Overview

HPE Synergy Composer

HPE Synergy, the first Composable Infrastructure (CI), empowers IT to create and deliver new value instantly and continuously.

This single infrastructure 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 compute, storage, and fabric pools into any configuration for any application. It also enables a broad range of applications from bare metal to virtualized to containers, and operational models like hybrid cloud and DevOps. HPE Synergy makes IT an internal partner to rapidly launch new businesses.

HPE Synergy Composer, which is powered by HPE OneView, manages the Composable Infrastructure (CI) and delivers:

- **Fluid pools of resources**, where a single infrastructure of Compute, Storage, and Fabric boots up ready for workloads and demonstrates self-assimilating capacity,
- **Software-defined intelligence**, with a single interface that precisely composes logical infrastructures at near-instant speeds; and demonstrates template-driven, frictionless operations, and
- **Unified API access**, which enables simple line-of-code programming of every infrastructure element; easily automates IT operational processes; and effortlessly automates applications through infrastructure deployment.

Fluid pools of resources
HPE Synergy Composer eliminates complexity and empowers IT to orchestrate a single infrastructure of compute, storage, and fabric pools with a single interface to assemble and re-assemble resources into any configuration. By delivering flexible pools of compute, storage, and fabric in a single infrastructure, all the resources needed to run an application are instantly available.

Additional capacity self-assimilates into larger flexible pools, which makes scaling simple and automated. Hardware and operational complexity does not increase with growth, ensuring IT can achieve economies of scale and efficiency.

Software-defined intelligence
HPE Synergy Composer delivers software-defined intelligence for IT to quickly and confidently make frictionless changes to the infrastructure. Templates define how the infrastructure needs to be configured, and the infrastructure's software-defined intelligence implements the needed changes programmatically without human intervention. This dramatically reduces operational complexity and cost while increasing service availability.

Software-defined intelligence is a paradigm shift in how infrastructure is managed. HPE Composer can automatically implement change operations via a template using a single interface to significantly reduce manual interactions and human errors. This empowers IT to configure development, test, and production environments with precision, accuracy, and speed.

Unified API
The Unified API in HPE Synergy Composer delivers automation by providing a single interface to discover, search, inventory, configure, provision, update, and diagnose the composable infrastructure in a heterogeneous environment. This aggregates and hosts internal IT infrastructure to present physical resources like virtual and public cloud resources.

Traditional environments can automate their operational processes and design their workflow around enterprise needs. Developers can also programmatically control the infrastructure to create a hyper-connected data center. DevOps tools can provision instantly and programmatically, without needing a detailed understanding of the underlying physical elements. The Unified API, which is also native to HPE OneView, is a fully programmable interface which will integrate into popular management tools such as Microsoft SystemsCenter® and VMWare vCenter® and into open source automation and DevOps tools such as Chef, Docker®, Puppet, Mesosphere, and OpenStack.

NOTE: HPE Synergy Composer manages Composable Infrastructure (CI) and delivers "infrastructure-as-code".

Overview

What's New

HPE Synergy Composer, powered by HPE OneView, manages the Composable Infrastructure of HPE Synergy.

Enhanced capability is provided in this version of Synergy Composer for:

- Security with support for:
  - Scope-Based Access Control (SBAC),
  - 2-factor authentication,
  - Certificate management, and
  - SNMPv3 and Secure boot;
- Integrated remote support for Synergy interconnect modules (ICMs);
- Synergy Virtual Connect with additional functionality in areas of:
  - LACP on s-channels/downlinks,
  - Mixed-speed Master/Satellite interconnect modules,
  - SmartLink and non-Redundant configurations,
  - Pause flood protection and Storm control
  - Private network support
  - Increase in VLAN scale for network sets, and
  - 16Gb Virtual Connect – FC interconnect module port trunking;
- Orchestrated firmware updates for interconnect modules (A-side/B-side) with no application downtime, auto-staging the firmware & drivers on the compute nodes; and
- Software-defined storage support for HPE 3PAR Direct Attach (FlatSAN):
  - Data path configuration load balancing, and
  - Volume template integration with Server Profiles & Templates.

Standard Features

HPE Synergy Composer is the primary appliance for managing Synergy systems. This hardware appliance is powered by HPE OneView and is designed with hardware failover -- allowing a redundant Composer appliance to take over control and keep your critical infrastructure up and running.

Infrastructure as Code

HPE Synergy Composer manages Composable Infrastructure with software-defined intelligence to present an 'infrastructure as code' view of fluid resource pools to developers and users.

HPE Synergy Composer provides native infrastructure management for assembling and re-assembling fluid pools of compute, storage, and fabric resources to meet any workload. Detailed configuration information can be saved as templates and then re-applied, enabling the physical infrastructure to be managed like software. 'Infrastructure as code' provides on-demand delivery and support of applications and services with consistent governance, compliance, and integration.

This represents a paradigm shift in managing infrastructure. Software-defined architecture auto-discovers and self-assimilates all HPE Synergy resources for immediate use with template-driven operations. This intelligence increases the speed, efficiency, and reliability of operations.

Composer deploys, monitors, and updates the infrastructure from one interface and one Unified API, which is also native to HPE OneView. IT groups can deploy infrastructure for traditional, virtualized, and cloud environments. And resources can be updated, flexed, and redeployed in a frictionless manner without service interruptions.

High Availability Lifecycle Management

HPE Synergy Composer is the management heart of HPE Synergy. It is the management appliance that provisions, monitors, updates, and repairs your composable infrastructure. HPE Composer provides management of the HPE Synergy 'ready-to-run' infrastructure with embedded licensing so that licensing concerns are invisible to you as a user.

High availability management

The HPE Synergy management infrastructure is designed for high availability (HA) operation. Redundancy is designed into all aspects of the management system. For example, pairs of HPE Composer appliances provide failover (active-standby) for enterprise high availability. Also, Frame Link Modules define the multi-frame management ring and are redundantly implemented for HA operation.

