

HPE InfiniBand Options for HPE ProLiant and Apollo Servers

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Overview

HPE InfiniBand Options for HPE ProLiant and Apollo Servers

Hewlett Packard Enterprise supports InfiniBand (IB) products that include Host Channel Adapters (HCA), HPE FlexLOM Adapters, switches, and cables for HPE ProLiant servers and HPE Apollo Servers. This QuickSpecs covers 56Gbps FDR InfiniBand products. For 100Gbps EDR InfiniBand adapter products, please refer to <https://www.hpe.com/us/en/product-catalog/servers/server-adapters.html>; for 100Gbps EDR InfiniBand switch products, please refer to <https://www.hpe.com/us/en/product-catalog/servers/server-switches.html>.

Hewlett Packard Enterprise supports InfiniBand products from InfiniBand technology partner Mellanox.

The following InfiniBand Adapter products based on Mellanox technologies are available from HPE:

- HPE IB FDR/EN 40/50Gb 2P 547FLR-QSFP Adapter (Based on Mellanox ConnectX-5 technology)

The 547 adapter is based on the Mellanox ConnectX-5 technology. This adapter utilizes the PCI Express 3.0 x8 interface. It is a dual function adapter that can support two Ethernet ports, a mix of InfiniBand on Port 1 and Ethernet on Port 2 or two InfiniBand ports. This adapter is designed for PCI Express 3.0 x8 FlexibleLOM expansion slots on HPE Gen 9 and Gen 10 servers.

InfiniBand host stack software (driver) is required to run on servers connected to the InfiniBand fabric. For HCAs based on Mellanox technologies, Hewlett Packard Enterprise supports Mellanox OFED driver stacks on Linux 64-bit operating systems, and Mellanox WinOF driver stack on Microsoft Windows Operating System.

An InfiniBand fabric is constructed with one or more InfiniBand switches connected via inter-switch links. A subnet manager is required to manage an InfiniBand fabric. OpenSM is a host-based subnet manager that runs on a server connected to the InfiniBand fabric. The Mellanox OFED software stack includes OpenSM for Linux. For comprehensive management and monitoring capabilities, Mellanox Unified Fabric Manager Advanced is recommended for managing the InfiniBand fabric based on Mellanox InfiniBand products.

The following InfiniBand FDR switch products based on Mellanox technologies are available from HPE:

- Mellanox IB FDR 36-port Managed switch
- Mellanox IB FDR 36-port switch
- Mellanox IB QDR/FDR 648, 324 and 216 port Modular Switches

The switch air flow for cooling is from the power side (front of the rack) to the ports side (rear of the rack).

The following Mellanox software for InfiniBand switches and adapters is available from HPE:

- Mellanox Unified Fabric Manager Advanced (UFM)

Mellanox Unified Fabric Manager™ Advanced (UFM™) is a powerful platform for managing scale-out computing environments. UFM enables data center operators to efficiently provision, monitor and operate the modern data center fabric.

UFM runs on a server and is used to monitor and analyze Mellanox fabrics health and performance. UFM also can be used to automate provisioning and device management tasks. For example, UFM can communicate with devices, reset or shut down ports or devices, perform firmware and software upgrades, etc. UFM's extensive API enables it to easily integrate with existing management tools for a unified cluster view. UFM also includes the ability to save historical information, to send alerts to external systems and to activate user made scripts based on system events.

Hewlett Packard Enterprise supports InfiniBand copper and fiber optic cables with QSFP-to-QSFP connectors.

- QSFP to QSFP FDR copper cables range from .5M to 3M for HCA to switch, or inter-switch links at FDR speed.
- QSFP to QSFP FDR fiber optic cables range from 3M to 30M for HCA to switch, or inter-switch links at FDR speed.
- Note that ports cannot be connected to splitter cables (only one MAC address per port available)

What's New

- Support for HPE IB FDR/EN 40/50Gb 2P 547FLR-QSFP Adapter

XXXXXX-**X21** is SKU designation formed by a common six-digit part number and a -**X21** suffix that identifies a SKU that is available across multiple server family lines. Refer to the table below to find the SKU suffix that applies to the specific server product line this option can be ordered with.

