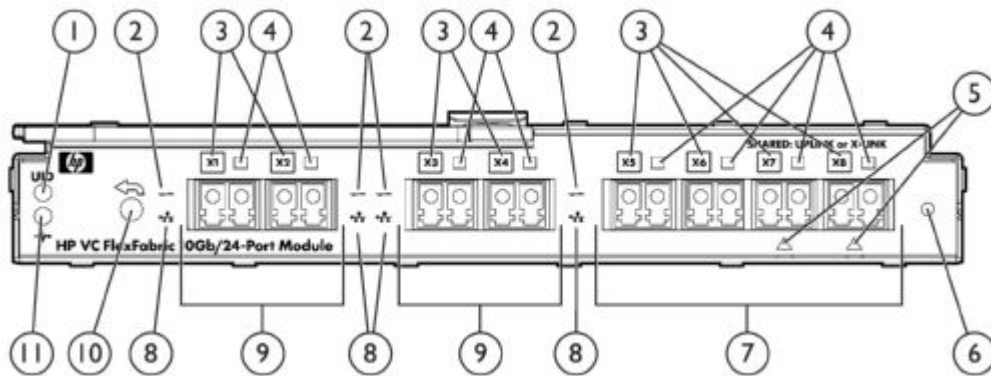


## Overview

HP Virtual Connect FlexFabric 10Gb/24-port Modules are the simplest, most flexible way to connect virtualized server blades to data or storage networks. VC FlexFabric modules eliminate up to 95% of network sprawl at the server edge with one device that converges traffic inside enclosures and directly connects to external LANs and SANs. Using Flex-10 technology with Fibre Channel over Ethernet and accelerated iSCSI, these modules converge traffic over high speed 10Gb connections to servers with HP FlexFabric Adapters (HP NC551i or HP NC551m Dual Port FlexFabric 10Gb Converged Network Adapters or HP NC553i 10Gb 2-port FlexFabric Converged Network Adapter). Each redundant pair of Virtual Connect FlexFabric modules provide 8 adjustable downlink connections ( six Ethernet and two Fibre Channel, or six Ethernet and 2 iSCSI or eight Ethernet) to dual port 10Gb FlexFabric Adapters on servers. Up to eight uplinks are available for connection to upstream Ethernet and Fibre Channel switches. VC FlexFabric modules avoid the confusion of traditional and other converged network solutions by eliminating the need for multiple Ethernet and Fibre Channel switches, extension modules, cables and software licenses. Also, Virtual Connect wire-once connection management is built-in enabling server adds, moves and replacement in minutes instead of days or weeks.



**Figure 1 Virtual Connect FlexFabric Module Front Bezel**

- |   |  |
|---|--|
| 1. Unit Identification Display LED              | 7. 4x 1/10Gb Ethernet (SFP+)                         |
| 2. Backlit Fibre Channel mode indicator         | 8. Backlit Ethernet mode indicator                   |
| 3. Backlit port number and status indicator LED | 9. 2x 10Gb Ethernet or 2/4/8 Gb Fibre Channel (SFP+) |
| 4. Port Link/Activity/Speed indicator           | 10. Enter button                                     |
| 5. Backlit up or X-link indicator               | 11. Module status indicator                          |
| 6. Reset button                                 |  |

## What's New

- Virtual Connect v3.70 highlights for the Virtual Connect FlexFabric 10Gb/24-Port Module
  - Direct Attach to 3PAR storage using FC uplinks
  - LACP and FlexNIC statistics
  - 2048-bits SSL certification
  - Activity logging improvements for TACACS+ and RADIUS
  - Task activity indicator via GUI/CLI
  - Browser Support - Internet Explorer 9 & 10; FireFox 10 and 11
  - New DAC cable support includes 10 and 15M ProCurve DAC
  - Rollback from firmware upgrades

## At A Glance

### Performance

- 16 x 10Gb Ethernet downlinks to server blade NICs and FlexFabric Adapters
- Each 10Gb downlink supports up to 3 FlexNICs and 1 FlexHBA or 4 FlexNICs
- Each FlexHBA can be configured to transport either Fiber Channel over Ethernet/CEE or Accelerated iSCSI

### Overview

protocol.

- Each FlexNIC and FlexHBA is recognized by the server as a PCI-e physical function device with adjustable speeds from 100Mb to 10Gb in 100Mb increments when connected to a HP NC553i 10Gb 2-port FlexFabric Converged Network Adapter or any Flex-10 NIC and from 1Gb to 10Gb in 100Mb increments when connected to a NC551i Dual Port FlexFabric 10Gb Converged Network Adapter or NC551m Dual Port FlexFabric 10Gb Converged Network Adapter
- 4 SFP+ external uplink ports configurable as either 10Gb Ethernet or 2/4/8Gb auto-negotiating Fibre Channel connections to external LAN or SAN switches
- 4 SFP+ external uplink ports configurable as 1/10Gb auto-negotiating Ethernet connected to external LAN switches
- 8 x 10Gb SR, LR fiber and copper SFP+ uplink ports (4 ports also support 10Gb LRM fiber SFP+)
- Extended list of direct attach copper cable connections supported
- 2 x 10Gb shared internal cross connects for redundancy and stacking
- HBA aggregation on FC configured uplink ports using ANSI T11 standards-based N\_Port ID Virtualization (NPIV) technology
- Allows up to 255 virtual machines running on the same physical server to access separate storage resources
- Low latency (1.5  $\mu$ s Ethernet ports and 2.0  $\mu$ s Enet/Fibre Channel ports) throughput provides switch-like performance.
- Line Rate, full-duplex 480 Gbps bridging fabric
- MTU up to 9216 Bytes - Jumbo Frames
- Supports up to 32,000 L2 MAC entries
- VLAN Tagging, Pass-Thru and Link Aggregation supported on all uplinks
- In tunneled VLAN mode, up to 4,096 networks are supported per network uplink and server downlink. In mapped VLAN mode, up to 1,000 networks are supported on network uplinks per Share Uplink Set, domain or module and on server downlinks up to 162 networks are supported per 10Gb physical port (VC v3.30 or later).
- Stack multiple Virtual Connect FlexFabric modules with other VC FlexFabric, VC Flex-10 or VC Ethernet Modules across up to 4 BladeSystem enclosures allowing any server Ethernet port to connect to any Ethernet uplink