Security

The HPE Synergy management platform provides a holistic basis for security:

- Separation of the data and management (or 'control') planes provides maximum control.
- User identifications and authorizations comply with the best known security practices, and utilize role-based access control.
- Single-sign-on (SSO) to iLO is supported and tracked via audit logs.
- Provisioning control assures standardization in mass deployments.
- Management appliances are security-hardened and have encryption of critical data.
- Backup and Recovery for the management appliance is handled in a secure manner.

Separation of Data and Management planes provides optimal bandwidth to maintain control at all times without oversubscription issues. A dedicated management plane also helps prevent malicious takeovers in Denial of Service (DoS) attacks.

Industry-standard enterprise Directory Services are utilized to confirm user identification and to control access to compute resources. This allows one administrator to quickly set up authentication and authorization for each user, as appropriate to their responsibilities and organizational associations, for specific categories of compute resources. Role-based access control (RBAC) restricts system access to authorized users. A separate role for server firmware operators is provided for profile management and basic break-fix operations.

Standard Features

Single-sign-on (SSO) to iLO is provided in HPE Composer. All user actions are logged in an audit log. Options for LDAP/AD-based directory services authentication and authorization are also supported.

Provisioning control is provided for general deployment and provisioning use in HPE Synergy. Both general provisioning and HPE Image Streamer avoid use of PXE Boot with its known security issues.

Management appliances are security-hardened with limited open ports, limited access to the command prompt, and a restricted "kiosk" graphical user interface (which prevents access to the underlying operating system and other software). Sensitive data on the appliance is encrypted and data downloaded from the appliance is encrypted by default (e.g. support dumps, backup files).

Management appliance backup
Appliance backups for HPE Composer provide both automated and scheduled 'push' backups. The user supplies access to a backup repository system, and the backup is 'pushed' to that location at regular intervals. Remote locations and a regular schedule for backups can be specified. Backup processes also utilize a specific user role which does not permit access to other resource views and tasks. Backup files are also encrypted and contain configuration settings and management data, which avoids the need to create separate backup files for the appliance and its database files. Backups can be created while the management appliance is online, and the backup process can be scheduled from outside the management appliance with file collection set according to your site's policies.

Health and maintenance
HPE Composer provides a streamlined, modern alert management architecture that simplifies monitoring. When managed resources are added to the appliance, they are automatically discovered, inventoried, and set up for monitoring, including the automatic registration of SNMP traps and scheduling of health data collection. HPE Synergy compute modules are monitored immediately without requiring additional configuration or discovery steps.

All monitoring and management of data center devices is agentless and out-of-band for increased security and reliability. No OS software is required, no open SNMP ports on the host OS are required, and zero downtime updates can be performed for these embedded agents. HPE Composer also provides proactive alert notifications via email. Administrators can configure alert filters and email identifications to match new alerts to filter criteria and then send an email to the identified contact. You can also view all alerts, filter your alerts, and search your alerts using HPE Smart Search. Alerts can be assigned to specific users and annotated with notes from administrators. Notifications or traps can be automatically forwarded to enterprise monitoring consoles or to centralized SNMP trap collectors.

Self-diagnostic capabilities allow HPE Synergy Composer to be aware if a hardware component is misconfigured or failing. The Synergy management infrastructure itself knows what has failed. For example, if a module is not properly seated or a component fails, HPE Synergy acknowledges the event and notifies administrators.

Customized dashboard capabilities also allow you to select and display important inventory, health, or configuration information. This can also be used to define custom queries for new dashboard displays. Additional views of firmware revisions and of hardware inventory (servers, storage, and networks) are available in the user interface. Visibility into other data and inventory elements is always available through the user interface and Unified REST API -- info that can also be found using HPE Smart Search.

Auto-discovery and Self-assimilation

HPE Synergy provides automated discovery of physical resources. Everything in the management network is automatically discovered upon insertion or upon being linked into the network fabric. All linked frames in a domain are automatically discovered, resources are created for them in HPE Composer, and they are put into a monitored state. New resources are self-assimilated into the managed environment. Specific capabilities include:

- Discovery and inventory of each linked frame and its components that are connected on that same frame with the HPE Composer (including Frame Link Modules, compute modules, fans, power supplies) without the user having to supply any IP or toe-tag information,

Standard Features

- Discovery of each interconnect from the Field Replaceable Unit (FRU) with its device data (Serial number, DNS name, Base Mgmt MAC address, Base WWN),
- Automatic placement of discovered frames into a 'monitored' state,
- Resilience to add frames or remove frames (for example, if link cables are disconnected),
- Issuance of alerts for configured frames that are 'missing' from communications, and
- Detection of errors and diagnostic information about error conditions.

HPE Synergy setup is simplified by providing a guided installation experience, which steps the user through the process. HPE Synergy also incorporates an installation technician mode for faster and easier setups. This mode allows setup technicians to verify that hardware is correctly installed and is free of configuration errors -- before the systems are handed over to the infrastructure administrator for configuration. This mode enables setup technicians to perform all their typical tasks:

- Racking and cabling the frames and supplied power,
- Viewing the hardware inventory and health status,
- Viewing newly-added frames in HPE OneView as soon as the new frame is installed, powered on, and link cables are correctly in place, and
- Troubleshooting of any hardware faults.

Technicians can perform all their necessary installation tasks without being given unlimited administrative access to the systems.

Self-Assimilating Systems
Software-defined infrastructure assembles and re-assembles resources to eliminate complexity and to orchestrate fluid pools of resources. Templates capture best practices and efficiently use resources, including creation of logical infrastructures to provision at near-instant speeds and meet application needs. Self-assimilation of additional capacity into larger flexible pools, which reduces operational complexity as hardware grows, results in simple and automated scaling to achieve economies of scale and efficiency.

The result is that HPE Synergy systems are easy to set-up and bring-under management!

Compute Management

The HPE Synergy 12000 Frame is the foundation of HPE Synergy solution. It is designed to run today's compute and data-intensive applications and next-generation mobile-first, cloud-native applications.