-B21 COMPUTE Server Line	-H21 SPECIALIZED COMPUTE Server Line	-K21 STORAGE Line
HPE Cloudline CL2100/CL2200/CL2800/CL3100/CL4100/CL5200/CL5800 Servers HPE Composable Cloud for ProLiant DL HPE ProLiant BL460c/BL660c Servers HPE ProLiant DL20/DL160/DL180 Servers HPE ProLiant DL325/DL360/DL380/DL385/DL560/DL580 Servers HPE ProLiant DX360/DX380 Servers HPE ProLiant MicroServer HPE ProLiant for Microsoft Azure Stack HPE ProLiant ML30/ML110/ML350 Servers HPE Synergy 480/660 Systems HPE ProLiant DX170r/DX190r, DX2000 Servers HPE ProLiant DX560 Gen10 server HPE ProLiant DX4200 Gen10 server	HPE Apollo 35/40/70 Systems HPE Apollo 2000/6000 Servers HPE XL170r/XL190r/XL270d (Apollo 6500) Gen10 Server for BlueData Software HPE Converged System 300/500/700/750 HPE Edgeline Systems and Servers HPE Integrity BL860c i6/BL870c i6/BL890c i6 Server Blades HPE Integrity MC990 X Server HPE Integrity rx2800 i6 Server HPE Integrity Superdome HPE SGI 8600 System HPE Solutions for SAP HANA (TDI)	HPE Apollo 4200 Gen9/Gen10 Servers HPE Apollo 4200 Gen10 LFF Server for BlueData Software HPE Apollo 4510 Gen10 System HPE D2220sb/D2500sb Storage Blade HPE D3000/D6020/D8000 Disk Enclosures HPE Scalable Object Storage with Scalify RING HPE SimpliVity 2600 HPE SimpliVity 325/380 Gen10 HPE Storage File Controllers HPE StoreEasy 1460/1560/1650/1660/1860 Disclaimer: This may not be a complete listing of applicable servers

Standard Features

At A Glance

- **Dual function InfiniBand/Ethernet cards based on Mellanox ConnectX-5 technology**
 - HPE IB FDR/EN 40/50Gb 547FLR 2p QSFP Adapter (part number: 879482-B21)
 - o Dual QSFP ports PCI Express 3.0 card based on ConnectX-5 technology
 - o Support PCI Express 3.0 x8
 - o Single or dual ports FDR InfiniBand
 - o Single or dual ports 10/40/50Gb Ethernet

- o A mix of InfiniBand on Port 1 and Ethernet on Port 2 (Default)
- o Use UEFI to change the port personality
- o NCSI Shared-Network-port (SNP) and Wake-on-Lan are supported on Port 2 only
- o InfiniBand features: Improved message rate, Tag matching, Adaptive routing, Atomic operations
- o Additional features: RoCE, DPDK, SRIOV, VXLAN, NVGRE
- o Support the following Hewlett Packard Enterprise servers: Apollo 2000/XL170r Gen10, Apollo 2000/XL190r Gen10, Apollo 4200 Gen9, Apollo 4500/XL450 Gen10, DL360 Gen10, DL380 Gen10, DL385 Gen10, DL560 Gen10, DL580 Gen10
- o For firmware release notes, please visit [the support website](#) and search by part number and operating system. Look for the most recent release.

- **Mellanox Software**

- Mellanox Unified Fabric Manager Advanced (UFM)

- o Can run on one server, or on two servers for high availability.

Notes: Supported on 64-bit Linux operating systems only.