### Management

- Integrated Virtual Connect Manager included with every module, providing out-of-the-box, secure HTTP and scriptable CLI interfaces for individual Virtual Connect domain configuration and management.
- Pre-configure server I/O configurations prior to server installation for easy deployment
- Move, add, or change server network connections on the fly without impacting LAN and SAN administrator Monitoring and management via industry standard SNMP v.1 and v.2
- Supported by Virtual Connect Enterprise Manager (VCEM) v6.2 and higher for centralized connection and workload management for hundreds of Virtual Connect domains. Learn more at: [www.hp.com/go/vcem](http://www.hp.com/go/vcem)
- CLI commands provide access to essential system status, resource utilization, MAC forwarding tables, interfaces, and throughput to assist datacenter network troubleshooting
- Displays Fibre Channel and Ethernet port statistics via the VCM CLI, GUI and SNMP interfaces
- Port Mirroring on any uplink provides network troubleshooting support with Network Analyzers
- IGMP Snooping optimizes network traffic and reduces bandwidth for multicast applications such as streaming applications
- LDAP, RADIUS, TACACS+ compatible role based authentication, authorization and accounting (RADIUS and TACACS+ require v3.30 or greater. Accounting supported in LDAP and TACACS+)
- Recognizes and directs Server-Side VLAN tags
- Network access groups prevent enabling specific network combinations in the same server profile
- Provisioned storage resource is associated directly to a specific virtual machine - even if the virtual server is re-allocated within the BladeSystem
- Server-side NPIV removes storage management constraint of a single physical HBA on a server blade Does not add to SAN switch domains or require traditional SAN management
- Centralized configuration of boot from iSCSI or Fibre Channel network storage via Virtual Connect Manager GUI and CLI
- Remotely update Virtual Connect firmware on multiple modules using Virtual Connect Support Utility 1.7.0 or greater

### Options

- Virtual Connect Enterprise Manager (VCEM), provides a central console for multiple VC domains including up to 250 domains with 1,000 HP BladeSystem c-Class enclosures

### Overview

- Optional HP 10Gb SFP+ SR, LR, and LRM modules and 10Gb SFP+ Copper cables in 0.5m, 1m, 3m, 5m, and 7m lengths
  - Optional HP 8 Gb SFP+ and 4 Gb SFP optical transceivers
  - Supports all Ethernet-NICs, Flex-10 NICs and FlexFabric adapters for BladeSystem c-Class server blades (Supported functionality defined by each adapter)
  - Supports use with other VC modules within the same enclosure (VC Flex-10/10D and Flex-10 Ethernet Module, VC 4 and 8 Gb Fibre Channel Modules).
- 

### Models

HP Virtual Connect FlexFabric 10Gb/24-port Module for c-Class BladeSystem

571956-B21

HP Virtual Connect FlexFabric 10/24 Enterprise Edition BLc7000 Option

605865-B21

**NOTE:** Includes 2 x HP Virtual Connect FlexFabric 10Gb/24-port modules plus 1 x VCEM BL-c7000 enclosure license. Customer will receive a printed license entitlement certificate and 2 Virtual Connect modules as a single deliverable. The license entitlement certificate must be redeemed online or via fax to obtain the VCEM license activation key.

### Supported Products

#### Compatibility

HP BladeSystem c-Class Virtual Connect Firmware v3.70 and the HP Virtual Connect FlexFabric 10Gb/24-port Module support the following hardware.

#### HP Servers

All HP ProLiant and Integrity server blades with their supported Ethernet adapters and the following server blades with supported FlexFabric (integrated or mezzanine) and Ethernet Adapters

#### HP ProLiant Server Blades

- HP ProLiant BL2x220c G6 Server Series
- HP ProLiant BL2x220c G7 Server Series
- HP ProLiant BL280c G6 Server Series
- HP ProLiant BL420c Gen8 Server Blade
- HP ProLiant BL460c G6 Server Series
- HP ProLiant BL460c G7 Server Series
- HP ProLiant BL460c Gen8 Server Blade
- HP ProLiant BL465c G6 Server Series
- HP ProLiant BL465c G7 Server Series
- HP ProLiant BL465c Gen8 Server Blade
- HP ProLiant BL490c G6 Server Series
- HP ProLiant BL495c G6 Server Series
- HP ProLiant BL620c G7 Server Series
- HP ProLiant BL660c Gen8 Server Blade
- HP ProLiant BL680c G7 Server Series
- HP ProLiant BL685c G6 Server Series
- HP ProLiant BL685c G7 Server Series

#### Integrity Server Blades

- HP Integrity BL860c Server Blade
- HP Integrity BL860c i2 Server Blade
- HP Integrity BL870c Server Blade
- HP Integrity BL870c i2 Server Blade
- HP Integrity BL890c i2 Server Blade

**NOTE:** Some servers listed above may be discontinued.

#### HP Network Adapters

FlexFabric adapter:

- HP NC551i Dual Port FlexFabric 10Gb Converged Network Adapter
- HP NC551m Dual Port FlexFabric 10Gb Converged Network Adapter
- HP NC553i 10Gb 2-port FlexFabric Converged Network Adapter
- HP NC553m 10Gb 2-port FlexFabric Converged Network Adapter
- HP FlexFabric 10Gb 2-port 554M Adapter
- HP FlexFabric 10Gb 2-port 554FLB Adapter

