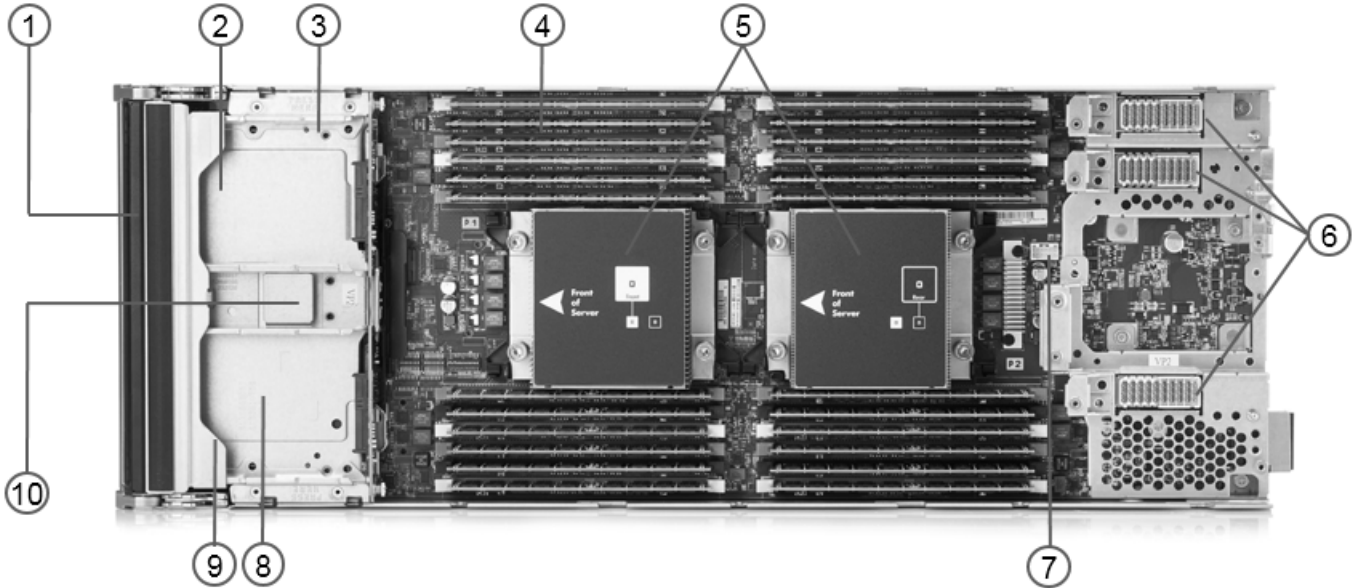


Overview

HPE Synergy 480 Gen9 Compute Module



HPE Synergy 480 Gen9 Compute Module – Internal View

- | | |
|---|---|
| 1. Removable drive cage with two hot-plug drive bays | 6. Mezzanine connectors (x16 PCIe 3.0) |
| 2. TPM connector (under drive cage) | 7. HPE Smart Storage Battery connector |
| 3. USB 3.0 (under drive cage) | 8. iLO (under drive cage) |
| 4. Twenty four (24) DDR4 DIMM memory slots (12 per processor) | 9. Micro SD Slot (under drive cage) |
| 5. Up to two (2) Intel Xeon processors | 10. Storage controller connector (under drive cage) |

HPE Synergy is a single infrastructure of physical and virtual pools of compute, storage, and fabric resources, and a single management interface that allows IT to instantly assemble and re-assemble resources in any configuration. As the foundation for the New Style of Business infrastructure, HPE Synergy eliminates hardware and operational complexity so IT can precisely deliver infrastructure to applications faster and with greater flexibility.

Standard Features

NOTE: This document covers the HPE Synergy 480 Gen9 Compute Module only. For information on HPE Synergy 12000 Frame and interconnects please see the HPE Synergy 12000 Frame QuickSpecs.

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

Processor Processor information will be available Second Quarter 2016
Up to two of the following

Cache Memory Processor information will be available Second Quarter 2016
One of the following depending on Model

Chipset Intel® C610 Series Chipset
NOTE: For more information regarding Intel chipsets, please see the following:
<http://www.intel.com/products/server/chipsets/>.

On System Management Chipset HPE iLO (Firmware HPE iLO4 2.0), 4GB NAND with 1GB USB user space configurable via UEFI and accessible via iLO. Read and learn more in the [iLO QuickSpecs](#).

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

Memory Protection Advanced ECC
Memory Mirroring
Memory Online Spare Mode (Rank Spare Mode)

Memory Type HPE SmartMemory
One of the following depending on Model DDR4 Load Reduced (LRDIMM), or Registered (RDIMM)

DIMM Slots Available	24 (12 DIMM slots per processor, 4 channels per processor, 3 DIMMs per channel)
Maximum (LRDIMM)	1.5TB (24 x 64GB)
Maximum (RDIMM)	768GB (24 x 32GB)

NOTE: HPE memory from previous generation servers (DDR3) is not compatible with this compute module. HPE SmartMemory is required to realize the memory performance improvements and enhanced functionality listed in this document for Gen9. For additional information, please see the HPE SmartMemory QuickSpecs at:
<http://www8.hp.com/h20195/v2/GetHTML.aspx?docname=c04111535>
NOTE: LRDIMM and RDIMM are distinct memory technologies and cannot be mixed within a compute module.

Network Controller HPE Synergy 3820C 10/20Gb Converged Network Adapter
NOTE: Supports full hardware offload of FCoE storage protocol processing for high performance converged Ethernet data and storage networks.
HPE Synergy 3520C 10/20Gb Converged Network Adapter
NOTE: Composes multiple network flows including FCoE, RoCEv2, PMD for DPDK or Ethernet within each connection.
HPE Synergy 2820C 10/20Gb Converged Network Adapter

Standard Features

NOTE: Delivers flexibility to compose multiple network flows including Ethernet and FCoE or iSCSI within each connection.

Standard iLO Network Controller:

One (1) 1Gbps port for the HPE iLO 4 to HPE Frame Link Module connection.

