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FastLinQ® QL41112HLRJ

8th Generation 10Gb Ethernet Adapter with Universal RDMA

CAVIUM FastLinQ®
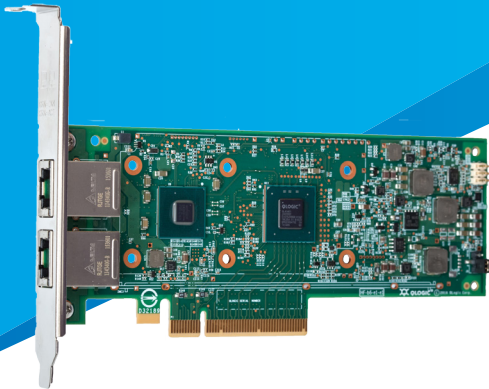
Note: Picture may not be representative of the final shipping product

- Delivers full line-rate 10GbE performance across both ports

- Universal RDMA—Delivers the choice and flexibility with concurrent support for RoCE, RoCEv2 and iWARP technologies

- Secure firmware update with private/public key encryption

- Enables provisioning of 10GbE ports for greater deployment flexibility through switch-independent NIC partitioning

- Boosts host CPU efficiency with hardware offloads for GRE, NVGRE, and VXLAN tunnels

- 10GBASE-T version provides low-cost and easy-to-install RJ45 connectivity that is compatible with existing 1GbE

- Simplifies deployment and troubleshooting using the QCC GUI, QCC CLI, vCenter Plug-in, and OpenStack integration

OVERVIEW

The FastLinQ® QL41112HLRJ 10Gb Intelligent Ethernet Adapter with Universal Remote Direct Memory Access (RDMA)—available in 10GBASE-T (RJ45), supports LAN (TCP/IP) traffic at 10Gb Ethernet line-rate speeds. The QL41112HLRJ provides extremely low host CPU usage by enabling full stateless offloads over dual-port RJ-45 connectors.

The QL41112HLRJ, based on Cavium's eighth generation ASIC controllers, leverages Cavium's long-standing industry leadership in Ethernet by providing the highest levels of performance, efficiency, and scalability for the enterprise data center.

For more effective use of the 10GbE bandwidth, the FastLinQ QL41112HLRJ Intelligent Ethernet Adapter offers switch-independent NIC partitioning (NPAR), which enables segmentation of a single 10GbE port into multiple network partitions and dynamic allocation of bandwidth to each port. The segmentation allows IT organizations to optimize resources while lowering infrastructure and operational costs.

The evolution of data centers—triggered by high-density server virtualization, software-defined networking (SDN), and multitenant cloud computing platforms—demands a high-performance 10GbE solution that boosts CPU efficiency, and reduces capital expenditures (CAPEX) and operational expenditures (OPEX) of the migration to 10GbE. The FastLinQ

QL41112HLRJ Intelligent Ethernet Adapter is the solution of choice for workload-intensive computing environments, providing a reliable, high-performance 10GbE connectivity solution.

FEATURES

- PCI Express (PCIe) Gen3 x8 (8GT/s) support
- Full line-rate performance across both ports
- Broad OS and hypervisor support
- Network boot support:
  - iSCSI remote boot
  - Preboot Execution Environment (PXE) 2.0
  - Unified Extensible Firmware Interface (UEFI) support
- Switch-independent NPAR with up to eight partition assignments per 10GbE link
- Universal RDMA technologies—RDMA over Converged Ethernet (RoCE), RoCEv2, iSCSI Extensions for RDMA (iSER), and Internet wide area RDMA protocol (iWARP)
- Data plane development kit (DPDK) support

FEATURES (*continued*)

- Energy Efficient Ethernet (EEE) support for reduced idle power consumption in RJ45-based networks

- MSI and MSI-X support

- IPv4 and IPv6 offloads

- PCI-SIG Single Root I/O Virtualization (SR-IOV)

- Comprehensive stateless offloads

- Auto negotiation: 100M/1G/10G

- RX/TX multiqueue:
  - VMware NetQueue
  - Windows Hyper-V Virtual Machine Queue
  - Linux Multiqueue

- Tunneling offloads:
  - Windows Network Virtualization using Generic Routing Encapsulation (NVGRE)
  - Linux Generic Routing Encapsulation (GRE)
  - VMware and Linux Virtual Extensible LAN (VXLAN)

- Receive side scaling (RSS)

- Transmit side scaling (TSS)

- Support for virtual LAN (vLAN) tagging

- Support for jumbo frames larger than 1,500 bytes (up to 9,600 bytes)

- Network teaming, failover, and load balancing:
  - Switch Independent NIC Teaming/Bonding)
  - Switch Dependent NIC Teaming/Bonding
  - Link aggregation control protocol (LACP) and generic trunking

- Data center bridging (DCB)

- Storage over Ethernet:
  - iSCSI using OS-based software initiators

- Cavium DPDK high-speed packet processing engine

BENEFITS

Simplified Migration to 10GbE

FastLinQ QL41112HLRJ Adapters feature a high-speed, flexible architecture and switch-independent NPAR technology. Designed for both physical and virtual environments, this switch-agnostic approach enables administrators to split up the 10GbE network pipe to divide and reallocate bandwidth and resources, as needed, at the adapter level.