- o Physical Fabric topology view

- Automatic fabric discovery
 - Drill down to each device and port
 - Racking and grouping

- o Central dashboard

- Health and performance snapshot
 - Congestion analysis map
 - Per logical entity/service bandwidth utilization graph

- o Advanced Monitoring Engine

- Monitor each device / data counter combination
 - Both health and performance data
 - Aggregate and correlate to physical racks to logical entities

- o Event Management

- Threshold based alerts
 - Fully configurable - threshold, criticality, action
 - Correlated to physical and to business entities

- o Fabric Health Reports

- Fabric Health Tab for quick deployment and maintenance analysis
 - Increased fabric robustness
 - Formatted reports for process/improvement management

- o Logical / Service Oriented fabric management

- Group devices into service-oriented entities such as applications or departments
 - Deploy fabric policy such as partitioning and QoS based on application/service needs
 - Aggregate and correlate health and performance data to the service-oriented layer

- o Perform tasks on single or multiple devices

- Establish an SSH session to the device

- Resetting or shutting down the port or device
- Manage alarms
- Perform firmware and software upgrades

o Monitoring history

- Monitor history sessions from the GUI
- Periodic fabric snapshots

o Monitoring templates for saving user/task monitoring scenarios

o Advanced event management

- Sends SNMP traps to central monitoring systems
- Activates user made scripts based on system events

o Advanced multicast optimizations through multicast tree management

o User management with control and authorization groups

o Multicast tree routing optimizations

o User authorization management

• **InfiniBand switches based on Mellanox SwitchX-2 technology**

– Mellanox IB FDR 36-port unmanaged switch (part number: 670767-B21)

- o 36 FDR QSFP ports, support FDR InfiniBand copper and fiber optic cables, with the front-to-rear cooling fan that has air flow from the front to the rear (ports side).
- o Dual power supplies for redundancy.

– Mellanox IB FDR 36-port unmanaged switch with reversed airflow fan unit (part number: 670768-B21)

- o 36 FDR QSFP ports, support FDR InfiniBand copper and fiber optic cables, with the rear-to-front cooling fan that has air flow from the rear (ports side) to the front.
- o Dual power supplies for redundancy.

– Mellanox IB FDR 36-port managed switch (part number: 670769-B21)

- o 36 FDR QSFP ports, support FDR InfiniBand copper and fiber optic cables
- o Integrated management module for Fabric Management
- o Dual power supplies for redundancy.

– Mellanox IB FDR 36-port managed switch with reversed airflow fan unit (670770-B21)

- o 36 FDR QSFP ports, support FDR InfiniBand copper and fiber optic cables, with the rear-to-front cooling fan that has air flow from the rear (ports side) to the front.
- o Integrated management module for Fabric Management
- o Dual power supplies for redundancy.

• **InfiniBand cables**

- For InfiniBand cables, please see the cables section below. Please also consult product's firmware release notes for list of support cables.

- **Ethernet cables**

- The Dual Function cards support most HPE Ethernet cables. Consult product's firmware release notes for list of supported cables.

- o 10 Gb Ethernet requires the use of a QSFP to SFP+ Adapter 655874-B21

- Notes:** Ports cannot be connected to splitter cables (only one MAC address available per port)

Bandwidth

All ports on FDR HCA card and switch can support 56 Gbps signaling rate, with a peak data rate of 52 Gbps in each direction.

All ports on QDR HCA card and switch can support 40 Gbps signaling rate, with a peak data rate of 32 Gbps in each direction.

Operating systems support

The 547 series device configured as IB only mode, Ethernet only mode, or Port 1 IB and Port 2 Ethernet mode is supported on MLNX_OFED 4.3-1.0.1.0 on the following Linux operating systems:

- **RHEL:** 7.5; 7.4; 7.3
- **CentOS:** 7.5; 7.4; 7.3
- **SLES:** 12 SP3; 12 SP2; 11 SP4

The 547 series device configured as IB or Ethernet mode is supported on WinOF2 1.9 on the following Windows operating systems (switch-based subnet manager or Linux host-based subnet manager required)

- **Windows Server 2016 (x64 only)**

The 544+ series devices configured as IB only mode, Ethernet only mode, or Port 1 IB and Port 2 Ethernet mode are supported on MLNX_OFED 4.3-1.0.1.0 on the following Linux operating systems:

- **RHEL:** 7.5; 7.4; 7.3
- **CentOS:** 7.5; 7.4; 7.3
- **SLES:** 12 SP3; 12 SP2; 11 SP4

The 544+ series devices configured as Ethernet mode are supported on WinOF on the following Windows operating systems:

- **Windows Server 2016 (x64 only) with WinOF 5.40**
- **Windows Server 2012 R2 (x64 only) with WinOF 5.35**

The 544+ series devices configured as Ethernet only mode are also supported in the following virtualized environments:

- **ESXi:** 6.7 with inbox driver
 - **ESXi:** 6.5 with VMware 3.16.11.6
-

Auto-negotiation/self-discovery

InfiniBand ports support auto-negotiation down to lower rate. For example, ports of an FDR switch will negotiate down to QDR speed if they are connected to a device which can only operate at QDR. Self-discovery is supported by subnet manager.

Management

Mellanox OFED includes drivers and utilities to configure and manage the HCA in a Linux environment and Mellanox WinOF includes drivers and utilities to configure and manage the HCA in the Microsoft Windows server environment.

InfiniBand fabric requires a subnet manager: see the subnet manager discussion above.

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- An assigned HPE team
- Modular and fully personalized engagement
- Enhanced Incident Management experience with priority access
- Digitally enabled and AI driven customer experience

<https://www.hpe.com/services/completecure>

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<https://www.hpe.com/services/techcare>

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- Implementation assistance services: Highly trained technical service specialists to assist you with a variety of activities, ranging from design, implementation, and platform deployment to consolidation, migration, project management, and onsite technical forums.
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Notes: To review the list of Lifecycle Services available for your product go to:

<https://www.hpe.com/services/lifecycle>

For a list of the most frequently purchased services using service credits, see the [HPE Service Credits Menu](#)

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- Customers purchasing from a commercial reseller can find services at <https://ssc.hpe.com/portal/site/ssc/>

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For more information

<http://www.hpe.com/services>

Configuration Information

Models

HPE Dual Function Adapters

InfiniBand/Ethernet based on Mellanox ConnectX-5 technology

HPE InfiniBand FDR/Ethernet 40/50Gb 2-port 547FLR-QSFP Adapter

879482-B21

Notes:

- FLR Indicates HPE FlexibleLOM Adapter series
Also 10 Gb Ethernet capable. Requires the QSFP to SFP+ adapter 655874-B21
- Ports cannot be connected to splitter cables (only one MAC address available per port)

40GbE Ethernet cables

HPE Networking Comware X240 40G QSFP+ QSFP+ 1m Direct Attach Copper Cable	JG326A
HPE Networking Comware X240 40G QSFP+ QSFP+ 3m Direct Attach Copper Cable	JG327A
HPE Networking Comware X240 40G QSFP+ QSFP+ 5m Direct Attach Copper Cable	JG328
HPE Networking X140 40G QSFP+ MPO SR4 Transceiver	JG325B
HPE BladeSystem c-Class 40G QSFP+ to QSFP+ 15m Active Optical Cable	720211-B21
HPE BladeSystem c-Class QSFP+ to 4x10G SFP+ 15m Active Optical Cable	721076-B21

10GbE Ethernet cables

HPE QSFP/SFP+ Adapter Kit	655874-B21
HPE BladeSystem c-Class 10GbE SFP+ to SFP+ 3m Direct Attach Copper Cable	487655-B21
HPE BladeSystem c-Class 10GbE SFP+ to SFP+ 5m Direct Attach Copper Cable	537963-B21
HPE BladeSystem c-Class 10Gb SFP+ SR Transceiver	455883-B21
HPE BladeSystem c-Class 10Gb SFP+ LR Transceiver	455886-B21

