Overview

HPE Synergy Virtual Connect SE 32Gb FC Module

The HPE Virtual Connect SE 32Gb FC Module for HPE Synergy is a Storage Area Network (SAN) interconnect with a wire-once change-ready technology. The Fibre Channel (FC) module in conjunction with Synergy composer powered by HPE OneView allows workloads to be moved or managed without modifying the network. HPE OneView provides an intuitive management console for seamless connectivity between virtualized Synergy Compute Modules and 32Gb FC SAN fabrics.

For high performance enterprise datacenter environments, the HPE VC SE 32Gb FC module or the alternative, Brocade 32Gb FC SAN Switch Module for HPE Synergy, are the best choices for applications demanding low-latency high I/O performance, i.e. flash storage. The QSFP ports significantly simplify cabling infrastructure, reduce cabling from four to one, and help reduce power attributed to optics transceivers 2.5x.

If deployment costs are a concern, by adopting the Synergy frame and Gen 6 32Gb FC technology, you can reduce costs and simplify connections to SANs, consolidate your network connections and enable administrators to add, replace and recover compute modules resources on-the-fly. The integrated Synergy design frees up rack space, reduces power and cooling requirements.

The HPE Synergy VC SE 32Gb FC Module is protected by HPE Services 3-Years Next Business Day 9x5 Hardware Support.

Figure 1 The HPE Synergy VC SE 32Gb FC Module Front View

1. Q1 QSFP+ ports
2. 1-8 SFP+ ports
3. Q2 QSFP+ ports

Models

HPE Virtual Connect SE 32Gb Fibre Channel Module for Synergy	876529-B21

Supported Products

Compatibility	The HPE Virtual Connect SE 32Gb Fibre Channel Module for Synergy supports the following hardware.
HPE Compute Module	HPE Compute Modules:

HPE Compute Modules:
- HPE Synergy 480 Gen9 Compute Module
- HPE Synergy 620 Gen9 Compute Module
- HPE Synergy 660 Gen9 Compute Module
- HPE Synergy 680 Gen9 Compute Module
- HPE Synergy 480 Gen10 Compute Module
- HPE Synergy 660 Gen10 Compute Module

Fibre Channel Host Bus Adapters (HBA)
- HPE Synergy 3530C 16Gb Fibre Channel Host Bus Adapter
- HPE Synergy 3830C 16Gb Fibre Channel Host Bus Adapter
- HPE Synergy 5830C 32Gb Fibre Channel Host Bus Adapter
- HPE Synergy 5330C 32Gb Fibre Channel Host Bus Adapter

NOTE: Consult individual compute module TechSpecs for specific adapter support

Supported Configurations

HPE Synergy 12000 Frame - Rear View

Mezzanines

Port Mapping	Port mapping differs slightly between full height and half-height compute modules due to the support for additional Mezzanine cards on the full height version.

HPE 12000 Synergy Frame

NOTE: For ease of representation and understanding paired Interconnect Bay (ICB) are shown adjacent rather than vertically as in the real-frame. Interconnect frames are formed between ICB 1 with ICB 4, ICB 2 with ICB 5, and ICB 3 with ICB 6. Hence the below representation.

Supported Products

Interconnect Module Configurations			Compute Module Network Adapters Used	
Frame				
[ICB 1]	HPE VC SE 32Gb	->	HPE VC SE 32Gb	[ICB 4]	HPE Synergy 32Gb HBA
[ICB 2]	Empty/Interconnect	->	Empty/Interconnect	[ICB 5]	Empty/Adapter
[ICB 3]	Empty/Interconnect	->	Empty/Interconnect	[ICB 6]	Empty/Adapter

Interconnect Module Configurations			Compute Module Network Adapters Used	
Frame				
[ICB 1]	Empty/Interconnect	->	Empty/Interconnect	[ICB 4]	Empty/Adapter
[ICB 2]	HPE VC SE 32Gb	->	HPE VC SE 32Gb	[ICB 5]	HPE Synergy 32Gb HBA
[ICB 3]	Empty/Interconnect	->	Empty/Interconnect	[ICB 6]	Empty/Adapter

