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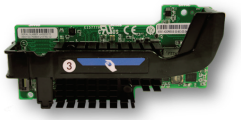
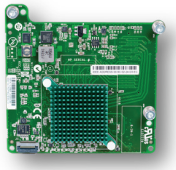
CONNECT - DATA SHEET

Dual-Port 10/20Gb HP FlexFabric Adapters for HP ProLiant Gen9 Server Blades for c-Class BladeSystem

HP FlexFabric 10/20Gb 2-port 650FLB FlexibleLOM Adapter (HP Part # 700763-B21)
HP FlexFabric 10/20Gb 2-port 650M Mezzanine Adapter (HP Part # 700767-B21)



HP FlexFabric 650FLB FlexibleLOM Adapter



HP FlexFabric 650M Mezzanine Adapter

Overview

Based on the Emulex fourth-generation OneConnect® Converged Network Adapter (CNA) technology, the 20Gb Ethernet (20GbE) 2-port HP 650FLB and 650M adapters are the industry's first CNAs to support Local Area Network (LAN), Storage Area Network (SAN) and RDMA over Converged Ethernet (RoCE) on a single 10GbE or 20GbE wire.

The HP FlexFabric 650FLB and 650M are multi-speed adapters that can operate at either 10GbE or 20GbE depending on the switch or Virtual Connect Ethernet Module they are connected to, providing flexibility and scalability to end users. With support for both Flex-10 and Flex-20 (Flex-10/20), the 650FLB and 650M adapters deliver high performance for HP ProLiant Gen9 server blades for the c-Class BladeSystem enclosure. The form factor for the 650FLB is a FlexibleLOM, or modular LAN on motherboard (LOM), whereas the form factor for the 650M is a mezzanine adapter (Type A).

The HP FlexFabric 650FLB and 650M adapters offer more scalable virtualization with support for enhanced Single-Root I/O Virtualization (SR-IOV), RDMA over Converged Ethernet (RoCE), Virtual Connect Flex-10/20 port partitioning and next-generation overlay networking technologies that address the requirements of virtual machine (VM) mobility and massive scaling of Layer 2 subnets inside private or hybrid cloud infrastructures. For HP ProLiant Gen9 servers, HP adapters provided by Emulex deliver:

- Virtual Network Exceleration™ (VNeX™) offload virtualization suite
- Microsoft SMB Direct with RoCE
- More than one million I/O operations per second (IOPS) for both iSCSI and Fibre Channel over Ethernet (FCoE) - 2x higher than previous generations of Emulex offloads[1]
- Up to 4x better small packet processing performance than the previous generation adapter[1]
  - Ideally suited for messaging, social media user posts and mobile streaming video applications

VNeX overlay network tunnel offloads for IT agility and secure scalability

Together, HP and Emulex deliver VNeX, a superior overlay networking solution for both HP ProLiant BladeSystem Gen9 and HP ProLiant Gen9 rack servers. HP FlexFabric 10/20GbE networking solutions include the industry's only hardware offload support for Virtual Extensible Local Area Network (VXLAN) and Network Virtualization using Generic Routing Encapsulation (NVGRE) tunnels. These solutions are designed to simplify VM mobility and network scalability while optimizing server performance when compared to adapters that lack offload capability.

Emulex VNeX tunnel offload technology is powered by a multi-core adapter ASIC engine that accelerates the performance of overlay networking. By offloading the Ethernet packet header encapsulation process, while simultaneously preserving legacy stateless TCP offloads, Emulex VNeX provides full native network performance with reduced server CPU utilization in an overlay network environment, enabling greater VM density. It also results in higher server power efficiency, reducing data center energy and cooling expenses. Additionally, this technology allows HP customers to massively scale secure isolated networks to meet the growing demands of simultaneously servicing many user groups.

