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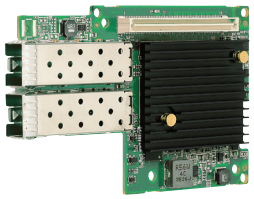
OCm14000-OCP 10GbE Converged Network Adapter

High Performance Networking for Enterprise Virtualization and the Cloud



OCm14102-UX-OCP 10GbE Converged Network Adapter

The OneConnect® OCm14000-OCP 10Gb Ethernet (10GbE) Converged Network Adapter (CNA) provides high performance 10GbE connectivity in an Open Compute Project (OCP) mezzanine card form factor.

The OCm14000-OCP adapter enables:

- Increased data center IT agility and scalability through deployment of a secure multi-tenant cloud
- Optimized server hardware utilization, by scaling high density virtualization
- User-controlled bandwidth partitioning delivered across workloads and management services

The OCm14000-OCP CNA is designed for the high bandwidth and scalability demands of enterprise applications, more scalable virtualization with support for enhanced Single Root I/O Virtualization (SR-IOV) and Network Interface Card (NIC) partitioning, and next-generation overlay network technologies that address the need for virtual machine (VM) mobility and massive scaling of Layer 2 subnets inside private or hybrid cloud infrastructures.

The Open Compute Project Foundation is a rapidly growing community of engineers from around the world whose mission is to design and enable the delivery of the most efficient server, storage, and data center hardware designs for scalable computing. The OCP designs are maximized for total cost of ownership (TCO), energy efficiency, and reduced complexity in the scalable computing space. The OCm14000-OCP adapter adheres to the mezzanine card specification for OCP v2.0 motherboards.

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 Virtual Local Area Network (VLAN) IDs are insufficient to isolate/secure each tenant in a data center (private cloud) or hybrid cloud environment.

Key benefits

- Maximizes server hardware return on investment (ROI) with high VM density
- Simplifies deployment of secure, scalable multi-tenant cloud infrastructures
- Minimizes TCO through deployment of heterogeneous workloads on converged networking infrastructures
- Accelerates applications and storage performance
- Provides the bandwidth needed for slot-constrained server platforms
- Reduces complexity through the deployment of a common network platform
- Reduces management and infrastructure costs

Key features

- Superior network convergence—storage and network traffic over a common 10GbE infrastructure
- SR-IOV
- Powerful hardware offloads for:
  - Overlay networks (NVGRE and VXLAN)
  - Storage protocols: iSCSI and Fibre Channel over Ethernet (FCoE)
  - Stateless TCP
- Greater bandwidth with PCIe 3.0
- VMware vSphere NetQueue with RSS support
- Microsoft Windows Server VMQ, Dynamic VMQ, RSS, and vRSS support

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Virtual Extensible Local Area Network (VXLAN), supported by VMware and Linux, and Network Virtualization using Generic Routing Encapsulation (NVGRE), supported by Microsoft, are two 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 Layer 3 IP networks. Traffic from each VM is mapped to a specific virtual network; the packets are then routed transparently over the existing physical infrastructure.

Emulex VNeX offload technology, powered by a multi-core adapter ASIC engine, accelerates the performance of network virtualization by offloading the header encapsulation process, while simultaneously preserving legacy stateless TCP offloads, providing full native network performance in a virtual network environment.

Remote Direct Memory Access (RDMA) support

The OCm14000-OCP adapter leverages RDMA over Converged Ethernet (ROCE), enabling server-to-server data movement directly between application memory, without any CPU involvement; thus providing high throughput and data acceleration on a standard Ethernet fabric, without the need for any specialized infrastructure or management.

Flexible workload storage connectivity with FCoE and iSCSI offloads

The OCm14000-OCP adapter supports FCoE offload, using the same enterprise-class Emulex drivers that work with Emulex LightPulse® Fibre Channel FC Host Bus Adapters (HBAs). The OCm14000-OCP adapter also supports iSCSI offload, providing performance that is superior to iSCSI solutions, based on software initiators and standard NICs. Finally, the OCm14000-OCP adapter also has the ability to support NIC and iSCSI or Fibre Channel over Ethernet (FCoE) offloads on the same port.