Mezzanine connectors

Three (3) I/O expansion mezzanine connectors:

- x16 PCIe 3.0 Type D (supports Type C and Type D mezzanine cards) (mezzanine connector 1).
NOTE: This mezzanine connector supports dual-port mezzanine cards: one port is routed to interconnect module bay 1 and the other to bay 4.
- x16 PCIe 3.0 Type D (supports Type C and Type D mezzanine cards) (mezzanine connector 2).
NOTE: This mezzanine connector supports dual-port mezzanine cards: one port is routed to interconnect module bay 2 and the other to bay 5. NOTE: A second processor must be installed (in processor slot 2) to have access to mezzanine connector 2.
- x16 PCIe 3.0 Type C (supports Type C mezzanine cards) (mezzanine connector 3).
NOTE: This mezzanine connector supports dual-port mezzanine cards: one port is routed to interconnect module bay 3 and the other to bay 6.

Mezzanine options include:

- Dual-port 10/20Gb compute module mezzanine adapter options for additional network ports.
- Dual-port 16Gb Fibre Channel HBA options for SAN connectivity.

HPE Compute Module ROM

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

HPE ROM provides for essential initialization and validation of hardware components before control is passed to the customer-installed operating system. The ROM also provides the capability of booting from various fixed media (HDD, CD-ROM) and removable media (USB), to continue operation to the operating system.

HPE ROM performs very early configuration of the video controller, to allow monitoring of initialization progress via an attached monitor. If configuration or hardware errors are discovered during this early phase of hardware initialization, suitable messages are now displayed on the connected monitor. Additionally, these configuration or hardware errors are logged to the Integrated Management Log (IML) to assist in diagnosis. HPE Synergy Compute ROM is used to configure the following:

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

NOTE: For further information, please refer to the HPE RBSU (ROM based setup utility) user guide:

<http://www.hp.com/support/rbsu>

HPE Server Unified Extensible Firmware Interface (UEFI) or Legacy Mode

HPE Synergy Compute Module System BIOS is an EDK2 UEFI solution, and adheres to the latest revisions of UEFI Class 2 specifications which supports both legacy boot and UEFI boot operation. The HPE Synergy 480 Gen9 defaults to UEFI boot operation and can be factory or field configured for Legacy boot operation.

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

NOTE: For more information on Hewlett Packard Enterprise Synergy Compute Module System BIOS and UEFI, see the UEFI Information Library: <http://www.hp.com/go/uefi/docs> .

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

To modify the compute module configuration ROM default settings, press F9 in the HPE Synergy Compute Module POST screen to enter the UEFI System Utilities screen. By default, the System Utilities menus are in

Standard Features

the English language.

UEFI enables numerous new capabilities, including both industry standard functionality and features specific to HPE Synergy Compute Modules. Following are some of the features that UEFI enables and that the HPE Synergy 480 Gen9 can support when configured for UEFI boot operation:

- Secure Boot - A new feature in which the system firmware, option card firmware, operating systems, and software collaborate to greatly enhance platform security.
- Operating system specific functionality - Microsoft Windows 2012 supports several features only when installed in UEFI mode.
- Support for > 2.2 TB (using GPT) boot drives - Such drives could previously only be used for boot drives when using RAID solutions such as HPE Smart Array.
- UEFI Shell - Provides a pre-boot environment for running scripts and tools. The HPE Synergy Compute Module UEFI Shell provides both standard capabilities as well as numerous enhancements.
- PXE boot support for IPv6 networks.
- PXE Multicast Boot allowing for faster PXE deployments for large numbers of servers.
- Boot support for option cards that only support a UEFI option ROM.

NOTE: When the server is configured for UEFI Boot Mode, PXE servers must be configured with a UEFI boot image.

NOTE: When the server boots in UEFI mode, it does not boot media with a legacy OS installation. This includes DOS targets and Windows or Linux systems installed in Legacy mode. The reverse is also true for servers that boot in Legacy mode.

Storage Controller	Choice of:		
	• HPE Smart Array P240nr Controller with 1GB Flash-Backed Write Cache (FBWC) supporting RAID 0, 1, 10, 5, 6, and 1 ADM		
	• HPE Smart Array P542D Controller with 2GB Flash-Backed Write Cache (FBWC) supporting RAID 0, 1, 10, 5, 50, 6, 60, 1 ADM, and 10 ADM		
	• HPE H240nr Smart HBA supporting RAID 0, 1, 10, 5		
			• HPE B140i (chipset SATA)

Maximum Internal Storage One of the following depending on Model	Hot Plug SFF SAS	4.0TB	2 x 2.0TB
	Hot Plug SFF SATA	4.0TB	2 x 2.0TB
	Hot Plug SFF SAS SSD	7.68TB	2 x 3.84TB
	Hot Plug SFF SATA SSD	3.2TB	2 x 1.6TB
	Hot Plug SFF NVMe SSD	4.0TB NVMe	2 x 2.0TB NVMe

NOTE: The HPE Synergy 480 Gen9 Compute Module supports the HPE hot plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from previous generation servers (prior to Gen8) are not compatible with the HPE Synergy 480 Gen9 drive bays.

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

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

Industry Standard Compliance	ACPI 2.0
	Microsoft® Logo certifications
	USB 3.0 Support

Standard Features

IPMI 2.0
 Secure Digital 2.0
 TPM 1.2 and 2.0 Support
 IEEE (specific IEEE standards depending on Ethernet adapter card(s) installed)
 Advanced Encryption Standard (AES)
 Triple Data Encryption Standard (3DES)
 SNMP
 SSL 2.0
 DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP)
 Active Directory v1.0
 PCIe 3.0
 ASHRAE A3

Operating Systems and Virtualization Software Support for HPE Synergy Compute Modules

Microsoft Windows Server
Red Hat Enterprise Linux (RHEL)
SUSE Linux Enterprise Server (SLES)
VMware

Enclosures HPE Synergy 12000 Frame, is the base for all Synergy products and supports: Up to 12 half-height or 6 full-height Compute Modules, mixing allowed

Graphics Integrated Matrox G200eh video controller

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

HPE iLO Management On System Management Memory

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

Form Factor HPE Synergy 480 Gen9 is a half-height compute module that plugs into the HPE 12000 Frame.