Technical Specifications

Compliance		
InfiniBand HCA cards	PCI Express 3.0 IBTA Specification 1.2.1 compliant RoHS-R6	
Power and Environmental Specification		
Operating	Temperature	
	HCA cards:	0 to 55° C.
	Notes: Please refer to Mellanox product specification for Mellanox switch models.	
	Humidity (non-condensing)	Notes: Please refer to Mellanox product specifications for Mellanox switch models.
Power requirement	HCA cards:	<ul style="list-style-type: none">• HPE IB FDR/EN 40/50G 2P 547FLR QSFP Adapter:<ul style="list-style-type: none">– With Active Optical Cables: typical 19W, max 21W– With Passive Copper Cables: typical 14.1W, max 16.1W
	Switches: Notes: Please refer to Mellanox product specifications for Mellanox switch models.	
Emissions Classifications	HCA cards:	USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU : EN61000-3-2, Class A EU : EN61000-3-3, Class A Japan : VCCI, Class A Korea: MIC, Class A Taiwan: BSMI, Class A
	Switches: Notes: Please refer to Mellanox product specification for Mellanox switch models.	
Environment-friendly Products and Approach		
End-of-life Management and Recycling	Hewlett Packard Enterprise offers end-of-life Hewlett Packard Enterprise product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: http://www.hpe.com/info/recycle . To recycle your product, please go to: http://www.hpe.com/info/recycle or contact your nearest Hewlett Packard Enterprise sales office. Products returned to Hewlett Packard Enterprise will be recycled, recovered, or disposed of in a responsible manner.	
	The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information	

(product disassembly instructions) is posted on the Hewlett Packard Enterprise web site at: <http://www.hpe.com/info/recycle>. 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
19-Feb-2024	Version 31	Changed	Networking product names were updated.
08-Jan-2024	Version 30	Changed	HPE Services Rebranding
04-Oct-2021	Version 30	Changed	Overview section was updated
04-Jun-2018	Version 29	Changed	HPE IB FDR/EN 40/50Gb 2P 547FLR-QSFP Adapter Overview section was updated Obsolete SKUs were deleted: 764286-B21, 702211-B21, 702212-B21, 670768-B21, 670770-B21, 498385-B21, 498385-B22, 498385-B23, 498385-B24, 498385-B25, 498385-B26, 498385-B27, 453151-B21, 453154-B21, 487649-B21, 487658-B21.
23-Oct-2017	Version 28	Changed	Care Pack naming and Service and Support- Parts and Materials updated.
06-Mar-2017	Version 27	Changed	Overview, Models, Operating Systems Support, InfiniBand Fabric Management, and Technical Specifications sections were updated.
		Changed	Obsolete SKUs were deleted: 649281-B21, 649282-B21, 649283-B21, 592520-B21, 583211-B21, 589478-B21, 505959-B21, 589479-B21, 589480-B21, 589481-B21, 589482-B21, 589483-B21, 589484-B21, 670760-B21, 670760-B22, 670760-B23, 670760-B25, 670760-B26, 670760-B27, 670760-B28, 674281-B21, 674283-B21, 712495-B21, 712496-B21, 712497-B21, 712498-B21.
29-Apr-2016	Version 26	Changed	Models and Operating Systems Support
		Changed	Obsolete SKU was removed: 670760-B24
05-Jan-2016	Version 25	Changed	Information in QuickSpecs sections was updated.
		Changed	SKUs added in Models section: 764284-B21, 764285-B21, 764286-B21, 808722-B21, 808722-B22, 808722-B23, 808722-B24, 808722-B25, 808722-B26, 808722-B27, 808722-B28, 498385-B26, 498385-B27, JG325A, JG326A, JG327A, JG328A, 655874-B21, 453151-B21, 453154-B21, 487649-B21, 487652-B21, 487655-B21, 537963-B21, 487658-B21, 455883-B21, 455886-B21
		Changed	Obsolete SKUs were deleted: BD569A, BD573A, BD574A, 498386-B23, 498386-B24, 498386-B25, 498386-B26, 498386-B27, 498386-B28, JG325A.
18-Apr-2014	Version 24	Changed	Changes made in Service and Support section.
18-Feb-2014	Version 23	Changed	Changes made throughout the QuickSpecs.
25-Mar-2013	Version 22	Changed	Models: Removed Voltaire IB Swatches and Options section.
04-Dec-2012	Version 21	Changed	Changes were made in Overview and Models sections.
13-Aug-2012	Version 20	Changed	Changes made throughout the QuickSpecs.
26-Mar-2012	Version 19	Changed	Changes made in the Models section only.
06-Mar-2012	Version 18	Changed	Changes made throughout the QuickSpecs.
10-Feb-2012	Version 17	Removed	Removed several part numbers from the At A Glance and Models sections.