- Customers deploying rack and tower servers with multiple GbE adapters can greatly benefit from consolidating multiple network adapters and freeing up PCI slots for other add-in card upgrades.

- With NPAR, QL41112HLRJ Adapters can further partition their network bandwidth into multiple virtual connections, making one dual-port adapter appear as 16 adapters to the OS for use by the applications.

- NPAR greatly simplifies the physical connectivity to the server, reduces implementation time, and lowers the acquisition cost of the 10GbE migration.

- Available in 10GBASE-T, SR optic, and direct-attach copper (DAC), QL41000 Series Adapters are the ideal choice for migrating multiple 1GbE network connections to consolidated 10GbE.

- Ability to converge storage and networking I/O by deploying OS-based software iSCSI initiators over the QL41112HLRJ Adapters' 10GBASE-T and optical or DAC connections. (Note: Cavium offers a complete range of Adapters that deliver a fully offloaded iSCSI and Fibre Channel over Ethernet (FCoE) solution that conserves CPU resources and delivers maximum performance.)

Designed for Next-Gen Server Virtualization

QL41112HLRJ Intelligent Ethernet Adapter supports today's most compelling set of powerful networking virtualization features, including SR-IOV, NPAR, tunneling offloads, including VXLAN, Generic Routing Encapsulation (GRE), and Network Virtualization using Generic Routing Encapsulation (NVGRE), and industry-leading performance, thus enhancing the underlying server virtualization features.

- SR-IOV delivers higher performance and lower CPU use with increased virtual machine (VM) scalability.

- Cavium NPAR enables up to eight physical, switch-agnostic, switch-independent NIC partitions per adapter port. Dynamic and fine-grained bandwidth provisioning enables control of network traffic from VMs and hypervisor services.

- Concurrent support for SR-IOV and NPAR enables virtual environments with the choice and flexibility to create an agile virtual server platform.

- Availability of both RSS and TSS allows for more efficient load balancing across multiple CPU cores.

High-Performance Multitenancy Delivered

As large-scale private and public cloud deployment requirements for isolation and security stretch the boundaries of traditional vLANs, the QL41112HLRJ Intelligent Ethernet Adapter deliver network virtualization features for high-performance overlay networks.

- Designed to meet the demands of large, public cloud deployments, the QL41112HLRJ Adapters feature tunneling offloads for multitenancy with VXLAN, GRE, and NVGRE support.

- Line-rate 10GbE performance across individual ports, in multitenant deployments, maximizes server-processing performance by delivering an offloaded NIC for cloud deployments on Microsoft Windows Server 2012 and VMware vSphere.

Simplified Management

The QConvergeConsole® (QCC) delivers a broad set of powerful Ethernet and Fibre Channel (FC) adapter management features for administrators to maximize application performance and availability. Available in both GUI and CLI options, QCC offers application-based wizards to enable the environment to be quickly and easily provisioned based on published best practices.

ACCELERATE ANY NETWORK WITH UNIVERSAL RDMA OFFLOAD

FastLinQ QL41112HLRJ adapter supports RoCE and iWARP acceleration to deliver low latency, low CPU utilization, and high performance on Windows Server Message Block (SMB) Direct 3.0 and 3.02, and iSER. QL41112HLRJ adapters have the unique capability to deliver Universal RDMA that enables RoCE, RoCEv2, and iWARP. Cavium Universal RDMA and emerging low latency I/O bus mechanisms such as Network File System over RDMA (NFSoRDMA) and Non-Volatile Memory Access Express over Fabric (NVMe-oF) allow customers to accelerate access to data. Cavium's cutting-edge offloading technology increases cluster efficiency and scalability to many thousands of nodes.

ACCELERATE TELCO NETWORK FUNCTION VIRTUALIZATION (NFV) WORKLOADS

In addition to OpenStack, the FastLinQ QL41112HLRJ adapter supports NFV that allows decoupling of network functions and services from dedicated hardware (such as routers, firewalls, and load balancers) into hosted VMs. NFV enables network administrators to flexibly create network functions and services as they need them, reducing capital expenditure and operating expenses, and enhancing business and network services agility. Cavium technology is integrated into the DPDK and can deliver up to 60 million packets per second to host the most demanding NFV workloads.

OPEX Savings with Low-power PCIe Gen3

The QL41112HLRJ are PCIe Gen3 based adapters that have one of the lowest power-consumption profiles in the industry.

- Supporting the latest generation of host bus connectivity, PCIe Gen3 enables the QL41112HLRJ Intelligent Ethernet Adapter to deliver line-rate, dual-port performance without compromise.

