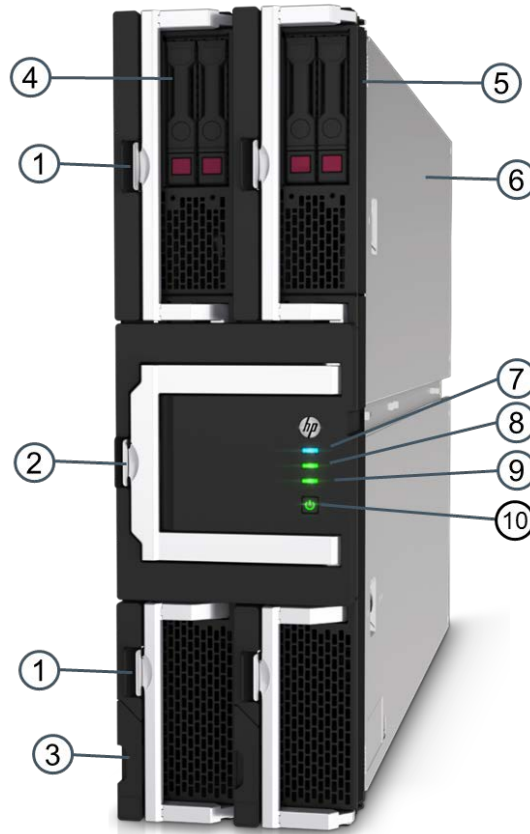


Overview

HPE Synergy 680 Gen9 Compute Module



HPE Synergy 680 Gen9 Compute Module – Internal View

- | | |
|---|--|
| 1. Compute Module release latches | 6. Quick Access Panel |
| 2. Compute Module Link with release latch | 7. UID LED |
| 3. External USB 2.0 connector (behind serial label pull tab) | 8. Health status LED |
| 4. SFF Drive Box 1: Drive Bay 1 and 2 (if uFF, Drive Bay 1/101 and 2/102) | 9. Mezzanine NIC status LED |
| 5. SFF Drive Box 2: Drive Bay 1 and 2 (if uFF, Drive Bay 1/101 and 2/102) | 10. Power On/Standby button and system power LED |

HPE Synergy, the first platform built from the ground up for Composable Infrastructure, offers an experience that empowers IT to create and deliver new value instantly and continuously. It is a single infrastructure that reduces operational complexity for traditional workloads and increases operational velocity for the new breed of applications and services. Through a single interface, HPE Synergy composes physical and virtual compute, storage, and fabric pools into any configuration for any application. As an extensible platform, it easily enables a broad range of applications and operational models such as virtualization, hybrid cloud, and DevOps. With HPE Synergy, IT can become not just the internal service provider but the business partner to rapidly launch new applications that *become* the business.

HPE Synergy supports both two-socket and four-socket compute modules which provide the performance, scalability, density optimization, storage simplicity, and configuration flexibility to power a variety of workloads, including business processing, IT infrastructure, web infrastructure, collaborative, and high-performance computing.

Overview

The HPE Synergy 680 Gen9 Compute Module is a 2-socket mission-critical composable compute option designed to meet the needs of almost any enterprise IT tier and workload. This x86 compute module with Intel® Xeon® v4 processors is ideal for financial, insurance, healthcare, manufacturing, and retail enterprises that require mission-critical levels of availability, extended versatility, and real-time performance.

HPE Synergy offers additional compute module options (that have individual QuickSpecs) including:

- HPE Synergy 620 Gen9 (2-socket, mission critical)
- HPE Synergy 660 Gen9 (4-socket, general purpose)
- HPE Synergy 480 Gen9 (2-socket, general purpose)

This QuickSpecs document focuses on the HPE Synergy 680 Gen9 Compute Module.

