Optical Communication/Photonics

Weekly Intelligence Report

2026-05-18 | 33 articles | 5 countries

troy-technical.jp

This Week's Keyword

AI Optical Interconnects

US/EU firms race to secure supply, innovate

33	5	$4 Billion	$1 Billion
articles	countries	USD	USD
Total Articles Analyzed	Source Countries	NVIDIA Optical Investment	GF SiPho Revenue (2028)

All 33 Articles This Week — 5-Axis Evaluation Matrix

How to read columns — Tech Novelty: degree of breakthrough Market Proximity: closeness to commercialization Market Impact: industry-wide effect Data Reliability: quantitative data & peer review US/EU Relevance: direct impact on US/European companies & supply chains

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#01	NVIDIA & Corning US Mfg	Corporate Strategy	●●●○○	●●●●●	●●●●●	●●●●○	●●●●●	NVIDIA & Corning partner to 10x US optical interconnect manufacturing for AI data centers, creating 3000 jobs.
#02	GF SCALE™ Optical Module	New Product	●●●○○	●●●●○	●●●●○	●●●●○	●●●●●	GF launches SCALE™ optical module, industry's first OCI MSA-compliant solution, accelerating CPO for AI data centers.
#03	GF SiPho Revenue Forecast	Market Analysis	●●○○○	●●●●●	●●●●○	●●●○○	●●●●●	GF projects silicon photonics revenue to double by 2026, exceeding $1B by 2028, driven by AI data center demand.
#04	NTT IOWN R&D;	Research	●●●●○	●○○○○	●●●○○	●●○○○	●●●○○	NTT advances IOWN with R&D; in optoelectronic integration, novel materials (thinnest LC), and subsea cables for ultra-low power.
#05	TSMC COUPE for AI	New Technology	●●●●○	●●●○○	●●●●●	●●●○○	●●●●○	TSMC forecasts $1.5T semiconductor revenue by 2030, introduces COUPE optoelectronic integration for AI/HPC packaging.
#06	AI Fuels Optical Stock Surge	Market Analysis	●○○○○	●●●●●	●●●●○	●●●○○	●●●●●	AI infrastructure boom drives stock surge for optical networking leaders Coherent and Lumentum, benefiting from 800G/1.6T transceiver sales.
#07	Lumentum AI Investments	Corporate Strategy	●●○○○	●●●●●	●●●●○	●●●○○	●●●●●	Lumentum's optical components business accelerates with 90% YOY revenue growth, investing in 800G/1.6T and CPO for AI.
#08	Broadcom VCF 9.1 for AI	New Product	●●○○○	●●●●●	●●○○○	●●●●○	●●●●●	Broadcom unveils VMware Cloud Foundation 9.1 for secure, cost-effective production AI in private clouds, supporting multi-hardware.
#09	NTT IOWN DCI Rack Solution	New Product	●●●○○	●●●●○	●●●●○	●●●○○	●●●○○	NTT's IOWN DCI Rack Solution launches in Japan, using optical tech to resolve AI data center power, heat, and latency issues.
#10	Samsung SiPho & CPO Drive	Corporate Strategy	●●●○○	●●●○○	●●●●●	●●●○○	●●●●○	Samsung Foundry secures optical module order, ramping up silicon photonics and CPO drive for AI with 2028/2029 integration roadmap.
#11	KAIST Quantum Photonics	Research	●●●●●	●○○○○	●●○○○	●●○○○	●●●○○	KAIST unveils a new high-efficiency, scalable manufacturing method for quantum photonics chips, enhancing integration density and photon generation.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#12	Huawei CPO for AI DC	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●○○○	●●○○○	Huawei accelerates AI data center energy efficiency with optoelectronic integration, focusing on CPO commercialization with joint verifications.
#13	TFLN Modulators for 1.6T	Research	●●●●○	●●○○○	●●●○○	●●●○○	●●●○○	TFLN modulators emerge as key material for 1.6T optical transceivers, offering ultra-high speed, low power, and miniaturization for AI/HPC.
#14	RIKEN SiN Waveguides	Research	●●●●○	●●○○○	●●●○○	●●●○○	●●●○○	RIKEN achieves ultra-low loss optical waveguides with SiN photonics (<0.1 dB/cm), advancing quantum photonics, sensing, and long-haul comms.
#15	NTU Photonic AI Accel	Research	●●●●○	●○○○○	●●●○○	●●○○○	●●●○○	NTU unveils a prototype photonic AI accelerator using optical computing for matrix operations, promising power reduction and speed.
#16	SK SiPho LiDAR Mass Prod	New Product	●●●○○	●●●●○	●●●●○	●●○○○	●●●○○	South Korean company mass produces silicon photonics integrated FMCW LiDAR sensors for automotive, boosting autonomous driving adoption.
#17	JP 800G Transceiver Adopt	New Product	●●○○○	●●●●●	●●●●○	●●○○○	●●●○○	Japanese company announces customer adoption of 800G optical transceivers for data centers, compatible with NVIDIA AI networking, developing 1.6T.
#18	Foxconn Opto-Servers	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●○○○	●●●●○	Foxconn enters next-gen server development, adopting optoelectronic integration for chiplet-to-chiplet and board-to-board connections to overcome bottlenecks.
#19	NVIDIA $4B Optical Strat	Corporate Strategy	●●●○○	●●●●○	●●●●●	●●●○○	●●●●●	NVIDIA invests $4B in Coherent/Lumentum for CPO, accelerating its adoption to transform AI data center connectivity with power efficiency.
#20	NUS Photonic AI Accel	Research	●●●●●	●○○○○	●●●○○	●●●●○	●●●○○	NUS unveils a photonic AI accelerator achieving 20x energy reduction and 40% space saving with 91.6% accuracy in full optical domain computation.
#21	Ciena Open CPX MSA	Corporate Strategy	●●○○○	●●●●○	●●●●○	●●●○○	●●●●●	Ciena champions Open CPX MSA to accelerate widespread CPO adoption for AI, standardizing 6.4Tbps throughput and ensuring interoperability.
#22	MIT SiPho LiDAR Chip	Research	●●●●○	●●○○○	●●●●○	●●●○○	●●●●●	MIT develops novel silicon photonics LiDAR chip design, enabling compact, high-performance sensors for autonomous systems by eliminating moving parts.
#23	Optech 1.6T/800G OSFP224	New Product	●●○○○	●●●●○	●●●○○	●●●●○	●●●○○	Optech Technology unveils 1.6T and 800G OSFP224 optical transceivers for NVIDIA AI data centers, compatible with Quantum-X800 systems.
#24	Coherent Scales InP Prod	Corporate Strategy	●●●○○	●●●●○	●●●●●	●●●○○	●●●●●	Coherent scales InP laser production, doubling capacity in 2026/2027 and transitioning to 6-inch wafers to meet AI data center demand.
#25	AI Networking Bottleneck	Market Overview	●○○○○	●●●●●	●●●●●	●●○○○	●●●●●	AI networking is the new data center bottleneck, driving fundamental redesigns towards high-speed optical interconnects like CPO/NPO.
#26	Fiber Cabling for AI	Market Overview	●○○○○	●●●●●	●●●●○	●●○○○	●●●●●	AI clusters' 800G/1.6T demands exceed DAC/AOC limits, making structured fiber cabling indispensable for reach, scalability, and thermal design.
#27	EBO Connector MSA Forms	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●○○	●●●●●	New coalition (3M, AMD, Meta, etc.) forms EBO Connector MSA to standardize expanded beam optical connectors for reliable, scalable AI data centers.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#28	SiN vs SiOxNy Photonics	Comparison	●●○○○	●●○○○	●●○○○	●●●○○	●●●○○	Compares SiN and SiOxNy as critical photonics materials, highlighting SiN's ultra-low loss and SiOxNy's tunable refractive index for integrated devices.
#29	SiN-LC Quantum Interfer	Research	●●●●●	●○○○○	●●○○○	●●●●○	●●●○○	Research demonstrates scalable quantum interferometers by integrating liquid crystal on SiN, achieving low-power, reconfigurable quantum photonic circuits.
#30	InP Bottleneck for 1.6T	Market Analysis	●○○○○	●●●●●	●●●●●	●●●○○	●●●●●	InP is the true bottleneck for 800G/1.6T optical modules in AI buildouts; Lumentum is sole 200G/lane EML supplier, prompting NVIDIA pre-contracts.
#31	1 TOPS Photonic Tensor	Research	●●●●●	●○○○○	●●●○○	●●●●○	●●●○○	arXiv paper demonstrates an on-chip 0.96 TOPS hyperdimensional photonic tensor core using TSWDM silicon photonic crossbar for AI acceleration.
#32	Optical Testing Bottleneck	Analysis	●●●○○	●●●●○	●●●●○	●●●○○	●●●●●	Scaling AI networks with CPO/NPO shifts manufacturing bottleneck to optical testing, demanding parallelized automation and Design-for-Test.
#33	Marvell Acquires Celestial	Corporate Strategy	●●○○○	●●●●●	●●●●●	●●●○○	●●●●●	Marvell's $3.25B acquisition of Celestial AI highlights photonics' strategic value in shaping future AI data centers, following NVIDIA's optical investments.

●●●●○ High ●●●○○ Med-High ●●○○○ Med ●○○○○ Low | Yellow highlight = featured article

Three Questions That Demand Your Decision This Week

❶ Is your AI supply chain exposed to InP bottlenecks?

Indium Phosphide (InP) lasers are identified as the 'true chokepoint' for 800G/1.6T optical modules. Lumentum is the sole volume supplier for 200G/lane EMLs, prompting NVIDIA to pre-contract. What is your strategy to mitigate this critical supply risk?

❷ Does your CPO strategy align with industry standardization?

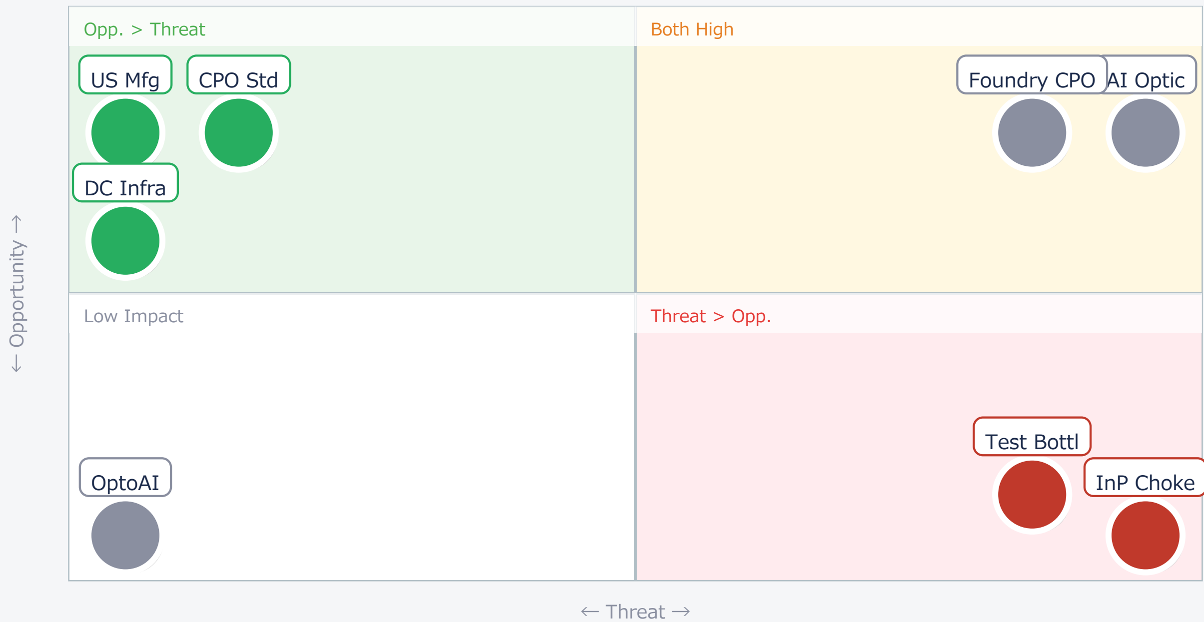
Major players like Ciena, Broadcom, and 3M are driving Open CPX MSA and EBO Connector MSA for CPO. Interoperability and reliability are key for widespread adoption. Are your CPO development and procurement plans leveraging or contributing to these open standards?

❸ Are you investing in next-gen optical manufacturing & test?

NVIDIA and Corning are scaling US optical interconnect manufacturing tenfold. The shift to CPO/NPO also moves the manufacturing bottleneck to optical testing. Are your R&D; and capital expenditure plans addressing these critical production and test challenges?

Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
● US Mfg	Opp.	US optical capacity	Supply chain shift
● CPO Std	Opp.	Interoperability	Lagging standards
● DC Infra	Opp.	Fiber infrastructure	Copper limits
● AI Optic	Critical	New market growth	Intense competition
● Foundry CPO	Critical	CPO adoption	Foundry competition
● InP Choke	Threat	InP supplier growth	Supply chain risk
● Test Bottl	Threat	Test equipment	CPO scaling risk

● OptoAI	Ref.	Future AI compute	Long-term disruption

Deep Dive ① — NVIDIA & Corning Scale US Optical Interconnect

#01 | 2026/05/13 | Business20Channel.tv | Tech Novelty●●●○○ Proximity●●●●● Market Impact●●●●● Data Reliability●●●●○ US/EU Relevance●●●●●

NVIDIA and Corning have formed a multi-year strategic partnership to dramatically expand US manufacturing capacity for advanced optical interconnect solutions for AI data centers. This collaboration aims to increase Corning's US optical connectivity manufacturing by 10x and fiber optic production by over 50%, establishing three new factories and creating more than 3,000 jobs.

This initiative directly addresses potential supply chain bottlenecks for optical interconnects, which are critical for scaling rapidly expanding AI infrastructures. The move underscores the strategic importance of optical connectivity as a core element of the AI hardware supply chain, aligning with broader trends toward strengthening supply chain resilience.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: The published numbers (10x capacity, 3000 jobs) are ambitious but realistic given NVIDIA's strategic imperative and investment. Technical barriers are primarily scaling existing processes and ensuring quality at higher volumes. [Opportunity] for US/EU materials & component suppliers to integrate into this expanded domestic supply chain. [Threat] for non-US/EU suppliers who may see reduced demand from US-based AI infrastructure projects. Next actions: [Procurement] Identify potential US/EU suppliers for Corning's expanded operations by end of Q3 2026. [Strategy] Evaluate feasibility of similar domestic manufacturing partnerships for other critical AI components by end of Q4 2026.

Deep Dive ② — NVIDIA's $4B Optical Strategy & CPO Transformation

#19 | 2026/05/07 | IO Fund | Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●● Data Reliability●●●○○ US/EU Relevance●●●●●

NVIDIA is accelerating its transition to Co-Packaged Optics (CPO) for AI data center networking, investing $2 billion each in Coherent and Lumentum to secure its optical component supply chain. CPO offers significant advantages over traditional copper and pluggable optical transceivers in terms of power efficiency (up to 5x better) and bandwidth.

Broadcom is already shipping its third-generation CPO product, Tomahawk 6, demonstrating 36 million hours of uptime in reliability testing with Meta. NVIDIA CEO Jensen Huang hails CPO as a "game-changer," pushing for early adoption of Quantum-X and Spectrum-X CPO switches, indicating the entire optical stack is indispensable for AI infrastructure.

▶ Strategic Analyst's Perspective

Strategic Analyst's Perspective: NVIDIA's $4B investment and Broadcom's CPO progress with Meta validate CPO's readiness and strategic importance. The power efficiency claims (5x better) are realistic given the reduced electrical path. Technical barriers include thermal management, manufacturing yields, and long-term reliability in harsh data center environments. [Opportunity] for US/EU optical component suppliers (lasers, modulators, fibers) and advanced packaging firms to partner with NVIDIA or its ecosystem. [Threat] for traditional copper interconnect providers and pluggable optical module manufacturers who fail to pivot to CPO. Next actions: [Business Dev] Engage NVIDIA, Coherent, Lumentum, and Broadcom to understand CPO roadmap and partnership opportunities by end of Q3 2026. [R&D;] Prioritize CPO-related R&D;, focusing on thermal solutions and high-yield manufacturing processes by Q4 2026.