HPE Synergy Frame combines compute, storage, and fabric in a single physical intelligent infrastructure which uses HPE Synergy Composer to flexibly compose those resources. The Synergy Frame easily scales by linking into larger groups (or domains) of frames to form a dedicated management network, and it is also designed to accept multiple generations of compute, storage, fabric, and management modules.

Composable compute resources of two-socket and four-socket compute modules plug into the Synergy Frame to provide the performance, scalability, density optimization, storage simplicity, and configuration flexibility to power a variety of workloads. Compute modules give flexibility in processor choices, storage options, and simplified I/O to power demanding workloads and to increase virtual machine density.

The HPE Synergy Composer consolidates management of the entire system domain (HPE Synergy Frames, HPE Synergy Compute modules, HPE Synergy Storage modules, HPE Image Streamer, and HPE Fabric modules). The composable frame contains everything needed to run applications, so IT can be quickly set up and consumed. Auto-discovery and self-assimilation lets this ready-to-run frame scale quickly to the rack- and row-level to meet your IT demands. Powerful templates allow frictionless changes to be implemented automatically, significantly reducing manual interactions and errors. And simplified lifecycle operations ensure real-time compliance with less effort. The HPE Synergy architecture lets IT quickly and accurately configure the entire infrastructure in one step, using one interface.

Powerful templates
HPE Synergy Composer templates are the most powerful in the industry -- covering compute, storage, and fabrics. These powerful templates define how the HPE Synergy infrastructure needs to be configured, and then

Standard Features

the infrastructure's software-defined intelligence implements the needed changes programmatically without human intervention. This significantly reduces operational complexity and cost, while increasing service availability. Detailed configuration information (such as BIOS, firmware, boot order, RAID, and storage configs) can be saved as templates and then re-applied, enabling the physical infrastructure to be managed like software ("infrastructure as code").

In traditional enterprise IT environments, infrastructure is managed one functional area at a time. Every device (whether it's servers, storage, or networking) is associated with a specific manager. If templates are used to configure those devices, the templates are associated with a specific hardware device and IT teams must configure each device. Provisioning an application across these multiple devices involves a complex process of configuring a variety of different products with different tools. This is a time consuming and costly undertaking which is also error prone because of the complexity.

In contrast, HPE Synergy templates bring intelligence into the infrastructure with a single interface that allows end-to-end control of the entire infrastructure. These built-in workload templates allow users to provision, configure, and update infrastructure according to the needs of the workload rather than the needs of a particular device. HPE Synergy Composer, powered by HPE OneView, provisions workloads with a template that describes the workload. The template-based approach can be used to automatically provision multiple compute nodes without additional manual operations. These templates provide significant "infrastructure as code" capabilities that speed provisioning and accelerate your time-to-service.

Templates in HPE Composer also provide "monitor, flag, and remediate" capabilities which can be used to enforce configuration compliance in server profiles. Multiple profiles created from a single template can be monitored for configuration compliance. When inconsistencies are detected, an alert is generated to indicate that the offending profile is out-of-compliance with its template and that it needs remediation. Likewise, when updates are made at the template level, all profiles derived from that template are flagged as inconsistent and as needing remediation. The user then has complete control over the remediation process to bring individual modules or multiple systems back into compliance. Template operations can also be used from the graphical user interface or from the Unified API using PowerShell or Python scripts.

Frictionless updates

Frictionless updates let you orchestrate firmware updates without impacting operations. Infrastructure changes in HPE Synergy (like firmware updates for both fabric interconnects and compute) can be implemented automatically through template-based operations to reduce downtime, manual operations, and errors. Hewlett Packard Enterprise aids the frictionless updates by providing a single firmware/driver set (Service Pack for ProLiant, or SPP), in which all the firmware and system software are tested together as a single solution stack. And all firmware update operations in HPE Composer will not impact your production network because they are performed entirely via the management network – which is a separate network.

Templates are a powerful way to update and maintain your existing infrastructure. Templates have a "one-to-many" model with inheritance properties which associate settings from a single template with multiple server profiles. A single template change can update multiple server profiles. HPE Composer then allows you to choose how you perform firmware and OS driver updates for composable compute in HPE Synergy. Application owners can apply updates instantly (on-demand) or they can stage updates to automatically take effect at a later time. This allows administrators to control when applications or servers are taken offline in order to target updates to different maintenance windows. Coordinating all these maintenance windows can be extremely difficult, and the staged update process provides flexibility. The updated firmware is copied to the compute modules, where it is stored until a convenient maintenance window is identified and at which time the update is applied. Firmware deployments can also be scheduled from the server profile with automated reboots.

An optional automated process allows users to perform an orchestrated (rolling) update throughout the entire managed environment without disrupting any applications. The software-defined intelligence of 'logical enclosures' enables multi-frame firmware updates across many diverse components: Frame Link Manager and components, logical interconnects, and server profiles. These update processes include automated dashboard-based compliance reporting. And HPE Synergy Composer also allows use of the high-level Unified API to automate these update tasks.

Standard Features

Storage Management

HPE Synergy architecture employs a variety of internal and external storage options to provide fluid pools of resources for any workload, from traditional applications to cloud-native applications. HPE Synergy Composer enables local and zoned direct attach storage (DAS), software-defined storage (SDS) solutions which feature HPE StoreVirtual virtual storage array (VSA) software, and system-defined tier-1 flash HPE 3PAR StoreServ storage area network (SAN) solutions. Third party SDS and SAN solutions will also be supported on Synergy, but without full system composability.

Software-defined intelligence integrates storage options with server profiles to save you time and make you more productive. This software-defined nature in HPE Composer enables you to:

- Attach storage to server profiles,
- View and manage your storage system and storage pools,
- Provision various types of SAN volumes from HPE 3PAR including thinly provisioned de-duplication volumes and snapshot volumes,
- Provision iSCSI volumes from StoreVirtual VSAs, and
- Create volume templates to provision multiple volumes with the same configuration.

