

Optical Interconnect for AI Data Centers Market Forecasts to 2034 – Global Analysis By Interconnect Architecture (Pluggable Optical Modules, Active Optical Cables, Optical Engines, Co-Packaged Optics, On-Board Optics, and Optical Circuit Switching), Interface Protocol, Aggregate Bandwidth, Wavelength Technology, Fiber Type, Reach, Application, End User, and By Geography

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Abstracts

According to Statistics MRC, the Global Optical Interconnect for AI Data Centers Market is accounted for \$29.7 billion in 2026 and is expected to reach \$658.2 billion by 2034 growing at a CAGR of 47.3% during the forecast period. Optical interconnect technology uses light to transmit data between computing components within AI data centers, enabling higher bandwidth, lower latency, and greater energy efficiency than traditional electrical interconnects. The market encompasses interconnect architectures including pluggable optical modules, active optical cables, optical engines, co-packaged optics, on-board optics, and optical circuit switching. Interface protocols include Ethernet, InfiniBand, PCI Express, Compute Express Link, and other high-speed interconnect protocols. These solutions serve AI cluster interconnect, GPU-to-GPU connectivity, switch-to-switch connectivity, server-to-switch connectivity, data center interconnect, and storage interconnect applications across hyperscale cloud providers, colocation providers, AI infrastructure providers, enterprises, and government institutions. Growing AI model complexity, GPU cluster scaling, and bandwidth requirements are key drivers of market expansion.

Market Dynamics:

Driver:

Growing AI cluster sizes and bandwidth requirements for distributed training

The rapid scaling of AI training clusters and associated bandwidth requirements is primary drivers for the optical interconnect for AI data centers market. Large language models require thousands of GPUs working in parallel, with massive data exchange between accelerators. Traditional electrical interconnects face bandwidth and distance limitations at these scales. Optical interconnect enables higher bandwidth, lower latency, and longer reach for GPU-to-GPU communication. As AI clusters grow and model sizes increase, demand for optical interconnect solutions expands, supporting sustained market growth.

Restraint:

High costs and complexity of optical interconnect deployment

The significant costs associated with optical interconnect components and deployment complexity represent a major restraint for the market. Optical modules and cables cost more than electrical alternatives. Co-packaged optics and advanced optical architectures present manufacturing complexity. Testing and validation requirements add cost. These cost and complexity barriers may constrain market growth, particularly for smaller data center operators.

Opportunity:

Development of co-packaged optics and integrated optical solutions

Continuous innovation in co-packaged optics and integrated optical solutions presents significant opportunities for optical interconnect for AI data centers market expansion. Co-packaged optics integrate optical engines directly with switch ASICs, reducing power and cost. Silicon photonics enables high-volume optical component production. On-board optics offer improved density and efficiency. As technology advances, integrated optical solutions capture growing market share.

Threat:

Competition from advanced electrical interconnects

Competition from advanced electrical interconnect technologies poses significant threats to optical interconnect market growth. Improved electrical signaling extends the reach and bandwidth of copper interconnects. Active electrical cables offer lower cost

alternatives for shorter distances. Technology competition may affect market share in certain applications. This competition may limit optical interconnect adoption in cost-sensitive segments.

Covid-19 Impact:

The COVID-19 pandemic accelerated optical interconnect for AI data centers market growth as AI adoption and cloud computing increased. The pandemic highlighted the importance of high-performance computing infrastructure. Supply chain disruptions affected component availability. Post-pandemic, continued AI advancement and data center expansion have sustained strong demand for optical interconnect solutions.

The Pluggable Optical Modules segment is expected to be the largest during the forecast period

The Pluggable Optical Modules segment is expected to account for the largest market share during the forecast period, driven by their established technology, flexibility, and widespread adoption in data center interconnects. Pluggable optical modules offer interoperability and ease of deployment. The segment benefits from continuous improvements in bandwidth and power efficiency. As AI data center bandwidth requirements increase, pluggable optical modules maintain the largest interconnect architecture segment share.

The Co-Packaged Optics segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the Co-Packaged Optics segment is predicted to witness the highest growth rate, fueled by its ability to reduce power consumption and increase bandwidth density, and growing adoption for next-generation AI switches. Co-packaged optics integrate optical engines directly with switch ASICs, eliminating electrical interface bottlenecks. The segment benefits from advances in silicon photonics manufacturing. As AI network bandwidth requirements increase, co-packaged optics delivers the fastest interconnect architecture segment growth.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share, supported by the concentration of hyperscale cloud providers, AI technology companies, and optical component manufacturers. The United States leads

regional growth with substantial deployment of optical interconnect in AI data centers. High concentration of technology innovation drives adoption. Well-established data center ecosystem supports market growth. With technology leadership and strong investment, North America maintains its dominant market position.