Deep Dive ③ — Indium Phosphide (InP): The True AI Optical Bottleneck

#30 | 2026/05/15 | NewMaxx's SSD Page | Tech Novelty●○○○○ Proximity●●●●● Market Impact●●●●● Data Reliability●●●○○ US/EU Relevance●●●●●

Despite the focus on silicon photonics, Indium Phosphide (InP) is identified as the true bottleneck for 800G and 1.6T optical transceivers in AI data centers. Silicon cannot emit light, making InP lasers indispensable as light sources, but their supply struggles to meet surging demand.

Lumentum is currently the sole volume supplier for 200G/lane Electro-Absorption Modulated Lasers (EMLs) needed for 1.6T pluggables, leading NVIDIA to pre-contract for EML supply post-2027. Coherent is also doubling InP production capacity in 2026 and 2027, transitioning to 6-inch InP wafers, but resolving the overall supply chain bottleneck is expected to take several years.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: The assessment of InP as a critical bottleneck is highly realistic and urgent. NVIDIA's pre-contracting confirms the severity of the supply constraint. Technical barriers include the complexity of InP wafer manufacturing, yield optimization, and the specialized expertise required. [Opportunity] for US/EU materials & component suppliers specializing in InP wafer growth, epitaxy, and laser fabrication to rapidly scale production and capture market share. [Threat] for any US/EU OEM or device manufacturer reliant on 800G/1.6T optical modules without diversified InP sourcing or long-term supply agreements. Next actions: [Procurement] Conduct an immediate audit of InP laser supply chain exposure and engage with Lumentum, Coherent, and potential alternative suppliers by end of Q2 2026. [R&D;] Investigate alternative light source technologies or integration methods to reduce InP dependency in the medium-long term by Q4 2026.

Other Notable Articles

GlobalFoundries Projects Silicon Photonics Revenue to Double by 2026, Exceeding $1 Billion by 2028 (TrendForce)
Tech Novelty●●○○○ Proximity●●●●● Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●●

GF's SiPho revenue forecast highlights the rapid market shift and opportunity for foundry services in optical components.

AI Infrastructure Boom Fuels Stock Surge for Optical Networking Leaders Coherent and Lumentum (Invezz)
Tech Novelty●○○○○ Proximity●●●●● Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●●

Investor confidence in optical networking for AI signals strong market demand and growth potential for key US players.

South Korean Company Initiates Mass Production of Silicon Photonics Integrated Sensors for Automotive LiDAR, Boosting Autonomous Driving Adoption (ET News (韓国専門メディア))
Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●○ Data Reliability●●○○○ US/EU Relevance●●●○○

Mass production of SiPho LiDAR indicates market maturity and competitive pressure for US/EU automotive sensor suppliers.

MIT Silicon Photonics LiDAR Chip Enables Compact, High-Performance Sensors for Autonomous Systems (MIT News)
Tech Novelty●●●●○ Proximity●●○○○ Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●●

MIT's SiPho LiDAR breakthrough promises compact, durable sensors, accelerating autonomous systems and broad sensing applications.

Recommended Actions This Week

Action recommendations based on article evaluation matrix and opportunity/threat analysis.

Immediate (this week)

- [Procurement] Assess InP laser supply chain exposure, especially for 200G/lane EMLs, and engage key suppliers like Lumentum/Coherent for 2027+ supply. (Ref: #30)
- [Strategy] Evaluate impact of NVIDIA's $4B optical strategy and Marvell's Celestial AI acquisition on competitive landscape and partnership opportunities. (Ref: #19, #33)

Short-term (1 month)

- [R&D;] Benchmark CPO/SiPho solutions from GlobalFoundries, TSMC, and Samsung for next-gen AI platforms and potential integration. (Ref: #02, #05, #10)
- [Business Dev] Engage in Open CPX MSA and EBO Connector MSA discussions to influence standards and ensure interoperability for future products. (Ref: #21, #27)
- [Procurement] Review data center cabling strategy, accelerating transition to structured fiber for 800G/1.6T AI clusters to mitigate DAC/AOC limits. (Ref: #26)

Medium-long term (quarter+)

- [R&D;] Initiate research into advanced optical testing methodologies and Design-for-Test (DfT) for CPO/NPO to prevent future manufacturing bottlenecks. (Ref: #32)
- [Strategy] Monitor developments in photonic AI accelerators (NUS, NTU, arXiv) for long-term disruptive potential in AI computing and energy efficiency. (Ref: #15, #20, #31)
- [Executive] Develop a comprehensive US/EU optical manufacturing strategy to capitalize on domestic capacity expansion (NVIDIA/Corning) and reduce reliance on foreign supply. (Ref: #01)

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Photonics — Selected Articles

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NVIDIA and Corning Partner to Scale US AI Optical Interconnect Manufacturing Tenfold

Published May 13, 2026 Business20Channel.tv USA

OVERVIEW

NVIDIA and Corning have announced a multi-year strategic partnership to dramatically expand US manufacturing capacity for advanced optical interconnect solutions targeting AI data centers. This collaboration will enable Corning to increase its US optical connectivity manufacturing by 10x and fiber optic production by over 50%, establishing three new factories and creating more than 3,000 jobs. The initiative directly addresses potential supply chain bottlenecks for optical interconnects, which are becoming critical for scaling rapidly expanding AI infrastructures.

IN DEPTH

Addressing the AI Infrastructure Bottleneck

The explosive growth of generative AI models has placed unprecedented demands on data center infrastructure. Large-scale AI clusters, often comprising thousands of GPUs, require massive, high-speed, low-latency data transfer, pushing traditional copper interconnects to their power consumption and bandwidth limits. This has highlighted the potential for optical interconnects to become a critical bottleneck in maximizing AI workload performance.

Strategic Partnership Details and Goals

To overcome this challenge, NVIDIA and Corning have forged a multi-year commercial and technical partnership aimed at substantially increasing US manufacturing capacity for advanced optical connectivity solutions for AI data centers. Backed by NVIDIA's investment, Corning plans to ramp up its domestic optical connectivity manufacturing by a factor of ten and boost fiber optic production by over 50%. This expansion includes the construction of three new factories in North Carolina and Texas, which are projected to create more than 3,000 new jobs, contributing significantly to regional economic development.

Technical Significance and Industry Impact

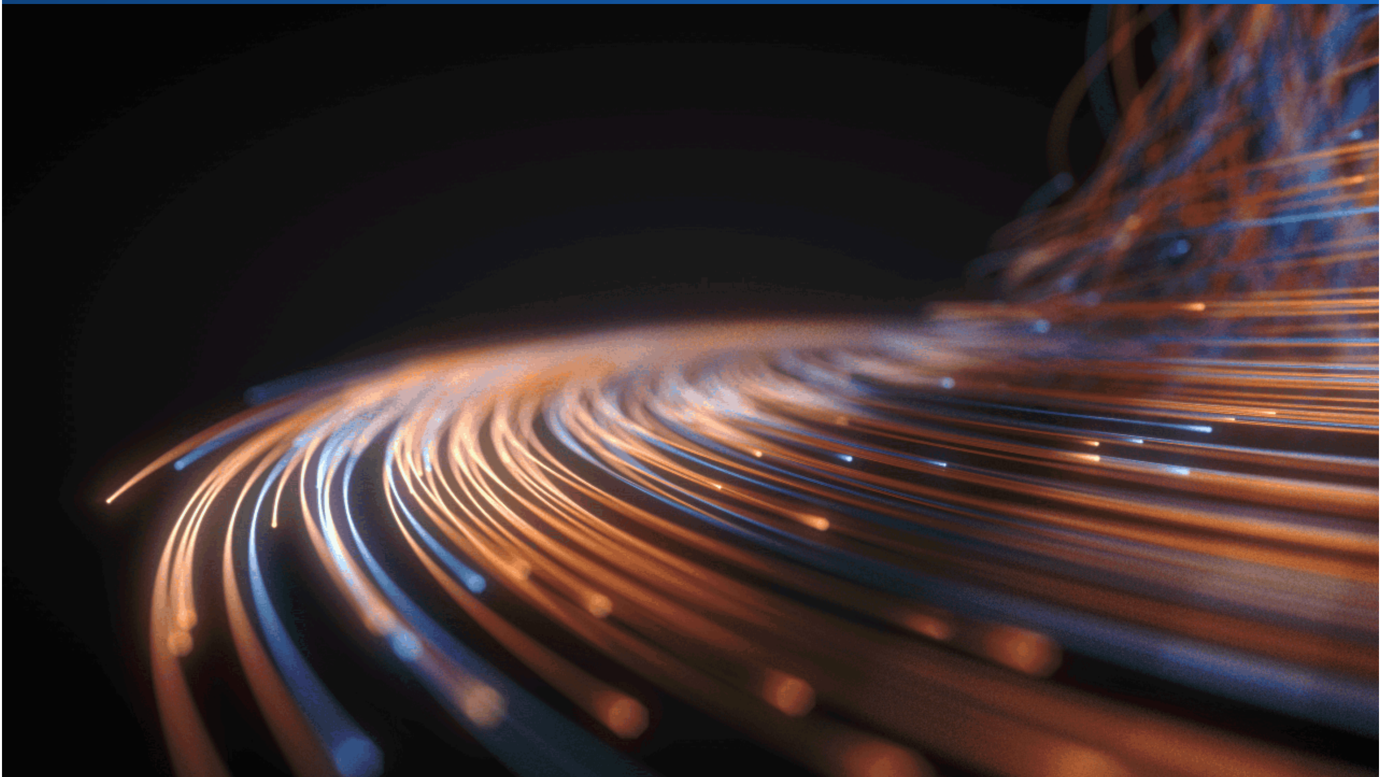
This partnership underscores the strategic importance of optical interconnects in AI infrastructure. As NVIDIA CEO Jensen Huang noted, "AI is driving the largest infrastructure buildout in modern times and creating a profound opportunity to re-energize American manufacturing and supply chain." Optical connectivity is rapidly moving from a mere component supply to a core element of the AI hardware supply chain itself. The emphasis on increasing US production capacity aligns with broader trends toward strengthening supply chain resilience in the face of geopolitical risks, thereby enabling the stable and scalable deployment of AI data centers. This strategic shift from copper to optical is seen as a technical imperative, expected to significantly enhance the power efficiency and performance of future AI data centers.

Source: https://business20channel.tv/nvidia-corning-partnership-2026-10x-us-optical-capacity-and-3000-

Collected: May 15, 2026 | Automated Research System (Gemini API)

GlobalFoundries Unveils SCALE™ Optical Module Solution to Accelerate Co-Packaged Optics for AI Data Centers

Published May 04, 2026   GlobalFoundries (GF)   USA



OVERVIEW

GlobalFoundries (GF) has introduced its SCALE™ optical module solution, designed to accelerate the adoption of Co-Packaged Optics (CPO) for advanced AI data centers. This platform is the industry's first OCI (Optical Compute Interconnect) MSA-compliant solution, exceeding the requirements of modern AI scale-up architectures. Leveraging GF's advanced silicon photonics technology with CWDM/DWDM, SCALE significantly boosts bandwidth density and system scalability compared to traditional copper interconnects.

IN DEPTH

The Interconnect Imperative in AI Data Centers

As modern AI data centers expand their computational capabilities and the volume of data transferred between GPUs, they face critical interconnect bottlenecks. Traditional copper interconnects are reaching their limits in terms of power consumption, latency, and bandwidth, impeding the efficient execution of AI workloads. Co-Packaged Optics (CPO) has emerged as a pivotal solution, integrating optical engines much closer to high-performance chips like switch ASICs. This proximity drastically shortens electrical signal paths, leading to significant improvements in power efficiency and bandwidth density.

Introducing GF's SCALE™ Optical Module Solution

GlobalFoundries (GF) has launched its SCALE™ optical module solution, a breakthrough platform set to accelerate CPO adoption. Positioned as the industry's first OCI (Optical Compute Interconnect) MSA-compliant platform, SCALE is designed to surpass the requirements of current AI scale-up architectures. The solution is built upon GF's leading silicon photonics technology and utilizes Coarse Wavelength Division Multiplexing (CWDM) and Dense Wavelength Division Multiplexing (DWDM) for bi-directional data transmission, offering substantial enhancements in bandwidth density and system scalability over conventional copper.

Technical Prowess and Future Outlook

The SCALE solution features certified high-performance photonic devices, including 50Gbps and 100Gbps micro-ring modulators and integrated photodiodes. It also supports copper pad pitches ranging from 110μm down to less than 45μm, enabling advanced 2.5D/3D stacking architectures. Mike Hogan, GF's Chief Business Officer, emphasizes that SCALE is paving the way for a future of high-bandwidth, energy-efficient connectivity in AI infrastructure. This represents a significant stride towards the industrialization of CPO, addressing data transfer bottlenecks and power consumption challenges in AI data centers. Its features are expected to facilitate a faster transition to volume production of highly efficient AI scale-up architectures. Future considerations include ensuring compatibility with existing systems, managing complex thermal designs, and fostering a robust ecosystem across the supply chain for widespread adoption.

Source: https://gf.com/gf-press-release/globalfoundries-accelerates-adoption-of-co-packaged-optics-for-advanced-ai-data-centers-with-scale-optical-module-solution/

Collected: May 15, 2026 | Automated Research System (Gemini API)

GlobalFoundries Projects Silicon Photonics Revenue to Double by 2026, Exceeding $1 Billion by 2028

Published May 07, 2026   TrendForce   USA

OVERVIEW

GlobalFoundries (GF) is poised for significant growth in its silicon photonics business, with revenue projected to double by 2026 and surpass $1 billion by the end of 2028. This surge is driven by the industry's rapid shift towards pluggable and Co-Packaged Optics (CPO) for expanding AI data center networking demands. GF already supports 1.6T solutions for three out of the top four pluggable optical transceiver companies and has a clear roadmap for 3.2T and beyond, solidifying its position as a key enabler for next-generation AI infrastructure.

IN DEPTH

Silicon Photonics at the Core of Growth

GlobalFoundries (GF), a leading semiconductor foundry, has strategically positioned its silicon photonics business as a core growth engine. Market reports indicate that the company's silicon photonics revenue is expected to double in 2026 and potentially exceed $1 billion annually by the end of 2028. This impressive growth is largely attributed to the explosive expansion of AI data centers and the consequent industry-wide shift towards advanced pluggable optical transceivers and Co-Packaged Optics (CPO).

Enabling High-Speed Optical Communication for AI Data Centers

GF's silicon photonics portfolio provides crucial components to meet the high-speed, high-capacity communication requirements of AI infrastructure. The company's CEO noted that three of the top four leading pluggable optical transceiver companies have adopted GF's designs, underscoring the market's strong recognition of its technological prowess. GF is currently in volume production for 1.6T optical transceiver solutions and has presented a clear development roadmap for next-generation 3.2T and beyond, thereby enhancing its capability to handle the immense data transfer demands of AI workloads.

Leadership and Outlook in the CPO Market

Reports also confirm GF's May announcement of the "SCALE™ optical module solution" for CPO, signaling the company's proactive stance in establishing a leading position in the CPO market. While major foundries like TSMC and Samsung are also ramping up investments in silicon photonics, GF differentiates itself through its strong traction in the pluggable optical transceiver market and concrete advancements in CPO solutions. Silicon photonics is transitioning into a vital foundational technology for next-generation connectivity in AI data centers, moving into volume production. GF's role is anticipated to become increasingly critical in driving further technological innovation and market expansion in this domain.

