

# Network interface cards with integrated optical modules



## AI Overview

Optical modules and network interface cards (NICs) work together to enable high-speed data transmission, with NICs handling digital packet processing and optical modules converting electrical signals to optical signals for fiber communication.

**Functional Overview** Network interface cards (NICs) are responsible for connecting a computer or server to a network. They contain a MAC (Media Access Control) layer that formats and manages digital packets and a PHY (Physical Layer) chip that handles the physical transmission of signals over the medium, whether copper or fiber. The PHY converts digital signals from the MAC into electrical signals for copper or into electrical signals that can be fed into an optical module for fiber transmission. Optical modules, such as SFP, SFP+, QSFP28, or QSFP56, act as transceivers that convert these electrical signals from the PHY into light pulses for transmission over fiber optic cables and then reconvert incoming light signals back into electrical signals for the PHY to process. This electro-optical conversion allows NICs to communicate over long distances with minimal signal degradation and immunity to electromagnetic interference.

**Interface and Standards** NICs and optical modules are connected through standardized interfaces. Common form factors include SFP/SFP+ for 1–10 Gbps, QSFP28 for 25–100 Gbps, and QSFP56 for 200 Gbps. These standards ensure compatibility between NICs and optical transceivers, allowing seamless integration in data centers and enterprise networks. The PHY chip within the NIC manages signal conditioning, rate matching, and jitter control, ensuring that the optical module receives a clean, high-speed electrical signal for conversion.

**Performance Considerations** The collaboration between NICs and optical modules determines network speed, reliability, and transmission distance. Optical modules a...

## Article Content

### Optical Line Cards

In this use case, we'll consider the application of fully integrated DC-DC power modules in smart network interface cards. Due to its ability to combine outputs flexibly, the MPM82504 allows tremendous

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First published on TECHNET on May 19, 2014 Storage Classification was introduced in System Center 2012 Virtual Machine Manager (VMM 2012) to provide the...

### Network interface controller

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EDGE Optic Network Interface Cards utilize industry-leading Intel chipsets and follow PCI Express (PCIe) bus standards. Our portfolio supports data rates from

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Bringing together the performance and reliability of integrated photonics with the scalability of silicon to enable high-bandwidth, power-efficient connectivity.

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Lightmatter InterConnect 2026 Keynote Presentation InterConnect 2026 keynote: photonic interconnects, co-packaged optics, and the future of AI. Explore how

### Microsoft 365 Roadmap | Microsoft 365

The Microsoft 365 Roadmap lists updates that are currently planned for applicable subscribers. Check here for more information on the status of new features and

### 6 Best Fiber Optic Network Interface Cards That Pros

For professionals who need portable fiber connectivity without sacrificing performance, this USB-C to Fiber Network Adapter Gigabit Card

### Networking Solutions for the Era of AI | NVIDIA

Technology The Innovations Defining NVIDIA AI Networking NVIDIA builds networking as part of an integrated AI platform—combining GPUs, SuperNIC™s,

BCM957504-P425G Quad-Port 25 Gb/s SFP28 Ethernet PCI Express

The Broadcom BCM957504-P425G is a quad-port 25 Gb/s PCI Express 4.0 x16 network interface card that supports SFP28/SFP+ optical modules and copper direct-attach cables. The card uses the

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Hardware Compatibility Tool | Juniper Networks Pathfinder

Juniper Networks Hardware Compatibility Tool helps you find the transceivers or optics, line cards, and interface modules that are supported on Juniper Networks products.

Ethernet Network Interface Card vs. IB Network

This article will introduce two types of network cards mainly used in data center servers: Ethernet network interface cards and IB network interface

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4331 Integrated Services Router: Access product specifications, documents, downloads, Visio stencils, product images, and community content.

Mixed-signal and digital signal processing ICs | Analog

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Networking Adapters for HP Workstations

The HP Z Dual-Port 10GbE G2 Network Module is a 10GBASE-T adapter utilizing the Marvell AQC113 controller chip to deliver premium network performance. This compact, low-cost module provides two

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Build high-performance and power-efficient optical modules for wireless, data center and communication applications with our optical networking ICs. Our products simplify designs by integrating

Cisco Enhanced High-Speed WAN Interface Cards

This data sheet describes the benefits, specifications, and ordering information for the Cisco Enhanced High-Speed WAN Interface Cards.

Cisco Optical Services Modules

Cisco offers a wide variety of plug-in cards supporting optical based platforms.

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Optical Solutions

The modular VFI system uses industry-standard MT ferrules and rugged, plug-and-play modules to provide compact CPO connections that shorten integration time,

Optical Line Cards

Optical line cards are a critical element in setting up high-speed data and network connections, as they link the router to an external network through an optical fiber interface.

2-CH 25G/10G/1G RDMA SFP28 Optical Ethernet Card

LUCID's PCIE-25GETH2-BC RDMA 25GigE NIC is a dual-port 25 Gb/s, PCI-Express Gen3 x8 Network Interface Card that supports both SFP28/SFP+ optical modules and is compatible

Xi'an Interwiser-best High-bandwidth digital processing system

These specialized cards are designed to facilitate high-speed data transfer by converting electrical signals into optical signals and vice versa, enabling faster and more efficient

Broadcom PCIe NIC Ethernet Adapters Specification Sheet Product Brief

The Broadcom® BCM957414A4140C is a single-port 50 Gb/s or 40 Gb/s, PCI-Express 3.0 x8 Network Interface Card (NIC) that supports both QSFP28/QSFP+ optical modules and copper direct-attach

## Contact Us

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