



## CONNECT

# XE4310R Dual-Port 10GbE or Quad-Port 1GbE Converged Network Controller with I/O Virtualization

## Creates Converged Universal LAN on Motherboard (LOM)

XE4310R provides a low-cost, single-chip dual-port 10 Gigabit Ethernet (10GbE) Controller with integrated 10GBASE-KR and 1000BASE-KX PHYs and I/O virtualization. XE4310R leverages Ethernet, iSCSI and Fibre Channel over Ethernet (FCoE) industry standards to dramatically reduce costs and operating expenses by converging network and storage I/O interconnects into a single unified Ethernet fabric. The XE4310R Ethernet Controller features an innovative purpose-built hardware architecture to carry network and storage traffic over two full-duplex 10GbE ports or four 1GbE ports, or a mix of two 10GbE and two 1GbE ports.

## Extensible Protocol Offload Architecture

The XE4310R Ethernet Controller uses an innovative combination of high performance hardware-based data path elements for protocol data movement and industry-standard embedded processors for protocol control path. Hardware-based isolation between offloaded protocols ensures precise control over bandwidth allocation and sharing between network and storage traffic. Protocol offload features are field upgradeable through a simple software update; bandwidth allocation and management features are exposed through industry standard APIs.

## Policy-based I/O Virtualization

I/O virtualization technology allows the network and storage resources on the controller to be carved up into multiple hardware-isolated and protected virtual network and virtual storage interfaces. One or more virtual network and virtual storage interfaces can be assigned to virtual machines (VMs) to realize near-native performance for virtualized performance sensitive workloads. Fine-grain Quality of Service (QoS) management features allow precise bandwidth allocation and management for individual virtual network and storage interfaces through centralized policies and industry-standard management APIs.

## Target Applications

- Single-chip solution for LAN on Motherboard (LOM)
- Embedded storage devices supporting Network Interface Card (NIC), iSCSI and FCoE initiator and target

## Key Benefits

- Reduce server cost and I/O cabling by more than 50%
- Reduce Storage Area Network (SAN) management costs by more than 50%
- Stateless server deployment with any OS using boot-from-SAN
- Maximize application performance through bandwidth provisioning and management
- Unified provisioning of physical and virtual servers
- Greener data centers with fewer Host Bus Adapters (HBAs) and switches

## Key Features

- Integrated 10GBase-KR and 1000Base-KX PHY interfaces for LOM and backplane
- Converged NIC, TOE, iSCSI and FCoE offload support in hardware
- 40 Gigabit full duplex throughput for network (LAN) and storage (SAN) traffic
- Eight physical functions configurable across both 10G ports for managing multiple networking and/or storage devices
- Single root I/O virtualization (SR-IOV) compliant interfaces for hypervisors
- Small form-factor suitable for LOM and embedded storage applications
- Less than seven watts power consumption (dual port configuration)
- Voltage controlled oscillator (VCO) technology for improved signal integrity and reliability

# XE4310R Dual-Port 10GbE or Quad-Port 1GbE Converged Network Controller with I/O Virtualization

## Ethernet Interface Standards

- Dual 802.3ae 10GBASE Ethernet ports (10GBASE-KR/10GBASE-KX4/XAUI)
- 20Gb/s uni-directional, 40Gb/s bi-directional across both ports
- Quad 802.3az 1000BASE Ethernet ports (1000BASE-KX/SGMII)
- IEEE 802.3ap 10GBASE-KR, 1000GBASE-KX auto negotiation
- IEEE 802.1q virtual LANs (VLAN) with 128 VLAN IDs
- IEEE 802.1qau Ethernet congestion management
- IEEE 802.3x Flow control with pause frames
- IEEE 802.1p QoS tagging
- IEEE 802.3ad/LACP

## Ethernet NIC and TCP/IP

- NDIS 5.2, 6.0 and 6.2 compliant Ethernet functionality
- Microsoft TCP chimney compliant
- IPv4/IPv6 TCP, UDP checksum offload
- IPv4/IPv6 Receive Side Scaling (RSS)
- IPv4/IPv6 Large Receive Offload (LRO)
- IPv4/IPv6 Large Send Offload (LSO)
- 64 Tx and 64 Rx queues
- 128 unicast MAC addresses per port
- Wire speed on-chip CAM for packet filtering and steering
- Multicast MAC address filtering
- Broadcast frame filtering per port
- VLAN insertion and extraction
- Support for nested VLANs (Q-in-Q)
- Jumbo frame support up to 9000 Bytes
- Wake-On LAN (WOL): D3 cold support
- Support for 6 Magic Packets