Source: https://www.trendforce.com/news/2026/05/07/news-globalfoundries-reportedly-sees-silicon-

photonics-revenue-doubling-in-2026-passing-1b-by-2028/

Collected: May 15, 2026 | Automated Research System (Gemini API)

NTT Group Advances IOWN Vision with Diverse R&D: Ultrafast Light Processing, Thinnest Liquid Crystal Layers, and Subsea Cables

Published May 14, 2026 NTT Group (WEB media that thinks about the future with NTT) Japan

OVERVIEW

NTT Group is driving the IOWN initiative forward with a broad range of R&D, releasing multiple technical articles covering optoelectronic integration, novel materials, and coherent optical communication. Key advancements include the world's thinnest liquid crystal layer, enhanced light utilization for high-speed processing, mitigation strategies for cosmic radiation effects on devices, and innovations in subsea cable technology. These foundational technologies are crucial for realizing IOWN's ultimate goals of ultra-low power consumption, ultra-high speed, and massive capacity communication.

IN DEPTH

Diverse Foundational Technologies Underpinning IOWN

NTT Group's "WEB media that thinks about the future with NTT" platform has published a series of cutting-edge technical articles highlighting various research efforts aimed at realizing the Innovative Optical and Wireless Network (IOWN) concept. IOWN envisions a next-generation communication infrastructure powered by all-optical networking, striving for ultimate energy efficiency, ultra-high speeds, and massive data capacities. Achieving this ambitious vision necessitates breakthroughs across multiple technological domains.

Key Technical Topics and Research Progress

- **"The World's Thinnest Liquid Crystal Layer"** (published May 14, 2026) signifies advances in novel material development, potentially contributing to the miniaturization of optical devices and enabling new functionalities.
- **"Squeezing Light for Speed"** (published May 11, 2026) focuses on technologies that enhance the efficiency and speed of optical signal processing, which is crucial for improving the performance of optoelectronic integrated devices.
- **"Cosmic Radiation Disrupting Devices"** (published May 11, 2026) addresses a critical challenge in ensuring communication infrastructure reliability, indicating research efforts towards stabilizing device operations in space and at high altitudes.
- **"Data Under The Sea"** (published May 7, 2026) highlights advancements in subsea cable technology for long-distance, high-capacity communication, underscoring its importance as a foundational technology for global data flow.

Each of these articles demonstrates contributions to novel material development, optical device performance enhancement, reliability assurance, and the deepening of long-distance transmission technologies, illustrating the broad spectrum of R&D efforts aimed at achieving the IOWN vision.

Industry Impact and Future Prospects

The IOWN concept holds significant potential for improving bandwidth and energy efficiency in future Data Center Interconnect (DCI) and long-distance communication. Particularly, the evolution of subsea cable technology is indispensable for supporting global data traffic and strengthening international information and communication infrastructure. A key challenge moving forward will be the successful implementation and widespread adoption of these fundamental and applied research outcomes into actual products and services. Through these technologies, NTT Group aims to realize a sustainable and prosperous information society.

Source: https://group.ntt/en/group/iown/

Collected: May 15, 2026 | Automated Research System (Gemini API)

TSMC Forecasts $1.5 Trillion Semiconductor Revenue by 2030, Introduces Optoelectronic COUPE Technology for AI

Published May 14, 2026 Taipei Times Taiwan

OVERVIEW

TSMC projects global semiconductor revenue to reach $1.5 trillion by 2030, driven by surging AI demand. The company plans to release its Compact Universal Photonic Engine (COUPE) technology this year, integrating multiple ICs, photonics, and fiber couplers into a single package. COUPE, slated for integration with CoWoS packaging, aims to reduce coupling loss, enhance energy efficiency, and accelerate chip-to-chip connectivity in data centers, thereby addressing the growing demands of AI workloads.

IN DEPTH

AI Driving Semiconductor Market Growth to $1.5 Trillion

Taiwan Semiconductor Manufacturing Co. (TSMC), the world's largest contract chipmaker, has issued an optimistic forecast, predicting that the global semiconductor market revenue will hit $1.5 trillion by 2030. This growth is primarily fueled by the explosive demand for artificial intelligence (AI), which is driving unprecedented consumption of tokens and computing power. This projection firmly establishes AI as a central force in next-generation computing and a primary catalyst for semiconductor innovation.

Introducing COUPE: Next-Generation Optoelectronic Integration

In response to AI's escalating demands for high performance and power efficiency, TSMC is set to introduce its "Compact Universal Photonic Engine (COUPE)" technology later this year. COUPE represents a groundbreaking innovation that integrates multiple integrated circuits (electrical dies), a photonic die, and optical fiber couplers into a single, advanced package. This technology achieves ultra-low impedance and high energy efficiency by directly stacking electrical and photonic dies using SoIC-X stacking. This capability dramatically reduces coupling losses in data centers, boosts energy efficiency, and significantly accelerates chip-to-chip interconnects.

Integration with CoWoS Packaging and Future Outlook

TSMC also plans to integrate its COUPE technology with CoWoS (Chip-on-Wafer-on-Substrate), its leading advanced packaging platform. The third generation of CoWoS is scheduled for volume production this year, with targets to offer even larger CoWoS technologies by 2029—supporting 14 times the reticle size for 24 High Bandwidth Memory (HBM) chips, and over 40 times the reticle size for 64 HBM chips. The integration of COUPE with CoWoS holds immense potential for eliminating chip-to-chip interconnect bottlenecks and substantially improving scalability and performance in future AI/HPC systems. TSMC's strategy clearly demonstrates that the combination of advanced chiplet technology and optoelectronic integration is indispensable for enhancing AI processor performance and power efficiency, thereby solidifying its leadership in this critical domain.

Source: https://www.taipeitimes.com/News/front/archives/2026/05/15/2003857365

Collected: May 15, 2026 | Automated Research System (Gemini API)

AI Infrastructure Boom Fuels Stock Surge for Optical Networking Leaders Coherent and Lumentum

Published May 13, 2026 Invezz USA

OVERVIEW

Driven by the escalating demand for AI infrastructure, optical networking companies like Coherent and Lumentum Holdings have experienced significant stock gains in 2026. Bank of America predicts Coherent to capture 20-30% of the global transceiver market, benefiting most from rising 800G/1.6T transceiver sales, and has raised its price target. Coherent's manufacturing advantage on 6-inch substrates positions it to meet demand across multiple platforms, including silicon photonics (SiPho) and electro-absorption modulated lasers (EML).

IN DEPTH

AI Demand Energizes Optical Networking Market

The rapid build-out of AI data center infrastructure is providing a substantial tailwind for the optical communications and photonics industry. Key players like Coherent and Lumentum Holdings, suppliers of indispensable optical transceivers for high-speed, high-capacity data transfer within data centers, have seen their stock prices surge notably in 2026. This trend suggests that investors are increasingly recognizing the strategic importance of optical networking within the broader AI ecosystem.

Coherent's Market Leadership and Competitive Edge

Analysts at Bank of America project that Coherent will command a significant 20% to 30% share of the global optical transceiver market. The company is identified as one of the primary beneficiaries from the growing sales of next-generation 800G and 1.6T transceivers, leading to an upward revision of its price target. A core strength for Coherent lies in its manufacturing prowess, particularly its advantage in producing on 6-inch substrates. This capability allows the company to efficiently address demand across diverse technology platforms, including silicon photonics (SiPho) and electro-absorption modulated lasers (EML), potentially leading to further market share gains.

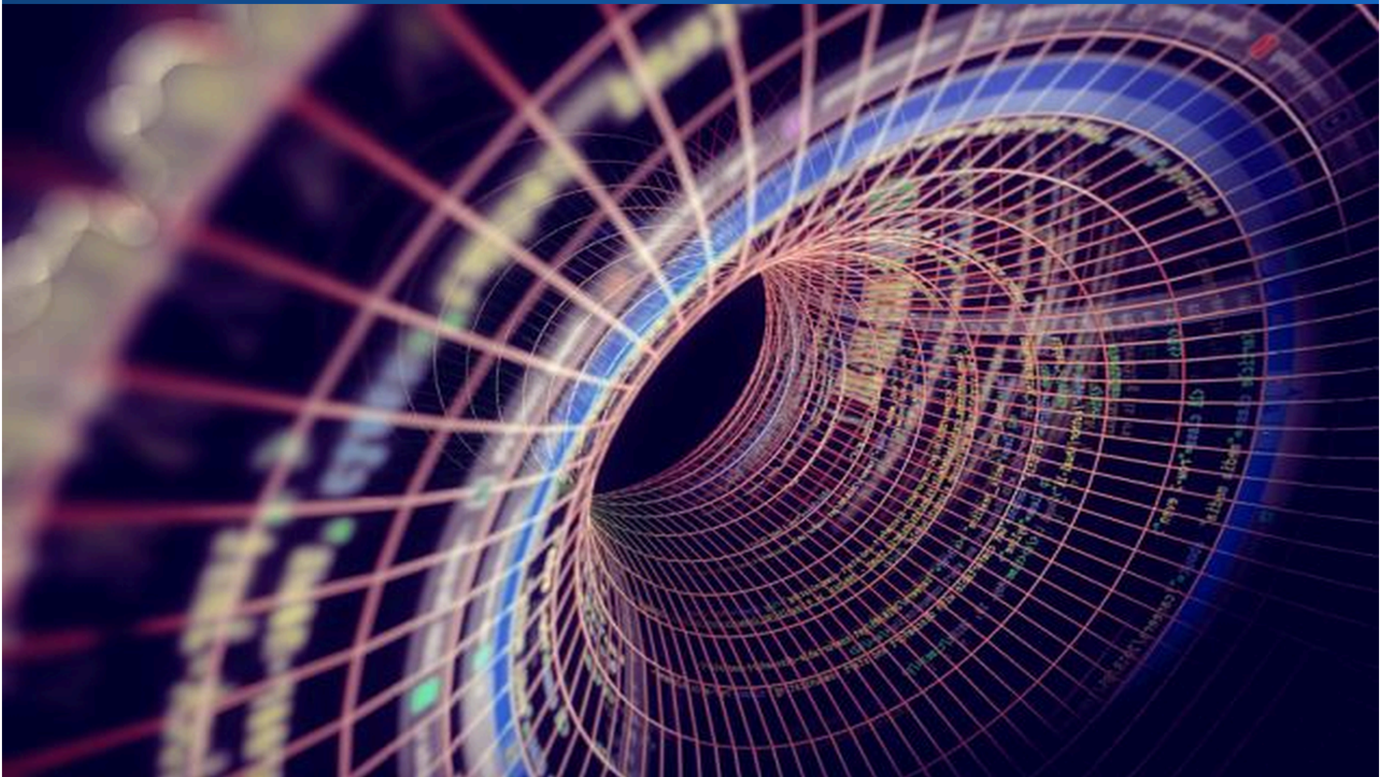
Advancements in Production Technology and Profitability

Coherent has also reported the initial shipments of transceiver products from its 6-inch manufacturing facility, a development expected to enhance manufacturing efficiency and improve gross margins. The burgeoning demand for high-speed transceivers, such as 800G and 1.6T, is a powerful driver for the evolution of optical device manufacturing technologies like silicon photonics and EML. In an environment of rapidly increasing industry demand, consistent component supply and sustained investment in next-generation technologies will remain critical factors determining corporate growth.

Source: https://invezz.com/news/2026/05/13/coherent-lumentum-stocks-continues-surge-how-high-can-the-ai-trade-go/

Lumentum's Optical Components Business Accelerates Amidst AI Boom, Bolstering Investments in 800G/1.6T and CPO

Published May 14, 2026 Zacks USA



OVERVIEW

Lumentum's optical components business is rapidly accelerating, driven by the expanding AI-powered optical networking market. The company is actively scaling its manufacturing capacity for 800G and 1.6T transceivers while prioritizing investments in Co-Packaged Optics (CPO) and Indium Phosphide (InP) laser production. This strategic focus aims to meet the escalating demands of AI data centers, stabilizing the supply chain and mitigating component shortage risks. Lumentum has reported robust performance, including a 90% year-over-year increase in quarterly revenue.

IN DEPTH

AI Market Growth Driving Lumentum's Business Trajectory

The explosive demand for AI data centers is creating substantial business opportunities in the optical networking market, particularly for optical component suppliers. Lumentum's components division has shown rapid acceleration, reporting a 90% year-over-year revenue increase, indicating the critical role of high-performance optical connectivity in efficient AI workload execution.

Strategic Investments in High-Speed Transceivers, CPO, and InP Lasers

Lumentum is aggressively expanding its manufacturing capacity for next-generation high-speed optical connectivity standards, including 800G and 1.6T transceivers. Furthermore, the company is making focused investments in Co-Packaged Optics (CPO) technology and Indium Phosphide (InP) lasers, which are essential light sources for optical transceivers. CPO significantly improves power efficiency and bandwidth density by integrating optical engines closer to switch ASICs, while InP lasers are crucial for generating high-performance optical signals. Lumentum's vertically integrated laser manufacturing capabilities are instrumental in enhancing supply chain management and mitigating potential component shortage risks that are a growing concern across the industry.

Technical Significance and Future Outlook

As AI data center deployment accelerates, the stable supply of high-performance optical components becomes paramount. Lumentum's strategic investments are crucial for meeting this increasing demand and supporting the scale-up of AI infrastructure. Particularly, the vertical integration of InP laser production contributes to a reliable supply of high-performance light sources and cost efficiency, helping Lumentum solidify its position as a leading active optical component supplier in the AI era. Ongoing challenges include maintaining and improving yields in the complex manufacturing processes of high-speed optical components and responding swiftly to rapidly evolving market needs.

Source: https://www.zacks.com/stock/news/2921505/lumentums-components-business-accelerates-

more-upside-ahead

Collected: May 15, 2026 | Automated Research System (Gemini API)

Broadcom Unveils VMware Cloud Foundation 9.1 to Enhance Cost-Efficiency and Security for Production AI in Private Clouds

Published May 12, 2026 Storage Newsletter USA

OVERVIEW

Broadcom has announced VMware Cloud Foundation (VCF) 9.1, a secure and cost-effective infrastructure platform engineered for production AI workloads. VCF 9.1 provides an AI and Kubernetes-native private cloud platform that supports mixed computing infrastructures across AMD, Intel, and NVIDIA hardware. This solution enables enterprises to deploy AI inference and agent AI applications with significantly reduced costs, enhanced security, and flexible GPU/CPU hardware choices. Research indicates private clouds remain the preferred platform for AI inference.

IN DEPTH

Challenges of AI Workloads and the Role of Private Clouds

The proliferation of generative AI models and the execution of AI workloads in production environments pose new challenges for enterprises in terms of computing power, storage, and networking. Especially for AI inference, where data privacy, security, and cost-effectiveness are paramount, private clouds have emerged as the preferred platform. Broadcom's research indicates that 56% of respondents are either already running or planning to run AI inference in private clouds, highlighting their increasing importance.

Key Features and Benefits of VMware Cloud Foundation 9.1

To address these challenges, Broadcom has unveiled VMware Cloud Foundation (VCF) 9.1, an integrated infrastructure platform optimized for AI workloads. VCF 9.1 offers several key benefits:

- **Multi-Hardware Support:** It supports mixed computing infrastructures across leading vendor GPUs and CPUs from AMD, Intel, and NVIDIA, providing enterprises with hardware selection flexibility.
- **AI/Kubernetes-Native:** As an AI and Kubernetes-native private cloud platform, it enables efficient deployment and management of AI workloads and containerized applications.
- **Cost Reduction:** The solution promises up to a 40% reduction in server costs, up to a 39% reduction in storage TCO, and up to a 46% reduction in Kubernetes operational costs.
- **Operational Efficiency:** It significantly enhances operational efficiency by accelerating cluster upgrades by 4x and doubling fleet capacity.
- **Enhanced Security:** Provides robust security features essential for production AI environments.

Technical Significance and Data Center Impact

The enhancements in VCF 9.1 reflect Broadcom's comprehensive approach to addressing the integrated challenges of computing, storage, and networking in AI data centers. Efficient AI workload execution necessitates not only high-performance computing resources but also the optimization of the entire supporting infrastructure. Optical connectivity technologies will play an indirectly critical role in this high-performance and efficient foundation, particularly for high-speed interconnects within data centers and for Data Center Interconnect (DCI). The adoption of integrated platforms like VCF 9.1 will provide a holistic solution to the cost, security, and flexibility challenges in AI data centers, further accelerating the proliferation of AI workloads in private cloud environments.