Interconnect Module Configurations			Compute Module Network Adapters Used	
Frame				
[ICB 1]	HPE VC SE 32Gb	->	HPE VC SE 32Gb	[ICB 4]	HPE Synergy 32Gb HBA
[ICB 2]	HPE VC SE 32Gb	->	HPE VC SE 32Gb	[ICB 5]	HPE Synergy 32Gb HBA
[ICB 3]	Empty/Interconnect	->	Empty/Interconnect	[ICB 6]	Empty/Adapter

NOTE: This configuration is only applicable for single frame, not for multi-frame

Stacking Configuration   Stacking is only supported on Virtual Connect SE 40Gb F8 Modules via Master/Satellite stacking or between two Virtual Connects with M-LAG. The Virtual Connect FC modules don't support stacking.

Standard Features

Product Features   **Performance**
- (12) 8/16/32Gb Auto-negotiating Fibre Channel uplinks connected to external SAN switches
- (12) 32Gb Fibre Channel downlink ports provide maximum HBA performance
- HBA Aggregation on uplinks ports using ANSI T11 standards-based N_Port ID Virtualization (NPIV) technology
- Allows up to 255 virtual machines running on the same physical compute modules to access separate storage resources
- Extremely low latency throughput provides switch-like performance.

Management
- Storage management is no longer constrained to a single physical HBA on a compute module
- Managed with composer based HPE OneView
- Does not add to SAN switch domains or require traditional SAN management
- Appears as a pass-thru device to the SAN Manager

Virtual server profiles
- Provisioned storage resource is associated directly to a specific virtual machine - even if the virtual server is re-allocated within the Synergy Frame
- Ability to pre-configure compute module I/O connections
- Ability to move, add, or change compute modules on the fly
- Once defined, SAN Administrators don't have to be involved in compute modules changes

Related Options

Transceivers	HPE B-series 32Gb SFP28 Short Wave 1-pack Transceiver	P9H32A
	HPE B-series 16Gb SFP+ Short Wave Transceiver	QK724A
	HPE B-series 4x32Gb 1-pack Short Wave QSFP Transceiver	Q2R27A
	HPE B-series 4x16 Short Wave QSFP Transceiver	K2Q87A
Cables	HPE Multi Fiber Push On to 4 x Lucent Connector 5m Cable	K2Q46A
	HPE Multi Fiber Push On to 4 x Lucent Connector 15m Cable	K2Q47A
	HPE Premier Flex MPO/MPO Multi-mode OM4 12 fiber 10m Cable	QK729A
	HPE Premier Flex MPO/MPO Multi-mode OM4 8 fiber 50m Cable	QK731A
	HPE Premier Flex MPO/MPO OM4 100m (12ft) Cable	H6Z30A
	HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 1m Cable	QK732A
	HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 2m Cable	QK733A
	HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 5m Cable	QK734A
	HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 15m Cable	QK735A
	HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 30m Cable	QK736A
	HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 50m Cable	QK737A
	HPE LC to LC Multi-mode OM3 2-Fiber 0.5m 1-Pack Fiber Optic Cable	AJ833A
	HPE LC to LC Multi-mode OM3 2-Fiber 1.0m 1-Pack Fiber Optic Cable	AJ834A
	HPE LC to LC Multi-mode OM3 2-Fiber 2.0m 1-Pack Fiber Optic Cable	AJ835A
	HPE LC to LC Multi-mode OM3 2-Fiber 5.0m 1-Pack Fiber Optic Cable	AJ836A
	HPE LC to LC Multi-mode OM3 2-Fiber 15.0m 1-Pack Fiber Optic Cable	AJ837A
	HPE LC to LC Multi-mode OM3 2-Fiber 30.0m 1-Pack Fiber Optic Cable	AJ838A
	HPE LC to LC Multi-mode OM3 2-Fiber 50.0m 1-Pack Fiber Optic Cable	AJ839A