Region with highest CAGR:

Over the forecast period, the Asia-Pacific region is anticipated to exhibit the highest CAGR, driven by rapid AI adoption, expanding data center infrastructure, and increasing investment in optical interconnect technologies across China, Japan, South Korea, and Taiwan. The region's large and growing digital economy creates substantial demand for optical interconnect solutions. Government initiatives promoting AI development support market growth. As AI adoption and data center capacity expand, Asia Pacific delivers the fastest optical interconnect for AI data centers market growth globally.

Key players in the market

Some of the key players in Optical Interconnect for AI Data Centers include Coherent Corp., Lumentum Holdings Inc., Broadcom Inc., Marvell Technology, Inc., NVIDIA Corporation, Cisco Systems, Inc., Intel Corporation, Advanced Micro Devices, Inc., Fabrinet, Innolight Technology, Eoptolink Technology Inc., Ltd., Source Photonics, Applied Optoelectronics, Inc., MACOM Technology Solutions Holdings, Inc., and Ayar Labs, Inc.

Key Developments:

In September 2026, Coherent Corp. showcased its next-generation AI infrastructure interconnect portfolio at ECOC 2026, demonstrating a 3.2T 2xDR4 transceiver in an OSFP package, a 6.4T near-packaged optics (NPO) optical engine, and high-density 2D VCSEL arrays for co-packaged optics (CPO) architectures.

In September 2026, Lumentum Holdings teamed up with Qualcomm and Corning to demonstrate a high-density 1060 nm VCSEL die-to-die optical interconnect at ECOC 2026, delivering approximately 1 Tb/s per millimeter of chip edge for multi-rack AI scale-up systems.

In April 2026, Broadcom Inc. presented its roadmap for the 200T AI cluster era at OFC 2026, highlighting 3.2T Near-Packaged Optics (NPO), 200G-per-lane optical interconnects components, and wafer-scale Co-Packaged Optics (CPO) architectures.

Interconnect Architectures Covered:

Pluggable Optical Modules

Active Optical Cables

Optical Engines

Co-Packaged Optics

On-Board Optics

Optical Circuit Switching

Interface Protocols Covered:

Ethernet

InfiniBand

PCI Express

Compute Express Link

Other High-Speed Interconnect Protocols

Aggregate Bandwidth Covered:

100G

200G

400G

800G

1.6T and Above

Wavelength Technologies Covered:

Single-Lambda

Four-Wavelength

Eight-Wavelength

Wavelength Division Multiplexing

Fiber Types Covered:

Single-Mode Fiber

Multimode Fiber

Multi-Core Fiber

Hollow-Core Fiber

Reach Covered:

Short Reach

Medium Reach

Long Reach

Extended Reach

Applications Covered:

AI Cluster Interconnect

GPU-to-GPU Connectivity

Switch-to-Switch Connectivity

Server-to-Switch Connectivity

Data Center Interconnect

Storage Interconnect

End Users Covered:

Hyperscale Cloud Providers

Colocation Providers

AI Infrastructure Providers

Enterprises

Government and Research Institutions

Regions Covered:

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Italy

Spain

Netherlands

Belgium

Sweden

Switzerland

Poland

Rest of Europe

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Thailand

Malaysia

Singapore

Vietnam

Rest of Asia Pacific

South America

Brazil

Argentina

Colombia

Chile

Peru

Rest of South America

Rest of the World (RoW)

Middle East

Saudi Arabia

United Arab Emirates

Qatar

Israel

Rest of Middle East

Africa

South Africa

Egypt

Morocco

Rest of Africa

What our report offers:

Market share assessments for the regional and country-level segments

Strategic recommendations for the new entrants

Covers Market data for the years 2023, 2024, 2025, 2026, 2027, 2028, 2030, 2032 and 2034

Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)

Strategic recommendations in key business segments based on the market estimations

Competitive landscaping mapping the key common trends

Company profiling with detailed strategies, financials, and recent developments

Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

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Note: Tables for North America, Europe, APAC, South America, and Rest of the World (RoW) Regions are also represented in the same manner as above.

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