Server profile templates can also specify which server profile should boot from DAS, iSCSI, or Fibre Channel volumes. Resulting server profiles generated from the template will indicate which volume is the boot target, and compliance checks are included.

Direct attached storage (DAS) – local and zoned

Local direct attached storage (DAS) is managed by a Smart Array controller . Each compute module that is to be connected to the storage module over the SAS fabric is required to have one Smart Array controller (P542D or P416ie-m) in the Mezzanine #1 slot. Drives are then zoned to a server profile, including boot volumes.

Zoned direct attached storage (DAS) utilizes the HPE D3940 Storage Module. This double-wide module fits within the HPE Synergy frame to provide pooled storage for composable infrastructure. The HPE D3940 Storage Module also provides large storage capacities. Each storage module has 40 drives (up to 153TB for SSD or 80TB for HDD), and HPE Synergy Composer can zone up to 71 storage drives to any P542D controller (Gen9 only) or up to 200 drives to a P416ie-m controller (Gen10 only) to any compute module in the same frame. For DAS-centric workloads, the non-blocking SAS fabric allows full utilization of flash storage performance for local applications.

Software-defined storage (SDS) – StoreVirtual VSA

HPE StoreVirtual VSA is a software-defined storage solution that virtualizes underlying hardware to create scale-out cluster of shared capacity with enterprise storage features and simple management. This software product option allows you to take advantage of automated sub-LUN tiering for performance on a highly-dense, scalable storage platforms while maintaining the flexibility required for VMs and virtual desktop infrastructure (VDI) solutions.

The scale-out storage architecture of HPE StoreVirtual VSA on HPE Synergy allows the consolidation of DAS resources from multiple frames into a single pool of shared storage. All available capacity and performance is aggregated and accessible to every volume in the cluster. Multiple HPE StoreVirtual VSAs running on multiple compute modules with zoned DAS attached can create a clustered pool of storage with highly-available data volumes protected using network RAID. Adding more StoreVirtual VSAs to the cluster grows the storage pool. SDS volumes created using the native HPE StoreVirtual interface can be exported to the managed iSCSI initiator and then utilized with the iSCSI initiator automation to connect hosts to shared pools of storage. See **HPE StoreVirtual VSA** for more information.

External Arrays connected via Storage area networks (SAN) – 3PAR Storage Systems

HPE 3PAR Storage is part of the overall HPE Composable Storage family. HPE Composer provides software-defined intelligence for HPE 3PAR Storage Systems to be provisioned, grown, and recycled on-demand for use in compute composition, as defined by profiles and templates. Frictionless changes are implemented quickly using template-based operations. HPE Composer enables 3PAR storage resources to be aggregated and

Standard Features

disaggregated in a fluid manner, and with flexible ratios. HPE 3PAR storage is managed with software-defined intelligence through HPE Synergy Composer to deliver assured service-levels for traditional uses, virtualization, and IT-as-a-Service.

A variety of storage area network (SAN) topologies are available for use with HPE Synergy. HPE Synergy Composer provides SAN management compatibility with switched fabric, direct attach, and vSAN topologies with dynamic connectivity between HPE Synergy systems and HPE 3PAR StoreServ Storage Systems. HPE Composer discovers the SAN paths and provides connectivity services for the following types of Fibre Channel (FC), Fibre Channel-over-Ethernet (FCoE), and mixed FC/FCoE SAN infrastructures:

- SANs managed through the HPE B-Series SAN Network Advisor software (connected to an HPE B-series FC SAN configuration),
- SANs managed through Brocade Network Advisor (BNA) software (connected to a Brocade FC SAN configuration), and
- Managed directly through a switch in the SAN (connected to HPE 5900 family FC and FCoE SAN configurations).

HPE Synergy allows you to bring a SAN Manager, and the SAN infrastructure associated with that SAN Manager, under management of the HPE Synergy Composer. HPE Synergy Composer can discover SAN-connected servers and HPE 3PAR Storage Systems. You can then attach server profiles to SAN volumes on that 3PAR storage system through existing SAN connections or through the automated SAN zoning services of HPE Synergy Composer. HPE Composer can also automatically configure SAN zoning through server profile volume attachments.

Boot-from-SAN
HPE Composer allows users to select a managed volume as the boot target using a simplified server profile boot configuration. This action enables the software-defined intelligence in HPE OneView to internally perform the “cut and paste” functions. The user configures the connections as bootable, and then selects a managed volume from which to boot. Boot-from-SAN capabilities are available for HPE StoreServ (FC/FCoE) volumes and HPE StoreVirtual (iSCSI) volumes on HPE Synergy with HPE Virtual Connect.

Storage monitoring, connectivity, and synchronization
HPE Composer monitors storage systems and issues alerts when there is a change in health or connectivity status of storage systems. Storage systems are also monitored to ensure that they are synchronized with changes to hardware and configuration settings. Should the appliance lose connectivity with a storage system, an alert is displayed until connectivity is restored. Logical disks are also available for viewing in Map View.

See the **HPE Synergy Support Matrix** for supported storage systems.

Fabric Management

HPE Synergy simplifies next-generation fabric management with software-defined intelligence. Software-defined intelligence (such as groups, and sets) allows HPE Synergy Composer to enhance fabric management, capture best practices, and extend Virtual Connect features.

The HPE Synergy architecture includes three fabric interconnect types:

- HPE Virtual Connect interconnects,
- Switches, and
- Pass thru interconnects.

Virtual Connect interconnects are managed through the HPE Synergy Composer. Switches and Pass thru interconnects can be managed through a command-line interface (CLI), and switches can be monitored with the HPE Intelligent Management Center (IMC).

Virtual Connect
HPE Virtual Connect provides wire-once, edge-safe, change-ready environment to make it easy for administrators to manage their dynamic network environment at the server edge. HPE Synergy Composer manages Virtual Connect to deliver simple, composable bandwidth resources with no fixed ratios using a high

Standard Features

performance, cost-effective architecture.