Standard Features

NOTE: This document covers the HPE Synergy 680 Gen9 compute module only. For information on HPE Synergy 12000 Frame, interconnect, and mezzanine components, please see the HPE Synergy 12000 Frame TechSpecs

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 updated in Spring 2016
Up to two of the following **NOTE:** QuickSpecs update with processor information expected in 2Q2016

Cache Memory Cache memory information will be updated in Spring 2016
One of the following depending on Model **NOTE:** QuickSpecs update with processor information expected in 2Q2016

Chipset Intel® C602J 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.hpe.com/go/ilo>

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

Memory Memory information will be updated in Spring 2016.
One of the following depending on Model

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.hpe.com/h20195/v2/GetHTML.aspx?docname=c04111535>

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

NOTE: Depending on the memory configuration and processor model, the memory speed may run at 2133MHz, 1866MHz, or 1600MHz.

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 10Gb Converged Network Adapter
NOTE: Delivers flexibility to compose multiple network flows including Ethernet and FCoE or iSCSI

Standard Features

within each connection.

Standard iLO Network Controller:

One (1) 1Gbps port for the HPE iLO 4 to HPE Synergy Composer link.

Mezzanine connectors

Ten (10) I/O expansion mezzanine connectors (in PCIe discovery order):

- Mezzanine connectors 4 and 10 are X8 PCIe 3.0 and support Type C and D mezzanine cards for Fabric 1.
- Mezzanine connectors 6 and 12 are X16 PCIe 3.0 and support Type C mezzanine card for Fabric 3.
- Mezzanine connectors 3 and 9 are X8 PCIe 3.0 and support Type C mezzanine cards for Fabric 3.
- Mezzanine connectors 1 and 7 are X8 PCIe 3.0 and support Type C and Type D mezzanine cards for Fabric 1.
- Mezzanine connectors 2 and 8 are X16 PCIe 3.0 and support Type C and Type D mezzanine cards for Fabric 2.

Mezzanine options include:

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

HPE Compute Module ROM

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

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

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

HPE's ROM is used to configure the following:

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

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

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

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

HPE's 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 680 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 HPE's 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 POST screen to enter the UEFI System Utilities screen. By default, the System Utilities menus are in the English language. UEFI enables numerous new capabilities, including both industry standard functionality and features specific to HPE servers. Following are some of the features that UEFI enables and that the HPE Synergy 680 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.

Standard Features

- 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 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:
	<ul style="list-style-type: none"> • 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

Maximum Internal Storage One of the following depending on Model	Hot Plug SFF SAS	8.0TB	4 x 2.0TB
	Hot Plug SFF SATA	8.0TB	4 x 2.0TB
	Hot Plug SFF SAS SSD	15.28TB	4 x 3.84TB
	Hot Plug SFF SATA SSD	6.4TB	4 x 1.6TB
	Hot Plug SFF NVMe SSD	8.0TB	4 x 2.0TB
	Hot Plug uFF SATA SSD	2.72TB	8 x 340GB

NOTE: The Synergy 680 Gen9 compute module includes the HPE hot plug small form factor (SFF) SmartDrive carrier for enhanced management and reduced maintenance errors. HPE drives from previous generation servers (prior to Gen8) are not compatible with the Synergy 680 Gen9 drive bays.

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
	USB 2.0 Port	One (1) external USB 2.0 connector for USB flash media drive keys

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

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

Standard Features

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	Microsoft® Windows Server® 2012 and 2012 R2
Software Support for Compute modules	RED HAT® Enterprise Linux® 6.7 and 7.2 SUSE™ Linux Enterprise Server (SLES™) 11 SP4, 12, 12 SP1 VMware vSphere® 6.0 Update 1 Debian® 8.0 CentOS™ 6.7 and 7.2 Fedora® 23 OpenSUSE™ 13.3

