QLogic FastLinQ 45000 Series Ethernet Controllers

10/25/40/50/100GbE RoCE, FCoE, iSCSI, and SR-IOV PCIe 3.0 Controllers

- Quad-port 10GbE and 25GbE applications
- Dual-port 25GbE, 40GbE, and 50GbE applications
- Single-port 100GbE applications
- Low-power, single-chip solution for compliant backplane Ethernet
- iSCSI v1.0 Host Bus Adapter
- RoCE and RoCEv2
- Virtualization environments
- T10 Protection Information

OVERVIEW

QLogic® FastLinQ™ 45000 Series Ethernet Controllers are a fifth-generation solution designed for high-volume, converged network applications. The QL45604 supports speeds of 100Gbps, 50Gbps, 40Gbps, 25Gbps, and 10Gbps, while the QL45204 supports speeds of 25Gbps and 10Gbps. FastLinQ 45000 Series Controllers enable single root I/O virtualization (SR-IOV), RDMA over converged Ethernet (RoCE), iSCSI, Fibre Channel over Ethernet (FCoE), and data center bridging (DCB). They also support PCI Express® (PCIe®) 3.0, along with embedded virtual bridging and other switching technologies for high-performance DMA and virtual machine (VM)-to-VM switching.

The FastLinQ 45000 Series is a complete solution that enables leading-edge features for the enterprise and cloud (independent of server form-factor), while significantly raising the performance bar. This solution enables stateful and stateless offloads and includes advanced features such as network virtualization offload and enhanced teaming.

The QL45604 includes support for single-port 100GBASE, dual-port 50GBASE, dual-port 40GBASE, quad-port 25GBASE, and quad-port 10GBASE applications. The QL45204 includes support for up to quad-port 25GBASE-CR. FastLinQ 45000 Series Controllers integrate four IEEE 802.3-compliant MACs and support the network controller-sideband interface (NC-SI). Host-to-baseboard management controller (BMC) communication is also supported on top of the NC-SI to permit high-speed communication between the local host and the BMC or management controller (MC).

FastLinQ 45000 Series Controllers enable networked storage using block-based storage (iSCSI or FCoE) and file-based storage (CIFS or NFS). Clustering and interprocess communications (IPC) are supported with RoCE. They can simultaneously support all offload traffic types on each of the ports. Offloading results in superior storage and networking performance, as well as low CPU utilization, which in turn results in significant system-level power savings.

FastLinQ 45000 Series Controllers are designed for PCIe 3.0 and are also compatible with the *PCI Express Base Specification*, revisions 2.0 and 1.1. PCIe supports MSI and MSI-X capabilities. Each port supports multiple physical functions.

FastLinQ 45000 Series Controllers support IEEE 1588 precision timing protocol (PTP) and IEEE 802.1AS, providing a method of synchronization between *master* and *slave* clocks over a LAN.

FEATURES

The FastLinQ 45000 Series Controllers include the following features:

Network Interfaces

- Blade and dense servers:
  - Quad 10GBASE-KR
  - Quad 25GBASE-KR-S (IEEE 802.3by draft 3.0)
  - Dual 40GBASE-KR4
  - Dual 50GBASE-KR2
  - 1 × 100GBASE-KR4
- Rack, tower, and dense servers:
  - SFF8431 Annex E 10GbE (direct attach copper)
  - 10GBASE-S
  - 25GBASE-CR-S
  - 40GBASE-SR4 and 40GBASE-CR4 (direct attach copper)
  - 50BASE-CR2
  - 100GBASE-CR4 and 100GBASE-SR4

iSCSI Controller

- Offloaded full Host Bus Adapter (HBA) functionality iSCSI initiator
- iSCSI boot and iSCSI crash dump support

FCoE

- Offloaded full HBA functionality FCoE initiator
- FCoE boot

RoCE

- Hardware-based data placement in application buffers without CPU intervention (for user and kernel modes)
- Low latency

Data Integrity

- ECC and byte parity protection
- T-10 CRC

Robust Manageability

- NC-SI
- Serial gigabit media independent interface (SGMII) for 1Gb BMC interconnect
- Wake-on-LAN (WoL)
- Comprehensive diagnostic and configuration software suite:
  - Management Component Transport Protocol (MCTP) over PCIe vendor-defined messages (VDM)
  - MCTP over system management bus (SMB)
  - Host-to-BMC communication

DCB

- Enhanced Transmission Selection (ETS) (IEEE 802.1Qaz)
- Quantized Congestion Notification (QCN)-capable (IEEE 802.1Qau)
- Priority-based Flow Control (PFC) (IEEE 802.1Qbb)
- Up to eight traffic classes

Host Interfaces

- PCIe 3.0 x16 (8GTps), 2.0 (5GTps), and 1.1 (2.5GTps)

BENEFITS

Each FastLinQ 45000 Series Controller is an SR-IOV converged solution—power and space is optimized for blade, rack, and tower servers, and Converged Network Adapter (CNA) applications.

FastLinQ 45000 Series Controllers provide the following benefits:

Extremely Low CPU Utilization for iSCSI, FCoE, and RDMA Applications

- Host CPU is free to run application code
- Minimal load on memory subsystem with zero copy

Accelerated IP-based File and Block Storage

- Lower CPU utilization for file-level storage protocols such as CIFS/SMB and NFS
- Offloaded and accelerated iSCSI block storage with high IOPS and low CPU utilization

Accelerated FCoE

- Offloaded and accelerated FCoE for Fibre Channel block storage with high IOPS and low CPU utilization

Performance-focused—Optimized for High Throughput, Low Latency, and CPU Utilization

- Adaptive interrupt coalescing
- Receive side scaling (RSS) reduces CPU utilization on multi-CPU systems
- MSI and MSI-X allow interrupt distribution in a multi-CPU system

Robust and Highly Manageable

- NC-SI enables high bandwidth out-of-band system management functionality over shared infrastructure
- Guaranteed delivery of management traffic
- Pre-execution environment (PXE) v2.1, advanced configuration and power interface (ACPI) v2.0b, WoL
- Host-to-BMC communication for connectivity between the local host and the MC or BMC

Server-class Reliability, Availability, and Performance Features

- Link aggregation and load balancing:
  - Switch-dependent
- IEEE 802.3ad (LACP), generic trunking (GEC/FEC):
  - Switch- and NIC-independent

PACKAGING

- 27mm × 27mm; 676 pins

ORDERING INFORMATION

- QL45604-B0G
  - Supports all speeds: 10Gbps, 25Gbps, 40Gbps, 50Gbps, and 100Gbps
- QL45204-B0G
  - Supports 10Gbps and 25Gbps speeds

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

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www.qlogic.com

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Corporate Headquarters QLogic Corporation 26650 Aliso Viejo Parkway Aliso Viejo, CA 92656 949-389-6000

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