HPE management solution	HPE Synergy Composer with HPE OneView	HPE Synergy integrates HPE OneView to deliver 'composable infrastructure' with a view of resources. This flexible and scalable solution provides IT managers with the architecture to implement their software-defined data center (SDDC) -- and to address the changing business needs and the challenges of today's enterprise data centers.
	HPE Integrated Lights Out	Monitor your servers for ongoing management, service alerting, reporting and remote management with iLO. Learn more at http://www.hp.com/go/ilo
	UEFI	Configure and boot your servers securely with industry standard Unified Extensible Firmware Interface (UEFI). Learn more at http://www.hp.com/go/ProLiant/uefi
	HPE RESTful API	RESTful API is an application programming interface. RESTful Web Service API served by iLO's web server. http://www.hp.com/go/restfulapi
	Intelligent Provisioning	Provision servers by discovering and deploying 1 to few servers with Intelligent Provisioning. Learn more at http://www.hp.com/go/intelligentprovisioning

Server Utilities	HPE Smart Update	Optimize firmware and driver updates with HPE Smart Update solutions. Learn more at http://www.hp.com/go/smartupdate
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Standard Features

- Scripting Tool Kit and Windows PowerShell** Provision 1 to many servers using your own scripts to discover and deploy them with HPE Scripting Tool Kit for Windows and Linux or HPE Scripting Tools for Windows PowerShell. Learn more at <http://www.hp.com/go/ProLiantSTK> or <http://www.hp.com/go/powershell>.
- HPE RESTful Interface Tool** HPE RESTful API tool is a scripting tool to provision servers using RESTful API Interface to discover and deploy servers at scale. Learn more at <http://www.hp.com/go/restfulapi>.
- HPE iLO Mobile Application** Enables the ability to access, deploy, and manage your server anytime from anywhere from select smartphones and mobile devices. For additional information please visit: <http://www.hp.com/go/ilo/mobileapp>.

Security

- Power-on password
- Administrator's password
- Keyboard password (QuickLock)
- HPE iLO Management On System Management Chipset with:
 - SSL encryption
 - Secure Shell version 2
 - Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser, CLP and XML scripting interface
 - AES and RC4 encryption of video
- External USB port enable/disable
- Network server mode
- Serial interface control
- TPM (Trusted Platform Module) 1.2 or 2.0 option
- Advanced Encryption Standard (AES)
- Intel® Advanced Encryption Standard-New Instructions (AES-NI)

Availability

Memory

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

Mezzanine options and I/O

- Multiple I/O mezzanine connectors that support a wide variety of mezzanine cards each supporting multiple data paths routed to redundant interconnect modules.
- Network Adapter Teaming (bonding) provides network fault tolerance, transmit load balancing, and switch-assisted load balancing.

Storage

- Two (2) Small Form Factor hot-plug SAS/SATA drive bays.
- Choice of the HPE Smart Array P240nr Controller with 1GB FBWC, HPE Smart Array P542D Controller with 2GB FBWC, HPE H240nr Smart HBA, or the HPE B140i (chipset SATA). Optional dual-port Fibre Channel mezzanine card(s) for redundant SAN connections.

Processor/Chipset

Standard Features

- 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.

HPE Synergy 12000 Frame

- Up to 12 half-height or 6 full-height compute modules, mixing allowed
- Ten fans and single Frame Link Module included with every system
- Two appliance bays for redundant management appliances, embedded OneView and other solutions to come via REST
- Up to six 2650 Watt Power Supplies of Titanium class efficiency providing 7950 Watts of redundant power
- Up to 6 ICM module/switch bays for full redundancy of 3 fabrics.
- 2 slots for Frame Link Modules, offers links to multiple frames through a private air-gapped management network
- HPE Thermal Logic technology to maximize power and cooling efficiency
- HPE Intelligent Resources technology built-in to every option for OneView Auto-Discovery of resources.

Warranty

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

NOTE: Compute module warranty includes 3-year Parts, 3-year Labor, 3-year on-site support. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have Hewlett Packard Enterprise replace Optional CSR parts at no charge. Additional information regarding worldwide limited warranty and technical support is available at <http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>.

Optional Features

- Graphics Adapter**
- NVIDIA® Tesla® M6 graphics
 - Workstation class performance for ultra high end professional 3D graphics, or VDI acceleration delivering true PC graphics experience.
 - 8GB (GDDR5) memory
 - Supports shared graphics, pass-through and hardware GPU virtualization
 - Supported Environments (Refer to “Technical Specification” section at end of document for full listing per graphics adapter)
 - Bare Metal Client Operating System – Non Virtualized
 - Not Supported
 - Server / Hypervisor
 - Citrix XenServer 6.5 or later
 - VMware vSphere 5.5 or later
 - Microsoft® Windows Server 2012 R2 (64-bit)
 - **NOTE: Microsoft® Windows Server only supported in a Citrix or VMware virtualized environment**

Fibre Channel Support Up to two (2) optional Fibre Channel mezzanine HBAs are supported on the HPE Synergy 480 Gen9.

Compatible SAN HPE Synergy 480 Gen9 Compute Modules are optimized for HPE MSA, EVA, 3PAR, XP, and LeftHand.

HPE Virtual Connect HPE Synergy composable fabric delivers high performance and composability for the delivery of applications and services. The composable fabric is based on master/satellite architecture.

The HPE Virtual Connect SE 40Gb F8 Module, master module, based on composable fabric is designed for Composable Infrastructure. Its disaggregated, rack-scale design uses a master/satellite architecture to consolidate data center network connections, reduce hardware and scales network bandwidth across multiple HPE Synergy Frames.

The master module contains intelligent networking capabilities that extend connectivity to satellite frames through Interconnect Link Modules. This eliminates top of rack switch need and substantially reduces cost. The reduction in components also simplifies fabric management at scale while consuming fewer ports at the data center aggregation layer.