Frames	<p>HPE Synergy 12000 Frame is the base for all Synergy products and supports:</p> <ul style="list-style-type: none"> Up to 12 half-height, 6 full-height single-wide, or 3 full-height double-wide Compute Modules (mixing allowed) Up to 5 half-height double-wide HPE Synergy D3940 Storage Modules (mixing with compute modules in any to any ratio allowed) Up to three (3) HPE Synergy 680 Gen9 Compute Modules
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Graphics	<p>Integrated Matrox G200eh video controller</p> <ul style="list-style-type: none"> 1600 x 1200 (32 bpp) 1920 x 1200 (16 bpp) <p>HPE iLO Management On System Management Memory</p> <ul style="list-style-type: none"> 16 MB Flash Video Memory 256 MB DDR 3 with ECC (112 MB after ECC and video)
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Form Factor	HPE Synergy 680 Gen9 is a full-height double-wide compute module that plugs into the HPE Synergy Frame 12000.
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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 UEFI	Monitor your servers for ongoing management, service alerting, reporting and remote management with iLO. Learn more at http://www.hp.com/go/ilo
	HPE RESTful API	Configure and boot your servers securely with industry standard Unified Extensible Firmware Interface (UEFI). Learn more at http://www.hp.com/go/uefi
	Intelligent Provisioning	RESTful API is an application programming interface. RESTful Web Service API served by iLO's web server. http://www.hp.com/go/restfulapi
Server Utilities	HPE Smart Update	Provision servers by discovering and deploying 1 to few servers with Intelligent Provisioning. Learn more at http://www.hp.com/go/intelligentprovisioning
		Optimize firmware and driver updates with HPE Smart Update solutions. Learn more at http://www.hp.com/go/smartupdate .

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/STK or http://www.hpe.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 and 2.0 options
- 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

- Four (4) Small Form Factor hot-plug SAS drive bays or 8 Micro Form Factor hot-plug drives.
- Choice of the HPE Smart Array P240nr Controller with 1GB FBWC, HPE Synergy Smart Array P542D Controller with 2GB FBWC, or the HPE H240nr Smart HBA.
- RAID 0,1, 5, and 10 support for all storage controller offerings.
- Optional dual-port Fibre Channel mezzanine card(s) for redundant SAN connections.

Standard Features

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.
- Intel® 602J Chipset

HPE Synergy 12000 Frame

- Up to 12 half-height, 6 full-height single-wide, or 3 full-height double-wide Compute Modules (mixing allowed)
- Up to 5 half-height double-wide HPE Synergy D3940 Storage Modules (mixing with compute modules in any to any ratio 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 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 four (4) optional Fibre Channel mezzanine HBAs are supported on the HPE Synergy 680 Gen9.

Compatible SAN

HPE Synergy 680 Gen9 compute modules are optimized for HPE MSA, EVA, 3PAR, XP, and LeftHand.

HPE Virtual Connect

HPE Virtual Connect SE 40GB F8 Module for HPE Synergy Modules are the simplest, most flexible way to connect virtualized compute module to data or storage networks. VC SE 40Gb F8 modules eliminate up to 95% of network sprawl at the server 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/20Gb Converged Network Adapters on each server.

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

<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**

HPE'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)**

HPE'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**

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

- **Storage Device Management Software**

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

- **HPE StoreVirtual VSA**

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

NOTE: You will need your server serial number in order to complete the registration form. Fully functional, capacity-based licenses are available in 4TB, 10T and 50TB sizes. For more information and access to the 60-day free trial, visit: <http://www.hp.com/go/tryVSA>

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

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

Optional Features

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, 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 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

Optional Features

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 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 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

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.

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

Models	HPE SY 680 Gen9 4S-EX CTO Cmpmt Mdl	HPE SY 680 Gen9 4S-EX Base Cmpmt Mdl	HPE SY 680 Gen9 4S-EX Perf Cmpmt Mdl
SKU	TBD	TBD	TBD
Processor(s)	Information on Processors Kits will be available in Spring 2016.		
DDR4 DIMM	Information on Memory Kits will be available in Spring 2016.		
Storage controller choices	Choice of: <ul style="list-style-type: none"> HPE H240nr Smart HBA storage controller HPE Smart Array P240nr storage controller HPE Smart ArrayP542D 	HPE Smart ArrayP542D	HPE Smart ArrayP542D
I/O expansion slots	10 mezz slots: 4 x16 PCIe 3.0 (Type-C), 6 x 8 PCIe 3.0 (Type-D)	10 mezz slots: 4 x16 PCIe 3.0 (Type-C), 6 x 8 PCIe 3.0 (Type-D)	10 mezz slots: 4 x16 PCIe 3.0 (Type-C), 6 x 8 PCIe 3.0 (Type-D)
Networking: Mezzanine Adapters	Choice of: <ul style="list-style-type: none"> HPE Synergy 3820C 10/20Gb CNA HPE Synergy 3520C 10/20Gb CNA HPE Synergy 2820C 10Gb CNA 	HPE Synergy 3520C 10/20Gb CNA	HPE Synergy 3820C 10/20Gb CNA
Drives supported	0 or 4 HPE small form factor (SFF) hot-plug SAS/SATA HDD or NVME SSD drive bays, or support for 0 or 8 uFF drives	None – no local storage	2 x 600GB SFF
Security	TPM module 1.2 or 2.0	TPM module 2.0	TPM module 2.0