Key features

- Storage, network and RDMA traffic over a common 10/20GbE infrastructure
- SMB Direct with RoCE support
- Superior performance:
  - Overlay network tunneling offloads (VXLAN and NVGRE)
  - iSCSI and FCoE storage protocols offload
  - TCP/IP stateless offloads
- VMware vSphere NetQueue support
- Microsoft Windows Server VMQ and Dynamic VMQ support

Key benefits

- Perform vMotion or Live Migration without reconfiguring network resources
  - Save up to $1,800 per migration event[2]
- Reduce capital and operational expenditures (CAPEX and OPEX) with maximized server efficiency[1]
  - Increase throughput up to 129%
  - Increase server CPU effectiveness up to 46%
  - Improve server power efficiency up to 122%
- Provision secure, multi-tenant cloud-scale networks
  - Exceed the typical 4096 VLAN limit to enable support for larger numbers of tenants/user groups

[1] IT BrandPulse Test Report, "OCe14000 Performance," July, 2014

[2] Allwyn Sequeira, CTO and VP, Security & Networking, VMware, presentation at Open Networking Summit, April, 2012

Dual-Port 20Gb HP FlexFabric Adapters for HP ProLiant Gen9 Server Blades for c-Class BladeSystem

Optimized bandwidth allocation with Virtual Connect Flex-10 and Flex-20

Virtual Connect Flex-10/20 allows multiple PCI functions to be created on each network adapter card port. Each port on the HP FlexibleLOM and mezzanine adapters can be configured as either four NIC functions (FlexNICs), three FlexNIC functions and one iSCSI or FCoE storage function, or two FlexNIC functions, one iSCSI storage function, and one FCoE storage function. Virtual Connect Flex-10/20 is ideal for virtualized server environments because bandwidth allocation can be optimized to support I/O intensive applications, virtualization services and server management functions.

Accelerated Microsoft applications performance with SMB Direct with RoCE support

RDMA reduces CPU utilization and data latency and improves throughput by bypassing the host TCP/IP stack. SMB Direct with RoCE leverages Converged Ethernet, also known as Data Center Bridging (DCB), as a lossless physical layer networking medium. The RoCE architecture removes the TCP/IP stack and a data copy step. This technology works by seamlessly sensing, without user action or intervention, the presence of an SMB Direct RDMA compliant adapter and switching from standard TCP/IP networking to SMB Direct mode.

Flexible storage connectivity using FCoE and iSCSI hardware offloads

The HP FlexibleLOM and mezzanine adapters support FCoE offload using the same field-proven Emulex drivers that work with Emulex LightPulse® Fibre Channel Host Bus Adapters (HBAs). They also support hardware iSCSI offload, delivering performance that is superior to iSCSI solutions based on software initiators and standard NICs. Finally 10/20GbE FlexibleLOM and mezzanine adapters also have the ability to support NIC and iSCSI or FCoE offloads on the same physical port with HP Virtual Connect Flex-10/20 technology.

Optimized host server virtualization density using SR-IOV

SR-IOV optimizes I/O for VMs, enabling higher host server virtualization ratios to deliver maximum server return on investment (ROI). SR-IOV provides a more cost-effective solution than multiple physical adapter ports. SR-IOV enables multiple VMs to directly access the HP adapters' I/O resources, thus allowing the VM's network I/O to bypass the hypervisor's virtual switch and take a path directly between the VM and the adapter, eliminating redundant I/O processing in the hypervisor. This, in turn, allows higher I/O performance and lower CPU utilization as compared to the alternative of software-emulated NIC devices that are implemented in the hypervisor.

Simplified management using a host of HP management tools including HP OneView or Emulex OneCommand® Manager application

The HP FlexibleLOM and mezzanine adapters support both HP as well as Emulex management tools. HP OneView provides fast, efficient, secure local and remote deployment, configuration and update capabilities. The Emulex OneCommand Manager application provides centralized management of HP adapters based on Emulex OneConnect CNAs and LightPulse HBAs throughout the data center from a single management console. The OneCommand Manager application provides a graphical user interface (GUI) and a scriptable command line user interface (CLI). OneCommand Manager for VMware is fully integrated with VMware vCenter, enabling "single pane of glass" management for VMware deployments.

Enterprise-class performance and reliability

Leveraging four generations of advanced, field-proven controller and adapter technology, the HP FlexibleLOM and mezzanine adapters meet the robust interoperability and reliability requirements of enterprise cloud and scale-out data centers.