The HPE VC SE 40Gb F8 modules eliminate up to 95% of network sprawl at the compute module edge with one device that converges traffic inside frames and directly connects to external LANs. Each redundant pair of Virtual Connect modules provide eight adjustable downlink connections (six Ethernet and two Fibre Channel, or eight Ethernet) to dual-port 10Gb and in case of 20Gb Converged Network Adapters 16 adjustable downlinks connections 14 Ethernet and two Fibre Channel) on each compute module. Up to six uplinks using QSFP+ interfaces are available for connection to upstream Ethernet switches. Including splitter cables up to 24 uplinks are available for connection to upstream Ethernet and Fibre Channel. The HPE VC SE 40Gb F8 modules avoid the confusion of traditional and other converged network solutions by eliminating the need for multiple Ethernet and Fibre Channel switches, extension modules, cables and software licenses. Also, Virtual Connect wire-once connection management is built-in enabling compute modules adds, moves and replacement in minutes instead of days or weeks. The Master/Satellite disaggregated architecture removes fixed of ratios of interconnects in every frame and allows extending networking resources pool for Virtual Connect to satellite frames.

For more information on Virtual Connect and converged network options, see

Optional Features

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

Storage Software

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

Storage software that gets the job done:

- **Data Protection and Recovery Software**

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

- **Data Archive and Migration Software**

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

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

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

- **Data Replication Software**

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

- **Storage Device Management Software**

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

- **HPE StoreVirtual VSA**

HPE StoreVirtual VSA allows you to create fully featured shared storage on a VMware vSphere or Microsoft Hyper-V virtualized server.

NOTE: For more information available Storage Software including QuickSpecs, please see:

<http://www.hp.com/go/storage/software>.

Support Services

Service and Support HPE Technology Services offers you a rich portfolio of consulting and support services designed to add value to our core products and solutions. We have the know-how and experience to put technology to work for you. We work closely with you, as your strategic partner, leveraging our full services portfolio to make sure that everything works to help optimize your enterprise.

Choose from services aligned to our product offerings and lifecycle. From proactive onsite services to innovative support when your products are connected to Hewlett Packard Enterprise Enterprise, you choose the precise level of attention and support your business demands.

HPE Technology Services for HPE Synergy

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

Protect your business beyond warranty with HPE Support Services

HPE support services offer complete care and support expertise with committed response choices that are designed to meet your IT and business needs.

HPE Foundation Care services offer scalable reactive support-packages for HPE Synergy and software. You choose the type and level of service that is most suitable for your IT and business needs.

HPE Proactive Care keeps your system stable and reliable helping to prevent problems and reduce outages through proactive service management and enhanced technical response.

Advise, transform, integrate, support, automate, and flex

HPE Technology Services helps you get the most out of what you have today and transition to HPE Synergy, a composable infrastructure, at your pace and from wherever you are on the journey.

Start with the HPE Transformation Workshop to ensure that your business and IT organizations collaborate, define the topline strategy for composable, software-defined, cloud-ready infrastructure and kick-start your projects confidently. This workshop clarifies your business requirements and the issues that IT and operations teams must resolve in order to meet these requirements. A detailed executive briefing or high-level report summarizes the strategies, high-level plan and functional requirements.

HPE Modernization and Migration Services helps you choose the right platform for the right workload at the right cost and evolve your IT infrastructure, processes and organization taking advantage of “on-hybrid infrastructure” innovations such as composable, converged, software-defined, technologies. Hewlett Packard Enterprise experts advise, transform, integrate and implement for platform refresh, datacenter consolidation virtualization, migration and automation projects.

HPE Flexible Capacity is a pay per use model for on premise infrastructure. This offers needed HPE Synergy capacity in the datacenter, plus a buffer of additional capacity. As HPE Synergy will be a dynamic environment, this provides enough room to grow your environment, but only pay for actual metered use. Technology transitions and refresh can be built in, infrastructure and services are billed monthly, enabling you to align costs to business use.

HPE Datacenter Care-Infrastructure Automation (DC-IA) is an extension to HPE Datacenter Care and delivers enterprise-grade support, advice, guidance and best practices for infrastructure automation. The service also includes Enterprise editions of automation tools including Enterprise Chef and selected others. The DC-IA Center of Excellence (CoE) is staffed with highly trained experts who have specific expertise on integrating Chef with HPE OneView.

Choose the right support to maximize uptime, free up your resources, and achieve improved value—as you get the most out of the existing IT assets while accelerating time-to-revenue.

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

Builds and incorporates on Proactive Care and also gives customers personalized technical and operational advice from an assigned, local Account Support Manager for personalized technical collaboration, flexible

Support Services

access to specialist skills to help optimize business critical IT, and Critical Incident Management to help so the business is not affected if there is a system or device outage. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues.

<http://www8.hp.com/h20195/v2/GetPDF.aspx/4AA5-3259ENW.pdf>

Standard Support **HPE Proactive Care with 24x7 coverage, three year Support Service**

Hardware and software support services designed specifically for your technology with rapid access to Advanced Solution Center specialists for start to finish case management plus proactive reports and recommendations for firmware and software management and best practice advice. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues.

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

Deploy and integrate

HPE Synergy First Frame Installation and Startup - Provides for hardware installation (HPE Synergy compute modules, Storage Modules, Virtual Connect modules, Interconnect Link Modules, Frame Link Modules, and HPE Synergy D3940 Storage Modules) and software startup for the first frame of your HPE Synergy deployment. Additional frames can be added using the HPE Synergy Additional Frame Installation and Startup Service.

HPE Synergy Additional Frame Installation and Startup Service - Add additional frames to your HPE Synergy First Frame Startup service or expand your existing HPE Synergy Infrastructure.

HPE Education Services

Training your IT staff is critical to help drive the value of HPE Synergy with increased efficiencies and better business outcomes. Training is key to the transformation and management of HPE Synergy.

Parts and Materials

Hewlett Packard Enterprise will provide HPE-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

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

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

For more information Additional Support Services can be found at HPE Support Services Central

<http://ssc.hp.com>

Configuration Information – Factory Integrated Models

NOTE: Not all models are available in all regions. Check with your local country Hewlett Packard Enterprise offices for availability

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

NOTE: Configure-to-order compute modules must start with a CTO Compute Module.

