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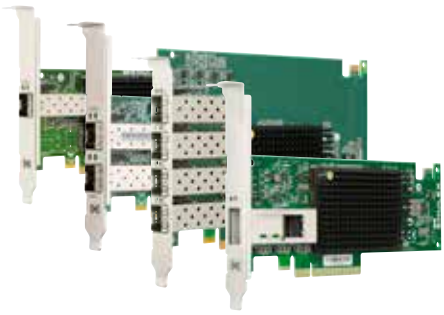
OCe14000 10Gb and 40Gb Ethernet Network Adapters

High Performance Networking for Enterprise Virtualization and the Cloud



OneConnect OCe14000 Family

Overview

As the fourth generation of the Emulex OneConnect® product line, the OCe14000 family of Ethernet network adapters provides high performance 10Gb Ethernet (10GbE) and 40GbE connectivity delivering multiple benefits for the enterprise cloud, including:

- Increasing data center IT agility and scalability through deployment of a secure multi-tenant cloud
- Optimizing server hardware utilization by scaling high density virtualization
- Delivering user-controlled bandwidth partitioning across workloads and management services
- Choice of single-port, dual-port or quad-port 10GbE SFP+ or single-port 40GbE QSFP+ PCIe adapters

The OCe14000 family of 10GbE and 40GbE network adapters is designed for the high bandwidth and scalability demands of enterprise applications, more scalable virtualization with support for RDMA traffic over Converged Ethernet (RoCE), enhanced Single-Root I/O Virtualization (SR-IOV) and NIC port partitioning, and next-generation overlay network technologies that address the requirements virtual machine (VM) mobility and massive scaling of Layer 2 subnets inside private or hybrid cloud infrastructures.

Emulex Virtual Network Exceleration (VNeX™) overlay network offloads for multi-tenant cloud networking

Scaling existing technologies for private or public multi-tenant infrastructures requires networking solutions that can enable VM-to-VM communication and virtual workload migration across Layer 2 and Layer 3 boundaries without impacting connectivity or performance.

At the same time, these solutions need to ensure isolation and security for thousands or millions of tenant networks. However, with existing technology, the available 4094 VLAN IDs are insufficient to isolate/secure each tenant in a data center (private cloud) or hybrid cloud environment.

Virtual Extensible Local Area Network (VXLAN) supported by VMware and Linux, and Network Virtualization using Generic Routing Encapsulation (NVGRE) ('supported by Microsoft') are next-generation overlay networking solutions that address these requirements. These solutions are a frame-in-frame data packet encapsulation scheme enabling the creation of virtualized Layer 2 subnets that can span physical L3 IP networks. Traffic from each VM is tunneled to a specific virtual network; the packets are then routed transparently over the existing physical infrastructure.

Key benefits

- Maximizes server hardware ROI with high virtual machine density
- Simplifies deployment of secure, scalable multi-tenant cloud infrastructures
- Accelerates applications performance
- Quad-port 10GbE SFP+ or single-port 40GbE QSFP+ Ethernet adapters for applications requiring 40GbE full-duplex bandwidth using a single PCIe for slot constrained server platforms
- Reduces complexity through the deployment of a common network platform
- Reduces management, infrastructure and energy costs

OneConnect™ OneCommand™

OCe14000 10Gb and 40Gb Ethernet Network Adapters

Emulex VNeX offload technology powered by a multi-core adapter ASIC engine accelerates the performance of network virtualization by preserving legacy stateless TCP offloads and scaling methods on encapsulated packets, providing full native network performance in a virtual network environment.

Remote Direct Memory Access (RDMA) support

The OCe14000 adapters leverage RoCE enabling server to server data movement directly between application memory without any CPU involvement providing high throughput and data acceleration on a standard Ethernet fabric without the need for any specialized infrastructure or management.

Optimized host virtualization density with SR-IOV support

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 OCe14000's I/O resources, thus allowing VM networking I/O to bypass the host 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, lower CPU utilization and significantly reduced latency as compared to the alternative of software-emulated Network Interface Card (NIC) devices that are implemented in the hypervisor.

