EMULEX®

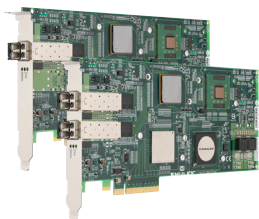## Converged Networking for a Unified Data Center Fabric

LightPulse®
LP21000/21002

SIMPLIFIED

NETWORKING,

TRUSTED SAN

INTEROPERABILITY

AND IMPROVED

EFFICIENCY

10Gb/s Ethernet
Converged Network Adapter

Converged Network Adapters

The Emulex LightPulse LP21000 family of Converged Network Adapters (CNAs) are intelligent multi-protocol adapters that provide host LAN and Fibre Channel SAN connectivity over 10Gb/s Ethernet using Fibre Channel over Ethernet (FCoE) and Enhanced Ethernet functionality. Unrivaled scalability and industry-leading virtualization support make the single-port Emulex LP21000 and dual-port LP21002 CNAs ideal solutions for server I/O consolidation.

Leveraging eight generations of advanced, field-proven Fibre Channel technology, the PCI Express-based LP21000 family meets the robust interoperability and reliability requirements of corporate data centers. The design leverages Emulex's proven enterprise class drivers, firmware and hardware architectures, while delivering the sophisticated capabilities required to manage multiple types of data flow concurrently without disrupting application performance.

Emulex LightPulse CNAs provide investment protection by leveraging existing storage management tools and processes for FCoE-connected devices. The LP21000 family features streamlined installation and management for both Fibre Channel and FCoE attached devices, yet offers the capability to isolate and support multiple differentiated concurrent traffic flows in a converged environment.

Key features

- Converges networking and Fibre Channel storage traffic on to a lossless 10 Gigabit Ethernet infrastructure
- Leverages field proven Fibre Channel protocol offload engine
- Supports dynamic allocation of networking and storage bandwidth
- Supports server virtualization optimizations for secure and scalable virtual machine deployments
- Provides failover and load balancing support for storage and networking stacks
- Centralizes administration and management of CNAs and HBAs using common management tools

Key benefits

- Reduces total adapter and switch ports, simplifies network cabling and lowers power consumption and cooling
- Proven interoperability enables investment protection by seamlessly integrating into existing SAN
- Dynamic bandwidth allocation enables adaptive resource management and improves data center efficiency
- Familiar driver model and tools retain existing SAN and networking best practices and improve number of servers managed per administrator
- Improved efficiency in server provisioning and OS image management through a wide range of boot options

LightPulse® LP21000/21002
Converged Networking for a Unified Data Center Fabric

Enhanced Ethernet (EE)

The LP21000 family of CNAs enable Fibre Channel traffic to be directly carried over Ethernet alongside networking traffic. FCoE eliminates the need to have two independent networks carrying storage and networking traffic—thereby, easing bandwidth management and offering significant cost savings. The Emulex CNA architecture combines the functionality of industry-standard Network Interface Cards (NICs) with Emulex's industry-leading Fibre Channel HBAs, seamlessly converging the traffic over a shared lossless Ethernet network. Emulex CNAs deliver the latest stateless offloads and dynamic bandwidth allocation to maximize performance.

Fibre Channel over Ethernet (FCoE)

FCoE combines the efficiency of the Fibre Channel protocol with the ubiquity of an Enhanced Ethernet network, while leveraging the mature storage management software and tools available with Fibre Channel. FCoE enables the convergence of Fibre Channel and Ethernet traffic and expands SAN economics to newly virtualized servers providing an evolutionary approach to convergence that leverages proven Fibre Channel technology. FCoE extends existing Fibre Channel fabric and storage investments and further reduces total cost of ownership (TCO) by enabling the use of existing SAN management tools, skills and processes.

Containing Cost with Unmatched Business Agility and Resilience

Today, data center managers must keep pace with unrelenting server growth, while managing limitations in staff size, floor space, power and cooling. Efforts to reduce data center complexity, management costs, and power consumption are increasingly being met by consolidation, virtualization and convergence initiatives. As workloads are consolidated on blades and virtualized servers, LAN and SAN connectivity requirements have grown, with a typical server having six to ten gigabit Ethernet connections as well as multiple Fibre Channel connections. In an effort to reduce the number of cable connections, IT managers have found appealing the concept of a unified fabric—a network capable of handling data, clustering and storage traffic.