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

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

NOTE: The Factory integrated w/o drive bay model ships with a grill blank in place of the drive cage and drive backplane.

Step 1: Base Compute Module Configuration (Select a configurable Compute Module)

Models	HPE Synergy 480 Gen9 Configure-to-order Compute Module	HPE Synergy 480 Gen9 Configure-to-order w/o Drive Bays Compute Module	HPE Synergy 480 Gen9 Configure-to-order Expanded Storage Compute Module
SKU Number	TBD	TBD	TBD
Processors	Information for Processors Kits will be available in Spring 2016.		
DIMM Slots	Information for Memory kits will be available in Spring 2016.		
Storage Controllers Supported	<ul style="list-style-type: none"> HPE Dynamic Smart Array B140i or one of the following controller options: <ul style="list-style-type: none"> HPE H240nr Smart Host Bus Adapter HPE Smart Array P240nr/1GB FBWC 	<ul style="list-style-type: none"> HPE Smart Array P542D/2GB FBWC 	<ul style="list-style-type: none"> HPE Smart Array P542D/2GB FBWC
Graphics Adapter (optional)	NVIDIA® Tesla® M6 Mezzanine GPU FIO Adapter with NVIDIA® Grid™ vGPU 2.0 and later technology (1536 CUDA Cores)		
PCIe Expansion	Three (3) x16 PCIe I/O mezzanine connectors		
Drives Supported	Two (2) HPE small form factor (SFF) hot-plug SAS/SATA drive bays with support for two (2) SFF drives or up to four (4) uFF drives	No support for local SFF or uFF drives External drive support enabled with the P542D and HPE Synergy D3940 Storage Module	Two (2) HPE small form factor (SFF) hot-plug SAS/SATA/PCIe NVMe drive bays with support for two (2) SFF drives or up to four (4) uFF drives
Security	One (1) TPM connector		
USB and MicroSD	One (1) front USB 3.0 port, One (1) internal USB 3.0 port, One (1) MicroSD		
Management	HPE Synergy Composer powered by OneView, iLO		

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

HPE Processors Processor information will be available Second Quarter 2016.

HPE Memory **HPE SmartMemory**
Memory information will be available Second Quarter 2016.

HPE Networking **10/20Gb Mezzanine Adapters**

Configuration Information – Factory Integrated Models

NOTE: The compute module requires a minimum of one (1) mezzanine network adapter.

NOTE: Mezzanine network adapters can be installed in any mezzanine connector.

Hewlett Packard Enterprise **best practice is to install the first network adapter in mezzanine connector 3 to facilitate installation of Type C and D mezzanines in mezzanine connectors 1 or 2**

HPE Synergy 3820C 10/20Gb Converged Network Adapter

HPE Synergy 3520C 10/20Gb Converged Network Adapter

HPE Synergy 2820C 10Gb Converged Network Adapter

Step 3: Choose Additional Factory Integration Options

HPE Storage Controllers

HPE Smart Array P240nr/1GB FBWC 12Gb 1-port Int FIO SAS Controller

HPE Smart Array P542D/2GB FBWC 12Gb Mezzanine SAS Controller

HPE Compute Module Smart Array P542D SAS Cable

HPE Smart Storage Battery with 260mm Cable Kit

HPE H240nr 12GB 1-port Int FIO Smart Host Bus Adapter

B140i RAID Enable Kit - BIOS Setting

NOTE: If the HPE Smart Array P240nr or the HPE H240nr Smart Host Bus Adapter are not selected, the B140i controller (chipset SATA) will be enabled to support SATA devices for the internal drive bays. If RAID is required when using the B140i controller, please choose HPE FIO B140i RAID Enable Kit - BIOS Setting' (784308-B21).

NOTE: The HPE Smart Array P542D is required for connection to storage resources in the HPE Synergy D3940 Storage Module.

NOTE: To support local drive bay and D3940 Storage Module connectivity on the same controller the HPE Smart Array P542D (759557-B21) and P542D SAS cable are required with the HPE Synergy 480 Gen9 Configure-to-order Expanded Storage Compute Module (732352-B21).

NOTE: The HPE Smart Storage Battery (782958-B21) is included with the HPE Smart Array P240nr Controller. If the Smart Array P542D Controller is selected the Smart Storage Battery is required to support battery-backed FBWC.

Configuration Information – Factory Integrated Models

Step 4: Choose Additional Options for Factory Integration

NOTE For additional options please see the Core Options and Additional sections below; or the following:

- HPE Synergy 12000 Frame QuickSpecs
- HPE Synergy Interconnect and Mezzanine Components QuickSpecs
- HPE Synergy D3940 Storage Module QuickSpecs

Additional Options

HPE Graphics Adapters

NVIDIA® Tesla® M6 Mezzanine GPU FIO Adapter

NOTE: Must be installed in Mezz 1. Due to heatsink size, no other card may be installed in Mezz 2.

NOTE: NVIDIA Tesla M6 requires NVIDIA Grid 2.0 or later to enable vGPU features. vGPU not enabled by default on the card alone.

NOTE: For more information, go to NVIDIA: <http://www.nvidia.com/grid>

HPE Networking

10/20Gb Mezzanine Adapters

HPE Synergy 3820C 10/20Gb Converged Network Adapter

HPE Synergy 3520C 10/20Gb Converged Network Adapter

HPE Synergy 2820C 10Gb Converged Network Adapter

HPE Fibre Channel

HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter

HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter

HPE Processors

Processor information will be available Second Quarter 2016

HPE Memory

HPE SmartMemory

Memory information will be available Second Quarter 2016

HPE Drives

NOTE: The HPE Synergy 480 Gen9 Compute Module supports the HPE hot-plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from generation G7 servers and before are not compatible with the HPE Synergy 480 Gen9 drive bays.