## I/O Virtualization and QoS

- PCI-SIG SR-IOV compliant:
  - Supports 56 Virtual Functions (VF)
  - Up to 30 VFs per PF
- Traffic Shaping and QoS across each VF and PF:
  - NIC fine-grain QoS 10 Mb/s to 10Gb/s in steps of 10Mb/s
  - HBA fine-grain QoS 1000 IOPS to 500,000 IOPS in steps of 1000 IOPS
- On-chip VM-VM switching
- Traffic steering and isolation
- Protection against denial-of-service attacks and malfunctioning VMs

## iSCSI Offload

- Full iSCSI protocol offload
- Header, data digest (CRC) and PDU
- Direct data placement of SCSI data
- Up to 4096 outstanding commands
- Up to 1024 offloaded iSCSI connections
- Supports iSNS
- Support for multipath I/O
- iSCSI to SCSI Virtualization
- OS-agnostic INT13 based iSCSI boot and iSCSI crash dump support
- RFC 3720 iSCSI
- RFC 4171 Internet Storage Name Service (iSNS)
- RFC 4544 definitions of managed objects for iSCSI
- RFC 4545 definitions of managed objects for IP storage user identity
- T10 PI support for end-to-end data integrity

## DCE/CEE Support

- Simultaneous operation of Ethernet TCP/IP and iSCSI or FCoE modes
- IEEE 802.1Qbb Priority Flow Control (PFC)
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS)
- IEEE 802.1Qaz Data Center Bridging Exchange (DCBX)
- Multi-level congestion management
  - Per-priority pause, programmable per-priority flow and per-priority rate control
  - Xon and Xoff timer support

## FCoE Offload

- Supports up to 255 NPIV interfaces
- Support FIP and FCoE Ether Type
- Generation and verification of FCoE CRC
- On-chip data segmentation and framing
- Direct data placement
- 1024 simultaneous logins per port
- 1024 active exchanges per port

## PCI Express Interface

- PCI Express 2.0 x8 host interface (5 Gb/s / lane)
- 20 Gb/s uni-directional, 40 Gb/s bi-directional
- PCI-e single root I/O virtualization (SR-IOV) compliant
- Advanced Error Reporting (AER)
- Message Signal Interrupts Extended (MSI-X) support:
  - 320 MSI-X vectors
  - INTA#, INTB#
- Supports D0, D3 (hot & cold) power management modes
- PCI Express Base Spec 2.0
- PCI Express Card Electromechanical Spec 1.0a

## Robust Management

- UEFI and x86 remote boot support including PXE v2.1, iSCSI and FCoE
- MAC statistics gathering (SNMP, Ethernet MIB, MIB2, RMON, RMON2)
- Diagnostic and configuration driver suite
- ACPI v2.0 compliant power management
- RMII NCSI management interface
- IPMI pass-through allows baseboard management controller (BMC) access to the network

## Driver Support

- Windows Server
- Red Hat Enterprise Linux
- SuSE Linux Enterprise Server
- VMware ESX
- Oracle Solaris

## System Level Design

- IEEE 1149-1 compliant JTAG support
- Network Controller Sideband Interface (NC-SI) support
- Single 25.00 MHz clock crystal for 10Gb/s operation
- Glueless interconnect for 10GBASE-KR 10Gb/s serial backplanes

## Mechanical Specifications

- 562-pin FCBGA package
- 27 mm x 27 mm package size
- RoHS compliant

## Electrical Specifications

- Power supply 2.5V, 1.8V, 1.0V
- 9W maximum power consumption

## Environmental

- Operating temperature: 0° to 70°C

## Ordering Information

- XE4310R-P1

This data sheet represents the underlying functionality of the Emulex I/O Controller. It does not guarantee feature enablement through reference only. Although this information is believed to be accurate and reliable at the time of publication, Emulex assumes no responsibility for errors or omissions. Emulex reserves the right to make changes or corrections without notice. This report is the property of Emulex and may not be duplicated without permission from the Company.



World Headquarters 3333 Susan Street, Costa Mesa, CA 92626 +1 714 662 5600  
 Bangalore, India +91 80 40156789 | Beijing, China +86 10 84400221  
 Dublin, Ireland +353 (0) 1 652 1700 | Munich, Germany +49 (0) 89 97007 177  
 Paris, France +33 (0) 1 58 580 022 | Tokyo, Japan +81 3 5325 3261  
 Wokingham, United Kingdom +44 (0) 118 977 2929

[www.emulex.com](http://www.emulex.com)