# Advanced 10GbE networking with Dual-Port 10Gb HP Ethernet, FlexFabric and StoreFabric Adapters for HP ProLiant Gen8 and Gen9 Rack Servers
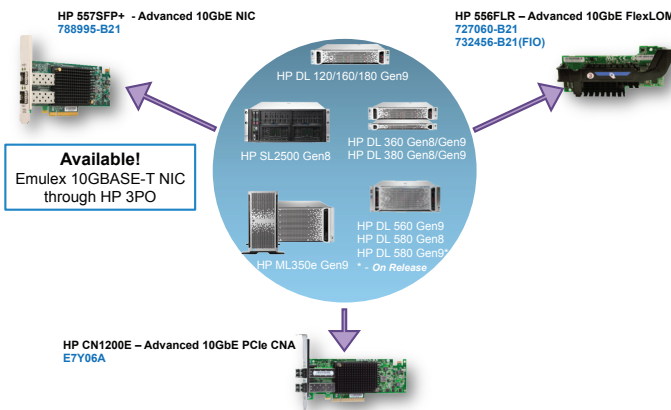
HP Ethernet 10Gb Dual-port 557SFP+ Adapter (788995-B21)
HP FlexFabric 10Gb Dual-port 556FLR-SFP+ FlexibleLOM (HP Part # 727060-B21)
HP StoreFabric 10Gb Dual-port HP CN1200E CNA (HP Part # E7Y06A)

## Overview

Based on fourth generation Emulex XE100 series of Ethernet Controller technology, HP offers a complete family of 10Gb Ethernet (10GbE) network and converged network adapters (CNA). These adapters exclusively support Local Area Network (LAN), Storage Area Network (SAN) and RDMA over Converged Ethernet (RoCE) capabilities on a single 10GbE hardware platform.



The HP 557SFP+, HP 556FLR-SFP+ and CN1200E adapters exclusively offer more scalable virtualization with support for enhanced Single Root I/O Virtualization (SR-IOV), RoCE and tunnel offloads for 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 Gen8 and Gen9 rack and tower servers, HP adapters provided by Emulex deliver:

- Emulex Virtual Network Exceleration™ (VNeX) offload virtualization suite
- Superior Microsoft applications performance (SQL Server, Exchange, SharePoint, IIS) with SMB Direct over RoCE offload
- Over one million I/O operations per second (IOPS) for both iSCSI and Fibre Channel over Ethernet (FCoE) storage offloads

### VNeX overlay network tunnel offloads for IT agility and secure scalability

Together, HP and Emulex are delivering a superior overlay networking solution for HP ProLiant Gen8 and Gen9 rack servers. HP 10GbE networking solutions from Emulex 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.

## Advanced Performance

- Accelerated private/hybrid cloud networking
  - Up to146% higher throughput on VXLAN overlay networks compared to BE3 adapter without VXLAN hardware offload[1]
- Accelerate Microsoft Enterprise Applications storage I/O performance
  - Up to 82% higher IOPS with Microsoft SMB Direct over RoCE compared to BE3 adapter without RoCE[2]
- Higher telco NFV, messaging, VOIP applications throughput
  - Up to 4x higher small packet performance compared to previous generation[1]

## Value

- Perform vMotion or Live Migration without networking reconfigurations
  - Save up to $1800 per VM migration[3]
- Lowered energy operating expenses with higher throughput/watt
  - Increase host power efficiency, (measured in Mbps/watt) by 122% using tunnel offload[1]
  - Higher server CAPEX ROI

## Simplicity

- Driver/image compatible with Gen8 servers
- Single-pane management with VMware vCenter plug-in software HP iLO integrated
- HP iLO integrated

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

[2] IT BrandPulse Technology Brief, "Blade Server I/O and workloads of the future", October 2014

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

# Dual-Port 10Gb HP Ethernet, FlexFabric and StoreFabric Adapters for HP ProLiant Gen8 and Gen9 Rack Servers

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 higher server CPU effectiveness 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, overlay networks allow HP customers to massively scale secure isolated networks to meet the growing demands of simultaneously servicing many user groups in private/hybrid cloud environments.

### Accelerated Microsoft applications performance with SMB Direct over RoCE storage I/O
Microsoft enterprise applications including SQL Server, Exchange, IIS and Hyper-V can now connect to file server clusters for high performance storage.

SMB Direct storage I/O uses RDMA support in the adapters to improve throughput by bypassing the host TCP/IP stack. SMB Direct over RoCE leverages Converged Ethernet, also known as Data Center Bridging (DCB), as a lossless physical layer networking medium. The RoCE architecture bypasses the TCP/IP stack and a data copy step. This technology works by seamlessly sensing, without user action or intervention, the presence of the HP SMB Direct over RoCE 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 StoreFabric CNAs support FCoE offload using the same field-proven Emulex drivers that work with Emulex LightPulse® Fibre Channel (FC) Host Bus Adapters (HBAs). They also support hardware iSCSI offload, delivering performance that is superior to iSCSI solutions based on software initiators and standard Network Interface Cards (NICs). Finally, 10GbE FlexibleLOM and StoreFabric CNAs also have the ability to support NIC and iSCSI or FCoE offloads on the same physical port. The 556FLR-SFP+ and CN1200E adapters support storage connectivity, with support for up to three functions per port when connected to a switch that supports DCB. Each port can be configured as one NIC function; one NIC function and one iSCSI or FCoE function; or one NIC function, one iSCSI function, and one FCoE function.

### 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 from the VM to 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 PCI Express (PCIe) 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 FC 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.

### HP ProLiant Gen9 servers enhance virtualization
**Industry leading CPU effectiveness (Gbps/% of CPU utilized)[2]**
- Increased VM density
- Higher ROI on server CAPEX
- Higher server power efficiency (throughput per watt)

**Industry leading VMware throughput[4]**
- Better application performance

**vCenter plug-in and vSphere web client**
- Single pane of glass management

[4] Compared to other top-tier HP adapter suppliers (Emulex Labs tested)

# Dual-Port 10Gb HP Ethernet, FlexFabric and StoreFabric Adapters for HP ProLiant Gen8 and Gen9 Rack Servers

### Controller

· Emulex Engine™ (XE)100 series (Skyhawk™) of Ethernet Controllers

### 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)

### 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 in L3 (MAC in UDP or MAC in IP) encapsulration
· 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)
· 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 (only applies to FlexFabric and StoreFabric adapters)

· 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

### Internet Small Computer System Interface (iSCSI) offload (only applies to FlexFabric and StoreFabric adapters)

· 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
· Low latency queues for small packet sends and receives
· Windows Server SMB Direct (RoCE)

### PCI Express (PCIe) Interface

· PCIe 3.0 x8 (8, 5.0, and 2.5GTps per lane) compliant interface:
  - Up to 64Gbps 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 Extended (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 plug-in 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

### Hardware environments

**ProLiant Gen8 and Gen9**
· DL 180
· DL 580 (Gen8 until Gen9 release)
. DL 560
· DL 360
· DL 380
· ML 350
· SL 2500 (Gen8 until Gen9 Release)

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## 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
· Full height with standard bracket
· Low profile bracket also available

## 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

### 556FLR-SFP+
· Part # 727060-B21 (Advanced 10GbE FlexibleLOM for rack servers (aLOM))

### HP 557SFP+
· Part# 788955-B21 (Dual-port Advanced 10GbE PCIe adapter for rack servers)

### CN1200E
· Part# E7Y06A (PCIe adapter for rack servers)

## EMULEX®