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

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

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

HPE uFF SATA Solid State Drives

HPE SFF(2.5in) Flash Adapter with Dual 340GB 6G SATA Read Intensive UFF(1.0in) Solid State Drives

HPE 340GB 6G SATA Read Intensive UFF(1.0in) Solid State Drive

HPE SFF(2.5in) Flash Adapter with Dual 120GB 6G SATA Read Intensive UFF(1.0in) Solid State Drives

HPE 120GB 6G SATA Read Intensive UFF(1.0in) Solid State Drive

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

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

HPE 500GB 6G SATA 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive

Additional Options

12G SAS (2.5-inch) 512e SC Drives

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

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

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

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

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

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

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

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

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

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

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

HPE 300GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive

HPE 450GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive

HPE 600GB 12G SAS 15K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive

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

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

HPE 500GB 6G SAS 7.2K rpm SFF (2.5-inch) SC Midline 1yr Warranty Hard Drive

6G SATA (2.5-inch) 512e SC Drives

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

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

6G SATA Read Intensive Hot Plug SFF (2.5-inch) Solid State Drives

HPE 1.6TB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive

HPE 800GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive

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

HPE 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive

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

HPE 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive

HPE 240GB 6G SATA Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive

HPE 480GB 6G SATA Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive

HPE 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Boot 3yr Wty Solid State Drive

HPE 80GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Boot 3yr Wty Solid State Drive

6G SATA Mixed Use Hot Plug SFF (2.5-inch) Solid State Drives

Additional Options

HPE 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive

HPE 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive

HPE 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive

HPE 800GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty M1 Solid State Drive

6G SATA Write Intensive Hot Plug SFF (2.5-inch) Solid State Drives

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

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

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

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

12G SAS Read Intensive SFF (2.5-inch) SC Solid State Drives

HPE 480GB 12G SAS RI-3 SFF SC SSD

HPE 960GB 12G SAS RI-3 SFF SC SSD

HPE 1.92TB 12G SAS RI-3 SFF SC SSD

HPE 3.84TB 12G SAS RI-3 SFF SC SSD

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

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

HPE 800GB 12G SAS Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty Solid State Drive

12G SAS Mixed Use SFF (2.5-inch) SC Solid State Drives

HPE 400GB 12G SAS MU-3 SFF SC SSD

HPE 800GB 12G SAS MU-3 SFF SC SSD

HPE 1.6TB 12G SAS MU-3 SFF SC SSD

HPE 3.2TB 12G SAS MU-3 SFF SC SSD

12G SAS Write Intensive SFF (2.5-inch) Solid State Drives

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

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

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

HPE 1.6TB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive

HPE 200GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive

HPE 400GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2 Solid State Drive

HPE 800GB 12G SAS Mainstream Endurance SFF 2.5-in ENT Mainstream SC 3yr Wty H2

Additional Options

Solid State Drive

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

HPE 2TB NVMe PCIe Read Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive

HPE 1.2TB NVMe PCIe Read Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive

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

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

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

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

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

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

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

HPE 2TB NVMe PCIe Write Intensive SFF 2.5-in SC2 3yr Wty Solid State Drive

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

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

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

NOTE: The HPE Synergy 480 Gen9 Configure-to-order Expanded Storage Compute Module (732352-B21) is required to support HPE NVMe PCIe drives.

HPE Security

HPE Trusted Platform Module Option

HPE Trusted Platform Module 2.0 Kit

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® 2012. 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 2012 has not been tampered with while the system was offline.

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

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

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

HPE Storage Controllers

HPE Smart Array P240nr/1GB FBWC 12Gb 4-ports Int SAS Controller

HPE Smart Array P542D/2GB FBWC 12Gb Mezzanine SAS Controller

HPE H240nr 12Gb 4-ports Int Smart Host Bus Adapter

HPE Compute Module Smart Array P542D SAS Cable

HPE Smart Storage Battery with 260mm Cable Kit

NOTE: If the HPE Smart Array P240nr or the HPE H240nr Smart Host Bus Adapter are not selected, the B140i controller (chipset SATA) will be enabled to support SATA devices for the internal drive bays. If RAID is required when using the B140i controller, please choose HPE FIO B140i RAID Enable Kit - BIOS Setting (784308-B21).

NOTE: The HPE Smart Array P542D is required for connection to storage resources in

Additional Options

the HPE Synergy D3940 Storage Module.

NOTE: To support local drive bay and D3940 Storage Module connectivity on the same controller the HPE Smart Array P542D (759557-B21) and P542D SAS cable are required with the HPE Synergy 480 Gen9 Configure-to-order Expanded Storage Compute Module (732352-B21).

NOTE: The HPE Smart Storage Battery (782958-B21) is included with the HPE Smart Array P240nr Controller. If the Smart Array P542D Controller is selected the Smart Storage Battery is required to support battery-backed FBWC.

HPE Secure Encryption

HPE Secure Encryption No Media E-LTU per Drive

HPE Secure Encryption No Media Flexible License per Drive

NOTE: HPE Secure Encryption is supported on the HPE Smart Array P240nr, HPE Smart Array P542D, and H240nr (running in RAID mode) as an option. HPE Secure Encryption licensing is based on the number of physical drives requiring encryption.

NOTE: For more information about HPE Secure Encryption, go to

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

HPE Flash Media Kits

HPE Enterprise Mainstream Flash Media Kits for Memory Cards

HPE 8GB USB Enterprise Mainstream Flash Media Drive Key Kit

HPE 8GB microSD Enterprise Mainstream Flash Media Kit

HPE 32GB microSD Enterprise Mainstream Flash Media Kit

HPE Dual 8GB microSD Enterprise Midline USB Kit

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

http://h18000.www1.hp.com/products/QuickSpecs/13971_div/13971_div.html

Memory

Memory Subsystem Architecture

Each processor socket contains four memory channels that support three DIMMs each for a total of 12 (12) DIMM per installed processor or a grand total of twenty four (24) DIMMs for the server.

