FastLinQ QL41212HLCU-CI

8th Generation 25G/10GE Ethernet Adapter with Universal RDMA
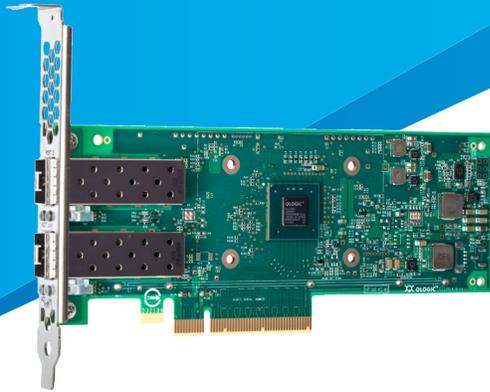
Note: Picture may not be representative of the final shipping product

- Industry's most powerful 25G adapter with 10G compatibility

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

- FastLinQ® SmartAN™ for simplified connectivity with 10G DAC switches without user intervention

- Secure firmware update with private/public key encryption

- Increase VM density and accelerate multitenant networks with full offload for tunneling protocols

- Accelerate the most demanding telco NFV workloads with Cavium DPDK high-speed packet processing engine

- Manage hyperscale OpenStack® deployments with Cavium cloud-enabled management framework

OVERVIEW

The Cavium QL41212HLCU-CI Intelligent Ethernet Adapter with Universal remote direct memory access (RDMA) leverages Cavium's eighth-generation technology to deliver true 25Gbps Ethernet performance. Integrated, advanced networking eliminates I/O bottlenecks and conserves CPU cycles. Optimized for use across enterprises, managed service providers (MSPs), and large public and scalable public cloud deployments, the QL41212HLCU-CI enables organizations to achieve new levels of performance in physical, virtual, and cloud environments.

The 25Gb Ethernet (25G/10GE) specification enables network bandwidth to be cost-effectively scaled in support of next-generation server and storage solutions residing in cloud and Web-scale data center environments. 25GbE results in a single-lane connection similar to existing 10GbE technology—but it delivers 2.5 times greater bandwidth. Compared to 40GbE solutions, 25GbE technology provides superior switch port density by requiring just a single lane (versus four lanes with 40GbE), along with lower costs and power requirements. Cavium is a leading innovator driving 25GbE technologies across enterprise and cloud market segments.

The QL41212HLCU-CI 25G/10GE Adapter delivers advanced Ethernet solutions designed to meet requirements from leading enterprise and cloud providers. Cavium features that collectively deliver the most advanced 25GbE adapter include:

- Cutting-edge server virtualization technologies—single-root I/O virtualization (SR-IOV) and switch independent NIC partitioning (NPAR)

- Network virtualization—offloads for Virtual Extensible LAN (VXLAN), Generic Network Virtualization Encapsulation (GENEVE), and Network Virtualization using Generic Routing Encapsulation (NVGRE)

- Universal RDMA technologies—RDMA over Converged Ethernet (RoCE), RoCEv2, iSCSI Extensions for RDMA (iSER), and Internet wide area RDMA protocol (iWARP)

- Migration path from 10GbE to 25GbE

REDUCE CAPITAL EXPENDITURE AND OPERATING EXPENSE

Cavium QL41212HLCU-CI 25G/10GbE technology delivers better price-per-gigabit versus 10GbE. The adapter is backward compatible with existing 10GbE installations while allowing an upgrade to 25GbE infrastructure. This technology enables cloud providers and large-scale data center operators to reduce operating expenses while continuing to scale their network of server and storage nodes to meet increasing demands of the

future. Cavium 25GbE technology is cost-efficient and power-efficient because it uses a single lane in comparison to other alternatives, such as quad-lane 40GbE. QL41212HLCU-CI 25GbE technology is compatible with 25Gbps lanes used in 100GbE, paving the way to a seamless upgrade path to connect to 100GbE switches that have 4×25GbE capability.

ACCELERATE ANY NETWORK WITH UNIVERSAL RDMA OFFLOAD

The QL41212HLCU-CI 25G/10GE Adapter supports RoCE and iWARP acceleration to deliver low latency, low CPU usage, and high performance on Windows Server® Message Block (SMB) Direct 3.0 and 3.02, and iSER. QL41212HLCU-CI 25G/10GE 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 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.

HIGH DENSITY SERVER VIRTUALIZATION

The latest hypervisors and multicore systems use several technologies to increase the scale of virtualization. The QL41212HLCU-CI 25G/10GE adapter supports:

- VMware® NetQueue
- Windows® Hyper-V® Virtual Machine Queue (VMQ)
- 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 while providing full 25Gbps bandwidth per port. Public and private cloud virtualized server farms can now achieve 2.5 times the VM density for the best price and VM ratio.

