 Low Voltage Memory Kit	647903-B21

NOTE: Depending on the memory configuration and processor model, 1600MHz and 1333MHz memory may operate at a lower speed. Please see the "Memory" section later in this document and the Online Memory Configuration Tool for details at www.hp.com/go/ddr3memory-configurator.

Storage



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

Hard Drives

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

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

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

	Quantity Supported	Position Supported	Controller
1.2TB 6G SAS 10K	2	1-2	HP Smart Array P220i Controller
900GB 6G SAS 10K			
600GB 6G SAS 10K			
450GB 6G SAS 10K			
300GB 6G SAS 10K			
300GB 6G SAS 15K			
146GB 6G SAS 15K			

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

	Quantity Supported	Position Supported	Controller
1TB 6G SAS 7.2K	2	1-2	HP Smart Array P220i Controller
500GB 6G SAS 7.2K			

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

	Quantity Supported	Position Supported	Controller
1TB 6G SAS 7.2K	2	1-2	HP Smart Array P220i Controller
500GB 6G SAS 7.2K			

12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 12G SAS	2	1-2	HP Smart Array P220i Controller
400GB 12G SAS			
200GB 12G SAS			

12G SAS Mainstream Endurance Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 12G SAS	2	1-2	HP Smart Array P220i Controller
400GB 12G SAS			
200GB 12G SAS			

Storage

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Boot Solid State Drives

	Quantity Supported	Position Supported	Controller
120GB 6G SATA VE Boot	2	1-2	HP Smart Array P220i Controller

6G SATA VE Hot Plug SFF (2.5-inch) Enterprise Value Solid State Drives

	Quantity Supported	Position Supported	Controller
800GB 6G SATA VE	2	1-2	HP Smart Array P220i Controller
480GB 6G SATA VE			
240GB 6G SATA VE			

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Boot Solid State Drives

	Quantity Supported	Position Supported	Controller
600GB 6G SATA VE Boot	2	1-2	HP Smart Array P220i Controller
300GB 6G SATA VE Boot			

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

	Quantity Supported	Position Supported	Controller
800GB 6G SATA ME	2	1-2	HP Smart Array P220i Controller
400GB 6G SATA ME			
200GB 6G SATA ME			
100GB 6G SATA ME			

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

	Quantity Supported	Position Supported	Controller
800GB 6G SAS ME	2	1-2	HP Smart Array P220i Controller
400GB 6G SAS ME			
200GB 6G SAS ME			

6G SAS SLC Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives

	Quantity Supported	Position Supported	Controller
400GB 6G SAS SLC	2	1-2	HP Smart Array P220i Controller
200GB 6G SAS SLC			

Technical Specifications

System Unit	Dimensions (H x W x D) (with bezel)	366.27mm (14.42") x 56.54mm (2.23") x 516.67mm (20.34")
	Weight (approximate)	<p>Maximum: 4 processors, 27.1 lb (12.3 kg) 2 FlexibleLOMs, 32 DIMMs, 2 hard drives, 3 mezzanine cards, and 2 flash cache batteries installed</p> <p>Minimum: 2 processors, 1 FlexibleLOM, and 2 DIMMs installed</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"> • HP BladeSystem c3000 Enclosure QuickSpecs at http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html NOTE: The ProLiant BL660c Gen8 requires the c3000 Enclosure to be configured with 6 fans. • HP BladeSystem c7000 Enclosure QuickSpecs at http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html NOTE: The ProLiant BL660c Gen8 requires the c7000 Enclosure to be configured with 10 fans. <p>To review typical system power ratings use the HP Power Advisor which is available via the online tool located at www.hp.com/go/hppoweradvisor.</p>
	System Inlet Temperature	<p>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.</p> <p>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.</p> <p>System performance may be reduced if operating with a fan fault or above 30°C (86°F).</p>
	Relative Humidity (non-condensing)	<p>Non-operating -30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).</p> <p>Operating 10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.</p> <p>Non-operating 5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.</p>
	Altitude	<p>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).</p>

Technical Specifications

		Non-operating	9,144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1,500 ft/min).
	Acoustic Noise	<p>For acoustic noise specifications, please see the HP BladeSystem c-Class Enclosures QuickSpecs located at: HP BladeSystem c3000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12790_div/12790_div.html HP BladeSystem c7000 Enclosure QuickSpecs: http://h18000.www1.hp.com/products/quickspecs/12810_div/12810_div.html</p>	
HP Smart Array P220i Controller	Disk Drive Interface	6G SAS (Serial Attached SCSI)	
	Server Interface	x4 PCI Express host interface	
	Cache Memory Speed	512MB flash backed write cache (FBWC) cache standard with Pre-configured Models and optional on Factory Integrated Models	
	Logical Drives Supported	64 (with included 512MB cache)	
	Host Memory Addressing	64-bit, supporting servers memory space greater than 4GB	
	RAID Support	RAID 1 (mirroring) and RAID 0 (striping) NOTE: The FBWC is not required for RAID capability. The purpose of the cache is it can increase hard drive write performance and provides data protection in case the server losses power.	
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)	
HP FlexFabric 10Gb 2-port 554FLB FlexibleLOM (Included with Pre-configured Models)	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	Emulex BE3	
	Data Transfer Method	x8 PCI Express 2.0	
	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 HP 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	ProLiant Teaming including Network Fault Tolerance, Transmit Load Balancing, and Switch-Assisted Load Balancing 9K Jumbo frames (4K Jumbo frames when in FCoE mode) Microsoft Windows Receive Side Scaling (RSS) Hardware-based accelerated iSCSI iSCSI boot Flex-10 capability Fibre Channel over Ethernet (FCoE) TCP/IP offload engine (stateless TCP/IP) Autosensing 1Gb/10Gb Ethernet	

Technical Specifications

Environment-friendly Products and Approach

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: <http://www.hp.com/go/green>. To recycle your product, please go to: <http://www.hp.com/go/green> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/green>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

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