Emulex LightPulse CNAs perform the network convergence that enables a unified fabric for controlling costs and enhancing power efficiency, while delivering unmatched virtual machine (VM) optimized services and powerful management capabilities. The LP21000 family of FCoE CNAs supports QoS enhancements, including lossless Ethernet, enabling unified fabric support. The LP21000 family provides IT managers with installation and management capabilities designed to minimize reboots and further simplify deployment, delivering unmatched business resilience. Emulex's firmware-based architecture enables feature and performance upgrades without costly hardware changes. In addition, advanced error checking features and enhanced end-to-end data integrity provide for the highest levels of operational continuity.

Ecosystem of Partners

Emulex actively supports standards and works with its ecosystem partners to deliver unmatched interoperability in a converged network.

Emulex LightPulse CNA Architecture

The LP21000 provides Converged Network Adapter functionality by appearing to the host as two PCI devices—a network adapter and Fibre Channel adapter. Host networking and storage drivers communicate with the appropriate PCI function in the LP21000. I/O operations are processed by the respective functionality of the CNA, and in the case of a networking transaction, delivered to the lossless Media Access Control (MAC) for delivery to the unified fabric. For Fibre Channel transactions, Fibre Channel frames are sent to the FCoE encapsulation engine, and then transferred to the lossless MAC for delivery to the unified fabric.

Received traffic is handled much the same way. Incoming traffic is processed by the lossless MAC, then filtered based on FCoE ethertype. Non FCoE traffic delivered to the Ethernet NIC, and FCoE traffic decapsulated by the FCoE engine, are then forwarded to the Fibre Channel HBA device for further processing. The block is then relayed to the appropriate host device driver.
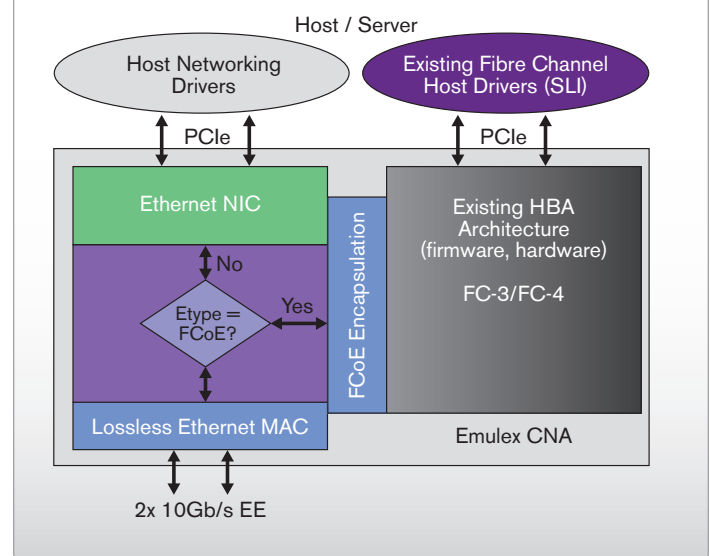
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Specifications

Standards

- ANSI Fibre Channel: FC-BB-5 (draft), FC-PH-3, FC-PI-2, FC-FS, FC-AL-2, FC-GS-4, FC-FLA, FC-PLDA, FC-TAPE and FCP-2
- PCI Express base spec 1.0a
- PCI Express card electromechanical spec 1.0a
- Fibre Channel class 3
- PHP hot plug-hot swap
- IEEE 802.3-2005 10Gb/s Ethernet, 802.1Q, 802.1P, 802.3ad (via NIC drivers), 802.3X flow control
- Enhanced Ethernet (draft): Lossless Ethernet MAC using Priority Flow Control, Automatic link configuration using Data Center Bridging Capabilities eXchange Protocol

Architecture

- Single-channel (LP21000) or dual-channel (LP21002)
- Integrated data buffer and code space memory

Comprehensive OS Support

- Windows Server 2008, Windows Server 2003, Suse Linux, Red Hat Linux, Solaris

Hardware Environments

- x86, x64 processor family

Physical Media

- Copper
  - SFP+ Direct Attached Twin-Ax Copper interface
  - Standards compliant passive copper cable for use with Cisco switches - 1, 3 or 5m
- Optical
  - Data rates: auto-detected
  - Optics: 10GBASE-SR short wave lasers with LC type connector
  - Optical Cable:

Fiber type	Minimum modal bandwidth @ 850 nm (MHz x km)	Operating range (meters)
62.5 μm MMF	160	2 to 26
	200 (OM1)	2 to 33
50 μm MMF	400	2 to 66
	500 (OM2)	2 to 82
	2000 (OM3)	2 to 300

Physical Dimensions

- Standard form factor card
- 111.15mm x 231.14mm (4.376" x 9")
- Standard bracket

Power & Environmental Requirements

- Volts: +3.3
- Operating temperature: 0° to 55°C (32° to 131°F)
- Airflow required: 150 lf/m
- Storage temperature: -40° to 70°C (-40° to 158°F)
- Relative humidity: 5% to 95% non-condensing

Agency Approvals

- Class 1 Laser Product per DHHS 21CFR (J) and EN60825-1
- UL recognized to UL 60950-1
- CUR recognized to CSA22.2, No. 60950-1-03
- TUV certified to EN60950-1
- FCC rules, Part 15, Class A
- ICES-003, Class A
- EMC Directive 2004/108/EEC (CE Mark)
  - EN55022, Class A
  - EN55024
- Australian EMC Framework (C-Tick Mark)
  - AS/NZS CISPR22, Class A
- VCCI, Class A
- MIC (Korea), Class A
- BSMI (Taiwan), Class A
- RoHS Compliant (Directive 2002/95/EC) for environmental requirements

Ordering Information

- **LP21000-M**
  - Single-channel, optical SFP+ Interface
- **LP21002-M**
  - Dual-channel, optical SFP+ Interface
- **LP21000-C**
  - Single-channel, copper SFP+ Interface (Standards compliant 3m cable included for use with Cisco switches)
- **LP21002-C**
  - Dual-channel, copper SFP+ Interface (Standards compliant 3m cables included for use with Cisco switches)
- **LP21000-NC**
  - Single-channel, copper SFP+ Interface (No cable included)
- **LP21002-NC**
  - Dual-channel, copper SFP+ Interface (No cables included)

Ethernet Controller Features

- Load balancing and failover support including adapter fault tolerance (AFT), switch fault tolerance (SFT), adaptive load balancing (ALB), teaming support and IEEE 802.3ad
- IEEE 802.3 2005* flow control support
- IPv6, IPv4 Tx/Rx IP, TCP, and UDP checksum offloading
- TCP segmentation/large send offload
- MSI-X supports multiple independent queues
- Interrupt moderation

Enhanced Ethernet Features

- Lossless Ethernet MAC using Priority Flow Control
- Automatic link configuration using Data Center Bridging Capabilities eXchange Protocol

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Specifications

Management Features

- Emulex feature-rich management capabilities simplify and speed deployment and device management, while reducing administration costs and protecting IT investments.

- Centralized discovery, monitoring, reporting and management of both local and remote adapters from a secure remote client. With in-depth management capabilities including remote firmware and boot code upgrades, beaconing, statistics and advanced diagnostics. An extensive CLI is available for scripting.

- Simplified installation and configuration of drivers and management capabilities for multiple adapters on Windows servers. A single installation of drivers and applications eliminates multiple reboots and ensures that each component is installed correctly and the CNA is ready to use.

- Rapid deployment and migration of virtual machines with SAN-attached storage in a Microsoft Virtual Server and Hyper-V environment leveraging NPIV-based Virtual HBA technology.

- Emulex management capabilities are based on open management standards. SMI-S and common HBA API support enable seamless upward integration into enterprise storage and server management solutions.

Additional Features

- Emulex LightPulse technology features frame-level multiplexing and out-of-order frame reassembly for maximum link utilization.

- End-to-end data protection with hardware parity, CRC, ECC and other advanced error checking and correcting ensure that data is safe from corruption.

- Detailed real-time event logging and tracing enables quick diagnosis of SAN problems. Universal Boot capability allows the appropriate boot environment to be automatically selected for any given OS.

- Strong authentication between host and fabric is based on the Fibre Channel Security Protocol (FC-SP) Diffie-Helmann Challenge Handshake Authentication Protocol (DHCHAP).

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