Ethernet and Flex-10 Ethernet adapters:

- HP NC325m PCI Express Quad Port 1Gb server adapter
- HP NC326i Integrated Dual Port PCI Express Gigabit Server Adapter
- HP NC326m PCI Express Dual Port Multifunction Gigabit Server Adapter
- HP NC360m Dual Port 1GbE BL-c Adapter
- HP NC364m Quad Port 1GbE BL-c Adapter
- HP NC370i Dual Port Multifunction Gigabit Network Adapter
- HP NC373i Dual Port Multifunction Gigabit Network Adapter
- HP NC373m Dual Port Multifunction Gigabit Network Adapter
- HP NC382i Integrated Dual Port PCI Express Gigabit Server Adapter
- HP NC382m Integrated Dual Port PCI Express Gigabit Server Adapter
- HP NC522m Dual Port Flex-10 10GbE Multifunction BL-c Adapter

### Supported Products

- HP NC532i Dual Port Flex-10 10GbE Multifunction BL-c Adapter
- HP NC532m Dual Port Flex-10 10GbE Multifunction BL-c Adapter
- HP NC542m Dual Port Flex-10 10GbE BL-c Adapter
- HP NC550m 10Gb 2-port PCIe x8 Flex-10 Ethernet Adapter
- HP NC522m Dual Port Flex-10 10GbE Multifunction BL-c Adapter
- HP Flex-10 10Gb 2-port 530FLB Adapter
- HP Flex-10 10Gb 2-port 530M Adapter
- HP Flex-10 10Gb 2-port 552M Adapter
- HP Ethernet 1Gb 2-port 361FLB Adapter
- HP Ethernet 1Gb 4-port 366M Adapter

**NOTE:** Consult individual server blade QuickSpecs for specific adapter support.

**NOTE:** Some options listed above may be discontinued.

#### HP BladeSystem c-Class Enclosures

HP BladeSystem c-Class c7000 Enclosure with Onboard Administrator

**NOTE:** VC FlexFabric modules are not supported in BladeSystem c3000 enclosures.

#### Virtual Connect Firmware

Virtual Connect Firmware v3.70 is recommended with the following release sets for HP ProLiant and HP Integrity environments

#### HP ProLiant server blades

##### HP Service Pack for ProLiant : Version 2012.08.0 or greater

The HP Service Pack for ProLiant is an enhanced, re-packaging of ProLiant systems software and firmware based on the rich legacy of ProLiant Support Packs (PSPs) and HP Smart Update Firmware DVD. It contains the first comprehensive collection of firmware and system software components, all tested together including drivers, agents, non-agents, utilities, firmware packages for servers, controllers, storage, HP BladeSystem enclosures and components (including Virtual Connect, Onboard Administrator), and all components and options supported by HP ProLiant Support Packs for Windows and Linux version 8.70. In addition, VMware offline firmware updates are included.

To access the latest HP Service Pack for ProLiant click here:

[www.hp.com/go/server/service\\_packs/updates](http://www.hp.com/go/server/service_packs/updates)

#### HP Integrity i2 Server Blades

##### Recommended HP Smart Update Firmware:

HP Smart Update Firmware-HP Integrity BL860c/870c/890c i2 System Firmware Bundle for Linux/Windows, 26.32

To access latest HP Smart Update Firmware, click here:

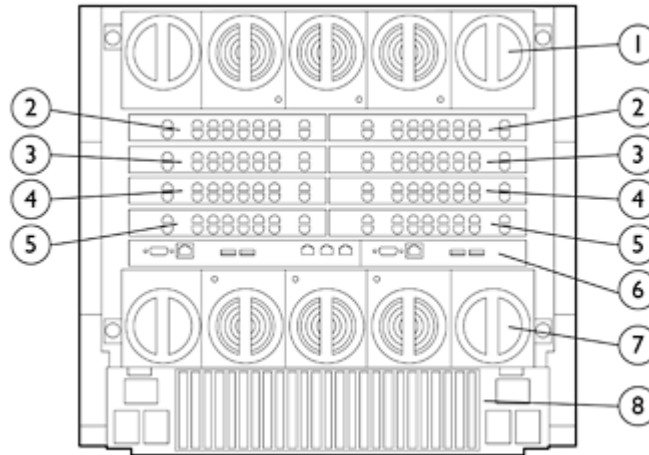
<http://h18004.www1.hp.com/products/blades/integrity-release-sets.html>