HPE Synergy Composable Fabrics enhance the familiar Virtual Connect 'wire-once' experience with:

- Flexible bandwidth pools,
- Fabric disaggregation,
- Frictionless scaling,
- Frictionless updates,
- Multi-module link aggregation (MLAG), and
- Software-defined intelligence.

Flexible bandwidth pools

Flexible bandwidth pools are enabled by using a single very-large switching fabric with special cables and interconnect modules to reach compute modules in additional frames. Single bandwidth pools will enjoy flexible subscription ratios, low-cost scaling by adding Interconnect Link Modules, and enhanced firmware upgrade experiences. Single-hop east-west switching for both intra-frame and inter-frame configurations will see negligible latency with Interconnect Link Modules, and will also see reduced ToR switch port consumptions.

Fabric disaggregation

Fabric disaggregation optimizes resources to workloads. Composable fabrics allow you to disaggregate the pool of network resources and eliminate the constraints imposed by the typical fixed-ratio of interconnects per frame. Composability avoids 'forced ratio constraints' on fabric resources.

Composable fabrics are implemented using a master/satellite architecture which provides:

- 10Gb and 20Gb bandwidth (with larger future bandwidths to compute modules),
- Flexible bandwidth allocation (in 200Mb increments on 20Gb network interface cards),
- Lower fabric hardware costs (of 40% or more), and
- Ethernet, Fibre Channel (FC), Fibre Channel over Ethernet (FCoE), and iSCSI capability.

The master/satellite architecture disaggregates and extends the composable fabric from the master interconnect module to satellite frames using HPE Synergy Interconnect Link Modules. This eliminates the need for top-of-rack (ToR) switches because additional satellite frames are connected to the master interconnect module instead of to a ToR switch. In the HPE Synergy fabric, all the satellite module ports terminate onto master modules. This differs from typical fabrics where ports are consumed on the ToR switch and where ToR switch ports are connected to an end-of-row (EoR) switch.

Fabric disaggregation in HPE Synergy can reduce your fabric hardware components (and costs), scale network bandwidth across multiple frames, and simplify networking.

Frictionless scaling

Frictionless scaling composes additional fabric resources on-demand to meet your business needs. When you need to add frames or grow your environment, the unique HPE Synergy scaling makes multi-frame deployment simple. Frictionless scaling does not add hops, and it also reduces the number of required management touch points and management steps.

HPE Synergy Composer uses the software-defined intelligence of 'logical enclosures' to add frames to the master/satellite architecture. This process utilizes hot-pluggable link extensions with the HPE Synergy Interconnect Link Modules to add satellite frames. As HPE Synergy satellite frames are added, they consume ports on the master frames instead of on a top-of-rack (ToR) switch. This approach consumes fewer ports at the data center aggregation layer and simplifies fabric management at scale.

Frictionless updates

The goal of frictionless updates is to seamlessly deliver firmware and driver updates without impacting your operations. Frictionless lifecycle operations need to automatically implement the desired changes without disruptive downtime. Hewlett Packard Enterprise aids your update processes by providing Synergy Software Release Sets, which are firmware and driver combinations that have been developed, tested, and released together as a single solution stack. Synergy Software Release Sets include a custom Synergy version of the SPP.

Standard Features

Frictionless interconnect updates require that only the interconnect components be affected, and not the data path. HPE Synergy interconnect updates have no dependency on the compute module and no dependency on the top-of-rack (ToR) configuration. These HPE Synergy systems are designed with separation between the 'management ASIC' and the 'switching plane' so that the interconnect modules can continue to forward traffic even though the modules are rebooted.

HPE Synergy lets you to confidently perform updates to your interconnects while maintaining data traffic. These frictionless updates help you avoid service interruptions, operational costs, and downtime.

Multi-module link aggregation
Multi-module link aggregation (MLAG) on uplinks provides resiliency against failures. This allows applications to remain online through those failures, even when an end-of-row (EoR) switch or one of the two master interconnect modules is lost. MLAG can also use the fabric architecture to sustain operations in the event of a single-point-of-failure in hyper-virtualized environments. This allows the fabric to withstand a single-point-of-failure in real-time fashion without disruption to hundreds of virtual machines, even though the failure might range from the port-level to the module-level. This appears as one logical switch to the upstream switch and is simple to configure. Furthermore, efficient bandwidth utilization is achieved using Active-Active configurations.

Additional capabilities for managing fabrics in HPE Synergy may provide further productivity and efficiency. These capabilities include: untagged traffic, VLAN tunneling, and configurable Link Aggregation Control Protocol (LACP) timers, min/max bandwidth settings on connections, visibility to MAC address tables, 'per FlexNIC' traffic statistics and performance monitoring, and enhanced detection-protection-reporting of network loops.

Software-defined intelligence
HPE Synergy Composer extends software-defined intelligence to HPE Virtual Connect features to simplify management and to capture best practices.

- Logical Interconnect Groups can configure the Virtual Connect module with its uplinks and satellite modules, creating one 'big' Virtual Connect fabric between multiple frames. These groups enable efficient application to multiple Virtual Connect environments.
- Network Sets can easily update multiple networks in various profiles from a single location, rather than updating each network separately. Network sets are useful in virtual environments where each profile connection needs to access multiple networks.

Software-defined intelligence provides a rich set of interconnect features like easy moves, adds, and changes to HPE OneView-based profiles. These features and flexible connections help to minimize the impact on your existing SAN/LAN infrastructure.

See the **HPE Synergy Configuration and Compatibility Guide** for specific Virtual Connect and network hardware requirements.

Image Streamer

HPE Image Streamer is a new approach to deployment and updates for composable infrastructure. This optional Synergy management appliance works with HPE Composer to provide fast software-defined control over physical compute modules with operating system (OS) provisioning. HPE Image Streamer enables true stateless computing combined with rapid deployment and updates.

HPE Image Streamer provides a highly-available appliance pair that can capture/edit/store images, create stateless boot images, and deploy or update compute modules quickly. Profiles are combined with golden images and personalities for stateless operation. Stateless boot images are stored in an image repository for fast implementation onto compute hardware at any time. These stateless capabilities can be used to rapidly deploy and/or update multiple compute nodes.