HP ProLiant Gen9 servers enhance virtualization

Industry leading CPU effectiveness (Gbps/% of CPU utilized)

- Increased VM density
- Higher ROI on Server CAPEX
- Higher power efficiency (throughput per watt)

Industry-leading VMware throughput

- Better application performance
- More simultaneous vMotion and Hyper-V migrations

vCenter plug-in and vSphere web client

- Single pane of glass management

SMB Direct / RoCE

- Accelerate application file storage I/O by up to 82% compared to previous generation Emulex adapters without RoCE[3]
- Deliver up to 80% better server electrical power efficiency than adapters not using RoCE[3]

SR-IOV with Flex-10/20

- Enhancement of Virtual Connect & FlexFabric
- Direct Assignment and ability to maintain Service Level Agreements (SLAs)
- Up to 48 virtual functions (VFs) in Flex-10/20 mode

[3] IT Brand Pulse TECHBRIEF2013005 v18 November, 2014

Dual-Port 20Gb HP FlexFabric Adapters for HP ProLiant Gen9 Server Blades for c-Class BladeSystem

Controller

- Emulex Engine, XE104

Ethernet standards

- IEEE 802.3-2008 10GBASE Ethernet ports
- IEEE 802.3ae 10Gb Ethernet over Fiber
- IEEE 802.1p QoS Tagging
- IEEE 802.1Q virtual LANs (VLAN)
- IEEE 802.3x Flow control with Pause frames
- IEEE 802.1Qbg Edge Virtual Bridging
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS)and Data Center Bridging Capability Exchange(DCBX)
- IEEE 802.1Qbb Priority Flow Control (PFC)
- IEEE 802.3ad Link Aggregation/LACP
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
- IEEE 802.3ap Backplane Ethernet

Ethernet network interface (Layer 2 NIC) and TCP/IP

- NDIS 6.0, 6.1, 6.2, 6.3 and 6.4-compliant Ethernet Functionality
- IPv4 (RFC 791) and IPv6 (RFC 2460 & 3513)
- IPv4/IPv6 TCP, UDP checksum offload
- IPv4/IPv6 Receive Side Scaling (RSS)
- IPv4/IPv6 Large Receive Offload (LRO)
- IPv4/IPv6 Large Send Offload (LSO)
- Dynamic VMQ (Windows Server 2012 Hyper-V) and NetQueue (VMware vSphere)
- Programmable MAC and VLAN addresses
- 128 MAC/VLAN addresses per port
- Support for hash-based Multicast MAC address filters
- Support for hash-based Broadcast frame filters per port
- VLAN Offloads (insertion and extraction)
- Jumbo packet support up to 9000 Bytes

I/O virtualization

- Stateless L2, L3, and L4 offloads for frame in frame encapsulation (VXLAN, NVGRE)
- PCI-SIG Address Translation Service (ATS) v1.0
- Support for up to 512 hardware queues
- Virtual Switch Port Mirroring for diagnostic purposes
- Virtual Ethernet Bridging (VEB)
- HP Virtual Connect Flex-10/20 supports up to four NIC partitions or functions per physical port; one or two functions can be a storage function (iSCSI or FCoE)
- NIC SR-IOV supports up to 63 Virtual Functions (VFs) per port for NIC
- QoS for controlling and monitoring bandwidth assigned to and used by virtual entities
- Configurable control of network bandwidth by physical port, queue, or protocol
- Traffic Shaping and QoS across each VF and Physical Function (PF)