HPE Synergy Services

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

HPE Synergy Proactive Care Services

HPE 3 Year Proactive Care 24x7 Synergy VC 32Gb FC Module Service	HM7N3E
HPE 3 Year Proactive Care 24x7 with CDMR Synergy VC 32Gb FC Module Service	HM7N4E
HPE 3 Year Proactive Care Advanced 24x7 Synergy VC 32Gb FC Module Service	HM7N5E
HPE 3 Year Proactive Care Advanced 24x7 with CDMR Synergy VC 32Gb FC Module Service	HM7N6E

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

Service and Support

HPE Support Services

Service and Support

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

Choose from services aligned to our product offerings and lifecycle. From proactive onsite services to innovative support when your products are connected to Hewlett Packard Enterprise, 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.

Deploy and integrate

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

Service and Support

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 Synergy First Frame Installation and Startup - Provides for hardware installation (HPE Synergy compute modules, Storage Modules, Virtual Connect modules, Interconnect Link Modules, Fibre Channel 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.

Optimized Support 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.

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 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 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.
https://www.hpe.com/h20195/v2/getpdf.aspx/4aa3-8855enw.pdf

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

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

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

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

HPE Comprehensive Defective Material Retention (CDMR) allows the customer to keep all data retentive components. The customer must also copy the information found on the label of the malfunctioning component and provide it to HPE. The malfunctioning part will then be replaced. The customer will be responsible for destroying and/or permanently removing the device from production.

Service and Support

For more information	Additional Support Services can be found at HPE Support Services Central **http://ssc.hpe.com/portal/site/ssc/**
Warranty	Interconnect Limited Warranty includes 3 year Parts, 3 year Labor, 3-year on-site support. Additional information regarding worldwide limited warranty and technical support is available at: **http://h17007.www1.hpe.com/us/en/enterprise/servers/warranty/**

Technical Specifications

Shipping Dimensions	**Length**	19.45 in (494 mm)
	Width	15.55 in (395 mm)
	Height	5.75 in (154 mm)
Shipping Weight		1.497 kg (3.18 lbs)
Product Specifications Hardware	**Performance**	32 Gb/sec line speed, full duplex Maximum frame size 2148 bytes (2112 byte payload)
	Bandwidth	192Gbps, Full Duplex @ 8-Gbps 384Gbps, Full Duplex @ 16-Gbps 768Gbps, Full Duplex @ 32-Gbps
	Fabric Latency (intra-switch)	700 nSec. Latency increases as input port speed is lower than the output port speed.
	Number of Fibre Channel Ports	16 external 8/16/32-Gbps ports (Max 12 usable) 12 internal 32-Gbps ports
	External Port Type	Configured as Node port s (N_Port), 16Gb, 8Gb or 4Gb auto- negotiating SFP ports
	Internal Port Type	Configured as Fabric port (F_Port), 32Gb
	Classes of Service	Class 2 and Class 3 Fibre Channel services
	Scalability	Does not contribute to the total switch limit. See the SAN Design Guide for latest supported configurations.
	Buffer Credits	8 buffer credits per port, ASIC embedded memory
	Connectors and Cabling	QSFP+ and SFP+ optical hot-pluggable transceiver with LC connector
	Indicators	Port ID Indicator Module Status Indicator Port Link/Activity Indicator Module Locator (UID)

	Dimensions	Width	16.92 in (42.97 cm.)
		Depth	11.05 in (28.07 cm.)
		Height	1.08 in (2.75 cm.)
	Weight	Approx 3.18 lbs – without media	
	Environmental Ranges	Specification **Temperature Range**	10C to 35C (50F to 95F)