Configuration Information

USB and MicroSD	<ul style="list-style-type: none"> • 1 x internal USB 2.0 slot • 1 x external (front) USB 2.0 slot • 1 x internal uSD slot 	<ul style="list-style-type: none"> • 1 x internal USB 2.0 slot • 1 x external (front) USB 2.0 slot • 1 x internal uSD slot 	<ul style="list-style-type: none"> • 1 x internal USB 2.0 slot • 1 x external (front) USB 2.0 slot • 1 x internal uSD slot
Management	HPE OneView, HPE iLO, HPE RESTful Interface Tool	HPE OneView, HPE iLO, HPE RESTful Interface Tool	HPE OneView, HPE iLO, HPE RESTful Interface Tool

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

HPE Processors Processor information will be updated in Spring 2016.

HPE Memory Memory information will be updated in Spring 2016

HPE Networking 10/20Gb Mezzanine Adapters

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

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

HPE Synergy 2820C 10Gb Converged Network Adapter

HPE Synergy 3820C 10/20Gb Converged Network Adapter

HPE Synergy 3520C 10/20Gb 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

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 Synergy 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 680 Gen9.

NOTE: The HPE Smart Storage Battery (782958-B21) is required by the Smart Array P542D Controller when configured in RAID mode. Only one HPE Smart Storage Battery is required per Synergy Compute Module and is already included with the HPE Smart Array P240nr Controller.

Step 4: Choose Additional Options for Factory Integration

Configuration Information

NOTE: For additional options, please refer to the "Core Options" and "Additional Options" section below. For additional options please see the Core Options and Additional sections below; or the following:

- HPE Synergy 12000 Frame QuickSpecs
<Insert HPE Synergy 12000 Frame QuickSpecs URL>
- HPE Synergy Interconnect and Mezzanine Components
<Insert HPE Synergy Interconnect URL>
<Insert HPE Synergy Mezzanine Component URL>
- HPE Synergy D3940 Storage Module QuickSpecs
<Insert HPE Synergy D3940 Storage Module URL>

Additional Options

HPE Networking 10/20Gb Mezzanine Adapters

HPE Synergy 2820C 10Gb Converged Network Adapter

NOTE: Please see QuickSpecs for technical specifications and additional information at <Insert URL>

HPE Synergy 3820C 10/20Gb Converged Network Adapter

NOTE: Please see QuickSpecs for technical specifications and additional information at <Insert URL>

HPE Synergy 3520C 10/20Gb Converged Network Adapter

NOTE: Please see QuickSpecs for technical specifications and additional information at <Insert URL>

HPE Fibre Channel HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter

NOTE: Please see QuickSpecs for technical specifications and additional information at <Insert URL>

HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter

NOTE: Please see QuickSpecs for technical specifications and additional information at <Insert URL>

HPE Processors Information on Processor Kits will be available in Spring 2016

NOTE: QuickSpecs will be updated with processor information in 2Q 2016

HPE Memory Information on Memory Kits will be available in Spring 2016

NOTE: QuickSpecs will be updated with memory information in 2Q 2016

HPE Drives

NOTE: The HPE Synergy 680 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 680 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: Please see the QuickSpecs for technical specifications and additional information at

<http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04111725>.