Source: https://www.storagenewsletter.com/2026/05/12/broadcom-announces-vmware-cloud-foundation-9-1-enabling-secure-and-cost-effective-infrastructure-for-production-ai/

Collected: May 15, 2026 | Automated Research System (Gemini API)

NTT's IOWN DCI Rack Solution Launches in Japan: Optical Tech to Resolve AI Data Center Power, Heat, and Latency Issues

Published May 11, 2026 PR TIMES Japan

OVERVIEW

Itochu Techno-Solutions (CTC), APRESIA Systems, and Edgecore Networks Corporation have partnered to deploy the "IOWN DCI Rack Solution" in Japan, based on NTT's IOWN concept. This solution fundamentally redefines data center connectivity by replacing traditional electrical signaling with advanced optical technology to address critical challenges such as power consumption, heat generation, and communication latency in the AI era. Utilizing Edgecore's Nexvec™ platform, it enables efficient optical interconnection of resources like GPUs and memory.

IN DEPTH

Addressing AI-Era Data Center Challenges

The rapid proliferation of generative AI has presented massive AI data centers with severe challenges concerning power consumption, heat generation, and data transmission latency. Traditional electrical wiring methods are approaching their limits in addressing these issues, necessitating a fundamental transformation of infrastructure. In response, the all-photonic technology central to NTT's IOWN (Innovative Optical and Wireless Network) concept is gaining attention as a promising solution.

Domestic Rollout of "IOWN DCI Rack Solution"

Itochu Techno-Solutions (CTC), APRESIA Systems, and Edgecore Networks Corporation have initiated a strategic collaboration for the domestic deployment of the "IOWN DCI Rack Solution," which is built upon NTT's IOWN concept to resolve AI-era infrastructure challenges. This solution aims to entirely revamp the traditional electrical signal-centric connectivity and transmission within data centers using advanced optical technology.

Technical Features and Anticipated Benefits

At the core of the IOWN DCI Rack Solution is Edgecore Networks' Nexvec™ platform. This foundation enables an architecture where critical computing resources such as GPUs and memory for AI processing can be efficiently connected via optics. This is expected to bring about the following fundamental improvements:

- **Reduced Power Consumption:** Minimizes electrical-to-optical conversion losses, significantly improving power efficiency in data transfer.
- **Heat Suppression:** Decreases heat generation from cables, lowering data center cooling costs.
- **Lower Latency:** Maximizes the transmission speed of optical signals, drastically shortening communication latency between GPUs.

This solution embodies the "Watt-Bit linkage" concept, a core tenet of the IOWN vision that holistically optimizes power and information. Its domestic deployment is set to bolster Japan's AI infrastructure competitiveness and potentially serve as a standard model for next-generation data centers. Future challenges include ensuring compatibility with existing infrastructure, fostering skilled technical personnel, and optimizing initial investment costs, though the robust collaborative framework is expected to accelerate its adoption.

Source: https://www.ctc-g.co.jp/news/release/20260511-02085.html

Collected: May 15, 2026 | Automated Research System (Gemini API)

Samsung Foundry Secures Optical Module Order, Ramps Up Silicon Photonics and CPO Drive for AI

Published May 01, 2026 TrendForce South Korea

OVERVIEW

Samsung Foundry has reportedly secured a significant optical module order, signaling an intensified focus on silicon photonics and Co-Packaged Optics (CPO). The company aims to differentiate itself by offering vertically integrated solutions combining high-bandwidth memory, logic foundry services, and advanced packaging. Samsung's roadmap includes integrating silicon photonics with AI accelerators by 2028 and embedding photonics within packages by 2029, reflecting the escalating competition among major foundries to address chip-to-chip communication bottlenecks in AI data centers.

IN DEPTH

Entering the Optical Module Market with a Vertical Integration Strategy

Samsung Foundry has reportedly secured a crucial order for optical modules, indicating an intensified commitment to advancing its capabilities in silicon photonics (SiPho) and Co-Packaged Optics (CPO). In this burgeoning sector, Samsung is strategically differentiating itself from competitors by offering vertically integrated solutions that leverage its core strengths: High-Bandwidth Memory (HBM), logic foundry services, and advanced packaging technologies.

AI Accelerator Integration and CPO Roadmap

Samsung's silicon photonics technology roadmap includes plans to integrate SiPho with AI accelerators by 2028. Furthermore, by 2029, the company aims to achieve even higher integration by embedding photonics directly within packages, realizing more sophisticated CPO solutions. This long-term roadmap underscores Samsung's deep recognition of silicon photonics as a key technology for resolving chip-to-chip communication bottlenecks, accelerating data transfer speeds, and reducing power consumption in AI data centers.

Foundry Competition and Industry Impact

Against a backdrop where NVIDIA, in collaboration with TSMC, has outlined a roadmap for directly integrating optical engines into switch packages—having already announced Quantum-X Photonics InfiniBand switches and planning Spectrum-X Photonics Ethernet switches for late 2026—Samsung's latest moves are set to intensify competition in the CPO market. The commitment of major semiconductor foundries to the full-scale business deployment of CPO will foster supply chain diversification and potentially accelerate the adoption of CPO technology in AI data center construction. While challenges such as technological maturity, manufacturing costs, and industry-wide standardization and cooperation remain crucial for widespread CPO implementation, Samsung's entry is expected to have a significant impact across the industry.

Source: https://www.trendforce.com/news/2026/05/01/news-samsung-foundry-reportedly-wins-optical-

module-order-steps-up-silicon-photonics-and-cpo-drive/

Collected: May 15, 2026 | Automated Research System (Gemini API)

KAIST Unveils New High-Efficiency, Scalable Manufacturing Method for Quantum Photonics Chips

Published May 10, 2026 The Korea Economic Daily (Japanese Edition) South Korea

OVERVIEW

A research team at KAIST (Korea Advanced Institute of Science and Technology) has announced a novel, highly efficient, and scalable manufacturing method for quantum photonics chips. This breakthrough significantly enhances the integration density and photon generation efficiency of single-photon sources. It marks a critical step towards realizing quantum communication and computing, particularly paving the way for the mass production of integrated quantum devices. Researchers emphasize that this technique enables the construction of complex quantum circuits on more compact chips.

IN DEPTH

Challenges in Quantum Photonics Chip Manufacturing

Quantum photonics chips are indispensable for manipulating and transmitting quantum states in quantum communication and computing. However, manufacturing these chips faces significant challenges, particularly regarding the efficient generation of single-photon sources, high integration density, and scalability. Traditional manufacturing methods have struggled to meet these requirements simultaneously, hindering the practical deployment of quantum devices.

KAIST's Novel Manufacturing Method

A research team at the Korea Advanced Institute of Science and Technology (KAIST) has announced the development of a groundbreaking new manufacturing method for quantum photonics chips, designed to overcome these challenges. This new technology represents a significant leap forward in several aspects:

- **High-Efficiency Photon Generation:** It enables a substantial improvement in the photon generation efficiency of single-photon sources, which is crucial for enhancing the reliability of quantum information processing.
- **High Integration Density:** The method allows for greater integration density of photon sources on a chip, opening the door to realizing more complex quantum circuits in compact form factors.
- **Scalability:** It provides a scalable process for the mass production of quantum devices, accelerating the transition from laboratory research to industrial applications.

The research team emphasized that this method allows for the efficient construction of complex quantum circuits, capable of manipulating multiple qubits, on smaller chips than previously possible.

Contribution to the Future of Quantum Technology

This novel manufacturing method from KAIST is a critical achievement, directly contributing to enhanced information security in quantum communication and a dramatic leap in computational power for quantum computing. The mass production of integrated quantum photonics chips is an essential factor in accelerating the societal implementation of quantum technology. Looking ahead, it is expected to significantly contribute to the development of a wide range of quantum photonic devices, including more practical quantum sensors and the construction of distributed quantum computing networks. This technology is set to elevate South Korea's presence in the field of quantum technology.

Source: #

Collected: May 15, 2026 | Automated Research System (Gemini API)

Huawei Accelerates AI Data Center Energy Efficiency with Optoelectronic Integration, CPO as Key Enabler

Published May 13, 2026 ASCII.jp Japan

OVERVIEW

Huawei is advancing energy-efficient solutions for AI data centers through optoelectronic integration technology, with a strong focus on Co-Packaged Optics (CPO). By integrating switch ASICs and optical engines within the same package, CPO is expected to significantly boost power efficiency and bandwidth density. This technology aims to reduce latency and improve signal quality for GPU-to-GPU connections within AI clusters. Huawei is working towards building next-generation AI data center infrastructure through CPO commercialization, with joint verifications already underway.

IN DEPTH

AI Data Center Power Challenges and the Need for Optoelectronic Integration

Power consumption stands as one of the most critical challenges for AI data center operational costs and environmental impact. The immense computational and data transfer demands of large-scale AI workloads, in particular, expose the limitations of traditional electrical signal interconnects, leading to increased heat generation and reduced power efficiency. To resolve these issues, "optoelectronic integration technology," which merges the advantages of light and electricity, is gaining prominence as a foundation for next-generation data centers.

Huawei's Drive for Co-Packaged Optics (CPO)

Huawei is focusing its development efforts on Co-Packaged Optics (CPO) as a core of this optoelectronic integration technology. CPO involves the tight integration of the ASIC (Application-Specific Integrated Circuit), central to data center switching, with the optical engine that transmits and receives optical signals, all within the same package. This integration dramatically shortens the electrical signal path, yielding the following benefits:

- **Significant Improvement in Power Efficiency:** Reduced electrical signal transmission losses lead to substantial power savings across the entire data center.
- **Enhanced Bandwidth Density:** Allows for the integration of more optical channels at higher densities, dramatically increasing switching capacity.
- **Reduced Latency and Improved Signal Quality:** For GPU-to-GPU connections within AI clusters, it lowers latency and suppresses signal degradation, thereby improving the training efficiency of AI models.

Through the commercialization of CPO, Huawei aims to build next-generation AI data center infrastructure and contribute to the realization of a sustainable information society. With joint verifications already underway with some data center operators, early market deployment is in sight, suggesting that CPO technology is increasingly likely to become a standard connectivity method for AI data centers.

Future Outlook and Challenges

While CPO adoption resolves power consumption and performance bottlenecks, it also introduces new technical challenges, such as thermal management within CPO packages, manufacturing yields of optical engines, and maintainability in case of failure. Huawei's efforts are expected to play a crucial role in addressing these challenges through cutting-edge optoelectronic integration technology and manufacturing process optimization, thereby accelerating the evolution of AI data centers.

Source: #

Thin-Film Lithium Niobate (TFLN) Modulators Emerge as Key Material for 1.6T Optical Transceivers in Data Centers

Published May 09, 2026 OPTCOM Magazine Japan

OVERVIEW

Recent research highlights new optical modulators based on Thin-Film Lithium Niobate (TFLN) as a critical component for next-generation 1.6T optical transceivers. TFLN promises significantly higher modulation speeds and lower power consumption compared to traditional bulk lithium niobate. This technology is poised to meet the demanding high-speed data transmission requirements of AI/HPC data centers and is expected to be adopted in future pluggable optical modules beyond 400G and 800G.

IN DEPTH

High-Speed Data Transmission Needs in the AI/HPC Era

The rapid advancements in AI and High-Performance Computing (HPC) data centers are escalating demands for data transmission speed and power efficiency. Current high-speed optical transceiver standards, such as 400G and 800G, continue to evolve, with 1.6T (terabits per second) transmission becoming essential for the next generation. Achieving such ultra-high speeds critically depends on enhancing the performance of optical modulators, which convert and modulate electrical signals into optical ones.

Innovation in Thin-Film Lithium Niobate (TFLN) Modulators

Thin-Film Lithium Niobate (TFLN) modulator technology has recently garnered significant attention in the field of optical modulators. Lithium Niobate (LiNbO3) is renowned for its excellent electro-optic properties, but TFLN technology enables the fabrication of this material as a micro-meter thin film on silicon substrates. This breakthrough offers dramatic performance improvements over conventional bulk LiNbO3 modulators:

- **Ultra-High-Speed Modulation:** Achieves modulation bandwidths exceeding 100GHz and ultra-fast response times, meeting the demands of ultra-high-speed optical transceivers like 1.6T.
- **Low Power Consumption:** Significantly reduces driving voltage, contributing to overall data center power efficiency.
- **Miniaturization and Integration:** Its compact device footprint facilitates smaller optical transceivers and high-density integration with other photonic circuits.
- **Excellent Linearity:** Enables high-quality signal transmission required for AI optical interconnects.

Application to 1.6T Optical Transceivers and Industrial Outlook

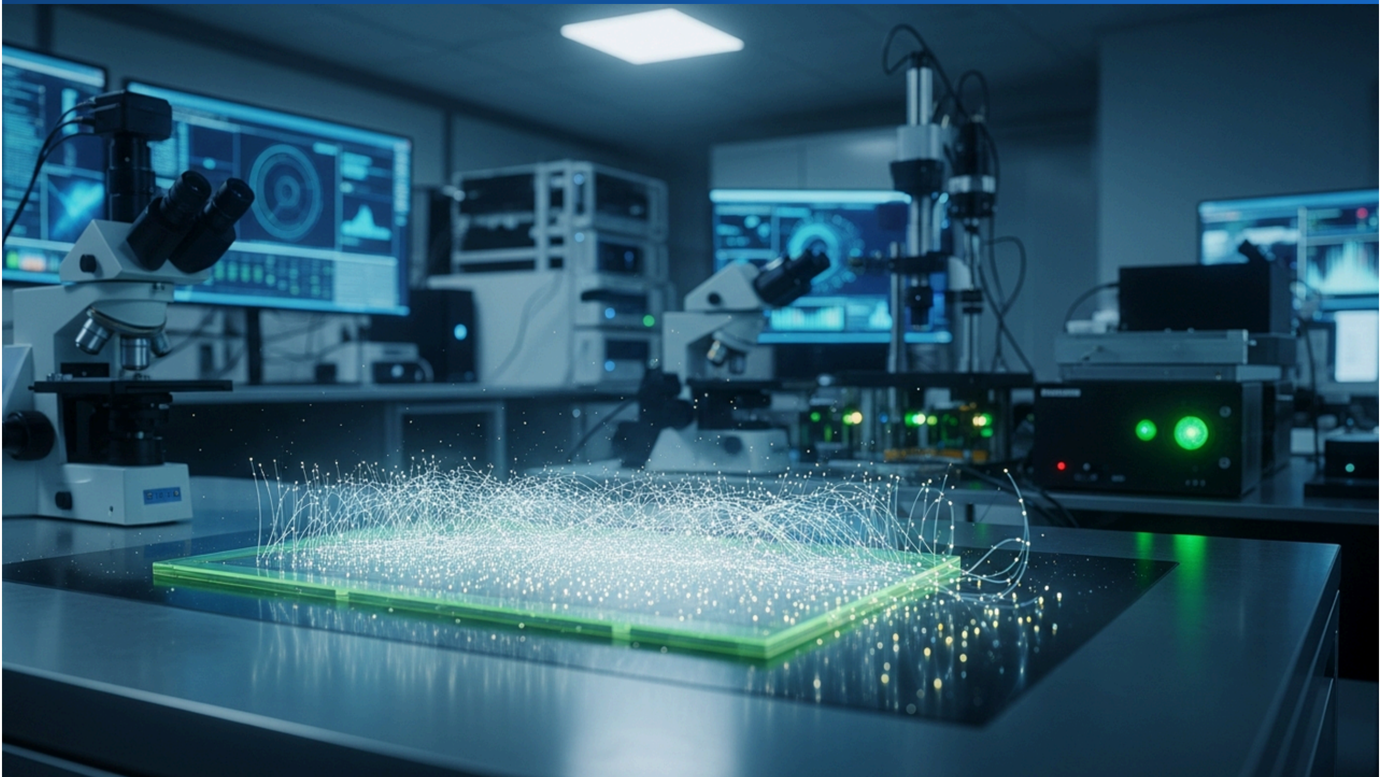
TFLN modulators are highly anticipated as key components for 1.6T optical transceivers in data centers, with development progressing towards sample shipments and early commercialization. The adoption of this technology is expected to contribute to cost reduction and manufacturing process efficiency for transceivers as a whole. Furthermore, TFLN is also gaining attention in the microwave photonics (MWP) field as an innovative platform to drive next-generation wireless technologies, particularly for millimeter-wave and terahertz-band signal processing in 6G. With unique advantages in speed, low power consumption, and linear performance compared to other platforms like silicon photonics and InP, TFLN is poised to become a critical material shaping the future of AI optical communications.