#### HP Integrity Server Blades

For HP Integrity BL860c and BL870c use System Firmware 04.26

### Supported Products

### Supported Configurations



**HP BladeSystem c7000 Enclosure - Rear View**

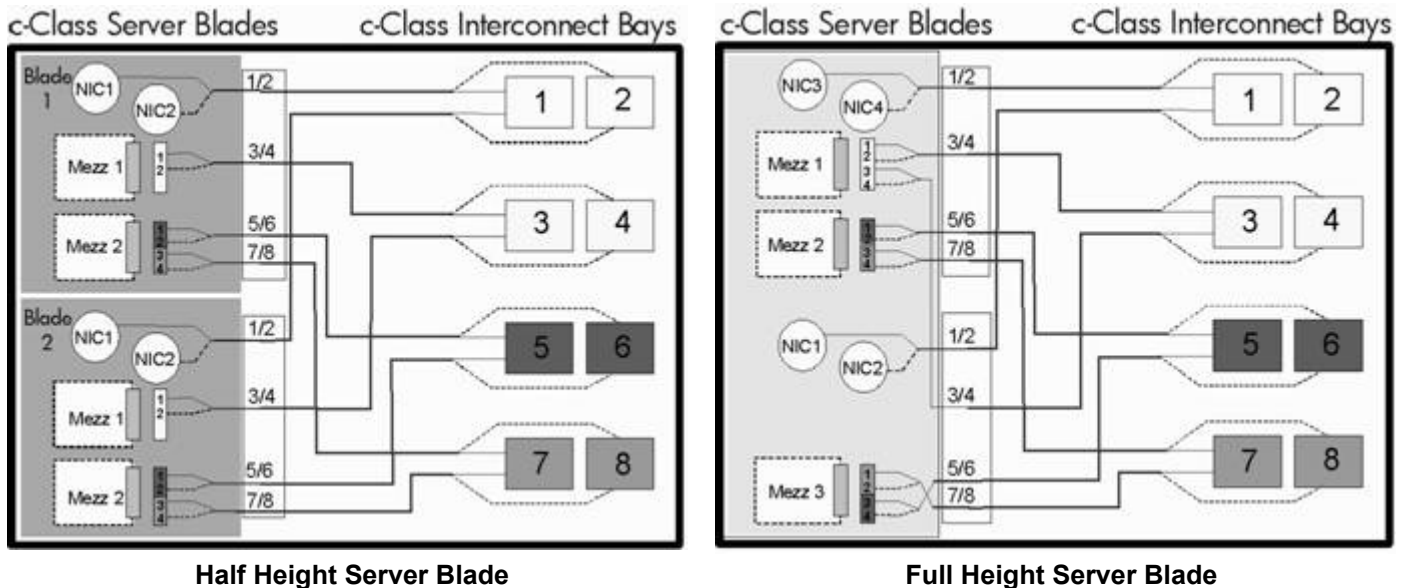
- |                            |                                 |
|----------------------------|---------------------------------|
| 1. Upper Fan System        | 5. Interconnect Bays 7 / 8      |
| 2. Interconnect Bays 1 / 2 | 6. On Board Administrator       |
| 3. Interconnect Bays 3 / 4 | 7. Lower Fan System             |
| 4. Interconnect Bays 5 / 6 | 8. Rear Redundant Power Complex |

### Mezzanines

#### c7000 Port Mapping

Port mapping differs slightly between full height and half height server blades due to the support for additional Mezzanine cards on the full height version.

HP has simplified the processes of mapping Mezzanine ports to switch ports by providing intelligent management tools via the Onboard Administrator and HP Insight Manager Software. The Onboard Administrator Guide and Enclosure Setup and Installation Guide provide detailed information on port mapping.



### HP BladeSystem c7000 Enclosure

**NOTE:** The following tables show a number of supported configurations for an HP BladeSystem c7000 Enclosure with Virtual Connect FlexFabric Modules. Not all possible combinations are shown here.

**NOTE:** VC FlexFabric modules are not supported in HP BladeSystem c3000 enclosures.

### Supported Products

Interconnect Module Configurations					Server Network Adapters Used
[Bay 1]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 2]	Integrated FlexFabric Adapter <sup>1</sup>
[Bay 3]	Empty	->	Empty	[Bay 4]	
[Bay 5]	Empty	->	Empty	[Bay 6]	
[Bay 7]	Empty	->	Empty	[Bay 8]	

[Bay 1]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 2]	FLEXFABRIC ADAPTER Integrated FlexFabric Adapter <sup>1</sup>
[Bay 3]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 4]	FlexFabric Adapter Mezzanine
[Bay 5]	Empty	->	Empty	[Bay 6]	
[Bay 7]	Empty	->	Empty	[Bay 8]	

[Bay 1]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 2]	Integrated FlexFabric Adapter <sup>1</sup>
[Bay 3]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 4]	FlexFabric Adapter Mezzanine
[Bay 5]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 6]	FlexFabric Adapter Mezzanine
[Bay 7]	Empty	->	Empty	[Bay 8]	

[Bay 1]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 2]	Integrated FlexFabric Adapter <sup>1</sup>
[Bay 3]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 4]	FlexFabric Adapter Mezzanine
[Bay 5]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 6]	FlexFabric Adapter Mezzanine
[Bay 7]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 8]	FlexFabric Adapter Mezzanine

[Bay 1]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 2]	Integrated FlexFabric Adapter <sup>1</sup>
[Bay 3]	VC Flex-10 VC Flex-10/10D VC FC	-> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC or Empty	[Bay 4]	Flex-10/Enet or FC HBA Mezzanine
[Bay 5]	Empty	->	Empty	[Bay 6]	
[Bay 7]	Empty	->	Empty	[Bay 8]	

### Supported Products

[Bay 1]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 2]	Integrated FlexFabric Adapter <sup>1</sup>
[Bay 3]	VC Flex-10 VC Flex-10/10D VC FC	-> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC or Empty	[Bay 4]	Flex-10/Enet or FC HBA Mezzanine
[Bay 5]	VC Flex-10 VC Flex-10/10D VC FC	-> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC or Empty	[Bay 6]	Flex-10/Enet or FC HBA Mezzanine
[Bay 7]	Empty	->	Empty	[Bay 8]	

[Bay 1]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 2]	Integrated FlexFabric Adapter <sup>1</sup>
[Bay 3]	VC Flex-10 VC Flex-10/10D VC FC	-> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC or Empty	[Bay 4]	Flex-10/Enet or FC HBA Mezzanine
[Bay 5]	VC Flex-10 VC Flex-10/10D VC FC	-> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC or Empty	[Bay 6]	Flex-10/Enet or FC HBA Mezzanine
[Bay 7]	VC Flex-10 VC Flex-10/10D VC FC <sup>3</sup>	-> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC <sup>3</sup> or Empty	[Bay 8]	Flex-10/Enet or FC HBA Mezzanine

[Bay 1]	Empty	->	Empty	[Bay 2]	
[Bay 3]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 4]	FlexFabric Adapter Mezzanine
[Bay 5]	Empty	->	Empty	[Bay 6]	
[Bay 7]	Empty	->	Empty	[Bay 8]	