Memory Population Rules and Guidelines:

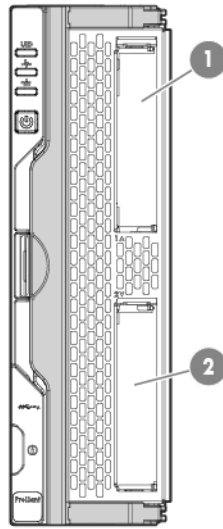
- A minimum of one DIMM is required per processor.
 - Install DIMMs only if the corresponding processor is installed.
 - If only one processor is installed in a two processor system, only half of the DIMM slots are available.
 - DIMM sizes can be mixed in channel. To maximize performance, it is recommended to balance the total memory capacity between all installed processors and to load the channels similarly whenever possible.
 - LRDIMM and RDIMMs are all distinct memory technologies and cannot be mixed within a compute module.
 - DIMMs of different speeds may be mixed in any order; the compute module will select a common optimal speed.
 - The maximum memory speed is a function of the memory type, memory configuration, and processor model.
 - The maximum memory capacity is a function of the memory type and number of installed processors.
 - HPE memory from previous generation servers is not compatible with the HPE Synergy 480 Gen9 Compute Module.
-

HPE Memory

HPE SmartMemory

Memory information will be available Second Quarter 2016

Storage



1-2 2 x SFF hot-plug drive bays for SAS, SATA, SAS SDD, SATA SSD, NVMe PCIe

Technical Specifications

System Unit	Dimensions (H x W x D) (with bezel)	2.5 x 8.43 x 23.62 in. (63.5 x 214 x 600 mm)	
	Weight (approximate)	Maximum: all processors, 24 DIMMs, drives, mezzanine cards, and one flash cache battery installed)	18 lbs. (8.16 kg)
		Minimum: one processor and 1 DIMM installed	14.5 lbs. (6.57 kg)
	Power Specifications	For power specifications including input requirements, BTU rating, and power supply output, please see the HPE Synergy Frame QuickSpecs. To review typical system power ratings use the HPE Power Advisor which is available via the online tool located at http://www.hp.com/go/hppoweradvisor .	
	System Inlet Temperature	Operating	10°C to 35°C (50°F to 95°F) The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault.
		Non-operating	-30C to 60C (-22F to 140F).
	Extended Ambient Operating Support	Qualifications for extended ambient configurations are detailed at: https://www.hp.com/servers/ASHRAE	
	Relative Humidity (non-condensing)	Operating	10% to 90% @ 28C (82.4F)
		Non-operating	5% to 95% @ 38.7C (101.7F)
	Acoustic Noise	For acoustic noise specifications, please see the HPE Synergy 12000 Frame QuickSpecs.	
HPE Smart Array P542D Controller	Storage Interface	12 Gb/s SAS (Serial Attached SCSI) 6 Gb/s SATA (Serial Advanced Technology Attachment)	
	SAS Connectors	Two (2) external ports supporting x4 SAS links each and two (2) internal ports supporting x4 SAS links each	
	SAS Speed	x16 12 Gb/s per physical link	
	PCIe Link Rate	PCIe 3.0 x8 links	
	Memory Bus Speed	DDR3-1866 MHz, 72-bit wide bus at 14.92 GB/s (2 GB cache module)	
	Logical Drives Supported	64 logical drives	
	Max Drives Supported	Up to 256 drives (Up to 128 drives per logical drive)	
	RAID Support	RAID 6, 60 (Advanced Data Guarding) RAID 5, 50 (Distributed Data Guarding) RAID 1, 10 (Drive Mirroring) RAID 1 ADM, 10 ADM (Advanced Data Mirroring) RAID 0 (Striping)	
	Upgradeable Firmware	Flashable ROM with redundant firmware images	

Technical Specifications

HPE Smart Array P240nr/1GB Controller	Disk Drive Interface	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	Server Interface	x8 5G PCIe 3.0 provides 8GB/s maximum bandwidth
	Cache Memory	1GB flash backed write cache (FBWC) cache standard
	Logical Drives Supported	64 (with included 1GB cache)
	Host Memory Addressing	64-bit, supporting servers memory space greater than 4GB
	RAID Support	RAID 1 (mirroring), RAID 0 (striping), RAID 5, RAID 10
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)
HPE H240nr Smart HBA	Disk Drive Interface	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	Compute module Interface	x8 5G PCIe 3.0 provides 8GB/s maximum bandwidth
	Cache Memory	None
	Logical Drives Supported	64
	Host Memory Addressing	64-bit, supporting compute modules memory space greater than 4GB
	RAID Support	RAID 1 (mirroring) and RAID 0 (striping), RAID 5, RAID 10
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)
HPE Dynamic Smart Array B140i Controller	Disk Drive Interface	6Gb/s SATA (Serial ATA)
	Compute module Interface	Embedded x4 PCIe 2.0
	SAS Connectors	2 internal SATA ports
	Cache Memory	None
	SAS Speed	6Gb/s SATA links
	Logical Drives Supported	Up to 10 logical volumes (4 physical drives)
	Host Memory Addressing	64-bit, supporting greater than 4GB compute module memory space
	Hot Plug Support	Yes
	RAID Support	RAID 1 (Mirroring), RAID 0 (Striping), RAID 5
Other	Upgradeable firmware with recovery ROM	
HPE Synergy 2820C 10Gb Converged Network Adapter	Type	Dual-port 10Gb mezzanine
	Network Processor	QLogic 57840S with integrated MAC/PHY
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 20Gbps full duplex; 40Gbps aggregate full duplex theoretical bandwidth

Technical Specifications

IEEE Compliance	802.3, 802.3ab, 802.3u, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, 802.3ap
Standard Features	<p>Delivers flexibility to compose multiple network flows including Ethernet and FCoE or iSCSI within each connection.</p> <p>Full hardware offload of FCoE and iSCSI storage protocol processing for highest performance converged Ethernet data and storage networks.</p> <p>Flex-10 Technology allows you to fine tune bandwidth for up to four partitioned FlexNIC's and FlexHBA's to optimize connectivity for different application needs. From 100Mb/s to 10Gb/s on up to four "Physical Function" NICs per port, in increments of 100Mb/s for NIC. The combined bandwidth of NICs cannot exceed port bandwidth i.e. 10 Gb.</p> <p>A single Type C mezzanine form factor provides flexible network and storage I/O for any HPE Synergy Compute Module.</p> <p>Provides up to 40 Gb/s of converged bi-directional Ethernet bandwidth. Industry-leading throughput and latency performance.</p> <p>Supports Tunnel Offload with NVGRE and VXLAN.</p> <p>Hardware acceleration and offloads for stateless TCP/IP, TCP Offload Engine (TOE). Orchestrates reliable adapter firmware updates with an entire HPE Synergy infrastructure from a single tool, HPE Synergy Composer.</p> <p>Integrated PHY and MAC.</p> <p>Support for Preboot eXecution Environment (PXE).</p> <p>Support for SR-IOV (Windows, Linux, VMware).</p> <p>Support for Network Partitioning (NPAR) when using Pass-thru modules.</p>