Source: https://optronics-media.com/news/20260508/109544/

Collected: May 15, 2026 | Automated Research System (Gemini API)

RIKEN Achieves Ultra-Low Loss Optical Waveguides with Silicon Nitride (SiN) Photonics, Advancing Next-Gen Optical Technology

Published May 08, 2026 理化学研究所 (RIKEN) プレスリリース Japan



OVERVIEW

RIKEN has announced successful development of optical waveguides using Silicon Nitride (SiN) photonics technology, achieving significantly lower optical loss compared to existing silicon photonics. This ultra-low loss waveguide minimizes signal attenuation over long distances and enables the construction of complex optical circuits. Applications are anticipated in quantum photonics, optical frequency combs, and high-precision sensing like LiDAR. SiN's broad wavelength compatibility from visible to near-infrared positions it for diverse optical device applications.

IN DEPTH

The Potential of Silicon Nitride (SiN) Photonics

Silicon photonics has become a crucial platform for optical device integration due to its high compatibility with semiconductor manufacturing processes. However, conventional silicon-on-insulator (SOI) based waveguides sometimes face challenges with optical loss, particularly in long-distance transmission and complex optical circuits. To address this, Silicon Nitride (SiN) photonics is emerging as a next-generation high-performance photonic platform.

RIKEN's Achievement in Ultra-Low Loss Optical Waveguides

RIKEN (Rikagaku Kenkyusho) has announced the successful development of optical waveguides utilizing SiN photonics technology, achieving significantly lower optical loss compared to previous silicon-based waveguides. This technological breakthrough is profoundly important for several reasons:

- **Ultra-Low Propagation Loss:** Achieves extremely low propagation loss, below 0.1 dB/cm, minimizing optical signal attenuation and enabling longer-distance data transmission and the construction of more complex optical circuits.
- **Broad Transparency Window:** Compatible with a wide range of wavelengths from visible to near-infrared, allowing for diverse optical devices and applications.
- **Excellent Nonlinear Optical Properties:** Contributes to advanced signal processing functions and the realization of new wavelength division multiplexing schemes.
- **Superior Thermal Stability:** Compared to silicon, SiN has a lower thermo-optic coefficient, resulting in less wavelength drift due to temperature changes, ensuring stable operation even in environments with large temperature fluctuations, such as data centers.

Diverse Applications and Industrialization Prospects

This ultra-low loss SiN optical waveguide technology is expected to find applications in various cutting-edge fields:

- **Quantum Photonics:** When integrated with liquid crystals, it enables low-power, reconfigurable quantum interferometers, forming a foundation for scalable quantum photonic circuits.

- **High-Precision Sensing:** Facilitates high-precision measurements and wide field-of-view, low-noise operation in optical frequency combs and LiDAR systems.
- **Long-Haul Optical Communication:** Overcomes the limitations of traditional SOI platforms, supporting hundreds of channels in DWDM systems and enabling more complex modulation formats.
- **AI Data Centers:** With high thermal stability, and through the combination of AI-driven process optimization and robotics, automated fabrication of complex SiN photonic chips (achieving over 95% first-pass yield) becomes possible, contributing to the stable supply of high-speed data transmission infrastructure.

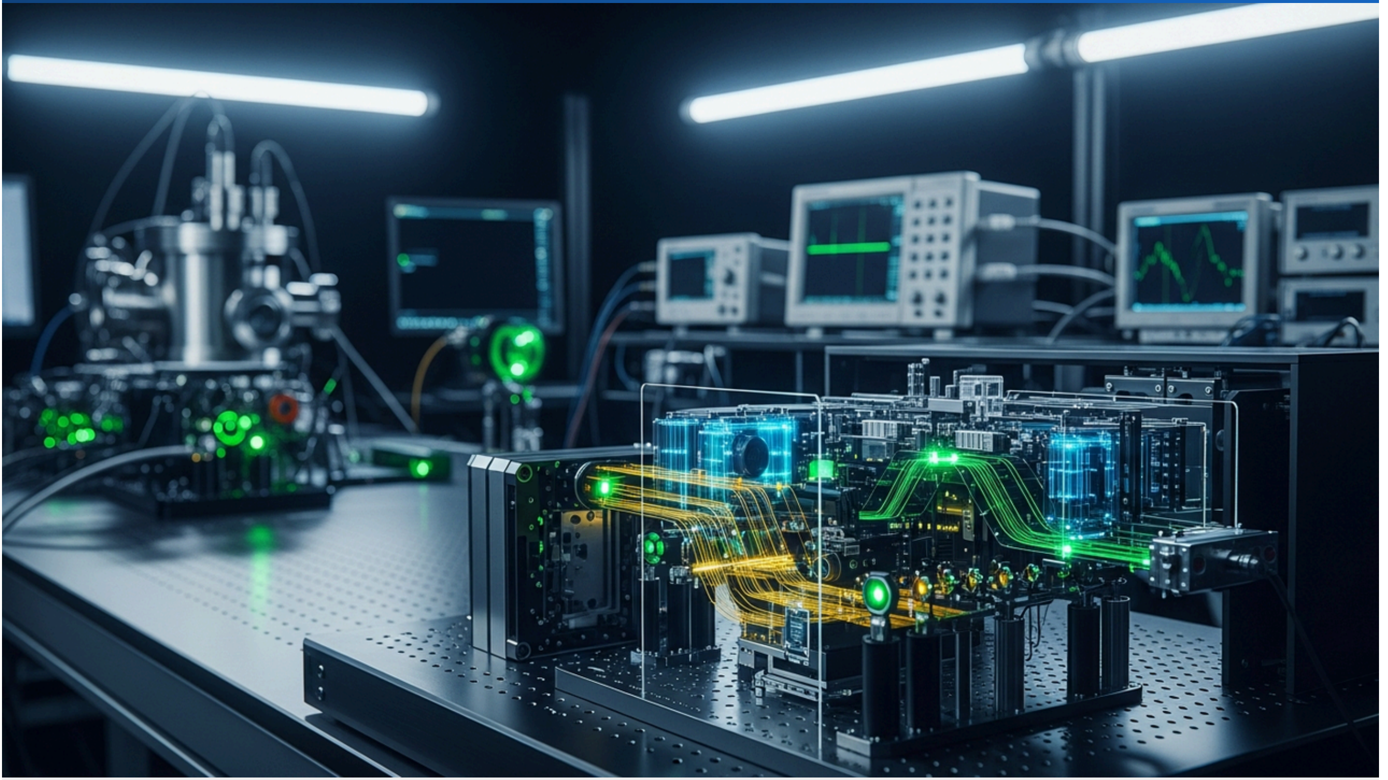
Given its exceptional properties and CMOS process compatibility, SiN photonics is anticipated to significantly contribute not only to further increasing capacity and reach in optical communication but also to the advancement of next-generation optical computing and sensor technologies. While challenges remain in further optimizing manufacturing processes and reducing costs for mass production, RIKEN's achievement is set to greatly accelerate the industrialization of this field.

Source: #

Collected: May 15, 2026 | Automated Research System (Gemini API)

National Taiwan University Unveils Prototype Photonic AI Accelerator for Optical Computing

Published May 07, 2026 National Taiwan University (NTU) News Release Taiwan



OVERVIEW

A research team at National Taiwan University (NTU) in Taiwan has successfully prototyped a 'photonic AI accelerator' leveraging optical computing technology. This accelerator aims to perform matrix operations using light instead of electrical signals, promising significant power reduction and enhanced computational speed compared to conventional electronic circuits. It specifically targets maximizing optical parallelism for high throughput in AI workloads like deep learning. Though currently a prototype, it holds potential for large-scale AI data centers and HPC systems, addressing critical power and performance challenges in AI.

IN DEPTH

AI Compute Challenges and the Potential of Optical Computing

The increasing complexity and scale of deep learning models pose significant challenges for conventional electronic AI accelerators. Specifically, AI computations, which are heavily reliant on matrix operations, entail enormous power consumption, and their speed is hitting the physical limits of electrical signals. Optical computing, which performs calculations using light, is gaining attention as a promising solution to this challenge. Light inherently possesses high parallelism and superior power efficiency, offering the potential to revolutionize AI acceleration.

National Taiwan University's Photonic AI Accelerator Prototype

A research team at National Taiwan University (NTU) in Taiwan has announced the successful prototyping of a 'photonic AI accelerator' that applies this optical computing technology. This prototype accelerator features several key characteristics:

- **Optical Matrix Operations:** By performing matrix operations using optical signals instead of electrical signals, it minimizes power loss associated with data transfer and enhances computational efficiency.
- **Significant Power Reduction:** It is expected to dramatically reduce power consumption for AI workloads compared to traditional electronic circuits. For instance, research from the National University of Singapore demonstrated a 20-fold energy reduction and 40% space saving with similar technology.
- **Improved Computational Speed:** By fully leveraging the speed of light and its parallel processing capabilities, it aims to achieve high throughput for AI workloads such as deep learning.

This technology also suggests the potential for realizing photonic AI accelerators with nearly 1 TOPS (tera-operations per second) computational power on a silicon photonics platform, using a new tensor core architecture integrated with WDM (Wavelength Division Multiplexing).

Future Outlook and Impact on AI Data Centers

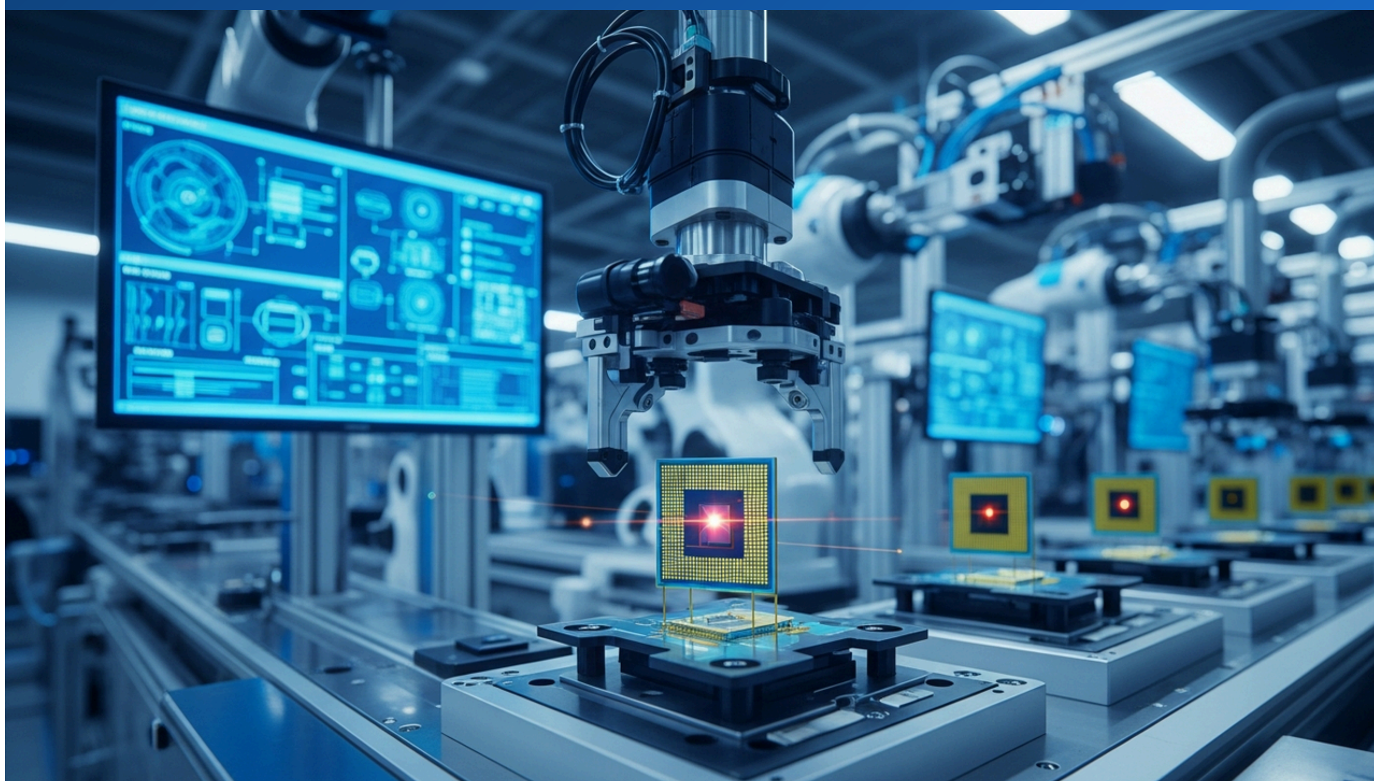
While currently in the prototype stage, NTU's research achievement is attracting international attention as one of the promising solutions to the power and performance challenges facing AI's evolution. Future considerations include its potential integration into large-scale AI data centers and HPC (High-Performance Computing) systems, which could dramatically enhance AI computing capabilities and contribute to reducing data center operational costs. Although optical computing is still an evolving technology, breakthroughs of this kind hold the potential to fundamentally transform the future of AI and information processing.

Source: #

Collected: May 15, 2026 | Automated Research System (Gemini API)

South Korean Company Initiates Mass Production of Silicon Photonics Integrated Sensors for Automotive LiDAR, Boosting Autonomous Driving Adoption

Published May 06, 2026 ET News (韓国専門メディア) South Korea



OVERVIEW

A South Korean company has reportedly commenced mass production of silicon photonics-based integrated sensors for automotive LiDAR systems. These sensors employ Frequency Modulated Continuous Wave (FMCW) technology, enabling high-precision distance and velocity detection. Leveraging silicon photonics facilitates miniaturization, lightweight design, and cost reduction of LiDAR units, with supply to automakers set to intensify. The company emphasized meeting stringent automotive qualification standards for Level 3+ autonomous vehicles, accelerating LiDAR adoption and enhancing autonomous driving safety.

Challenges in Automotive LiDAR and Silicon Photonics Solutions

In the widespread adoption of autonomous driving technology, LiDAR (Light Detection and Ranging) sensors are indispensable components for high-precision 3D environmental perception. However, conventional LiDAR systems have faced challenges due to high costs, large form factors, and reliability issues stemming from numerous moving parts, thus hindering their widespread integration into vehicles. In response, silicon photonics, which leverages semiconductor manufacturing techniques to integrate optical devices, has emerged as a promising technology for achieving miniaturization, cost reduction, and enhanced durability.

South Korean Company Begins Mass Production of SiPho LiDAR Sensors

A South Korean company has reportedly initiated mass production of silicon photonics-based integrated sensors designed for automotive LiDAR systems. These sensors feature the following characteristics:

- **Adoption of FMCW Technology:** Frequency Modulated Continuous Wave (FMCW) technology offers the advantage of directly detecting object velocity in addition to high-precision distance measurement. This enhances the perception capabilities of autonomous vehicles, contributing to safer driving.
- **Miniaturization and Cost Reduction:** The use of silicon photonics technology enables significant miniaturization, weight reduction, and substantial manufacturing cost reduction for the entire LiDAR unit. Research from MIT also indicates that silicon photonics chip-based LiDAR can achieve both wide field-of-view and low-noise operation, offering the potential for high durability and cost reduction without moving parts.
- **Automotive Qualification:** The company has emphasized meeting the stringent reliability and safety certification standards required by the automotive industry for deployment in Level 3 and higher autonomous vehicles. This marks a critical indicator that the technology has reached a practical stage.