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 ROI. SR-IOV provides a more cost-effective solution than multiple, physical adapter ports. SR-IOV enables multiple VMs to directly access the OCm14000–OCP adapter'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 and lower CPU utilization, as compared to the alternative of software-emulated NIC devices that are implemented in the hypervisor.

Optimized bandwidth allocation with Emulex Universal Multi-Channel™ port partitioning (also known as NIC partitioning or NPAR)

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

The key benefits of deploying Emulex UMC technology include:

- Lower TCO
- Consolidates multiple 1GbE adapters, associated cables, and switch ports
- Higher VM workload bandwidth allocation to drive higher VM density on host servers
- Lower per-Gb bandwidth cost compared to deploying multiple 1GbE adapters

Optimized I/O utilization

- Granular bandwidth provisioning minimizes wasted idle bandwidth and waste of dedicated 1GbE adapters
- Enables Service Level Agreement (SLA)-based provisioning and deployment

Simplified deployment

- UMC is not dependent on specialized OS support
- Works with any 10GbE switch

UMC is ideal for virtualized server environments because bandwidth allocation can be optimized to support I/O-intensive applications, VM migration, and management functions.

Simplified management: OneCommand® Manager application

The OneCommand Manager application provides centralized management of 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 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, the OCm14000-OCP CNA meets the robust interoperability and reliability requirements of enterprise and scale-out data centers.

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Controller

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

Ethernet standards

- Dual IEEE 802.3-2012 10GBASE Ethernet ports (10GBASE-SR/10GBASE-CR)
- 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 9200 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)
- Emulex Universal Multi-Channel™ (UMC) support for up to 16 PCIe physical functions (PFs) per adapter, which can be used as partitions, as follows:
  - OCm14102-OCP CNA adapter, each port can support eight NIC functions or seven NIC functions and a storage function (iSCSI or FCoE) or six NIC functions, an iSCSI function, and a FCoE function (concurrent mode)
  - 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

Fibre Channel over Ethernet (FCoE) offload

- Hardware offload for FCoE protocol
- ANSI T11 FC-BB-5 Compliant (FCoE)
- 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 4K per adapter (FCoE adapter-only mode)
- Supports up to 255 N_Port ID Virtualization (NPIV) interfaces per port
- Concurrent FCoE and iSCSI support on each port

Internet Small Computer System Interface (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 (iSCSI adapter-only mode)
- 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)
- IEEE 802.1Qaz Data Center Bridging Exchange (DCBX)
- IEEE 802.1Qau Congestion Notification (QCN)
- Absolute per-priority rate control option/ configuration

RDMA

- Direct data placement in application buffers without CPU intervention
- Supports IBTA RoCE specifications
- Linux Open Fabrics Enterprise Distribution (OFED) support
- Linux Network File System (NFS) over RoCE
- Linux iSCSI Extensions for RDMA (iSER)
- 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 Gbps 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
- Single Root I/O Virtualization (SR-IOV)
  - up to 63 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
- Oracle Solaris
- Debian (NIC mode only, storage not supported)
- Ubuntu (NIC mode only, storage not supported)
- FreeBSD (NIC mode only, storage not supported)

Management, boot support

- 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
- MAC statistics gathering (SNMP, Ethernet MIB, MIB2, RMON, RMON2)
- Offline and online firmware updates
- Integrated Thermal Sensor for thermal monitoring per OCP mezzanine v2 spec

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

Physical dimensions

- OCP mezz card form factor card
- 68mm x110mm (2.68 in x 4.3 in)
- Bracket not provided

Environmental requirements

- Operating temperature: 0° to 45°C (32° to 113°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]

OCm14102-UX-OCP
- Dual-port, 10GBASE-CR (direct attach copper) SFP+, CNA OCP 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

[1] For optical adapter support, a customer must order an Emulex accessory transceiver kit

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

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