HPE Synergy 3820C 10/20Gb Converged Network Adapter	Type	Dual-port 10/20Gb mezzanine
	Network Processor	QLogic 57840S with integrated MAC/PHY
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 40Gbps full duplex; 80Gbps aggregate full duplex theoretical bandwidth
	IEEE Compliance	802.3, 802.3ab, 802.3u, 802.3x, 802.3ad, 802.3p, 802.1q, 802.3ae, 802.3ap
	Standard Features	<p>Delivers flexibility to compose multiple network flows including Ethernet and FCoE or iSCSI within each connection.</p> <p>Full hardware offload of FCoE and iSCSI storage protocol processing for highest performance converged Ethernet data and storage networks.</p> <p>Flex-20 Technology allows you to fine tune bandwidth for up to four partitioned FlexNIC's and FlexHBA's to optimize connectivity for different application needs. From 100Mb/s to 20Gb/s on up to four "Physical Function" NICs per port, in increments of 100Mb/s for NIC. The combined bandwidth of NICs cannot exceed port bandwidth i.e. 20 Gb.</p> <p>A single Type C mezzanine form factor provides flexible network and storage I/O for any HPE Synergy Compute Module.</p> <p>Provides up to 80 Gb/s of converged bi-directional Ethernet bandwidth. Industry-leading throughput and latency performance.</p> <p>Supports Tunnel Offload with NVGRE and VXLAN.</p> <p>Hardware acceleration and offloads for stateless TCP/IP, TCP Offload Engine (TOE). Orchestrates reliable adapter firmware updates with an entire HPE Synergy infrastructure from a single tool, HPE Synergy Composer.</p> <p>Integrated PHY and MAC.</p> <p>Support for Preboot eXecution Environment (PXE).</p>

Technical Specifications

Support for SR-IOV (Windows, Linux, VMware).
Support for Network Partitioning (NPAR) when using Pass-thru modules.

HPE Synergy 3520C 10/20Gb Converged Network Adapter	Type	Dual-port 10Gb mezzaine
	Network Processor	Emulex XE-100 series
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 40Gbps full duplex; 80Gbps aggregate full duplex theoretical bandwidth
	IEEE Compliance	802.3ae, 802.1Q, 802.3x, 802.1p, 802.3ad/LACP, 802.1AB(LLDP), 802.1Qbg, 802.1Qbb, 802.1Qaz, 802.3ap
	Standard Features	<p>Composes multiple network flows including FCoE, RoCEv2, PMD for DPDK or Ethernet within each connection.</p> <p>Dual 20Gb ports provide up to 80Gb bi-directional per adapter.</p> <p>Flex-20 Technology allows fine tuning bandwidth for up to eight partitioned FlexNICs and FlexHBAs to optimize connectivity for different application needs. From 100Mb/s to 20Gb/s on up to four "Physical Function" NICs per port, in increments of 100Mb/s for NIC. The combined bandwidth of NICs cannot exceed port bandwidth i.e. 20 Gb.</p> <p>Provisions and updates all adapters quickly and consistently using the HPE Synergy template-driven server profiles.</p> <p>Orchestrates reliable adapter firmware updates with an entire HPE Synergy infrastructure from a single tool, HPE Synergy Composer.</p> <p>Multi-speed adapter operates at either 20GbE or 10GbE .</p> <p>Tunnel Offload support for VXLAN and NVGRE. Overlay networking reduces server CPU utilization and increases throughput in private/hybrid cloud networks</p> <p>RDMA over Converged Ethernet (RoCE) for greater server efficiency and lower latency (HPE Synergy 40G F8 only). RoCEv2 provides routing capability for enabling servers on separate subnets to leverage RDMA communications.</p> <p>Advanced FCoE and iSCSI offload processing frees up valuable CPU cycles</p> <p>Supports UEFI and legacy boot options.</p> <p>Mixed Storage – supports NIC + FCoE on one port, and NIC + iSCSI on the other.</p> <p>Poll Mode Driver (PMD) for DPDK provides faster small packet performance for Telco Network Function Virtualization (NFV) workloads.</p> <p>Greater bandwidth with PCIe 3.0</p> <p>Jumbo Frames support.</p> <p>Support for Preboot eXecution Environment (PXE).</p> <p>Optimized host virtualization density with SR-IOV support.</p>

NVIDIA® Tesla® M6 graphics adapter	Memory size	8GB
	Memory type	GDDR-5
	Memory interface	256-bit
	Card type	MXM-v3.1
	I/O interface	PCIe (x16) Gen3
	Max Power consumption	100W
	API	DirectX 12, Shader Model 5.0; OpenGL4.5, CUDA, DirectCompute, OpenCL
	Operating Systems	Microsoft® Windows Server 2012 R2 (64-bit)

Technical Specifications

NOTE: Microsoft® Windows Server only supported in a Citrix or VMware virtualized environment

Citrix XenServer 6.5 or later

VMware vSphere 5.5 or later

Environment-friendly Products and Approach**End-of-life Management and Recycling**

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

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

Summary of Changes

Date	Version History	Action	Description of Change
17-Dec-2015	From Version 1 to 2	Changed	Overview, Standard Features, Configuration Information-Factory, Integrated Models, Additional Options, Memory, Storage, Technical Specifications sections were updated.
1-Dec-2015	Version 1	Created	New QuickSpecs



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

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