Contribution to Autonomous Driving Adoption and Future Outlook

The commencement of mass production of silicon photonics LiDAR sensors by this South Korean company is expected to accelerate LiDAR adoption and significantly contribute to improving the safety and reliability of autonomous driving technology. Providing compact, low-cost, high-performance LiDAR will lower adoption barriers for automakers and further promote the market introduction of autonomous vehicles. In the future, applications are anticipated not only in automotive uses but also in a wide range of fields requiring high-precision sensing, such as drones, industrial robots, and smart city surveillance systems. The advancement of this technology will be an indispensable element for the future of mobility and the development of smart infrastructure.

Source: #

Collected: May 15, 2026 | Automated Research System (Gemini API)

Japanese Company Announces Customer Adoption of 800G Optical Transceivers for Data Centers, Paving Way for 1.6T

Published May 04, 2026 日経XTECH Japan

OVERVIEW

A leading Japanese optical device manufacturer has announced the commencement of customer adoption for its 800G optical transceivers designed for data centers. These 800G transceivers, compatible with OSFP and QSFP-DD form factors and employing PAM4 modulation, deliver high-speed, high-capacity data transmission. Targeted at increasing bandwidth demands for server-to-server and inter-rack connectivity in AI/HPC data centers, they emphasize power efficiency optimization. The company is also developing 1.6T transceivers, aiming to solidify its position as a key supplier for next-generation data center infrastructure.

IN DEPTH

The Crucial Role of Optical Transceivers in AI/HPC Data Centers

AI and High-Performance Computing (HPC) data centers demand ultra-fast, low-latency processing of massive data volumes. Consequently, optical transceivers play a critical role in connectivity both between server racks and within them. As GPU clusters scale, the demand for ultra-high-speed optical interconnects—400G, 800G, and eventually 1.6T—is rapidly escalating. Traditional copper-based connections are reaching their limits in terms of power consumption, heat generation, and bandwidth, accelerating the transition to optical technologies.

Japanese Company's 800G Optical Transceiver Customer Adoption and Features

A prominent Japanese optical device manufacturer has announced that its 800G optical transceivers for data centers have begun customer deployment. These 800G transceivers incorporate the following key features:

- **Form Factor Compatibility:** Supporting industry-standard OSFP and QSFP-DD form factors, facilitating easy integration into existing data center infrastructures.
- **PAM4 Modulation:** Employing Pulse Amplitude Modulation 4-level (PAM4), which achieves double the data transmission capacity at the same baud rate compared to traditional Non-Return-to-Zero (NRZ) modulation. This enables high-speed and high-capacity data transmission.
- **Optimized Power Efficiency:** A strong emphasis is placed on optimizing power efficiency to help reduce operational costs in AI/HPC data centers. This represents a significant solution to the heat generation and power consumption challenges faced by data centers.
- **AI/HPC Readiness:** Specifically designed to meet the growing bandwidth demands for inter-server and inter-rack connectivity, aiming to maximize the performance of AI workloads.

These 800G transceivers are also designed with compatibility for the latest AI networking environments, such as NVIDIA's Quantum-X800 system and ConnectX-8/9 SuperNICs, providing ultra-high-speed optical connections between GPUs, switches, and storage.

Roadmap to 1.6T and Industry Outlook

Alongside the customer adoption of 800G transceivers, the company is steadily progressing with the development of next-generation 1.6T optical transceivers. This is a strategic move to address the future needs of increasingly sophisticated AI data centers, demonstrating the company's ambition to establish itself as a key supplier for next-generation data center infrastructure. The optical transceiver market is being driven by AI demand, with companies like GlobalFoundries and Lumentum also accelerating their investments. This initiative by the Japanese company marks a crucial step towards technological leadership and market share in an intensely competitive global landscape.

Source: #

Taiwan's Foxconn Enters Next-Gen Server Development, Adopting Optoelectronic Integration as Core Technology

Published May 02, 2026 CNA (中央通訊社) Taiwan

OVERVIEW

Taiwanese electronics manufacturing giant Foxconn (Hon Hai Precision Industry) has reportedly made a significant entry into developing next-generation servers centered on optoelectronic integration technology. This initiative aims to overcome internal server data transmission bottlenecks, responding to the explosive growth in AI and HPC workloads. Foxconn plans to introduce optical interconnects for chiplet-to-chiplet and board-to-board connections, seeking to boost transmission speeds and reduce power consumption. This move highlights the imperative for server manufacturers to integrate optical technology as traditional electrical wiring reaches its limits.

IN DEPTH

AI Era Server Internal Bottlenecks and the Necessity of Optical Technology

The rapid proliferation of generative AI and High-Performance Computing (HPC) workloads is forcing significant transformations in traditional server architectures. Particularly, data transmission speeds between CPUs, GPUs, and memory within servers are becoming a bottleneck to performance improvements. Conventional electrical wiring faces limitations as distance increases, leading to greater signal attenuation, higher power consumption, and bandwidth constraints. Consequently, server manufacturers are exploring the integration of optical technology to overcome these bottlenecks and build next-generation AI servers.

Foxconn's Full Entry into Optoelectronic Integrated Server Development

Responding to this trend, Taiwan's Foxconn (Hon Hai Precision Industry), the world's largest electronics manufacturing services (EMS) provider, has reportedly made a full-fledged entry into developing next-generation servers with optoelectronic integration technology at their core. This strategic shift aims to fundamentally resolve internal server data transmission bottlenecks in response to the explosive growth of AI and HPC workloads.

Technical Approach and Anticipated Benefits

Foxconn is targeting the following optical technology integrations in its next-generation servers:

- **Chiplet-to-Chiplet Optical Interconnects:** Introducing optical technology for connections between multiple chiplets comprising server CPUs and GPUs, enabling ultra-high-speed and low-latency data transfer.
- **Board-to-Board Optical Interconnects:** Applying optics to connections between different printed circuit boards (PCBs) within servers, facilitating efficient transmission of large volumes of data.
- **Improved Transmission Speed and Reduced Power Consumption:** By using light instead of electrical signals, signal attenuation is suppressed, transmission speeds are dramatically increased, and significant power consumption reductions are achieved. This directly translates to lower operational costs and reduced environmental impact for the entire data center.

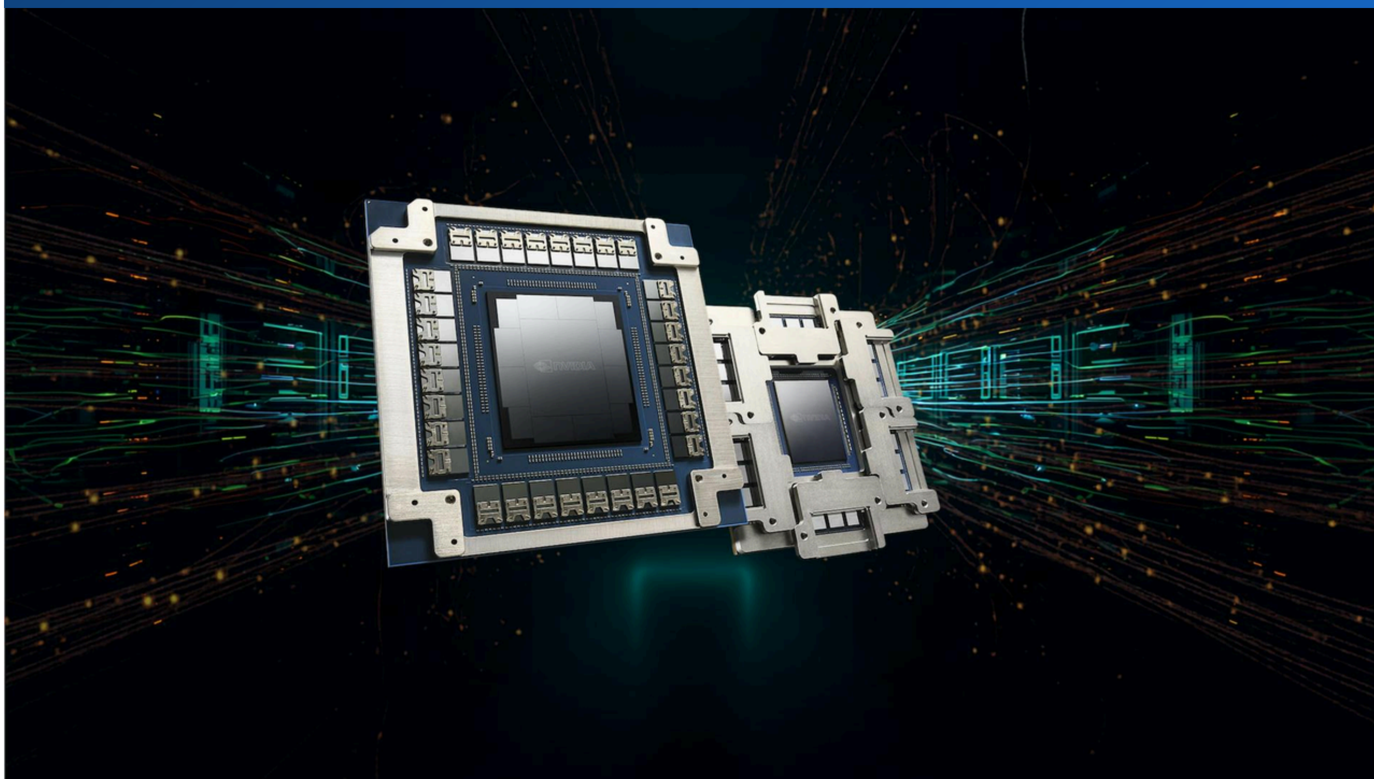
This move strongly indicates that server manufacturers are confronting the physical limitations of traditional electrical wiring, and the integration of optical technology is becoming an indispensable factor determining the performance and efficiency of AI servers. In the future, optoelectronic integration technology is likely to be standard in AI servers offered by Foxconn, which is expected to have a major impact on the data center industry, particularly in the design and construction of AI infrastructure.

Source: #

Collected: May 15, 2026 | Automated Research System (Gemini API)

NVIDIA's $4 Billion Optical Strategy: Co-Packaged Optics (CPO) to Fundamentally Transform AI Data Center Connectivity

Published May 07, 2026 IO Fund USA



OVERVIEW

NVIDIA is accelerating its transition to Co-Packaged Optics (CPO) for AI data center networking, investing $2 billion each in Coherent and Lumentum to secure its optical component supply chain. CPO offers significant advantages over traditional copper and pluggable optical transceivers in terms of power efficiency and bandwidth. Broadcom is already shipping its third-generation CPO product, Tomahawk 6, having achieved 36 million hours of uptime in reliability testing with Meta. The widespread adoption of CPO is expected to be driven by ongoing reliability validation and the strategic use of bridge solutions like NPO/LPO.

IN DEPTH

AI Data Center's Next Bottleneck: Networking

AI workloads, especially for large language model training and inference, demand ultra-high-speed and efficient data movement between GPUs. While traditional data centers were bottlenecked by compute capacity, the AI era sees networking—the connectivity between GPUs, switches, and storage—emerging as the new bottleneck. To address this challenge, optical interconnects, particularly Co-Packaged Optics (CPO), are becoming strategically critical.

NVIDIA's $4 Billion Optical Strategy and CPO Commitment

NVIDIA is making substantial strategic investments to accelerate the transition to CPO in AI data center networking. Specifically, it has invested $2 billion in equity in each of the optical component suppliers, Coherent and Lumentum, to secure its future optical component supply. NVIDIA CEO Jensen Huang has hailed CPO as a "game-changer" and is pushing for the early adoption of the company's Quantum-X and Spectrum-X CPO switches. This massive investment clearly indicates that the entire optical stack is considered indispensable for AI infrastructure buildout.

Technical Advantages and Industrialization Progress of CPO

CPO offers dramatic advantages over traditional pluggable optical transceivers and copper interconnects in several key areas:

- **Improved Power Efficiency:** By integrating optics closer to the ASIC, CPO can reduce power consumption for signal transmission by up to 5 times, lowering data center operational costs and environmental impact. Broadcom's Tomahawk 6, for instance, achieves 3.5 times better power efficiency compared to pluggable optics.
- **Expanded Bandwidth:** Enables high-density optical connections, delivering the ultra-high-bandwidth data transfer required by AI workloads.
- **Enhanced Signal Integrity:** Shortens electrical signal path lengths, preventing signal degradation and ensuring high reliability.

The industrialization of CPO is steadily advancing, with Broadcom already shipping its third-generation CPO product, Tomahawk 6. Furthermore, joint reliability testing with Meta has demonstrated 36 million hours of uptime, validating CPO's reliability. However, in the short term, factors such as the availability of lower-cost copper solutions, completion of reliability validation, and the utilization of intermediate solutions like NPO (Near-Packaged Optics) and LPO (Less-Power Optics) will determine the pace of CPO adoption.

Source: https://io-fund.com/ai-stocks/nvidia-4b-optical-strategy-cpo-ai-data-centers

Collected: May 15, 2026 | Automated Research System (Gemini API)

National University of Singapore Unveils Photonic AI Accelerator Achieving 20x Energy Reduction, Paving Way for Faster, Smarter AI

Published May 07, 2026 EurekAlert! (National University of Singapore) Singapore

OVERVIEW

A research team at the National University of Singapore (NUS) has announced a novel photonic AI accelerator capable of fully optical domain computation and response. This accelerator achieved 91.6% classification accuracy on the MNIST handwritten digit dataset, while reducing energy consumption by 20x and space by 40% compared to conventional photonic architectures. This breakthrough addresses the long-standing challenge of efficient nonlinearity implementation in optical computing, promising dramatic improvements in power and space efficiency for AI/HPC data centers and edge AI devices.

IN DEPTH

Addressing AI Compute Power and Space Challenges

The rapid advancement of artificial intelligence (AI) presents challenges of increasing computational demands in data centers and edge devices, coupled with escalating power consumption. Specifically, matrix operations and nonlinear activation functions, indispensable for AI workloads like deep learning, are pushing the limits of power efficiency in traditional electronic circuits. To tackle this, "optical computing" and "photonic AI accelerators" are gaining attention as promising technologies, but efficient implementation of nonlinearity in the optical domain has been a long-standing hurdle.

NUS Develops Breakthrough Photonic AI Accelerator

A research team at the National University of Singapore (NUS) has announced a new photonic accelerator that overcomes this nonlinearity challenge, enabling AI to compute and respond entirely within the optical domain. This groundbreaking accelerator features the following key characteristics:

- **Nonlinear Computation in Full Optical Domain:** It employs a unique architecture that converts optical signals into voltage-driven nonlinear responses, which are then fed back into the photonic circuit. This mimics the nonlinearity of the brain, allowing for highly efficient execution of key AI tasks like matrix multiplication.
- **Significant Energy and Space Savings:** In image recognition tasks using the MNIST handwritten digit dataset, it achieved a high classification accuracy of 91.6% while successfully reducing energy consumption by 20 times and occupied space by 40% compared to conventional photonic architectures.
- **Potential for Hybrid Integration:** The research team is also considering hybrid integration with lithium niobate and silicon photonics to further enhance performance.

Technical Significance and Industry Impact

This achievement represents a breakthrough in the efficient implementation of nonlinear activation functions, a long-standing challenge in optical computing, significantly improving the performance and practicality of photonic neural networks. With substantial reductions in power consumption and space, its potential for adoption in data centers with high AI workloads and edge AI devices requiring real-time processing is high. For instance, it could have a major impact on fields requiring high-speed, low-power AI processing, such as autonomous vehicles and industrial robots. While further development from the basic research stage, validation in real-world environments, and ensuring compatibility with mass production processes remain challenges, this technology marks a critical step in shaping the future of AI.