[Bay 1]	VC Flex-10	->	VC Flex-10 or Empty	[Bay 2]	Flex-10/Enet LOM
[Bay 3]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 4]	FlexFabric Adapter Mezzanine
[Bay 5]	Empty	->	Empty	[Bay 6]	
[Bay 7]	Empty	->	Empty	[Bay 8]	

[Bay 1]	VC Flex-10	->	VC Flex-10 or Empty	[Bay 2]	Flex-10/Enet LOM
[Bay 3]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 4]	FlexFabric Adapter Mezzanine
[Bay 5]	VC Flex-10 VC Flex-10/10D VC FC VC FlexFabric	-> -> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC or Empty VC FlexFabric or Empty	[Bay 6]	Flex-10/Enet, FC HBA or FlexFabric Adapter Mezzanine
[Bay 7]	Empty	->	Empty	[Bay 8]	



### Supported Products

[Bay 1]	VC Flex-10 VC FlexFabric <sup>2</sup>	-> ->	VC Flex-10 or Empty VC FlexFabric <sup>2</sup> or Empty	[Bay 2]	Flex-10/Enet LOM
[Bay 3]	VC FlexFabric	->	VC FlexFabric or Empty	[Bay 4]	FlexFabric Adapter Mezzanine
[Bay 5]	VC Flex-10 VC Flex-10/10D VC FC VC FlexFabric	-> -> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC or Empty VC FlexFabric or Empty	[Bay 6]	Flex-10/Enet, FC HBA or FlexFabric Adapter Mezzanine
[Bay 7]	VC Flex-10 VC Flex-10/10D VC FC <sup>3</sup> VC FlexFabric	-> -> -> ->	VC Flex-10 or Empty VC Flex-10/10D or Empty VC FC <sup>3</sup> or Empty VC FlexFabric or Empty	[Bay 8]	Flex-10/Enet, FC HBA or FlexFabric Adapter Mezzanine

<sup>1</sup> Requires HP ProLiant BL G7 server blades with HP NC551i or HP NC553i Dual Port FlexFabric 10Gb Converged Network Adapter.

<sup>2</sup> Supports Ethernet only when connected to server blades without embedded NC551i Dual Port FlexFabric 10Gb Converged Network Adapter.

<sup>3</sup> Requires full-height servers.

### Required Cabling

**NOTE:** Twinax direct attach copper (0.5 to 7m). 7m supported on ports 1-4

**NOTE:** Direct Attach Copper cables listed in the options section below are fully supported by HP. HP recommends use of these cables, however, Virtual Connect Firmware v3.0 or later will treat other brands of DAC cables as "allowed" connections. If not identified as a "supported" DAC, VC will allow the connection to proceed if the discovery process indicates the cable meets the following criteria: connector=copper pigtail; transceiver code=active cable or passive cable; speed >=10Gb; length between 1m and 7m, inclusive. The connection is logged as an unsupported cable. Prior to requesting support from HP, a DAC from the supported list must be used to validate the issue.

Maximum Distances	Multimode OM1 62.5/125 micron	Multimode OM2 50/125 micron	Multimode OM3 50/125 micron	Singlemode 9 micron
SR	2 - 26m/33m*	2 - 82m	2 - 300m	
LR				2 -10km
LRM	0.5 - 220m	0.5 - 220m	0.5 - 220m	

**NOTE:**\* 26m at 160MHz and 33m at 200MHz.

**NOTE:** For additional information on 10Gb cable specifications go to:  
[http://www.hewlett-packard.com/rnd/pdfs/10gig\\_cabling\\_technical\\_brief.pdf](http://www.hewlett-packard.com/rnd/pdfs/10gig_cabling_technical_brief.pdf)

### Supported Products

**Stacking Configuration** Stacking links are used to interconnect Virtual Connect Ethernet/FlexFabric Modules when using more than one enclosure or when using more than two Virtual Connect Ethernet/FlexFabric Modules in a single enclosure. All Virtual Connect Modules within the VC Domain must be interconnected. The following provides recommended configurations.

Interconnecting the modules allows all Ethernet NICs or CNAs on all server blades in the Virtual Connect domain to have access to any Virtual Connect Ethernet uplink port. By using these module-to-module links, a single pair of uplinks can be used as the data center Ethernet network connections for the entire Virtual Connect domain, and allows any server blade to be connected to any Ethernet network.

For additional stacking configuration information go to: HP Virtual Connect for c-Class BladeSystem Setup and Installation Guide (<http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c01732252/c01732252.pdf>).

**NOTE:** Two (2) internal 10Gb links are provided between Virtual Connect modules in horizontally adjacent bays. Also, VC FlexFabric and VC Flex-10 configuration requires a HP ProCurve XFP to SFP+ 1m Direct Attach Copper Cable to connect an HP Virtual Connect FlexFabric Module and HP Virtual Connect Flex-10 Ethernet Module.

### Service and Support, HP Care Pack and Warranty Information

**Service and Support** This Virtual Connect product is covered by a global limited warranty and supported by HP Services and a worldwide network of HP Authorized Channel Partners. Hardware diagnostic support and repair is available for one year from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Additional support may be covered under the warranty or available for an additional fee. Enhancements to warranty services are available through HP Care Pack services or customized service agreements.

**NOTE:** Server Blade Interconnect Limited Warranty includes 1 year Parts, 1 year Labor, 1-year on-site support. Additional information regarding worldwide limited warranty and technical support is available at:  
<http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>

HP services provide total care and support expertise with committed response designed to meet your IT and business needs

When you buy HP Virtual Connect FlexFabric 10Gb/24-Port Module for c-Class BladeSystem it's also a good time to think about what level of service you may need. HP Care Pack services provide total care and support expertise with committed response choices designed to meet your IT and business needs.

