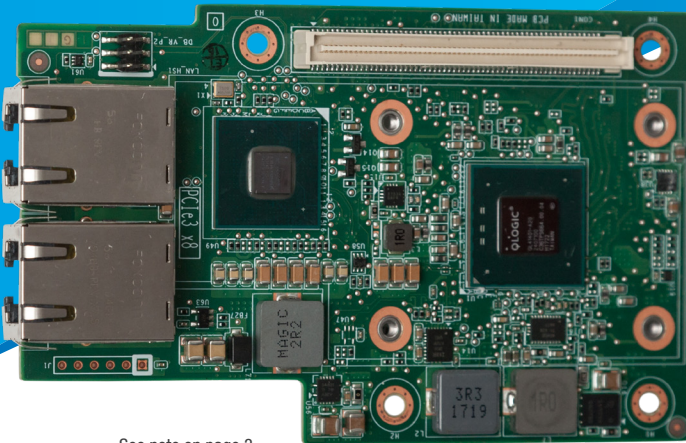


# FastLinQ QL41132HORJ-CI

## Dual-port 10Gbps RJ45 OCP Intelligent Ethernet Adapter with Universal RDMA



See note on page 3

- 10GBASE-T provides low-cost and easy-to-install RJ45 connectivity that is compatible with existing 1GbE
- Universal RDMA delivers the ultimate choice and flexibility with concurrent support for RoCE, RoCEv2, and iWARP technologies
- Secure firmware update process with private and public key encryption technology prevents malware injection and reduces attack surface
- Increase VM density and accelerate multitenant networks with full offload for tunneling protocols
- A powerful 10GbE OCP 2.0 adapter that delivers the best price and performance ratio

## OVERVIEW

Cavium offers a dual-port, 10G bits per second Ethernet (10GbE) OCP Intelligent Ethernet Adapter with Universal RDMA offloads for Open Compute Project (OCP) servers. The FastLinQ® QL41132HORJ-CI dual-port adapter leverages Cavium's long-standing industry leadership in Ethernet, providing the highest level of performance, efficiency, and scalability for Open Compute server and storage applications in Web 2.0, enterprise data centers, and cloud infrastructure.

For more effective use of the bandwidth, the FastLinQ Intelligent Ethernet Adapter from Cavium offers switch-independent NIC partitioning (NPAR), which enables segmentation of each 10GbE port into eight virtual ports, with flexible allocation of bandwidth to each port. The segmentation allows IT organizations to improve resource utilization while lowering infrastructure and operational costs.

Virtualization, cloud computing, high-performance computing, convergence, and clustering initiatives are increasing workload demands. Cavium's cutting-edge server and network virtualization features—Virtual Extensible LAN (VXLAN), Network Virtualization using Generic Routing Encapsulation (NVGRE), Generic Network Virtualization Encapsulation (GENEVE), and Genetic Routing Encapsulation (GRE) tunneling offloads—deliver the most advanced 10GbE adapters. The FastLinQ

QL41132HORJ-CI Intelligent Ethernet Adapter is the solution of choice for workload-intensive computing environments, providing a reliable, high-performance 10GbE connectivity solution.

## FEATURES

- Accelerate the most demanding telco network function virtualization (NFV) workloads with the Cavium data plane development kit (DPDK) high-speed packet processing engine
- Orchestrate and manage hyperscale OpenStack® deployments with Cavium cloud-enabled management framework
- Backward compatibility with 1GbE infrastructure for complete investment protection
- Dual-port 10GbE connectivity for OCP servers
- x8 PCI Express® (PCIe®) Gen3 (8GT/s) support
- Universal remote direct memory access (RDMA) technologies:
  - RDMA over Converged Ethernet (RoCE)
  - RoCE v2 (Routable RoCE)
  - Internet wide area RDMA protocol (iWARP)