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

HPE uFF SATA Drives

Additional Options

6G SATA LE Hot Plug SFF (2.5-inch) SC EL G1 Solid State Drives

HPE 960GB 6G SATA Light Endurance SFF 2.5-in SC Enterprise Light 3yr Wty G1 Solid State Drive

6G SATA Hot Plug with 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

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

<http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=c04111725>.

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

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 with 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

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

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 (2.5-inch) 512e SC HDD

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

12G SAS Write Intensive SFF (2.5-inch) SC 3yr Wty H2 Solid State Drive

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

12G SAS SFF (2.5-inch) SC 3yr Wty H2 Solid State 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

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

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

Additional Options

6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value 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

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

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 ME Hot Plug SFF (2.5-inch) Enterprise Mainstream 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

6G SAS VE (2.5-inch) SC EV Solid State Drives

HPE 480GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty G1 Solid State Drive

HPE 240GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty G1 Solid State Drive

HPE 120GB 6G SATA Value Endurance SFF 2.5-in SC Enterprise Value 3yr Wty G1 Solid State Drive

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

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

Additional Options

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 Solid State Drive

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

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

6G SATA Read Intensive (2.5-inch) SC G2 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 960GB 6G SATA Read Intensive SFF 2.5-in SC 3yr Wty Solid State Drive

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

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

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

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® 2008 R2 and

Additional Options

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 2008 R2 and 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: 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 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

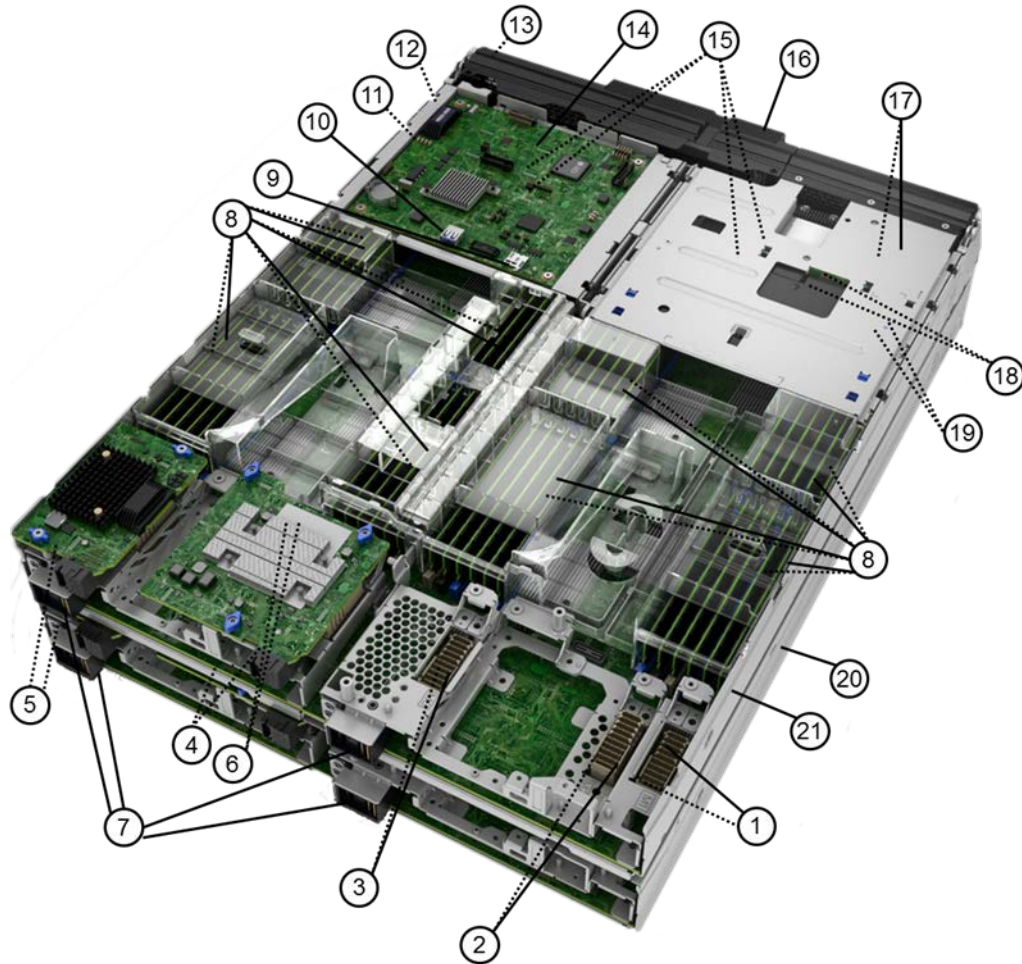
HPE 32GB microSD Enterprise Mainstream Flash Media Kit