12-Aug-2011	Version 16	Changed	Model descriptions were revised.
23-Jun-2011	Version 15	Changed	Link was corrected in Service and Support.
29-Apr-2011	Version 14	Removed	Removed part number 450716-B21 from the Models section.

Date	Version History	Action	Description of Change
08-Apr-2011	Version 13	Changed	Part number was changed for QLogic InfiniBand Fabric Suite (IFS) in QLogic IB switches and options and Service and Support was completely revised.
12-Nov-2010	Version 11	Changed	InfiniBand/Ethernet Gateway switches were added and all mentions of active copper were removed.
03-Sep-2010	Version 10	Changed	Additional Features was changed to Service and Support and HPE 2-Port DDR/QDR QSFP/CX4 IB Cu Cable - 2 Meter was removed from InfiniBand QSFP/CX4 Copper Cables in Models.
21-Jun-2010	Version 9	Changed	Voltaire IB 2-Port DDR 36-port internally managed switch with reversed airflow fan, Voltaire IB 2-Port QDR 162-Port switch chassis and Voltaire IB 2-Port QDR 162-Port switch fabric board were added to Models.
08-Dec-2009	Version 8	Changed	Voltaire 1500 Watt Power Supply was added to Voltaire IB switches and options and QLogic BLc 2-Port QDR IB Management Module was added to QLogic IB switches and options.
16-Nov-2009	Version 7	Changed	Changes were made throughout the QuickSpecs.
25-Sep-2009	Version 6	Changed	HPE 2-Port DDR/QDR QSFP IB Cu Cable - 7 meter Mellanox OFED for Linux and Mellanox WinOF for Microsoft Windows HPC server 2008
02-Jun-2009	Version 5	Changed	40Gbps (QDR) and 20Gbps (DDR) InfiniBand products to the Introduction in the Overview DL160 G6 throughout At A Glance in the Overview section Mellanox IB QDR 324P Switch Chassis throughout the QuickSpecs InfiniBand QSFP Active Copper Cables to the Models section
13-Apr-2009	Version 4	Changed	Edits were made throughout the Overview section Completely revised the Scalability and Reliability section and Auto-negotiation/self-discovery and Management in the InfiniBand fabric Management section Updated InfiniBand HCA cards and Power requirement in the Technical Specifications section
		Changed	Cisco IB OFED-based driver per node software license from HPE IB PCI HCA cards and drivers for ProLiant and Integrity servers in the Models section Subnet Manager from the InfiniBand Fabric Management section Standard Support section from HPE Services and Support in the Additional Features
03-Apr-2009	Version 3	Changed	HPE IB 2-Port QDR Conn-X PCI-e Dual-port HCA to HPE IB PCI HCA cards, and drives for ProLiant and Integrity servers and Voltaire IB 2-Port QDR 36-port Internally Managed Switch to Voltaire Switches and host-based subnet manager from HPE in the Models section.
30-Jan-2009	Version 2	Changed	Changed Power Supply amounts in the NOTE for Voltaire IB DDR Rev B96-port Switch Chassis and removed "with 3 yrs software support" from Voltaire Gridstack per HCA software license and Cisco IB

			OFED-based driver per node software license in the Models section.
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15-Sep-2008	Version 1	Added	What's New section to the Overview Voltaire 22P IB 10GE Line board to the Voltaire switches and host-based subnet manager from HPE section of the Models InfiniBand QSFP/CX4 Copper Cables and InfiniBand QSFP Copper Cables sections to the Models
		Changed	NOTEs section of Voltaire IB DDR Rev B 96-port Switch Chassis, Voltaire IB DDR Rev b 288-port Switch Chassis and Voltaire IB DDR Rev b 24-port Line Board to the Voltaire switches and host-based subnet manager from HPE section of the Models InfiniBand CX4 Copper Cables and InfiniBand CX4 Fiber Optic Cables section in the Models

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