**FEATURES** *(continued)*

- Tunneling offloads:
  - VXLAN
  - NVGRE
  - GENEVE
  - GRE
- Network boot support:
  - iSCSI remote boot
  - Preboot Execution Environment (PXE) 2.0
- MSI and MSI-X support
- IPv4 and IPv6 offloads
- PCI-SIG® single root I/O virtualization (SR-IOV) support
- Comprehensive stateless offloads
- Receive side scaling (RSS)
- Transmit side scaling (TSS)
- Jumbo frame support up to 9,600 bytes
- Network teaming, failover, and load balancing:
  - Switch-independent teaming modes
  - Switch-dependent teaming modes—dynamic link aggregation control protocol (LACP) and static generic trunking
- Data center bridging (DCB)

**ACCELERATE ANY NETWORK WITH UNIVERSAL RDMA OFFLOAD**

The Cavium QL41132HORJ-CI 10GbE 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. The QL41132HORJ-CI 10GbE Adapter has 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 iSCSI Extensions for RDMA (iSER), Network File System over RDMA (NFSoverRDMA), Storage Spaces Direct (S2D), and NVMe Express® (NVMe™) 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.

**HIGH-DENSITY SERVER VIRTUALIZATION**

The latest hypervisors and multicore systems use several technologies to increase the scale of virtualization. The Cavium QL41132HORJ-CI 10GbE Adapter supports:

- VMware® dynamic NetQueue
- Windows® Hyper-V® dynamic Virtual Machine Queue (dVMQ)
- Linux® Multiqueue
- Windows, Linux, and VMware switch-independent NPAR
- Windows Hyper-V, Linux Kernel-based Virtual Machine (KVM), and VMware ESXi SR-IOV

These features provide ultimate flexibility, quality of service (QoS), and optimized host and virtual machine (VM) performance.

**WIRE-SPEED NETWORK VIRTUALIZATION**

Enterprise-class data centers can be scaled using overlay networks to carry VM traffic over a logical tunnel using NVGRE, VXLAN, and GENEVE. Although overlay networks can resolve virtual local area network (VLAN) limitations, native stateless offloading engines are bypassed, which places a higher load on the system's CPU. The Cavium QL41132HORJ-CI 10GbE Adapter efficiently handles this load with advanced NVGRE, VXLAN, and GENEVE stateless offload engines that access the overlay protocol headers. This access enables traditional stateless offloads of encapsulated traffic with native-level performance in the network. Additionally, Cavium QL41132HORJ-CI Adapters support VMware NSX® and Open vSwitch (OVS).

**HYPER-SCALE ORCHESTRATION WITH OPENSTACK**

The Cavium QL41132HORJ-CI 10GbE Adapter supports the OpenStack open source infrastructure for constructing and supervising public, private, and hybrid cloud computing platforms. These platforms allow providers to rapidly and horizontally scale VMs over their entire, diverse, and widely spread network architecture to meet the real-time needs of their customers. Cavium's integrated, multiprotocol management utility, QConvergeConsole® (QCC), provides breakthrough features that allow customers to visualize the OpenStack-orchestrated data center using autodiscovery technology.

**ACCELERATE TELCO NETWORK FUNCTION VIRTUALIZATION (NFV) WORKLOADS**

In addition to OpenStack, the Cavium QL41132HORJ-CI 10GbE 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.

**TRUSTED, SECURE, RELIABLE, AND INTEROPERABLE**

The Cavium QL41132HORJ-CI 10GbE 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 prevents hackers from altering the code running on the adapter.

## Host Bus Interface Specifications

### Bus Interface

- PCI Express (PCIe) Gen3 x8, Gen2 x8 (electrical)

### Host Interrupts

- MSI-X supports independent queues

### I/O Virtualization

- SR-IOV (up to 192 virtual functions)
- NPAR (up to 16 physical functions)

### Compliance

- *Advanced Configuration and Power Interface (ACPI)*, v2.0
- *PCI Express Base Specification*, rev. 3.1
- *PCI Express Card Electromechanical Specification*, rev. 3.0
- *PCI Bus Power Management Interface Specification*, rev. 1.2
- Open Compute Project® v2.0