Optimized bandwidth allocation with Emulex Universal Multi-Channel™ port partitioning

Emulex Universal Multi-Channel (UMC) is ideal for virtualized server environments because bandwidth allocation can be optimized to support virtual machine migration, management and I/O intensive applications. UMC allows multiple Peripheral Component Interconnect (PCI) physical functions to be created on each adapter port. Each OCe14000 adapter can be configured with up to 16 functions.

Available Quad-port 10GbE SFP+

Use cases such as Content Delivery Network (CDN) and hosting providers have standardized on 10GbE and often are looking for more bandwidth per server for the services they provide.

The Emulex quad-port 10GbE model (OCe14104) delivers 40GbE full-duplex bandwidth using a single PCIe slot. An additional benefit of this configuration is utilization of existing 10GbE SFP+ switch connections versus buying new 40GbE QSFP+ switches.

Simplified management Emulex OneCommand® Manager application

Emulex OneCommand Manager provides centralized management of Emulex OneConnect Converged Network Adapters (CNAs) and LightPulse® Host Bus Adapters (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 to simplify management for virtual server deployments.

Fourth generation platform delivers enterprise-class reliability and performance

Leveraging generations of advanced, field-proven controller and adapter technology, OCe14000 adapters meet the robust interoperability and reliability requirements of enterprise and scale-out data centers.

Key features

- Superior network scalability—10GbE or 40GbE bandwidth on common software platform
- SR-IOV
- Data acceleration with RoCE support
- Powerful hardware offload for:
  - Overlay networks (NVGRE and VXLAN)
  - Stateless TCP
- Greater bandwidth with PCIe 3.0
- VMware vSphere NetQueue with RSS support
- Microsoft Windows Server VMQ, Dynamic VMQ, RSS and vRSS support

OCe14000 10Gb and 40Gb Ethernet Network Adapters

Controller

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

Ethernet standards

- Single IEEE 802.3-2012 40GBASE Ethernet port (40GBASE-SR4/40GBASE-CR4)
- Single or Dual IEEE 802.3-2012 10GBASE Ethernet ports (10GBASE-SR/10GBASE-LR/10GBASE-CR)
- Single or dual 1GBaseX/SGMII auto negotiation
- IEEE 802.1Q virtual LANs (VLAN)
- IEEE 802.3-2012 Flow control with Pause frames
- IEEE 802.1Qbg Edge Virtual Bridging
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS); Data Center Bridging Capability Exchange (DCBX)
- IEEE 802.1Qbb Priority Flow Control (PFC)
- IEEE 802.1AX Link Aggregation/LACP
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
- IEEE 802.1Qau Congestion Notification

Ethernet Network Interface (Layer 2 NIC) and TCP/IP

- NDIS 6.0, 6.2, 6.3-compliant Ethernet functionality
- 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 frame 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)
- Virtual Ethernet Port Aggregator (VEPA)
- Emulex Universal Multi-Channel™ (UMC), support for up to 16 PCIe physical functions (PFs) per adapter which can be used as partitions as follows:
  - OCe14401 Ethernet adapter, the port can support 16 NIC functions
  - OCe14101, OCe14102 Ethernet adapters, each port can support eight NIC functions
  - OCe14104 Ethernet adapters, each port can support four NIC functions
  - Note: the system hardware must support and enable ARI and the host operating system must support ARI for maximum number of functions to be enabled; see Emulex UMC manual for more details
- NIC Single Root I/O Virtualization (SR-IOV)
  - up to 63 virtual functions (VFs) per port
- Quality of Service (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 PF

Converged Enhanced Ethernet (CEE) and Datacenter Bridging (DCB)

- IEEE 802.1Qbb Priority Flow Control (PFC)
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS)
- IEEE 802.1Qaz Data Center Bridging Exchange (DCBX)
- IEEE 802.1Qau Congestion Notification (QCN)
- 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
- Support for Linux Network File System (NFS) over RoCE, iSCSI Extensions for RDMA (iSER)
- Low latency queues for small packet sends and receives
- Windows Server SMB Direct (SMB over RDMA)