Source: https://www.eurekalert.org/news-releases/1127259

Collected: May 15, 2026 | Automated Research System (Gemini API)

Ciena Championing Open Ecosystem with Open CPX MSA to Accelerate Widespread CPO Adoption

Published May 07, 2026 Ciena USA

OVERVIEW

As AI infrastructure scales, the limitations of pluggable optical modules necessitate a transition to Co-Packaged Optics (CPO). An open ecosystem is crucial for widespread CPO adoption, with Open CPX MSA providing the foundational framework. Broadcom continues investing in CPO, demonstrating 36 million hours of uptime in reliability tests with Meta, while Nvidia is deploying early Quantum-X and Spectrum-X CPO switches. Open CPX MSA is driving standardization to support 6.4Tbps throughput with 200Gbps/lane.

CPO's Importance in AI Infrastructure and the Need for an Open Ecosystem

The explosive growth of AI data centers has driven demands for data transfer bandwidth and power efficiency to unprecedented levels. Traditional pluggable optical modules are reaching their limits in terms of physical size, power consumption, and signal integrity, establishing Co-Packaged Optics (CPO) as an inevitable technological trend. However, for widespread adoption and proliferation of CPO, an open ecosystem is essential to ensure interoperability among vendors and diversify the supply chain.

Standardization Driven by Open CPX MSA

Leading industry players, including Ciena and Broadcom, are driving the "Open CPX MSA (Multi-Source Agreement)"—an open standardization initiative aimed at promoting CPO adoption. The Open CPX MSA provides a foundational framework for CPO technical specifications and sets forth the following objectives:

- **Ensuring Interoperability:** Guarantees connectivity between CPO products from different vendors, reducing the risk of vendor lock-in.
- **High Bandwidth and Efficiency:** Promotes standardization to support 32 bi-directional channels per module, totaling 6.4Tbps throughput (200Gbps/lane), meeting the demands of AI data centers.
- **Implementation Flexibility:** Enables the development of a single PCB compatible with both optical and copper connections, reducing design and implementation complexity.

Progress in CPO Reliability Validation and Initial Deployment

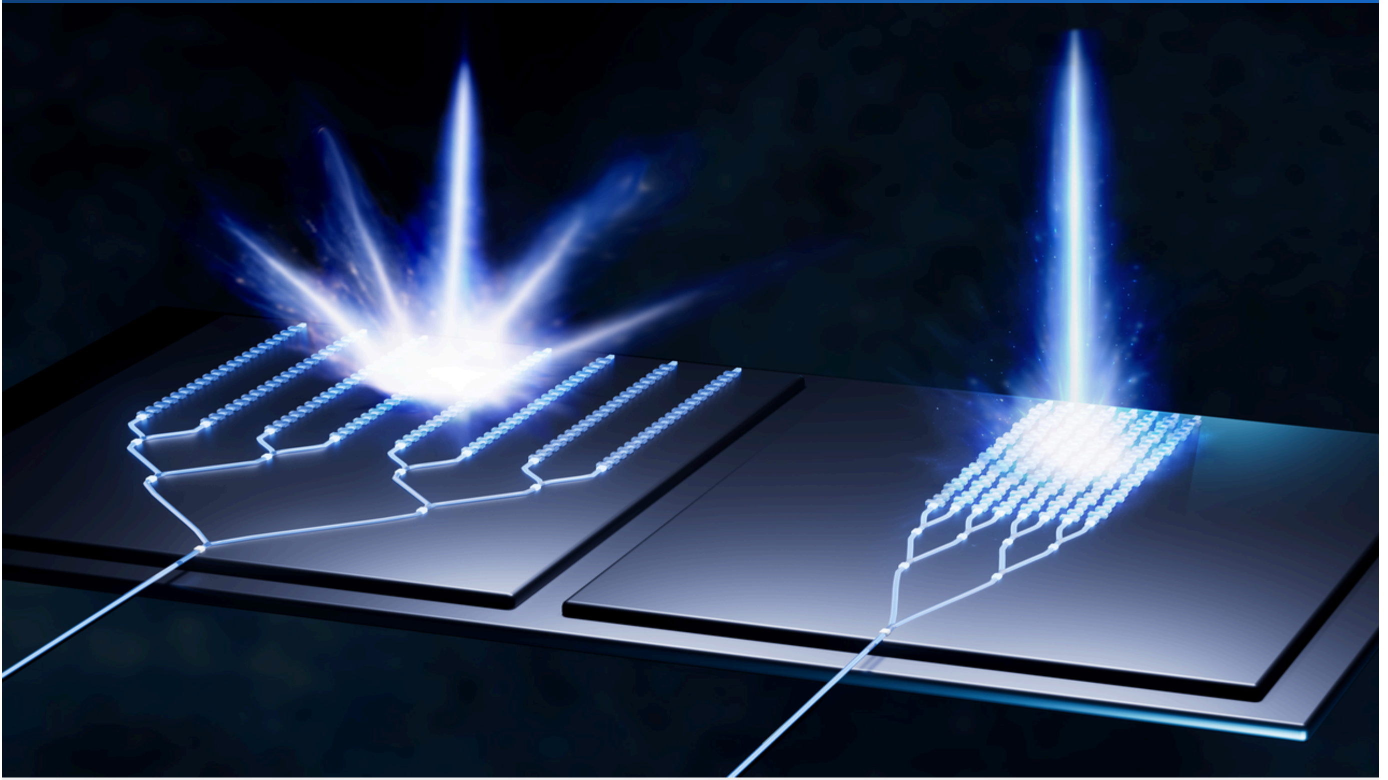
The reliability of CPO technology is a critical factor for its widespread adoption. Broadcom continues to invest in CPO technology, with joint reliability tests with Meta demonstrating robust performance over 36 million hours of uptime, proving its resilience. NVIDIA is also progressing with the initial deployment of its Quantum-X and Spectrum-X CPO switches, indicating that CPO is moving into the practical phase. A standardized open ecosystem is expected to reduce the technical complexity and adoption barriers of CPO, while diversifying the supply chain, thereby contributing to CPO cost reduction and supply stability. This will allow data center operators to benefit from CPO's power efficiency and performance improvements while mitigating vendor lock-in risks.

Source: https://www.ciena.com/insights/blog/2026/how-open-ecosystems-advance-cpo-adoption

Collected: May 15, 2026 | Automated Research System (Gemini API)

MIT Silicon Photonics LiDAR Chip Enables Compact, High-Performance Sensors for Autonomous Systems

Published May 07, 2026 MIT News USA



OVERVIEW

MIT researchers have developed a novel silicon photonics chip design for LiDAR sensors, promising miniaturization and enhanced durability by eliminating moving parts. This innovative design minimizes unwanted crosstalk between antennas in integrated Optical Phased Arrays (OPA), achieving both wide field-of-view and low-noise operation. This breakthrough addresses traditional LiDAR challenges of high cost, large size, and moving part degradation, accelerating adoption in automotive LiDAR and autonomous systems.

IN DEPTH

The Necessity of Evolving LiDAR, the 'Eyes' of Autonomous Systems

For advanced autonomous systems such as self-driving cars, drones, and industrial robots, LiDAR (Light Detection and Ranging) sensors are indispensable as the 'eyes' that perceive the surrounding environment in 3D with high precision. However, conventional LiDAR systems have faced challenges due to high costs, large form factors, and reliability issues stemming from numerous mechanical moving parts. This has hindered their widespread integration into vehicles and adoption in fields requiring compactness, lightweight design, and high durability. To address this, the integration of LiDAR using silicon photonics, which is highly compatible with semiconductor manufacturing processes, has been highly anticipated.

MIT Develops Innovative Silicon Photonics LiDAR Chip

Researchers at the Massachusetts Institute of Technology (MIT) have announced the development of a new silicon photonics chip design that overcomes these challenges. This design is based on integrated Optical Phased Array (OPA) technology and represents a groundbreaking advancement in the following areas:

- **Elimination of Moving Parts:** It completely eliminates mechanical moving parts, such as scanning mirrors found in conventional mechanical LiDAR, significantly improving the robustness and durability of the LiDAR unit.
- **Wide Field-of-View and Low-Noise Operation:** An innovative design that minimizes unwanted crosstalk between antennas in the OPA enables high-performance LiDAR with both a wide field-of-view and low noise. This resolves the limitations in field-of-view and noise issues previously associated with silicon photonics-based OPAs.
- **Miniaturization and Cost Reduction:** Highly integrating optical devices onto a semiconductor chip allows for dramatic miniaturization of LiDAR sensors and significant cost reduction in mass production.

Technical Significance and Industry Impact

MIT's achievement is poised to accelerate LiDAR adoption not only in automotive applications but also across all fields requiring compactness, lightweight design, high durability, and low cost, such as drones, industrial robots, AR/VR devices, and smart city surveillance systems. By realizing wide field-of-view and high-precision LiDAR without moving parts, the performance and reliability of these autonomous systems will be dramatically enhanced. In the future, it is expected to reduce cost and reliability barriers in areas where massive LiDAR deployment is anticipated, such as autonomous vehicles and robotics, thereby powerfully driving industrialization.

Source: https://news.mit.edu/2026/photonics-advance-could-enable-compact-high-performance-lidar-sensors-0507

Collected: May 15, 2026 | Automated Research System (Gemini API)

Optech Technology Unveils 1.6T and 800G OSFP224 Optical Transceivers for NVIDIA AI Data Centers

Published May 11, 2026   Optech Technology Co., Ltd.   その他

OVERVIEW

Optech Technology has announced advanced 1.6T and 800G OSFP224 optical transceivers designed for next-generation AI data centers, InfiniBand XDR, and Ethernet networks. These products are compatible with NVIDIA's Quantum-X800 systems, ConnectX-8 SuperNICs, and ConnectX-9 SuperNIC environments, providing ultra-high-speed optical connectivity between GPUs, switches, and storage. Notably, the 1.6T OSFP224 utilizes 200G/lane PAM4 technology and supports single-mode fiber reaches of 500m and 2km.

IN DEPTH

Soaring Demand for High-Speed Optical Connectivity in AI Data Centers

In modern data centers experiencing explosive growth in AI workloads, the data transfer speed between GPUs, switches, and storage has become a critical factor determining overall system performance. Especially in high-performance AI infrastructures, such as those provided by NVIDIA, ultra-high-speed optical interconnects like 800G and 1.6T are indispensable for InfiniBand XDR and next-generation Ethernet networks. Traditional copper connectivity is reaching its physical limits in terms of power consumption and bandwidth, accelerating the transition to optical technologies.

Optech Technology's New 1.6T/800G OSFP224 Transceivers

To meet this increasing demand, Optech Technology has announced a lineup of advanced 1.6T and 800G OSFP224 optical transceivers designed for next-generation AI data centers. These new transceivers are engineered for full compatibility with NVIDIA's cutting-edge AI infrastructure, specifically the Quantum-X800 system, ConnectX-8 SuperNIC, and ConnectX-9 SuperNIC environments. This ensures the provision of critically important ultra-high-speed optical connections within GPU clusters and for inter-rack connectivity.

Technical Details and Performance

The transceivers announced by Optech Technology possess the following key technical characteristics:

- **1.6T OSFP224 DR8/2xFR4:** These modules, achieving 1.6 terabits per second transmission speed, adopt the industry's most advanced 200G/lane PAM4 (Pulse Amplitude Modulation 4-level) modulation technology. This enables high-capacity data transfer while maximizing the use of existing fiber optic infrastructure. They support single-mode fiber reaches of 500m (DR8) and 2km (2xFR4), catering to various connectivity requirements within data centers.
- **800G OSFP224 DR4:** Provides 800 gigabits per second transmission speed, meeting the prevalent high-speed connectivity needs of current AI data centers.
- **OSFP224 Form Factor:** Adopts the OSFP224 form factor, which is the next-generation standard for OSFP (Octal Small Form-factor Pluggable), enabling high-density and power-efficient implementation.

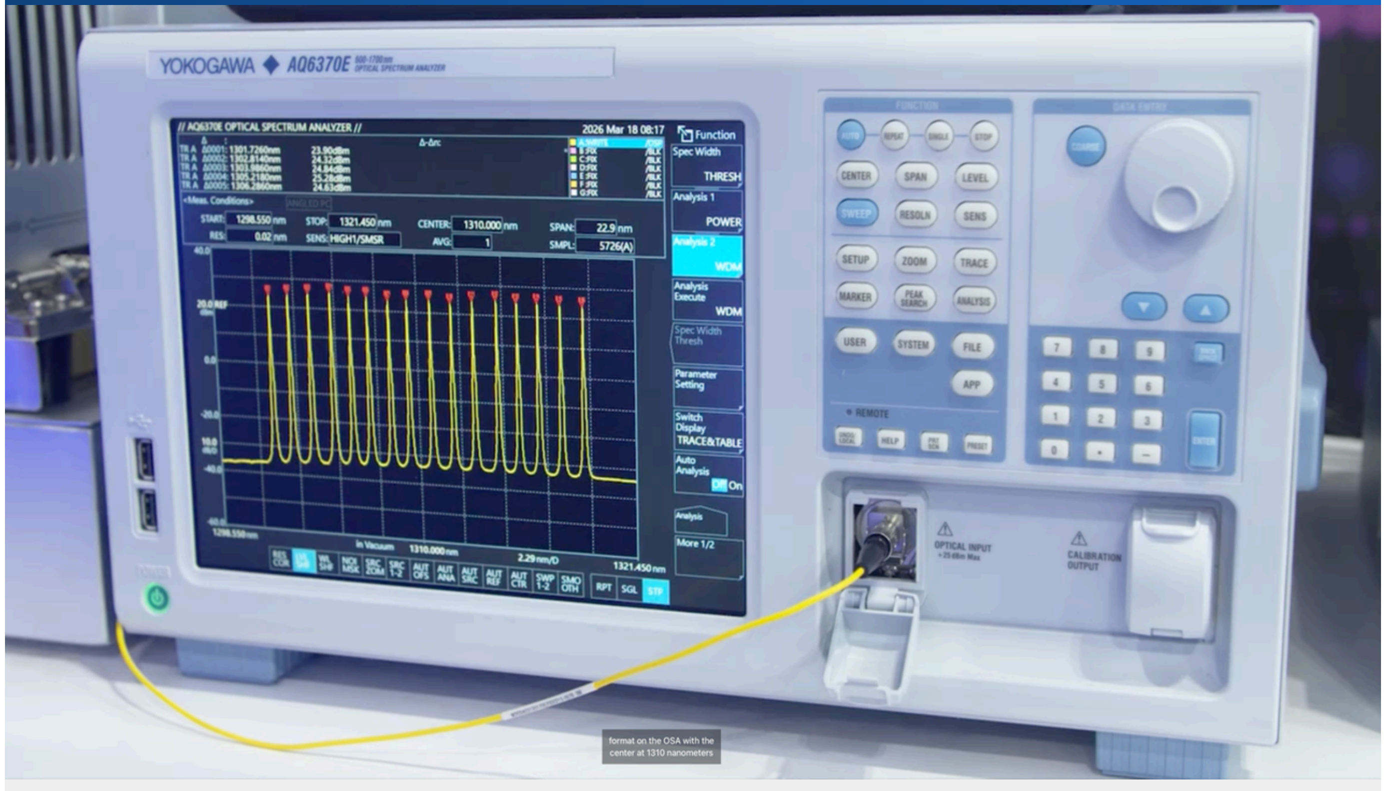
Industry Impact and Challenges for Adoption

The introduction of these products strengthens the supply of optical transceivers within the NVIDIA ecosystem and addresses the high-density, high-bandwidth optical connectivity needs in building AI clusters. A product lineup specialized for specific vendor AI networking environments is crucial for delivering performance, stability, and flexible connectivity options in AI infrastructure. Future challenges include competition with other suppliers, rapid alignment with NVIDIA's roadmap, and cost-effectiveness in the market. Nevertheless, Optech Technology's announcement marks a significant step in accelerating the high-speed trend of AI data centers.

Source: https://qsfpdd800g.com/blogs/artical/1-6t-800g-osfp224-optical-transceiver-nvidia-ai-datacenter

Lasers are the Heartbeat of Optical AI Data Centers: Coherent Dramatically Scales InP Production

Published May 13, 2026 Semiconductor Engineering USA



OVERVIEW

Indium Phosphide (InP) lasers are pivotal in optical interconnects for AI data centers. While most scale-out data currently uses laser-driven pluggable transceivers, Co-Packaged Optics (CPO) is beginning to replace copper for scale-up. Coherent, a leading supplier of InP CW UHP DFB lasers, is doubling its InP production capacity in 2026 and again in 2027, transitioning to industry-first 6-inch InP wafers to meet surging AI data center CAPEX and the shift to CPO.