True stateless computing combines the following elements using software-defined intelligence:

- Profile – Software-defined intelligence which defines compute modules

Standard Features

- Golden Image – Operating environment (bootable OS and application) and I/O driver version
- Personality – OS and application configuration (hostname, IP config, etc.)

Capabilities in HPE Image Streamer provide:

- Rapid deployments and/or updates to multiple compute nodes
- Software-defined integration of compute module and operating environment into profiles
- IP addresses assigned to Bootable Images for true stateless operation
- Highly-available image archive
- Secure access with rights and privileges from HPE Composer
- Compliance to the latest verified image(s)
- Tools for image capture, editing, and customization/personalization
- Accessibility via GUI and Unified API

HPE Synergy Image Streamer is private-cloud-ready for recent VMware ESXi, Red Hat Enterprise Linux (RHEL) and SuSE Linux (SLES) images. All tools are also provided for you to support your customized operating environment and images. HPE Image Streamer will greatly benefit IT areas needing fast changeovers, security update compliance, HA image storage, or programmatic access and control over infrastructure.

For more information, see **https://www.hpe.com/us/en/product-catalog/synergy/synergy-management.hits-12.html**.

Reports

Standardized reports are available to users in HPE Synergy Composer. A pre-defined list of reports is available from the user interface or through the REST API. These reports can be exported to CSV or Microsoft Excel files or printed as PDF files. Pre-defined reports include:

- Alerts Report
- Users Report
- Server Inventory
- Server Firmware Inventory
- Server Profiles Inventory
- Enclosure Bay Inventory
- Enclosure Inventory
- Interconnect Inventory

Reports are based on inventory, configuration, and health status information. Additional data and information can be obtained for custom reporting by querying the REST API.

Remote Management (iLO Advanced)

HPE Synergy Composer enables **iLO Advanced**, a comprehensive lights-out remote management solution. Numerous key features help to solve complex IT problems.

- Remote access to compute module power control and event logs.
- Graphical Remote Console turns a supported browser into a virtual desktop, giving the user full control over the display, keyboard, and mouse of the host node. The OS-independent console displays remote host node activities (like shutdown/startup operations) and can be launched from the HPE Composer Server profile page.
- Shared console and Console replay allows up to six team members to view and share control of a single virtual KVM session, while capturing and saving screen video for later review.
- USB-based Virtual Media allows an IT administrator to boot the remote node from the client machine (or anywhere on the client's network), and execute functions remotely.
- Integration with Microsoft Terminal Services provides a graphical remote console when the OS is fully-loaded/available on the host system -- and a secure, hardware-based Lights-Out console for remote access to the host server when the OS is not operational.
- Serial record and play back saves the text-based output data for later access and play back. Remote system logs record everything being done for later troubleshooting or records.

Environmental

HPE Synergy Composer provides you with a power and energy monitoring that scales with your datacenter.

Standard Features

Management

Centralized monitoring of datacenter power consumption and thermal output is complemented with energy instrumentation connected into HPE iLO capabilities, allowing compatibility with any operating system residing on the managed compute module.

Composer integrates thermal data visualization and power delivery infrastructure representation for environmental management of the data center. These key areas are captured in the following environmental management features:

- 3D data center thermal mapping allows you to view the thermal status of your entire data center at a glance. Thermal data is collected from the managed resources in each data center rack and is presented graphically, allowing easy identification of hot spots in a particular rack.
- Power Discovery Services enable automatic discovery and visualization of power delivery topology for your data center. HPE Intelligent Power Distribution Units (iPDUs) in the rack with the intelligent Titanium power supplies of the Synergy frame enable automatic rack power topology mapping, which can also automatically detect wiring errors (like lack of redundancy) and can automatically update electrical inventory when new servers are installed. Per-outlet power control for remote power cycling of each iPDU outlet is also supported.
- Utilization dashboards display key CPU/power/thermal information for the selected compute module, frame, or iPDU. Historical utilization graphs provide up to three years of data (depending on storage limitations) help identify and improve power utilization.
- Visualization of CPU, power, and thermal data for compute modules may be viewed and managed.

The environmental management in HPE Synergy Composer can help you save on your operating expenses (OpEx), and it can even extend data center capacity to avoid additional capital expenses (CapEx). It provides performance when you need it, and cost savings when you don't.

Remote Support

Unlock the benefits of your HPE Synergy technology investment by connecting to Hewlett Packard Enterprise for remote support. Achieve up to 77% reduction in down time, near 100% diagnostic accuracy and a single consolidated view of your environment in the HPE Support Center portal. By connecting, you will experience 24x7 monitoring, automatic support case creation, and automatic parts dispatch. Customers of HPE Proactive Care service and HPE Datacenter Care will additionally benefit from proactive reports and issue prevention activities.

These benefits are available to you at no additional cost with your HPE Synergy frames and compute modules securely connected to Hewlett Packard Enterprise support:

- Enable remote support via 'Settings' in the HPE OneView interface,
- Support HPE Synergy 12000 frames and HPE Synergy compute modules,
- Check a single box to enable remote support for all eligible devices,
- Quickly register your datacenter contacts and designated service or reseller partners,
- Quickly generate service alerts,
- Display contract and warranty data on server pages,
- Automatically trigger creation of a support case with display of the case ID from service events associated with hardware failures,
- Sign in to Hewlett Packard Enterprise Support Center to view case details, contract and warranty details, and a dashboard of all your connected devices, and
- Display a single consolidated view of devices connected via Insight Remote Support in the HPE Support Center along with your HPE OneView remote support connected devices.

HPE Synergy Composer provides integrated remote support from the management appliance. It utilizes the agentless remote support that is part of iLO4 and is independent of operating systems.