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 QL41212HLCU-CI 25G/10GE 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, the QL41212HLCU-CI 25G/10GE Adapter supports VMware NSX and Open vSwitch (OVS).

HYPER-SCALE ORCHESTRATION WITH OPENSTACK

The QL41212HLCU-CI 25G/10GE Adapter supports the OpenStack open source infrastructure for constructing and supervising public, private, and hybrid cloud computing platforms. It provides for both networking and storage services (block, file, and object) for iSER. 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 QL41212HLCU-CI 25G/10GE Adapter supports NFV that allows decoupling 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 25GbE technology is integrated into the Data Plane Development Kit (DPDK) and can deliver up to 60 million packets per second to host the most demanding NFV workloads.

TRUSTED, SECURE, RELIABLE, AND INTEROPERABLE

The QL41212HLCU-CI 25G/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) Gen3 x8, Gen2 x8 (electrical)

Host Interrupts
• MSI-X

I/O Virtualization
• SR-IOV (up to 192 virtual functions)
• NPAR (up to 16 physical functions)

Compliance
• *PCI Express Base Specification,* rev. 3.1
• *PCI Express Card Electromechanical Specification,* rev. 3.0
• *PCI Bus Power Management Interface specification,* rev. 1.2

Ethernet Specifications

Throughput
• 25Gbps line rate per-port in 25GbE mode
• 10Gbps line rate per-port in 10GbE mode

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)
• Receive segment coalescing (RSC) (Windows)
• Receive side scaling (RSS)
• Transmit side scaling (TSS)
• Interrupt coalescing
• VMware NetQueue, Microsoft Hyper-V VMQ, and Linux Multiqueue
• Universal RDMA

Tunneling Offloads
• Virtual Extensible LAN (VXLAN)
• Network Virtualization using Generic Routing Encapsulation (NVGRE)
• Generic Network Virtualization Encapsulation (GENEVE)

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

Compliance
• IEEE Specifications
  ○ *802.3-2015 (10Gb and 25Gb) Ethernet flow control*
  ○ *802.3-2015 Clause 52 (10Gb Ethernet Optical)*
  ○ *SFF8431 Annex E (10Gb Direct Attach Copper)*
  ○ *802.3by -2016 (25G Ethernet)*
  ○ *802.1q (VLAN)*
  ○ *IPv4 (RFQ 791)*
  ○ *IPv6 (RFC 2460)*
  ○ *1588-2002 PTPv1 (Precision Time Protocol)*
  ○ *802.1AS/1588-2008 PTPv2*

Board Firmware Features
• Secure Firmware Update process
• Smart Auto Negotiation (FastLinQ SmartAN)

RDMA Specifications

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

Forward Error Correction (FEC) Suupport

• FC-FEC
• RS-FEC

Tools and Utilities

Management Tools and Device Utilities
• CaviumControl 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
• QCC PowerKit PowerShell cmdlets for Linux and Windows
• Native OS management tools for networking

Boot Support
• Unified extensible firmware interface (UEFI)
• Pre-execution environment (PXE)
• iSCSI remote boot

Microsoft SDDC-Premium Certified for Azure Stack Hybrid Cloud and Storage Spaces Direct Solutions
• Routable RoCEv2 for SMB direct
• RDMA over virtual switch traffic
• Data center bridging (DCB) for QoS
  ○ Enhanced transmission selection (ETS)
  ○ Priority flow control (PFC)
• Hyper-V network virtualization (HNV) encapsulation Offloads for VXLAN and NVGRE
• Virtual machine multiqueues (VMMQ)
• SR-IOV
• Hyper-V Switch Embedded Teaming (SET)

APIs
• SNIA HBA API v2, and SMI-S

Operating Systems
• For the latest applicable operating system information, see http://driverdownloads.qlogic.com

Physical Specifications

Ports
• Dual 25/10Gbps Ethernet: SFP28 Cages

Form Factor
• Low-profile PCIe card (6.60 in. × 2.71 in.)

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%

Connectivity

Rate	Cable and Maximum Distance (m)		
	DAC	SR FOC	AOC
10G	7	400 OM4 300 OM3	30
25G	5	100 OM4 70 OM3	30

DAC = Direct attach cable
SR FOC = SR fiber optic cable
AOC = Active optic cable

Agency Approvals—Safety

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

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

Agency Approvals[1]—EMI and EMC (Class A)

US/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

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

New Zealand/Australia
- AS/NZS: Class A

Korea
- KC-RRA Class A

Taiwan
- BSMI CNS 13438

Compliance
- RoHS compliant

Ordering Information

QL41212HLCU-CI-BK Dual-port 25Gb Ethernet Network Adapter Card
- Cisco Product ID UCSC-PCIE-QD25GF and UCSC-PCIE-QD25GF=
- Ships in a bulk-packed box with a standard-height bracket installed
- Ships without SFP28 optical transceivers installed

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