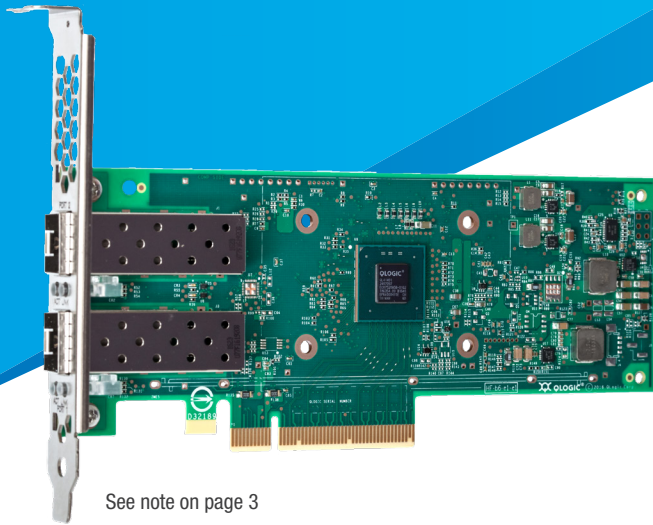


Lenovo ThinkSystem QLogic QL41262

Dual-port 25/10Gb Ethernet Adapter with Universal RDMA

See note on page 3

- 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 switches without user intervention
- Secure firmware update with private/public key encryption
- iSCSI and FCoE Offloads¹
- 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

OVERVIEW

The Lenovo™ ThinkSystem™ QLogic® QL41262 dual-port 25Gb Ethernet adapter with Universal remote direct memory access (RDMA) leverages eighth-generation technology from Cavium™ to deliver true 25Gb per second (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 Lenovo QL41262 Adapter enables organizations to achieve new levels of performance in physical, virtual, and cloud environments.

The 25/10Gbps Ethernet (25/10GbE) 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 QL41262 25GbE adapter delivers advanced Ethernet solutions that are designed to meet requirements from leading enterprise and cloud providers. Cavium features that collectively deliver the most advanced 25GbE adapter include:

- Manage hyperscale OpenStack® deployments with Cavium cloud-enabled management framework
- Cutting-edge server virtualization technologies—single-root I/O virtualization (SR-IOV) and NIC
- Network virtualization—offloads for Virtual Extensible LAN (VXLAN), Generic Network Virtualization Encapsulation (GENEVE), Network Virtualization using Generic Routing Encapsulation (NVGRE), and Linux Generic Routing Encapsulation (GRE)
- Universal RDMA technologies—RDMA over Converged Ethernet (RoCE), RoCEv2, iSCSI Extensions for RDMA (iSER), and Internet wide area RDMA protocol (iWARP)
- iSCSI and FCoE Offloads¹
- Migration path from 10GbE to 25GbE

¹ Feature available in a future software release

REDUCE CAPITAL EXPENDITURE AND OPERATING EXPENSE

Lenovo QL41262 Adapter 25GbE 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 expense while continuing to scale their network of server and storage nodes to meet increasing demands. Cavium 25GbE technology is cost-efficient and power-efficient because it uses a single lane, as opposed to quad-lane 40GbE. The QL41262 25GbE adapter 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 Lenovo QL41262 Adapter supports RoCE and iWARP acceleration to deliver low latency, low CPU utilization, and high performance on iSER, Windows Server Storage Spaces Direct (S2D), and Windows Server Message Block (SMB) Direct 3.0 and 3.02. QL41262 25GbE 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 (NFSoverRDMA) and Non-Volatile Memory Express (NVMe™) 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 QL41262 25GbE adapter supports:

- VMware® NetQueue
- Windows® Hyper-V Virtual Machine Queue (VMQ)
- Linux® Multiqueue
- Windows, Linux, and VMware switch-independent NIC partitioning (NPAR²)
- 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 cost-to-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, GRE, 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 QL41262 25/10GbE adapter efficiently handles this load with advanced NVGRE, GRE, 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 QL41262 25GbE adapter supports VMware NSX and Open vSwitch (OVS).

HYPER-SCALE ORCHESTRATION WITH OPENSTACK

The Lenovo QL41262 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 auto-discovery technology.

ACCELERATE TELCO NETWORK FUNCTION VIRTUALIZATION (NFV) WORKLOADS

In addition to OpenStack, the Lenovo QL41262 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 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 Lenovo QL41262 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.

² Feature available in a future software release

Host Bus Interface Specifications

Bus Interface

- PCI Express® (PCIe®) Gen 3 x8, Gen 2 x8 (electrical)

Host Interrupts

- MSI-X

I/O Virtualization

- SR-IOV (up to 192 virtual functions)
- NPAR¹ (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)
 - LRO (Linux)
 - Receive segment coalescing (RSC) (Windows)
- Receive side scaling (RSS)
- Transmit side scaling (TSS)
- Interrupt coalescing
- VMware® NetQueue, Microsoft Hyper-V VMQ (up to 208 dynamic queues), and Linux Multiqueue
- Universal RDMA

Tunneling Offloads

- VXLAN
- NVGRE
- GRE
- GENEVE

¹ Feature available in a future software release

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 (10Gb and 25Gb Ethernet flow control)
 - 802.3-2015 Clause 52 (10Gb Ethernet optical)
 - 802.3by-2016 (25G Ethernet)
 - 1588-2002 PTPv1 (Precision Time Protocol)
 - 1588-2008 PTPv2
- Other Specifications:
 - SFF8431 Annex E (10Gb Direct Attach Copper)
- RFQs:
 - IPv4 (RFQ 791)
 - IPv6 (RFC 2460)

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, S2D, and NVMe over Fabrics
- NFSoRDMA

FCoE Specifications

Performance

- 3.6 million FCoE IOPS

iSCSI Specifications

Performance

- 2.9 million iSCSI IOPS

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.

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
- Pre-execution environment (PXE) 2.0
- FCoE Boot from SAN²
- iSCSI Remote Boot

APIs

- SNIA HBA API v2
- SMI-S

Operating Systems

- For the latest applicable operating system information, see <http://static.lenovo.com/us/en/serverproven/index.shtml>

Physical Specifications

Ports

- Dual 25/10Gbps Ethernet: SFP28 cages

Form Factor

- Low-profile PCIe card (6.60in. x 2.71in.)

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%

² Feature available in a future software release

Compliance

- RoHS compliant

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 optical cable

Agency Approvals—Safety

US and Canada

- UL 60950-1
- CSA C22.2

Europe

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

Agency Approvals³—EMI and EMC (Class A)

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

³ Agency approvals have not been authorized at the time of publication; this list is preliminary.

Ordering Information

QL41262HLCU-LN-BK/FR (dual-port, SFP28 and direct-attach copper)

- BK= Bulk Kit
- FR=FRU Kit



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