Unified API for Open Integration

A Unified API enables access to the full power of the management architecture, assuming appropriate permissions, via the REpresentational State Transfer (REST) API and State-Change Message Bus. RESTful APIs are the standard of the modern IT industry because they are widely used, simple, and efficient. You can integrate, automate, and customize HPE Composer to access additional information or to control activities

Standard Features

using the Unified API.

The Unified API, which is also native to HPE OneView, makes 'infrastructure as code' accessible to:

- Create an intelligent automation hub to orchestrate and reduce manual operations,
- Automate standard work flows, troubleshooting steps, and integrations (such as for configuration management databases, also known as CMDB),
- Connect to Service Desks, providing a consistent and reliable representation of the state of infrastructure across multiple tools at any given moments,
- Monitor resources, collect data, map/model systems, and export data to custom formats,
- Attach custom databases, data warehouses, or 3rd party business intelligence tools, or
- Integrate in-house user customizations.

HPE Composer, which embeds HPE OneView, hosts a powerful State-change Message Bus which the REST APIs use to provide automation and a closed-loop method of ensuring compliance. This interface notifies custom scripts and integrations of all changes to managed resources (both logical and physical resources) via asynchronous messaging without having to continuously poll for status. The message bus returns commands in 500 milliseconds to give you fast responses for your custom integration of applications, processes, and devices.

Through HPE OneView, HPE Composer also provides access to an embedded RabbitMQ, a highly-scalable and distributed message bus infrastructure. RabbitMQ supports the industry-standard Advanced Message Queuing Protocol (AMQP), and it offers a variety of enterprise-class management features like reliability, high availability, flexible routing, clustering, federation, guaranteed delivery, multiprotocol, and tracing.

Using HPE Unified RESTful APIs, you can obtain certificates to access the two message buses: the State-Change Message Bus or the Metric Streaming Message Bus. The message content is sent in JavaScript Object Notation (JSON) format and includes the resource model.

Software developer kits (SDK) for the REST-based Unified API are available for several languages:

- Python: **https://github.com/HewlettPackard/python-hpOneView**
- PowerShell**: https://github.com/HewlettPackard/POSH-HPOneView**
- Java: **https://github.com/HewlettPackard/oneview-sdk-java**
- Ruby: **https://github.com/HewlettPackard/oneview-sdk-ruby**

Other documents to assist your custom integrations using the REST APIs can be found at:

- **HPE OneView technical documentation**
- Integration with HPE OneView: A technical guide for ISVs and developers **https://www.hpe.com/h20195/v2/GetDocument.aspx?docname=4AA5-8669ENW**
- **HPE OneView 3.0 REST API Scripting Help for HPE Synergy**
- **HPE OneView 3.0 Help and REST API Scripting Help for HPE Synergy (download)**
- **HPE OneView Community forum**

Integration for VMware vCenter

'HPE OneView for VMware vCenter' supports HPE Synergy Gen10, Synergy Composer, HPE Storage products (like 3PAR StoreServ, MSA, StoreVirtual), and Synergy Image Streamer. It seamlessly integrating the manageability features of HPE Synergy into the VMware vCenter Server console, and enabling administrators to gain insight and control of the HPE infrastructure that supports their virtualized infrastructure.

Capabilities with Synergy Image Streamer include editing cluster enhancements, which allows you to perform ESXi OS patch updates to all cluster hosts in a rotating, non-disruptive (to the VMs) manner, while also automatically handling maintenance mode, vMotion, updates, reboots – one host at a time.

This integration reduces the time it takes to make important change decisions, manage planned and unplanned downtime and do lifecycle management.

Standard Features

Integration for Microsoft System Center

'HPE OneView for Microsoft System Center' integrates with HPE Synergy Gen10 and Synergy Composer to provide comprehensive system health and alerting, driver and firmware updates, OS deployment, detailed inventory, storage and VM management, and HPE fabric visualization.

- Health monitoring and alerting for Synergy frames, compute modules, storage modules, and interconnects via the HPE OneView Management Pack for SCOM
- Fabric visualization and automated Hyper-V deployment and updates (using Synergy Composer Server Profile Templates) via the HPE Fabric Management Add-in for SCVMM
- Compute module firmware and Windows driver updates via the HPE ProLiant Updates Catalog for SCCM and SCVMM

Software Release Sets (with Synergy subsets of the SPP)

HPE Synergy Software Release Sets allow users to perform firmware, driver, and related software updates. Software Release Sets include download files to allow component updates for the Synergy subset of the SPP (delivered as a custom download), HPE Synergy Composer, HPE Synergy Image Streamer, and other switches that are not managed by Composer. Combinations within a specific release set are developed and released together. External repositories are also supported for use with HPE Synergy Service Pack releases.

- Overview of HPE Synergy Software Release Sets: **http://www.hpe.com/downloads/synergy**

Developers Hub, and Reference Architectures

HPE Synergy can be easily integrated with common applications in order to automate, orchestrate, and customize its use in IT environments. The Composable Infrastructure Developers Hub provides a wealth of resources, including partner applications and reference architectures.

- Composable Infrastructure Developers Hub: **http://www.hpe.com/info/composablepartners**

Service and Support

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
Hewlett Packard Enterprise 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. HPE 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.

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-

Service and Support

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.
https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA5-3259ENW.pdf

Standard Support

HPE Proactive Care - 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.
https://www.hpe.com/h20195/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 Factory Express Initial Frame Service for Synergy
Factory Express allows a customers' configurations to be pre-configured in the HPE Integration center with an implementation project manager to manage the deployment end to end. The project manager will act as a single point of contact to coordinate the build, delivery and onsite installation and commissioning of the solution. In addition to the configuration and deployment activities, your HPE Synergy configuration goes through comprehensive testing and a detailed documentation package on the configuration and settings of the delivered solution will be provided.