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

Technical Specifications



HPE Synergy 680 Gen9 Compute Module – Internal View

- | | |
|---|--|
| 1. Mezzanine Connectors 1 and 7 (underneath in primary module) - Fabric 1 | 12. TPM connector (under Manageability Card) |
| 2. Mezzanine Connectors 2 and 8 (underneath in primary module) - Fabric 2 | 13. USB 2.0 (external) – behind serial pull tab |
| 3. Mezzanine Connector 3 and 9 (underneath in primary module) - Fabric 3 | 14. Manageability Card (on primary module only) |
| 4. Mezzanine Connector 4 (under RAID card shown) and 10 (underneath in primary module) – Fabric 1 | 15. Processors (P1/P3 beneath Manageability Card and P2/P4 beneath HDD cage) |
| 5. Mezzanine Connector 6 (under LOM card shown) and 12 (underneath in primary module) – Fabric 3 | 16. 4-socket Compute Module Link |
| 6. Smart Storage battery connector (under card in view) | 17. 4 x Hard Disk Drive (HDD) bays |
| 7. Management Power Connectors | 18. Storage controller connector (under HDD cage hood) |
| 8. DIMMs (min 2/max 24 per processor; min 8/max 96 in unit) | 19. Backplane connector (under HDD assembly) |
| 9. uSD | 20. Primary Module (bottom in view) |
| 10. USB 2.0 (internal) | 21. Expansion Module (top in view) |
| 11. Manageability Card cConnector (under Manageability Card) | |

Technical Specifications

Memory Subsystem Architecture

Each processor socket contains eight memory channels that support three DIMMs each for a total of 24 (24) DIMMs per installed processor or a grand total of ninety-six (96) DIMMs for the compute module. Up to 64GB capacity DIMMs are supported for 6TB of memory (96 DIMM slots x 64GB per DIMM).

Memory Population Rules and Guidelines:

- A minimum of two DIMMs are required per processor.
- The HPE Synergy 680 requires a minimum of 4 processors, so a minimum of 8 DIMMs.
- Install DIMMs only if the corresponding processor is installed.
- 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.
- 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 680 Gen9 Compute Module.
- To realize the performance memory capabilities listed in this document, HPE SmartMemory is required. For additional information, please see the HPE SmartMemory QuickSpecs at:

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

HPE Memory

NOTE: Quickspecs will be updated with memory information in 2Q 2016

System Unit	Dimensions (H x W x D)	5.06in x 16.94in x 23.62in (127mm x 430.3mm x 600mm) (with bezel)
	Weight (approximate)	Maximum: all processors, 96 DIMMs, drives, mezzanine cards, and one flash cache battery installed) 69.85Lbs (31.752Kg) Minimum: four processors and 8 DIMMs installed 59.73Lb (27.15Kg)
	Power Specifications	For power specifications including input requirements, BTU rating, and power supply output, please see the HPE Synergy Frame TechSpecs. 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° 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 1000 ft) above sea level to a maximum of 3050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 20°C/hr (36°F/hr). The upper limit and rate of change may be limited by the type and number of options installed. System performance during standard operating support may be reduced if operating with a fan fault or above 30°C (86°F). Non-operating -30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).
	Extended Ambient Operating Support	For approved hardware configurations, the supported system inlet range is extended to be: 5° to 10°C (41° to 50°F) and 35° to 40°C (95° to 104°F) at sea level with an altitude derating of 1.0°C per every 175 m (1.8°F per every 574 ft)

Technical Specifications

above 900 m (2953 ft) to a maximum of 3050 m (10,000 ft).