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
  - Configurable width and speed to optimize power versus bandwidth
- Support for up to 16 PCIe physical functions (PFs)
- Support for x1, x2, x4, and x8 links widths
- NIC Single Root I/O Virtualization (SR-IOV)
  - up to 63 virtual functions (VFs) per port
- Message Signal Interrupts Extended (MSI-X)
- Advanced Error Reporting (AER)
- Completion Timeout (CTO)
- Function Level Reset (FLR)
- Alternative Routing ID Interpretation (ARI)

Comprehensive OS support

- Windows
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- Oracle Linux
- VMware vSphere
- CentOS
- Debian
- Ubuntu
- FreeBSD

Management, boot support

- vCenter management plugin support
- Role-based management, integrated with Active Directory and LDAP
- Multi-channel configuration and bandwidth control
- UEFI and x86 remote boot support including PXE v2.1, UEFI 2.3.1
- MAC statistics gathering (SNMP, Ethernet MIB, MIB2, RMON, RMON2)
- Offline and online firmware updates
- Integrated thermal sensor works with management utilities

Hardware environments

- x86, x64 servers

Please refer to the product page on www.emulex.com for further details.

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Interconnect

Copper

- SFP+ Direct Attached Twin-Ax Copper interface
- Standards compliant passive copper cables up to 5m and active copper cables up to 10m

Optical

- Optic 10GBASE-SR short wave lasers with LC type connector supported up to 300m on laser-optimized OM3 multimode fiber (MMF) cables
- Optic 40GBASE-SR4 short wave lasers with MPO type connector supported up to 100m for OM3 and 150m for OM4 respectively on MMF cables
- Optic 10GBASE-LR long wave lasers with LC type connector supported up to 10Km single mode fiber (SMF) cable, Ethernet use only

Physical dimensions

- For 1-port and 2-port adapters
  - Short, low profile MD2 form factor card
  - 167.64mm x 68.91mm (6.60" x 2.71")
  - Standard, full height bracket installed (low-profile bracket ships in box)
- For 4-port adapters:
  - Standard, full-height form factor
  - 167.64 mm by 111.15 mm (6.60" x 4.376")
  - Standard, full height bracket installed

Environmental requirements

- Operating temperature: 0° to 55°C (32° to 131°F)
- Storage temperature: -40° to 70°C (-40° to 158°F)
- Relative humidity: 5% to 95% non-condensing

Agency and product safety approvals

North America

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

Europe

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

Australia

- C-Tick or RCM Mark

Japan

- VCCI Class A

Taiwan

- BSMI Class A

Korea

- MSIP (formally KCC/MIC) Class A

China

- China RoHS Compliant

Ordering information

Adapters[1]

OCe14101-NX
- Single-port, 10GBASE-CR (direct attach copper) SFP+, Ethernet Network Adapter

OCe14101-NM
- Single-port, 10GBASE-SR (short reach optical) SFP+, Ethernet Network Adapter, Optics included

OCe14102-NX
- Dual-port, 10GBASE-CR (direct attach copper) SFP+, Ethernet Network Adapter

OCe14102-NM
- Dual-port, 10GBASE-SR (short reach optical) SFP+, Ethernet Network Adapter, Optics included

OCe14104-NX
- Quad-port, 10GBASE-CR (direct attach copper) SFP+, Ethernet Network Adapter

OCe14104-NM
- Quad-port, 10GBASE-SR (short reach optical) SFP+, Ethernet Network Adapter, Optics included

OCe14401-NX
- Single-port, 40GBASE-CR4 (direct attach copper) QSFP+, Ethernet Network Adapter

Optional Accessories[2]

OC10-SR-OPT-1
- 10GBASE-SR (short reach optical) SFP+ Optical Kit, 1 pc

OC10-SR-OPT-2
- 10GBASE-SR (short reach optical) SFP+ Optical Kit, 2 pcs

OC10-LR-OPT-1
- 10GBASE-LR (long reach optical) SFP+ Optical Kit, 1 pc, for Ethernet use only

OC40-SR4-OPT-1
- 40GBASE-SR4 (short reach optical) QSFP+ Optical Kit, 1pc

[1] For optical adapter support, a customer must either order a short reach optical model or a direct attach copper model with an Emulex accessory transceiver kit.

[2] Only Emulex Accessories are warranted and fully supported by Technical Support.

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