#### Recommended Services

#### Recommended HP Care Pack Services for optimal satisfaction with your HP product

**Enhanced Network Installation & Startup for BladeSystem Switches** Provide for the configuration and testing of BladeSystem Ethernet interconnect switches to facilitate proper implementation of network protocols and access to advanced features.

**BladeSystem c3000/c7000 Infrastructure (ICE + OS) Installation & Startup** Provides for the installation and startup of a BladeSystem c3000/c7000 Infrastructure in a single blade enclosure including hardware and software (HP SIM, RDP, RDP deployment of OS, PMP and VPM).

**Support - 3-Year, either 6 hour or 24 hour call to repair** HP Hardware Support Onsite 6-Hour or 24-hour Call-to-Repair Service provides you with a team of support specialists who will quickly begin troubleshooting your system to ensure the hardware is operational within a maximum of 6 hours or 24 hours from your initial service request.

**Support - 3-Year, 24x7 Same-Business-Day, On-site. 4-Hour response coverage, including holidays** Hardware Onsite Service delivers round the clock, fast reliable 4 hour response-Get product expertise from HP for fast and accurate problem resolution with integrated high quality remote monitoring and problem diagnosis, maintaining predictable service levels reducing unplanned downtime.

**Proactive Select** Proactive Select - is a flexible way to purchase HP best-in-class consultancy and services. You can buy Proactive Select Service Credits when you purchase your hardware then use the credits over the next 12 months, or 3-5 years.

#### Additional Services Information

For more information about HP services and support, contact your HP sales representative or HP-authorized Channel Partner or, visit: [www.hp.com/services/bladeSystem](http://www.hp.com/services/bladeSystem) or [www.hp.com/services/proliant](http://www.hp.com/services/proliant)

### Related Options

#### Cabling and Transceiver Options

#### Copper Cables

HP BladeSystem c-Class Small Form-Factor Pluggable .5m 10GbE Copper Cable	487649-B21
HP BladeSystem c-Class Small Form-Factor Pluggable 1m 10GbE Copper Cable	487652-B21
HP BladeSystem c-Class Small Form-Factor Pluggable 3m 10GbE Copper Cable	487655-B21
HP BladeSystem c-Class Small Form-Factor Pluggable 5m 10GbE Copper Cable	537963-B21
HP BladeSystem c-Class Small Form-Factor Pluggable 7m 10GbE Copper Cable	487658-B21
HP 7m C-series Active Copper SFP+ Cable	QK701A
HP 10m C-series Active Copper SFP+ Cable	QK702A
HP X242 SFP+ 10m DAC Cable	J9286B
HP X242 SFP+ 15m DAC Cable	J9287B
HP X242 SFP+ SFP+ 1m Direct Attach Cable	J9281B
HP X242 SFP+ SFP+ 3m Direct Attach Cable	J9283B
HP X242 SFP+ SFP+ 7m Direct Attach Cable	J9285B
HP X240 10G SFP+ SFP+ 0.65m DA Cable	JD095B
HP X240 10G SFP+ SFP+ 1.2m DA Cable	JD096B
HP X240 10G SFP+ SFP+ 3m DA Cable	JD097B
HP X244 XFP SFP+ 1m Direct Attach Cable	J9300A
HP X244 XFP SFP+ 3m Direct Attach Cable	J9301A
HP X244 XFP SFP+ 5m Direct Attach Cable	J9302A
HP 3m C-series Passive Copper SFP+ Cable	AP784A
HP 5m C-series Passive Copper SFP+ Cable	AP785A
HP 1m B-series Active Copper Cable with Integrated SFP+ Transceiver	AP818A
<b>NOTE:</b> Equivalent to Brocade 10Gbps Direct Attached SFP+Copper Cable - 1m (PN XBR-TWX-0101).	
HP 3m B-series Active Copper Cable with Integrated SFP+ Transceiver	AP819A
<b>NOTE:</b> Equivalent to Brocade 10Gbps Direct Attached SFP+Copper Cable -3m (PN XBR-TWX-0301).	
HP 5m B-series Active Copper Cable with Integrated SFP+ Transceiver	AP820A
<b>NOTE:</b> Equivalent to Brocade 10Gbps Direct Attached SFP+Copper Cable-5m (PN XBR-TWX-0501).	

#### Ethernet Optical Transceivers

HP BladeSystem c-Class 10Gb Short Range Small Form-Factor Pluggable Option	455883-B21
HP BladeSystem c-Class 10Gb Long Range Small Form-Factor Pluggable Option	455886-B21
HP BladeSystem c-Class 10Gb Long Range Mode Small Form-Factor Pluggable Option	455889-B21
HP BLc Virtual Connect 1Gb SX Small Form Factor Pluggable Option Kit	453151-B21
HP BLc Virtual Connect 1Gb RJ-45 Small Form Factor Pluggable Option Kit	453154-B21

#### Fibre Channel Optical Transceivers

HP 8Gb Shortwave B-series Fibre Channel 1 Pack SFP+ Transceiver	AJ716A
HP 8Gb Long Wave B-series 10km Fibre Channel 1 Pack SFP+ Transceiver	AJ717A
HP 8Gb Short Wave Fibre Channel SFP+ 1 Pack	AJ718A

### Related Options

HP 4Gb Short Wave B-series Fibre Channel 1 Pack SFP Transceiver	AJ715A
HP 4Gb Long Wave B-series 30km Fibre Channel SFP Transceiver 1 Pack	AN211A
HP 4 Gb Short Wave Single Pack SFP Transceiver	A7446B

#### Optical Cables

2m LC-LC FC Cable Kit	221692-B21
5m LC-LC FC Cable Kit	221692-B22
15m LC-LC FC Cable Kit	221692-B23
30m LC-LC FC Cable Kit	221692-B26
50m LC-LC FC Cable Kit	221692-B27
HP .5m Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk	AJ833A
HP 1m Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk	AJ834A
HP 2m Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk	AJ835A
HP 5m Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk	AJ836A
HP 15m Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk	AJ837A
HP 30m Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk	AJ838A
HP 50m Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk	AJ839A

**NOTE:** 7m DAC (P/N J9285B) length is supported on VC FlexFabric module ports X5-X8. Ports X1-X4 support up to 5m DAC lengths.