The approved hardware configurations for this system are listed at the URL:

NOTE: Qualifications for extended ambient configurations are detailed at: <https://www.hpe.com/servers/ASHRAE>

Relative Humidity (non-condensing)	Operating	Minimum to be the higher (more moisture) of -12°C (10.4°F) dew point or 8% relative humidity. Maximum to be the lower (less moisture) of 24°C (75.2°F) dew point or 90% relative humidity.
	Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
Altitude	Operating	3050 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 (1500 ft/min).
	Non-operating	9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
Acoustic Noise	For acoustic noise specifications, please see the HPE Synergy Frame 12000 TechSpecs located at: <placeholder>	

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

HPE Smart Array P240nr Controller	Disk Drive Interface	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	SAS Speed	x4 12Gb SAS provides 48GB/s maximum bandwidth
	PCIe Link Rate	PCIe 3.0 x4 provides 4GB/s maximum bandwidth
	Cache Memory	1GB flash-backed write cache (FBWC) cache
	Logical Drives Supported	Up to 64
	RAID Support	RAID 6 (Advanced Data Guarding) RAID 5 (Distributed Data Guarding)

Technical Specifications

		RAID 1, 10 (Drive Mirroring) RAID 1 ADM (Advanced Data Mirroring) RAID 0 (Striping)
	Other	Upgradeable firmware with recovery ROM
HPE Smart HBA H240nr Controller	Disk Drive Interface	12Gb/s SAS (Serial Attached SCSI) 6Gb/s SATA (Serial ATA)
	SAS Speed	x4 12Gb SAS provides 48GB/s maximum bandwidth
	PCIe Link Rate	PCIe 3.0 x4 provides 4GB/s maximum bandwidth
	Cache Memory	None
	Logical Drives Supported	Up to 64
	RAID Support	RAID 5 (Distributed Data Guarding) RAID 1, 10 (Drive Mirroring) RAID 0 (Striping)
	Other	Upgradeable firmware with recovery ROM Online drive flash (with SAS drives)
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
	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).</p> <p>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	Type	Dual-port 10/20Gb mezzanine

Technical Specifications

10/20Gb Converged Network Adapter	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).</p> <p>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 3520C 10/20Gb Converged Network Adapter	Type	Dual-port 10/20Gb mezzanine
	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</p>

Technical Specifications

server CPU utilization and increases throughput in private/hybrid cloud networks 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. Advanced FCoE and iSCSI offload processing frees up valuable CPU cycles Supports UEFI and legacy boot options.
 Mixed Storage – supports NIC + FCoE on one port, and NIC + iSCSI on the other. Poll Mode Driver (PMD) for DPDK provides faster small packet performance for Telco Network Function Virtualization (NFV) workloads.
 Greater bandwidth with PCIe 3.0
 Jumbo Frames support.
 Support for Preboot eXecution Environment (PXE).
 Optimized host virtualization density with SR-IOV support.

HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter

Type	Dual-port 16Gb mezzanine
Network Processor	QLogic 8324
Data Transfer Method	x8 PCI Express 3.0
Network Transfer Rate	Two ports, each at 16 Gbps, each direction; 64 Gbps aggregate full duplex theoretical bandwidth
Standard Features	<p>Flexible Configuration and Connection of Pools of Compute Resources.</p> <ul style="list-style-type: none"> • Provides flexible connectivity to HPE Synergy Virtual Connect FC Modules and Brocade FC Switch Modules. <p>Performance Optimized:</p> <ul style="list-style-type: none"> • Capable of delivering twice the data throughput (MB/s) compared to 8Gb FC HBAs. • High link speed combined with larger data block sizes results in improved application performance. • Dynamic Port Utilization architecture delivers up to 600K Input Output Operations per second (IOPS) on each port or up to 1.2 million IOPS with single port operation. <p>Virtualization Optimized:</p> <ul style="list-style-type: none"> • Ideal for high density server virtualization environments. • Enables more applications and Virtual Machines to run on a single HPE Synergy Compute Module and Fibre Channel port, resulting in reduced cabling and a higher return on IT investment. <p>Supports QLogic StorFusion(TM) technology designed to enhance diagnostic and troubleshooting capabilities, quicken SAN deployment, and improve QoS when connected to Brocade 16Gb FC fabrics.</p> <ul style="list-style-type: none"> • Accelerate SAN deployment (FA-PWWN, F-BLD). • Improve network resiliency and Quality of Service (FEC, CS_CTL). • Enhance diagnostics and troubleshooting (Clearlink®, LCB, RDP, FDMI, FC Ping, FC Traceroute). <p>Power Optimized:</p> <ul style="list-style-type: none"> • Latest generation technology saves power. • Reduced number of components on each FC HBA reduces overall power consumption. <p>RAS Optimized:</p> <ul style="list-style-type: none"> • Highest Data Integrity; Overlapping Protection Domains (OPD) extended for control and data paths. <p>Security Optimized:</p>