## Ethernet Specifications

### Throughput

- 10Gbps line rate per-port

### Ethernet Frame

- Standard MTU sizes and jumbo frames up to 9,600 bytes

### Stateless Offload

- IP, TCP, and User Datagram Protocol (UDP) checksum offloads
- TCP segmentation offload (TSO)
- Large send offload (LSO)
- Giant send offload (GSO)
- Large receive offload (LRO)
  - LRO (Linux)
  - Receive segment coalescing (RSC) (Windows)
- RSS
- TSS
- Interrupt coalescing
- VMware NetQueue, Microsoft® Hyper-V dVMQ, and Linux Multiqueue
- RDMA

## Multitenancy Tunneling Offloads

- VXLAN
- NVGRE
- GENEVE
- GRE

## Board Hardware Features

- Wake on LAN (WoL)
- Network controller sideband interface (NC-SI)
- Pulse width modulation (PWM) switching voltage regulator
- Over temperature protection design compliance

## Board Features

- Secure Firmware Update process
- DPDK poll mode driver

## Compliance

- IEEE Specifications
  - *802.1AS (Precise Synchronization)*
  - *802.1ax-2008 (Link Aggregation)*
  - *802.1Q (VLAN)*
  - *802.1Qaz (DCBX and ETS)*
  - *802.1Qbb (Priority-based Flow Control)*
  - *802.3-2015 Clause 78 EEE (Energy Efficient Ethernet)*
  - *802.3x (Flow Control)*
  - *802.3-2015 Clauses 55 and 40 (10GBASE-T and 1000BASE-T)*
  - *1588-2002 PTPv1 (Precision Time Protocol)*
  - *1588-2008 PTPv2*
- Other Specifications
  - *IPv4 (RFC 791)*
  - *IPv6 (RFC 2460)*

## RDMA Specifications

### Universal RDMA

- RoCE
- RoCE v2
- iWARP
- Storage over RDMA
  - iSER
  - NFSoRDMA
  - NVME-oF
  - S2D
  - SMB Direct
  - VMware Paravirtual RDMA (PVRDMA)

## Tools and Utilities

### Management Tools and Device Utilities

- QLogic Control Suite™ integrated network adapter management utility (CLI) for Linux and Windows
- QConvergeConsole integrated network management utility (GUI) for Linux and Windows
- QConvergeConsole Plug-ins for vSphere® (GUI) and ESXCLI plug-in for VMware
- QConvergeConsole PowerKit (Windows PowerShell®) cmdlets for Linux and Windows
- Pre-boot unified extensible firmware interface (UEFI) Device Configuration pages in system BIOS
- Native OS management tools for networking

### Boot Support

- UEFI
- PXE
- iSCSI remote boot

### APIs

- SNIA HBA API v2
- SMI-S

### Operating Systems

- For the latest applicable operating system information, see [Cavium.com Downloads](#)

## Physical Specifications

### Ports

- Dual 10Gbps Ethernet: RJ45 connectors

### Form Factor

- OCP version 2.0
- Type 1 heatsink

### Cooling Requirements

- 280 LFM at 45°C (113°F)

## Environment and Equipment Specifications

### Temperature

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

### Humidity

- Operating: 10% to 80%
- Storage: 5% to 90%

### Cabling Distance (Maximum)

- CAT6a/7 up to 100 meters

#### Note:

All advertised features are enabled in the hardware. Actual feature availability is dependent on software driver releases. See the release notes.

Picture may not be representative of the final shipping product.

**Compliance**

- RoHS compliant

**Agency Approvals—Safety**

**US and Canada**

- UL 60950-1
- CSA C22.2

**Europe**

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

**Agency Approvals<sup>1</sup>—EMI and EMC (Class A)**

**US and Canada**

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

<sup>1</sup> Agency approvals have not been authorized at the time of publication; this list is preliminary.

**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

**Ordering Information**

**QL41132HORJ-CI-BK Dual-port 10GBASET OCP V2 Ethernet Network Adapter Card**

- Cisco Product ID UCSC-OCF-QD10GCF and UCSC-OCF-QD10GF=
- Ships in a bulk-packed box



Corporate Headquarters Cavium, Inc. 2315 N. First Street San Jose, CA 95131 408-943-7100

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