**NOTE:** In addition to the supported HP and non-HP Copper cables above, Virtual Connect provides "allowed" connections using third party cables that meet the following criteria: connector=copper pigtail; transceiver code=active cable or passive cable; speed equal or less than 10Gb; length between 1m and 7m, inclusive. All "allowed" DACs are connected and logged. Prior to requesting support from HP, a DAC from the supported list above must be used to verify a cable issue is not involved.

**NOTE:** Two 8Gb Shortwave FC transceivers are offered to allow consistency with those used in other VC 8Gb Fibre Channel Modules in your environment. HP 8Gb Shortwave B-series Fibre Channel 1 Pack SFP+ Transceivers (A716A) supports VC FC 8Gb 24-port modules. HP 8Gb Short Wave Fibre Channel SFP+ 1 Pack Transceivers (AJ718A) also supports VC FC 8Gb 20-port modules.

### Related Options

#### Service and Support Offerings

**NOTE:** The HP Care Pack service part numbers below for ProLiant BL c-Class server blades, cover the server blade and all HP branded hardware options qualified for the server, purchased at the same time or afterwards, internal to the server.

#### Hardware Services On-site Service

HP 3year 4hour 13x5 c-Class Server Blade HW Support UE458E

HP 3year 4hour 24x7 c-Class Server Blade Hardware Support UE459E

HP 3year 6hour 24x7 Call to Repair c-Class Server Blade Hardware Support UE460E

**NOTE:** HP Care Pack services for the c7000 and c3000 Enclosures cover the enclosure, power supplies and fans. HP qualified rack options are covered by these services when installed within the same rack. HP supported c-Class enclosure devices including pass thru, Ethernet interconnect and virtual connect modules are also covered by the c7000 and c3000 enclosures Care Pack services.

**NOTE:** SAN/Fabric switches for the HP c-Class BladeSystem are not covered under the c7000 and c3000 enclosures Care Packs, SAN/Fabric switches carry separate Care Packs. SAN/Fabric Switch Care Pack service level support should always be uplifted to match existing storage or server service level.

#### Hardware Services On-site Service

HP 3 year Next business day c7000 Enclosure Hardware Support UE477E

**NOTE:** Uplifts the Ethernet devices to the same level of service as the c-class enclosure.

HP 3 year 4 hour 13x5 c7000 Enclosure Hardware Support UE478E

HP 3 year 4 hour 24x7 c7000 Enclosure Hardware Support UE479E

HP 3 year 6 hour 24x7 Call to Repair c7000 Enclosure Hardware Support UE480E

#### Installation & Start-up Services

HP Startup Blade System c-Class Enhanced Network Service UE603E

HP Install c-Class Server Blade Service UE493E

HP Install c-Class Enclosure & Server Blade Service UE494E

**NOTE:** For additional information; please visit:

<http://www.hp.com/services/bladessystemservices>

### Technical Specifications

<b>Shipping Dimensions</b>	<b>Length</b>	10.55 in (267.97 mm)
	<b>Width</b>	7.58 in (192.53 mm)
	<b>Height</b>	1.10 in (27.94 mm)
<b>Shipping Weight</b>		Approximately 1.27Kg (2.8 Lbs)
<b>Product Specifications</b>	<b>Performance</b>	Line Rate, full-duplex 240Gbps bridging fabric
<b>Hardware</b>		Non-blocking architecture
		Maximum transmission unit (MTU) of up to 9216 bytes (jumbo frames)
	<b>Connectors and Cabling</b>	16 x 10Gb downlinks through the midplane 2 x 10Gb cross connect links 4 x 10Gb SR, LR fiber and copper uplinks SFP+ 4 x 10Gb SR, LRM and LR fiber and copper uplinks SFP+ 1 internal interface to c-Class Onboard Administrator Module
	<b>Indicators</b>	Recessed Momentary Reset Switch Momentary Next/Step Switch Backlit port number, configuration and status indicator LED, one per bulkhead port, blue/amber/green Module status indicator, amber/green Module locator (UID), blue Link indicator, one per SFP+-port, green/amber/orange Active multiplexed port indicator, green
	<b>Weight</b>	1.27Kg (2.8 Lbs)
	<b>Latency</b>	1.2 µs on Ethernet only ports 1.7µ µs Enet/FC ports
	<b>External FC Port Type</b>	Configured as Node port s (N_Port), 2Gb, 4Gb or 8Gb auto- negotiating SFP ports
	<b>Classes of Service</b>	Class 2 and Class 3 Fibre Channel services
	<b>Scalability</b>	Does not contribute to the total switch limit.
	<b>Buffer Credits</b>	8 buffer credits per port, ASIC embedded memory
	<b>Environmental Ranges</b>	<b>Temperature Range</b>
		Specification 10C to 35C (50F to 95F)
		<b>Temperature Range*</b>
		Operating 10C to 35C (50F to 95F)
		Shipping Shipping -40C to 60C (-40F to 140F)
		Storage -20°C to 60°C (-4F to 140°F)
		Maximum wet bulb temperature 30C (80F)
		<b>Relative Humidity</b> (noncondensing)**
		Operating 10% to 90%
		Shipping 10% to 90%
	<b>Power Specification</b>	12V @ 9.17A (110 W)

\* All temperature ratings shown are for sea level. An altitude derating of 1°C per 304.8 m (1.8°F per 1,000 ft) to 3048 m (10,000 ft) is applicable. No direct sunlight allowed. Upper operating limit is 3,048m (10,000 ft) or 70 Kpa/10.1 psia. Upper non-operating limit is 9,144 m (30,000 ft) or 30.3 KPa/4.4 psia.