Fibre Channel over Ethernet (FCoE) offload

- Hardware offload for FCoE Protocol
- ANSI T11 FC-BB-5 Support
- Programmable World Wide Name (WWN)
- Support for FIP and FCoE Ether Types
- Concurrent Logins (RPI): up to 8K per adapter (FCoE adapter-only mode)
- Open Exchanges (XRI): up to 8K per adapter (FCoE adapter-only mode)
- Supports up to 255 NPIV interfaces
- Concurrent FCoE and iSCSI support on each port

iSCSI offload

- Hardware offload for iSCSI protocol
- Header and data digest support
- Up to 4K outstanding commands (iSCSI adapter-only mode)
- Up to 512 offloaded iSCSI connections
- Support for multipath I/O
- Operating System-agnostic INT13 based iSCSI boot and iSCSI crash dump support
- RFC 4171 Internet Storage Name Service (iSNS)
- Support for both IPv4 and IPv6 connections
- MTU packet size support up to 8342 bytes
- Concurrent iSCSI and FCoE support on each port

Converged Enhanced Ethernet (CEE) and Data Center Bridging (DCB)

- IEEE 802.1Qbb Priority Flow Control (PFC)
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS) and Data Center Bridging Exchange (DCBX)
- Absolute per-priority rate control option/ configuration

Remote Direct Memory Access (RDMA)

- Direct data placement in application buffers without CPU intervention
- Supports IBTA RoCE specifications
- Linux Open Fabrics Enterprise Distribution (OFED) support
- Low latency queues for small packet sends and receives
- Windows Server SMB Direct (SMB over RoCE)

PCI Express (PCIe) interface

- PCIe 3.0 x8 (8, 5.0, and 2.5 GT/s per lane) compliant interface:
  - Up to 64 Gb/s full duplex bandwidth
- Supports up to 4 PCIe PFs per port
- SR-IOV:
  - Supports up to 63 PCIe VFs for NIC per port
- Up to 704 Message Signal Interrupts (MSI-X)
- Advanced Error Reporting (AER)
- Completion Timeout (CTO)
- Function Level Reset (FLR)

Comprehensive OS support

- Windows Server
- Red Hat Enterprise Linux
- Novell SUSE® Linux Enterprise Server
- VMware ESX
- Citrix XenServer

Management, boot support

- Support for HP OneView
- Support for Emulex OneCommand Manager Management Application for configuration and control
- VMware vCenter management plugin support
- Role-based management, integrated with Active Directory and LDAP
- Flexible personality definition for networking and storage protocols
- Multi-channel configuration and bandwidth control
- UEFI and x86 remote boot support including PXE v2.1, UEFI 2.3.1, iSCSI and FCoE
- Offline and online firmware updates
- Integrated Thermal Sensor works with management utilities

HP Flex-10 and HP Flex-20 support

- Up to 4 physical function NICs per port
- 100Mb/s to 20Gb/s speeds, including 10GbE

Interconnect compatibility

- HP Virtual Connect FlexFabric-20/40 F8 Modules
- HP Virtual Connect Flex-10/10D Modules
- HP 6125XLG Ethernet Blade Switch

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Hardware environments

ProLiant Gen9
- BL460c
- BL660c

ProLiant Gen8
- HP ProLiant 460c
- HP ProLiant 660c

Interconnect

Copper
- SFP+ Direct Attached Twin-Ax Copper interface
- Standards compliant passive and active copper cables supported up to 5m

Optical
- 10GBASE-SR short wave optic transceivers (ordered separately)

Physical dimensions

- Supported only in Gen8 and Gen9 c-Class servers, which comes with Type A mezzanine slots
- Up to three adapters per full height server, two per half height server

Environmental requirements

- Operating temperature: 0° to 55°C (32° to 131°F)
- Storage temperature: -40° to 70°C (-40° to 158°F)
- Relative humidity (storage): 10% to 90% non-condensing

Agency Approvals

North America
- FCC Class A
- UL/CSA Recognized
- Class 1 Laser Product per DHHS 21CFR (J)

Australia / New Zealand
- C-Tick Mark

Europe
- CE Mark
- EU RoHS compliant
- TUV Bauart Certified
- Class 1 Laser Product per EN60825-1

Japan
- VCCI Class A

Taiwan
- BSMI Class A

Korea
- MSIP (formally KCC/MIC) Class A

China
- China RoHS Compliant

Ordering Information

650FLB
- Part# 700763-B21 (FlexibleLOM for blade servers (bLOM))

650M
- Part# 700767-B21 (Mezzanine adapter for blade servers)

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