- QL41112HLRJ Adapters are designed to provide maximum power efficiency while delivering a high-performance, I/O connectivity platform.

TRUSTED, SECURE, RELIABLE, AND INTEROPERABLE

The FastLinQ QL41112HLRJ 10GE Adapter adheres to standards that ensure interoperability with a wide range of network solutions. Cavium adapters are secure by design. Through public and private key encryption technology, the adapter enforces a process for secure firmware updates that prevent hackers from altering the code running on the adapter.

Host Bus Interface Specifications

Bus Interface
- PCI Express (PCIe) Gen 3 x8 (x8 physical connector)

Host Interrupts
- MSI-X supports independent queues

I/O Virtualization and Multitenancy
- SR-IOV (up to 192 virtual functions)
- Switch-independent NPAR (up to 16 physical functions)
- GRE and NVGRE packet task offloads
- VXLAN packet task offloads

Compliance
- *PCI Base Specification*, rev. 3.1
- PCI Express Card Electromechanical Specification, rev. 3.0
- *PCI Bus Power Management Interface Specification*, rev. 1.2
- Advanced configuration and power interface (ACPI) v2.0

Ethernet Specifications

Throughput
- 10Gbps line rate per port
- 100M/1G/10G Auto Negotiation

Ethernet Frame
- 1,500 bytes and larger (jumbo frame)

Stateless Offload
- Universal RDMA
- TCP segmentation offload (TSO)
- Large send offload (LSO)
- Large receive offload (LRO)
- Giant send offload (GSO)
- TCP and UDP checksum offloads
- Receive segment coalescing (RSC)
- Interrupt coalescing
- RSS and TSS
- VMware NetQueue, Microsoft
- DPDK
- Hyper-V VMQ, Linux Multiqueue

Compliance
- IEEE 802.1q (VLAN)
- IEEE 802.3ad (Link Aggregation)
- IEEE 802.3x (Flow Control)
- IEEE802.3-2015 Clauses 55, 40, 25 (10GBASE-T, 1000BASE-T, 100BASE-TX)

Compliance (*continued*)
- IPv4 (RFC 791)
- IPv6 (RFC 2460)
- IEEE 802.1Qbb (Priority-based Flow Control)
- IEEE 802.1Qaz (DCBX and ETS)
- IEEE 1588-2002 PTPv1 (Precision Time Protocol)
- IEEE 802.1AS/1588-2008 PTPv2

Board Firmware Features
- Secure Firmware Update process

RDMA Specifications

Universal RDMA
- RoCE
- RoCEv2
- iWARP
- Storage over RDMA: iSER, SMB Direct, and NVMe™ over Fabrics
- NFSoRDMA

Tools and Utilities

Management Tools and Device Utilities
- QLogic® Control Suite (QCS) Command Line Interface (CLI) for Linux and Windows
- QCC integrated network management utility graphical users interface (GUI) for Linux and Windows
- QCC Plug-in for vSphere (GUI) and ESXCLI plug-in for VMware
- QCC PowerKit PowerShell™ cmdlets for Linux and Windows
- Native OS management tools for networking

Boot Support
- PXE 2.0
- UEFI
- iSCSI remote boot

Operating System Support
- For the latest applicable operating system information, see http://driverdownloads.qlogic.com

Physical Specifications

Ports
- Dual RJ-45 10Gbps Ethernet

Form Factor
- PCI Express short, low-profile card: 167.65mm × 68.90mm (6.60in. × 2.71in.)

Approvals—Safety

US/Canada
- UL 60950-1
- CSA C22.2

Europe
- TUV EN60950-1
- TUV IEC 60950-1
- CB Certified

Agency Approvals—EMI and EMC

US and Canada
- FCC Rules,CFR Title 47, Part 15, Subpart Class A
- Industry Canada, ICES-003: Class A

Europe
- EN55032
- EN55024
- EN61000-3-2
- EN61000-3-3

Japan
- VCCI: Class A

New Zealand and Australia
- AS/NZS: Class A

Korea
- KC-RRA Class A

Taiwan
- BSMI CNS 13438

Compliance
- RoHS compliant

Environmental and Equipment Specifications

Temperature
- Operating: 32°F to 131°F (0°C to 55°C)
- Storage: –40°F to 149°F (–40°C to 65°C)

Airflow
- 100LFM at 55°C

Humidity (Relative, Non-condensing)
- Operating and non-operating: 10% to 90%

Cabling Distance (Maximum)
- CAT6a/7 up to 100 meters

Ordering Information

QL41112HLRJ-CK/SP/BK (Dual port)
- Ships with RJ-45 connectors (10GBASE-T). Intended for use with twisted pair copper cabling (not included)[1]
- Channel Kit (CK)
- Single-Pack (SP)
- Bulk Kit (BK)

1   Ships with a standard-size bracket installed. A spare low-profile bracket (-CK and -SP only) is also included.

Follow us:

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