\*\* Storage maximum humidity of 95% is based on a maximum temperature of 45°C (113°F). Altitude maximum for storage corresponds to a pressure minimum of 70 KPa.

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**Product Specifications Security Features** HTTPS (HTTP exchanged over an SSL-encrypted session) is required

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### Technical Specifications

#### Software

for access to the Virtual Connect Manager. Access to the Virtual Connect Manager is via the system Onboard Administrator. Each user account can be configured for a combination of four access privileges to control and/or view elements in the Virtual Connect Manager. User verification by account name and password (Case Sensitive).

LDAP Authentication services provide role based security via an LDAP SSL Directory Server connection.

TACACS+ authentication, authorization and accounting  
RADIUS authentication and authorization

Private VLAN's for secure connectivity between servers within a domain. Compliant with United States Department of Defense Policy on Use of Department of Defense (DoD) Information Systems Standard Consent Banner and User Agreement.

#### Trunking, Failover and Other Networking Features

Shared Uplink Sets using Link Aggregation Control Protocol (LACP) allows the creation of Ethernet channeling with upstream switches that conform to IEEE 802.3ad. Ports can alternatively be configured for failover only.

External ports within a Port Set can be on the same VC Ethernet module or on multiple VC modules within the VC domain.

In the event of an uplink failure to a data center switch, the next highest performance uplink connection or aggregation will become active.

Fast MAC Cache failover enables rapid recovery of network connections when a standby module becomes active.

Smart Link network senses a failed upstream switch connection and allows teamed NICs to properly failover.

#### VLAN Features

Configure uplink speeds to Auto, 1Gb, or 10Gb on the associated uplinks  
802.1Q VLAN supported on uplinks.

Uplink ports can be configured for VLAN tagging at egress or pass-thru of tagged VLAN packets from Server ports.

Native VLAN support for untagged packets on a shared uplink set. Packets can be targeted to a specific server ports.

Simultaneous tunneled and mapped VLAN connections to a single domain.

#### Industry Standard NPIV Support

The Virtual Connect FlexFabric module works by first converting FCoE traffic from multiple FLEXFABRIC ADAPTER ports to native Fibre Channel and then aggregating it over a single N-port uplink through the use of N\_port\_ID virtualization (NPIV). NPIV allows multiple distinguishable identities (multiple port WWNs or port IDs) over a single N-port connection. All 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 FlexFabric Module can aggregate traffic from up to 255 physical and virtual servers per Fibre Channel uplink port and up to 255 virtual server connections per single downlink port.

#### Data Center Connectivity

Each Virtual Connect FlexFabric module supports up to 4 SAN fabrics and is typically connected to Fibre Channel switches that have been



### Technical Specifications

configured to run in NPIV mode. The 4 FC configurable uplink ports are speed selectable from 2, 4, or 8Gb/s.

The setup wizard 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 FlexFabric Module's uplink port and the data center SAN switch. Once completed, all FlexHBA connections appear as though they are directly connected between the server and the SAN switch. The Virtual Connect FlexFabric Module appears as a pass-thru device to the SAN, yet cables are reduced as much as 16:1

**Management Features** Simple and intuitive Graphical User Interface (GUI) for defining, configuring, and managing all elements of the Virtual Connect Domain.

Setup Wizards for server profile creation and initial domain installation and configuration and network configuration.

Comprehensive administration, definition, and management of Ethernet Network, Shared Uplink Set, SAN Fabric management and Server Profiles

Embedded SNMP v1, v2 and SMI-S agents allow Network Management applications to query Virtual Connect for statistics and trap information.

A robust, scriptable and secure Command Line Interface simplifies management and enables macros to control common Virtual Connect tasks

Any uplink port can be used as a dedicated mirrored port for traffic analysis and troubleshooting by a Network Analyzer or Sniffer. Domain Management of user accounts, enclosure, Virtual Connect domain settings, and firmware updates

The location and status of Virtual Connect Modules in the HP c-Class Enclosure and Onboard Administrator can be viewed from the Hardware Status page. Including at-a-glance detailed information of the hardware elements via mouse-over pop-up windows.

MAC Address Administration allows local administration of predefined or user-defined MAC address ranges.

WWN Address Administration allows local administration of predefined WWN addresses ranges to allow pre-provisioning of SAN volumes

VC manager runs as a high-availability pair when an HP VC Module is installed in the adjacent bay. All configuration data is stored in flash memory and checkpointed to the standby module. Configurations can also be backed up to a workstation via the GUI.

A VC Ethernet module is not required in enclosure interconnect bay 1 or 2 when a VC FlexFabric Module is used in any bay as the primary VC module.

Up to 128 Network Access Groups can be defined to prevent enabling specific network combinations in the same server profile.

### Technical Specifications

Supported by HP Virtual Connect Enterprise Management v6.20 and higher. Provides centralized network connection management and workload mobility for thousands of servers. Learn more at: [www.hp.com/go/vcem](http://www.hp.com/go/vcem)

#### Management and Standards Support

#### Standards

- INCITS FC-BB-5 Rev 2.00
- IEEE 802.1Qbb (preliminary)
- IEEE 802.1Qaz (preliminary)
- IEEE 802.1AB LLDP
- IEEE 802.1Q (VLAN, 1024 maximum, includes Native VLAN support and server side VLAN tag mapping)
- IEEE 802.2 LLC
- IEEE 802.3ad Link Aggregation
- IEEE 802.3ae 10Gb Fiber Ethernet
- IEEE 802.3aq 10Gb LRM Ethernet
- SNMP v.1, v.2
- IGMP v1, v2, v3
- ANCI T11 N\_Port ID Virtualization
- FC-PH Rev. 4.3
- FC-PH-2
- FC-PH-3
- 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

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

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

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