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- SAN-level authentication (FC-SP), fabric-level isolation (NPIV and end-to-end data integrity (T10).

Management Optimized:

- Provisions and updates all adapters quickly and consistently using the HPE Synergy template-driven server profiles.
- Orchestrates reliable adapter firmware updates with an entire HPE Synergy infrastructure from a single tool, HPE Synergy Composer.

Fault tolerant HBA Architecture.

Two 16Gb/s Fibre Channel ports.

Multi-Path support for redundant HBAs and paths including Linux driver failover.

RoHS compliance.

QLogic Converge Console management utility for centralized management and remote control of distributed HBAs.

HPE Synergy 3530C	Type	Dual-port 16Gb mezzanine
16Gb Fibre Channel Host Bus Adapter	Network Processor	Emulex XE201
	Data Transfer Method	x8 PCI Express 3.0
	Network Transfer Rate	Two ports, each at 16 Gbps, each direction; 64 Gbps aggregate full duplex theoretical bandwidth
	Standard Features	<p>Flexible Configuration and Connection of Pools of Compute Resources:</p> <ul style="list-style-type: none"> • Provides flexible connectivity to HPE Synergy Virtual Connect FC Modules and Brocade FC Switch Modules. <p>Performance Optimized:</p> <ul style="list-style-type: none"> • Capable of delivering twice the data throughput (MB/s) compared to 8Gb FC HBAs. • High link speed combined with larger data block sizes results in improved application performance. • Dynamic Port Utilization architecture delivers up to 600K Input Output Operations per second (IOPS) on each port or up to 1.2 million IOPS with single port operation. <p>Virtualization Optimized:</p> <ul style="list-style-type: none"> • Ideal for high density server virtualization environments with up to 8,192 concurrent logins and open exchanges. • Enables more applications and Virtual Machines to run on a single HPE Synergy Compute Module and Fibre Channel port, resulting in reduced cabling and a higher return on IT investment. <p>Power Optimized:</p> <ul style="list-style-type: none"> • Latest generation technology saves power. • Reduced number of components on each FC HBA reduces overall power consumption. <p>RAS Optimized:</p> <ul style="list-style-type: none"> • Highest data integrity; supports rapid link diagnostics and resolution of cable link issues. <p>Security Optimized:</p> <ul style="list-style-type: none"> • SAN-level authentication (FC-SP), fabric-level isolation (NPIV and end-to-end data integrity (T10). <p>Management Optimized:</p> <ul style="list-style-type: none"> • Provisions and updates all adapters quickly and consistently using the HPE Synergy template-driven server profiles. • Orchestrates reliable adapter firmware updates with an entire HPE Synergy

Technical Specifications

infrastructure from a single too, HPE Synergy Composer.
 Two 16Gb/s Fibre Channel ports.
 Multi-Path support for redundant HBAs and paths including Linux driver failover.
 RoHS compliance.
 Emulex OneCommand Manager utility for centralized management and remote control of distributed HBAs.

Environment-friendly Products and Approach

End-of-life Management and Recycling

Hewlett Packard Enterprise offers end-of-life HPE 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.

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Summary of Changes

Date	Version History	Action	Description of Change
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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