Technical Specifications

	Operating	Inlet air temperature up to 43°C (109.4°F) at sea level with an altitude derating of 1.0°C per every 1000 feet of elevation above sea level to a maximum operating altitude. For example, the maximum inlet air temperature requirement at 5000 ft. above Sea level is 38°C.
	Non-operating	-40°C to 70°C (-40° to 158°F). Maximum rate of change is 20°C/Hr (36°F/Hr).
	Relative humidity (noncondensing)	
	Operating	5 to 95% relative humidity, 38.7°C maximum wet bulb temperature, and Non-condensing.
	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).
	Vibration	
	Operating	1 G, 10-500 Hz, 60 minutes per axis
	Non-Operating	9144 m (30,000 ft.). Maximum allowable altitude change rate is 457 m/min (1500 ft. /min).
	Shock	
	Operating	Half-sine-wave shock, 40 G, 2 ms duration, in each direction of three mutually perpendicular axes.
	Non-Operating	Half-sine-wave shock, 140 G, 2 ms duration, in each direction of three mutually perpendicular axes; and square-wave shock up to 80 G, 180 inches/s velocity change, in each direction of three mutually perpendicular axes.
Power Specification	12V @ 4.65A (56 W)	

Product Specifications Software	**Industry Standard NPIV Support**	The Virtual Connect Fibre Channel module works by aggregating multiple FC HBA ports over a single N-port uplink through the use of N_port_ID virtualization (NPIV). NPIV allows multiple distinguishable identities (multiple port WWNs and port IDs) over a single N-port connection. Most Fibre Channel SAN switch vendors have support for NPIV in their latest firmware release. By conforming to the NPIV standard, SAN equipment interoperability simplified. The Virtual Connect Fibre Channel Module Provides basic 4:1, 8:1, or 12:1 NPIV Fibre Channel concentration.
	Data Center Connectivity	Each Virtual Connect Fibre Channel module supports up to 12 SAN fabrics and is typically connected to a Fibre Channel switch that has been configured to run in NPIV

Technical Specifications

mode. The 12 uplink ports are speed selectable from 32, 16, or 8Gb/s.

The setup allows SAN administrators to name the fabric that servers will connect into and set the oversubscription rate. Fibre Channel boot parameters and WWN administration are configurable options that can be integrated into server profiles.

In an NPIV environment, there is an initial brief login function between the Virtual Connect Fibre Channel Module and the data center switch. Once completed, all HBA connections appear as though they are directly connected between the compute modules and the SAN switch. The Virtual Connect Fibre Channel Module appears as a pass-thru device to the SAN, yet cables are reduced as much as 12:1.

Management Features	Simple and intuitive Graphical User Interface (GUI) of composer based HPE OneView for defining, configuring, and managing all elements of the SAN.
	Comprehensive administration, definition, and management of Ethernet Networks, Shared Uplink Sets using VLANs, SAN Fabric management, and Server Profiles Management of user accounts, enclosure, Virtual Connect settings, and firmware updates
	WWN Address Administration allows local administration of predefined WWN addresses ranges to allow pre-provisioning of SAN volumes.

Management and Standards Support	**Standards**	• ANSI T11 N_Port ID Virtualization
		• FC-PH Rev. 4.3
		• FC-PH-2
		• FC-PH-3
		• FC-AL Rev 4.6
		• FC-AL-2 Rev 7.0
		• FC-FLA
		• FC-GS
		• FC-GS-2
		• FC-GS-3
		• FC-FG
		• FC-VI
		• FC Element MIB RFC 2837
		• Fibre Alliance MIB Version 4.0
		• Fibre Channel Management MIB RFC4044

Safety and Compliance	**Safety Certifications**	UL/CUL Recognition to UL/CSA 60950-1
		TUV to EN 60950-1
		CB report and certificate to IEC 60950-1 with all country deviations
		CE Marking

Electromagnetic Emissions Certifications FCC Part 15 Class A	FCC Part 15 Class A
	EN 55022 Class A (CISPR22 Class A)
	VCCI Class A
	AS/NZS 3548 Class A or AS/NZS CISPR22 Class A
	MIC Class A
	CE Marking

Technical Specifications

Environment-friendly Products and Approach - End-of-life Management and Recycling	Hewlett Packard Enterprise offers end-of-life **product return, trade-in, and recycling programs**, in many geographic areas, for our products. 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: These instructions may be used by recyclers and other WEEE treatment facilities as well Hewlett Packard Enterprise OEM customers who integrate and re-sell Hewlett Packard Enterprise equipment.

Summary of Changes

Date	Version History	Action	Description of Change
02-Apr-2019	Version 1	Created	Document Created

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