HPE Factory Express Synergy Additional Frame Service for Synergy
Add additional frames to your HPE Synergy Factory Express 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 Hewlett Packard Enterprise-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

More information on HPE services can be found at **http://www.hpe.com/services.**

Models

HPE Synergy Composer	**HPE Synergy Composer with embedded HPE OneView and iLO Advanced**	
	NOTE: HIGHLY RECOMMENDED that a second HPE Synergy Composer appliance module be added for high availability or redundancy. **NOTE:** No direct license is required. Supports any HPE Synergy Compute module and other installed module options. **NOTE:** Server provisioning (via 'HPE Insight Control server provisioning') is licensed for use with HPE Synergy Composer. It provides multi-server OS and driver provisioning. Media kit #BD883A can be ordered for a physical software copy (USB flash drive).	
	HPE Synergy Composer	804353-B21
	NOTE: Single unit; 2 units per solution required for a redundant pair	
	HPE Synergy TAA-compliant Composer	804353-B22
	NOTE: Single unit; 2 units per solution required for a redundant pair	
	NOTE: HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.	
HPE Image Streamer	**HPE Synergy Image Streamer is an optional management appliance for use with HPE Composer.**	
	REQUIREMENT: HPE Synergy Image Streamer units are always implemented as redundant pairs in different frames for use in Production environments. **CAUTION:** Single-frame configurations may be used in Development and Proof of Concept (POC) environments, but are not supported for use in Production environments. **NOTE:** No direct license is required. Supports any HPE Synergy Compute module and other installed module options. REQUIREMENT: HPE Synergy Image Streamer use in Production environments requires a minimum of three (3) Synergy Frames with two (2) HPE Image Streamers and two (2) HPE Composers. This minimal system also requires two (2) Interconnect Modules, two (2) transceivers, and four (4) cables for operation. For details, see products below and the Setup and Installation Guides.	
	HPE Synergy Image Streamer	804937-B21
	NOTE: Single unit; 2 units per solution required for a redundant pair	
	HPE Synergy TAA-compliant Image Streamer	804937-B22
	NOTE: Single unit; 2 units per solution required for a redundant pair	
	NOTE: HPE offers multiple Trade Agreement Act (TAA) compliant configurations to meet the needs of US Federal Government customers. These products are either manufactured or substantially transformed in a designated country.	
	Interconnect Modules	
	HPE Virtual Connect SE 40Gb F8 Module for Synergy	794502-B23
	NOTE: Single module; 2 modules per solution required for a redundant pair. **NOTE:** The following products are used for connecting to this Interconnect Module.	
	Connectors	
	HPE BladeSystem c-Class QSFP+ to SFP+ Adapter	720193-B21
	HPE 10GBase-T SFP+ Transceiver	813874-B21
	NOTE: Four (4) of each are required for redundant connection to the above Interconnect Modules.	

Models

HPE Synergy Dual 10GBASE-T QSFP+ 30m RJ45 Transceiver **NOTE:** Two (2) transceivers required for redundant connection to the above Interconnect Modules.	838327-B21

HPE CAT6A Cables

HPE Synergy Frame Link Module CAT6A 1.2m Cable	861412-B21
HPE FLM CAT6A 10ft cable	816413-B21
HPE FLM CAT6A 21ft cable	816414-B21

NOTE: Four (4) CAT6A cables are required for the HPE Synergy Image Streamer connection from the Frame Link Modules (MGMT port) to the Transceiver plugged into the Interconnect Module.

Software Solutions for HPE Synergy **NOTE:** For partner software integrations and solutions, see **http://www.hpe.com/info/composablepartners**

Related Options

HPE Synergy Services

NOTE: See HPE Support Services Central for additional services at **http://ssc.hpe.com**

HPE Synergy Proactive Care Services

HPE 3 Year Proactive Care 24x7 Synergy Composer Service	H0VV2E
HPE 3 Year Proactive Care 24x7 with DMR Synergy Composer Service	H0VV3E
HPE 3 Year Proactive Care Advanced 24x7 Synergy Composer Service	H0VV5E
HPE 3 Year Proactive Care Advanced 24x7 with DMR Synergy Composer Service	H0VV6E

Deployment/Installation & Start-up Services

HPE Factory Express Synergy Initial Frame Package 4 Service	HA454A1-300
HPE Factory Express Synergy Add-on Frame Package 4 Service	HA454A1-301
HPE Synergy First Frame Startup Service	U8JM3E
HPE Synergy Additional Frame Startup Service	U8JM4E

Technical Specifications

Environmental-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. Products returned to Hewlett Packard Enterprise will be recycled, recovered or disposed of in a responsible manner. For more information, contact your nearest Hewlett Packard Enterprise sales office or visit the **HPE Product Return and Recycling site**. 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. 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
04-Dec-2017	From Version 7 to 8	Changed	Overview, Standard Features, and Service and Support sections were updated.
11-Jul-2017	From Version 6 to 7	Changed	Standard Features and Models sections were updated
12-Jun-2017	From Version 5 to 6	Changed	Overview, Standard Features, Models and Technical Specifications sections were updated.
		Added	SKUs added in Models section: 804353-B21, 804353-B22, 804937-B22, 838327-B21.
16-Dec-2016	From Version 4 to 5	Changed	Overview, Standard Features, Service and Support, Models, and Related Options sections were updated.
		Removed	SKUs in Models sections were deleted: K8G29A, K8G29AAE, M5R19A, M5R19AAE.
18-Nov-2016	From Version 3 to 4	Changed	Models, Related Options and Service and Support sections were updated.
31-Mar-2016	From Version 2 to 3	Changed	Overview, Standard Features, Models, Service and Support, and Related Options sections were updated.
		Added	SKUs added in Models and Related Options sections: 804353-B21, 804937-B21, 779224-B21, 838327-B21, 861413-B21, K8G29A, K8G29AAE, M5R19A, M5R19AAE, H0VV2E, H0VV3E, H0VV5E, H0VV6E, HA454A1-300, HA454A1-301, U8JM3E, U8JM4E.
17-Dec-2015	From Version 1 to 2	Changed	Overview section was updated.
01-Dec-2015	Version 1	Created	New QuickSpecs

c04815139 - 15421 - Worldwide - V8 - 04-December-2017