IN DEPTH

The Indispensability of Lasers in AI Data Centers

The explosive growth of AI data centers has dramatically increased demands for data transfer volume and speed. Within this context, optical interconnects, particularly laser diodes, play a crucial role as the "heartbeat" that converts information into optical signals and transmits them throughout the data center. Since silicon itself does not emit light, high-performance external light sources—lasers—are indispensable for maximizing the performance of silicon photonics integrated circuits.

Strategic Significance of Indium Phosphide (InP) Lasers

Currently, Indium Phosphide (InP)-based lasers hold an extremely critical position in optical interconnects for AI data centers. Specifically, high-power continuous-wave (CW UHP) Distributed Feedback (DFB) lasers provide high output, reliability, and high-speed modulation capabilities in next-generation optoelectronic integration architectures like Co-Packaged Optics (CPO) and Near-Packaged Optics (NPO). These characteristics are decisive factors in realizing the ultra-high-speed, low-latency data transfer required by AI workloads.

Coherent's Major Scale-Up in InP Production and Transition to 6-inch Wafers

As a leading supplier of InP CW UHP DFB lasers, Coherent is making substantial investments to address the massive market trends of surging AI data center CAPEX and the transition to CPO. The company has announced ambitious plans to double its InP production capacity in 2026 and double it again in 2027. Central to this expansion plan is the industry's first transition to 6-inch InP wafers. Compared to conventional smaller diameter wafers, 6-inch wafers will significantly improve production efficiency and cost competitiveness, key to accelerating the stable supply and mass production of InP lasers.

Industry Impact and Future Outlook

As the supply capacity of InP lasers is becoming a bottleneck for AI data center growth, Coherent's massive capital expenditure and technological innovation are extremely critical for supporting overall industry growth. A stable supply of high-performance InP lasers will accelerate the adoption of CPO/NPO, which integrates AI chips and optical engines, contributing to improved power efficiency and performance in AI data centers. Future challenges include ensuring a stable supply of InP lasers, reducing costs, and addressing maintainability issues in CPO in the event of laser failure. Nonetheless, Coherent's initiatives will be an indispensable factor in shaping the optical infrastructure of the AI era.

Source: https://semiengineering.com/lasers-are-the-heartbeat-of-the-optical-ai-data-center/

AI Networking Emerges as Data Center Bottleneck: Optical Interconnects Offer Solution

Published May 09, 2026   Datacenters.com   USA

OVERVIEW

In modern AI environments, networking is becoming a more significant bottleneck than computing power. AI workloads constantly exchange vast amounts of data between GPUs, leading to concentrated east-west traffic within data centers, demanding ultra-low latency, high throughput, and rapid system synchronization. This necessitates a redesign of data center physical layouts, dedicated network fabrics, high-speed optical interconnects, and advanced switching architectures. Copper-based solutions face physical limits in scale and speed, while optical technology offers superior bandwidth, reach, power efficiency, and signal integrity.

IN DEPTH

The 'Network Bottleneck' Plaguing AI-Era Data Centers

The surge in artificial intelligence (AI) workloads is imposing new challenges on data center design and operation. Particularly in training and inference of large-scale AI models, thousands of GPUs must constantly exchange immense amounts of data at high speeds. This saturates network bandwidth within data centers (dubbed 'east-west traffic'), leading to a 'network bottleneck' where the network, rather than computing power itself, constrains overall system performance. Ultra-low latency, high throughput, and rapid synchronization between systems are crucial for efficient AI cluster operation.

Data Center Infrastructure Redesign and the Rise of Optical Technology

Addressing this network bottleneck requires a fundamental redesign of data center infrastructure. Specifically, the following elements are critical:

- **Optimizing Physical Layout:** Re-evaluating the placement of server racks and networking equipment to minimize data transfer paths.
- **Building Dedicated Network Fabrics:** Designing high-bandwidth network topologies specifically for AI workloads.
- **Implementing High-Speed Optical Interconnects:** Traditional copper-based solutions are reaching their physical limits in terms of distance, signal attenuation, power consumption, and bandwidth. In contrast, optical technology offers superior bandwidth, long-distance transmission capability, excellent power efficiency, and high signal integrity, establishing its dominance. Notably, Co-Packaged Optics (CPO) and Near-Packaged Optics (NPO) significantly reduce power and latency by integrating optical engines directly with switch ASICs.
- **Advanced Switching Architectures:** Architectures capable of efficiently handling AI traffic, including programmable optical switching technologies, are essential.

Industry Impact and Future Outlook

The recognition that AI workload performance is constrained by data movement rather than just computation implies a significant shift in AI infrastructure investment towards optical networking. This accelerates demand for optical components, fiber optics, and optical switching technologies, creating substantial market opportunities for optical device manufacturers and infrastructure providers. However, challenges persist, including operational complexities associated with managing large GPU fabrics, and the need for advanced orchestration, monitoring, and traffic optimization tools. Optical technology will be key to ensuring the scalability and sustainability of AI data centers.

Source: https://www.datacenters.com/news/how-ai-networking-is-becoming-the-bottleneck-inside-modern-data-centers

Collected: May 15, 2026 | Automated Research System (Gemini API)

Surging Demand for Structured Fiber Cabling in AI Clusters: Exceeding DAC/AOC Limitations

Published May 12, 2026 FS USA

OVERVIEW

As AI clusters expand and accelerate to 800G/1.6T, Direct Attach Cables (DAC) and Active Optical Cables (AOC) are becoming insufficient due to their short reach, making structured fiber optic cabling indispensable. Fiber optic cables support connections over 30m, 50m, and even 100m across multiple racks and rows, providing the necessary reach, scalability, and flexibility for GPU clusters. They also resolve airflow issues caused by thick, rigid DACs, improving thermal design and cooling efficiency.

IN DEPTH

Evolution of AI Clusters and the Limitations of DAC/AOC

The expansion of generative AI workloads is placing unprecedented demands on data center infrastructure. Large-scale GPU clusters, in particular, require ultra-high-speed, low-latency data transfer between GPUs, servers, and racks. Previously, Direct Attach Cables (DAC) and Active Optical Cables (AOC) were widely used for short-distance connections within server racks and adjacent racks due to their low cost and ease of deployment. However, as next-generation high-speed interconnects like 800G and 1.6T become prevalent, the physical distance limitation of DACs (approximately 5 meters) and the obstruction of airflow within racks by their thick, rigid cables have become apparent. AOCs also face challenges with the trade-off between distance and cost.

The Imperative for Structured Fiber Cabling

As AI clusters scale to tens or hundreds of racks, these limitations of DAC/AOC significantly impede overall system performance and operational efficiency. Therefore, a "structured fiber optic cabling system" that enables longer-distance and higher-density connections has become indispensable. Fiber optic cables surpass DAC/AOCs in the following aspects:

- **Reach and Scalability:** They can flexibly accommodate long-distance connections of 30m, 50m, 100m, and even beyond, spanning multiple racks and rows. This allows AI clusters to be physically distributed while maintaining high-speed interconnectivity. With 1.6T DR8-2 transceivers, reaches of up to 2000m are possible.
- **Improved Airflow and Thermal Design:** Thin, flexible fiber optic cables resolve the poor airflow issues caused by thick, rigid DACs, dramatically improving airflow and thermal design within racks. This enhances cooling efficiency and contributes to reducing data center operational costs.
- **Future Flexibility:** Fiber optic infrastructure provides an easy upgrade path to faster, next-generation transceivers (e.g., 3.2T and beyond), protecting long-term capital investments.

Industry Impact and Future Outlook

In the construction of AI data center physical infrastructure, the transition from DAC/AOC to fiber optic cables and their corresponding structured cabling systems is an inevitable trend. This presents significant business opportunities for optical cable manufacturers and infrastructure solution providers. However, challenges remain, including initial deployment costs, migration costs from existing infrastructure, and the securing of skilled installers. To maximize the performance and efficiency of AI clusters, the importance of structured fiber cabling, which forms the physical backbone for optical transceivers, will continue to grow.

Source: https://www.fs.com/blog/beyond-the-reach-of-dac-why-800g16t-ai-clusters-demand-structured-fiber-cabling-b48197.html

Collected: May 15, 2026 | Automated Research System (Gemini API)

New Coalition Forms to Advance Optical Connectivity for AI Data Centers: Standardizing Expanded Beam Optical (EBO) Connectors

Published May 12, 2026   3M News   USA

OVERVIEW

To support the rapid scale-up of AI data centers, industry leaders including 3M have formed a Multi-Source Agreement (MSA) to develop standard specifications for Expanded Beam Optical (EBO) connector solutions. EBO technology offers advantages in reliability, ease of maintenance, and performance in high-density environments, deemed crucial for accelerating AI infrastructure deployment. This initiative aims to promote interoperable and scalable optical connectivity solutions across the industry.

IN DEPTH

Challenges in Optical Connectivity for AI Data Centers and the Need for Standardization

The rapid expansion of AI data centers is posing new challenges to the reliability, maintainability, and scalability of optical interconnects. Particularly in high-density optical connectivity environments, issues such as the difficulty of cleaning and maintenance for traditional physical contact multi-fiber connectors, and concerns over connection reliability, have become prominent. To address these challenges and accelerate the deployment of AI infrastructure, robust and easily maintainable optical connectivity solutions based on common industry standards are essential.

Formation of the Expanded Beam Optical (EBO) Connector MSA

Based on this understanding, industry leaders, including major companies such as 3M, AMD, Arista Networks, Cisco, Meta, and Oracle, have collaborated to form a Multi-Source Agreement (MSA) to develop standard specifications for Expanded Beam Optical (EBO) connector solutions. EBO connector technology involves coupling light by expanding the beam rather than physically contacting the fiber end faces. This provides the following advantages:

- **High Reliability:** Since the fiber end faces are protected from the external environment, the risk of connection failures due to dust or physical damage is significantly reduced.
- **Ease of Maintenance:** Stringent cleaning requirements, common with traditional connectors, are either eliminated or greatly reduced, cutting operational costs and downtime.
- **Improved Performance in High-Density Environments:** Maintains stable performance in high-density optical connectivity settings, meeting the high bandwidth and reliability demands of AI data centers.
- **Scalability:** Provides a scalable solution that can easily accommodate future expansions of AI infrastructure.

Industry Impact and Future Outlook

The establishment of this EBO MSA indicates that cross-industry standardization efforts, focused on specific technologies at the physical layer of optical connectivity in AI infrastructure, are gaining momentum. Standardization will diversify the supplier ecosystem, leading to reduced complexity of deployment, faster deployment times, and cost savings for AI data center operators. This will also contribute to the realization of rack-scale optical architectures and play a crucial role in enhancing the operational efficiency and reliability of AI data centers. Moving forward, the progress of standardization and the accumulation of market adoption実績 for EBO technology will be key to determining its widespread uptake.

Source: https://news.3m.com/2026-05-12-New-coalition-launches-to-advance-and-scale-optical-connections-for-AI-data-centers

Collected: May 15, 2026 | Automated Research System (Gemini API)

Silicon Nitride vs. Silicon Oxynitride: Performance Comparison and Applications in Photonics Materials

Published May 14, 2026 PatSnap Eureka USA

OVERVIEW

Silicon Nitride (SiN) and Silicon Oxynitride (SiOxNy) are critical materials in the photonics industry, directly impacting integrated optical device performance. SiN has established itself as a leading platform for high-performance photonic circuits due to its excellent optical properties, including ultra-low propagation loss and a broad transparency window. SiOxNy, by contrast, offers tunable refractive index control by incorporating oxygen, facilitating mode matching and reduced coupling loss in complex photonic circuits. Both materials maintain CMOS process compatibility while meeting demands for higher integration, broader spectral coverage, and improved thermal stability.

IN DEPTH

The Importance of Material Selection in Integrated Photonics

The performance of a wide range of integrated photonic devices, including those for optical communication, sensing, and optical computing, heavily depends on the optical properties of their underlying materials. Materials compatible with silicon-based semiconductor manufacturing processes are particularly advantageous for mass production and cost efficiency, thus driving active research and development. Silicon Nitride (SiN) and Silicon Oxynitride (SiOxNy) are prominent materials in this field.

Advantages of Silicon Nitride (SiN)

Silicon Nitride has established itself as a leading platform for high-performance photonic circuits due to its exceptional optical properties. Its key advantages include:

- **Ultra-Low Propagation Loss:** Achieves extremely low propagation losses, below 0.1 dB/cm, minimizing signal attenuation for long-distance transmission and complex optical circuit construction.
- **Broad Transparency Window:** Maintains transparency across a wide wavelength range, from visible to mid-infrared, enabling diverse applications.
- **High Refractive Index Contrast:** Allows for the design of high-density optical circuits with a small footprint.
- **Excellent Thermal Stability:** Features a low thermo-optic coefficient, making it robust against temperature changes and ensuring stable operation even in environments with large fluctuations, such as data centers.

These properties make SiN widely applicable in fields like long-haul optical fiber communication, quantum photonics (e.g., phase modulators integrated with liquid crystals), and high-precision LiDAR systems.

Flexibility of Silicon Oxynitride (SiOxNy)

On the other hand, Silicon Oxynitride (SiOxNy) offers unique flexibility by allowing precise control over its refractive index through the introduction of oxygen. This is particularly advantageous for:

- **Refractive Index Tuning:** Enables customization of the refractive index to specific application requirements, contributing to mode matching and reduced coupling losses between different materials.
- **Complex Circuit Design:** Provides flexibility in designing more intricate photonic circuits, optimizing light paths and maximizing performance.

Both materials maintain compatibility with CMOS processes. Leveraging these materials is expected to facilitate the development of next-generation photonic devices with higher integration density, broader spectral coverage, and improved thermal stability. For instance, research is advancing on hybrid integration of SiN with Thin-Film Lithium Niobate (TFLN) to realize low-loss, ultra-high-speed optical modulators. From a material science perspective, the choice of integrated photonics platform significantly influences device optical performance, integration density, and CMOS compatibility, making the optimization of manufacturing processes to fully exploit these material properties crucial moving forward.

Source: https://eureka.patsnap.com/report-silicon-nitride-vs-silicon-oxynitride-performance-in-photonics

Scalable Quantum Interferometers with SiN and Liquid Crystal Integration: Towards Low-Power, Reconfigurable Quantum Photonic Circuits

Published May 08, 2026 arXiv (学術論文プレプリント) その他

arXiv

OVERVIEW

Compact, efficient, and low-power phase modulators are essential for integrated quantum photonics. This research developed a Mach-Zehnder interferometer (MZI) integrating liquid crystal (LC) on a silicon nitride (SiN) platform, demonstrating CMOS-compatible performance and high-visibility quantum interference (approx. 98.5%). LC offers an attractive alternative to existing SiN modulators' high power consumption and thermal crosstalk issues, due to its large refractive index change and industrial maturity. This study establishes LC-integrated SiN photonics as a scalable, reconfigurable, and energy-efficient platform for quantum photonic circuits.

IN DEPTH

The Importance of Phase Modulators in Quantum Photonic Circuits

In the fields of quantum computing and quantum communication, integrated quantum photonic circuits play a crucial role in encoding and manipulating quantum information using photons. One of the central components of these circuits is the phase modulator, which precisely controls the phase of photons to enable qubit operations and quantum interference. However, existing phase modulators have faced challenges in terms of miniaturization, efficiency, low power consumption, and scalability.

Innovative Integration of Silicon Nitride (SiN) and Liquid Crystal (LC)

To address these challenges, this research developed an innovative Mach-Zehnder interferometer (MZI) that integrates Liquid Crystal (LC) on a Silicon Nitride (SiN) platform. SiN is an excellent photonic material known for its ultra-low loss and broad transparency window, but existing SiN-based thermo-optic modulators have struggled with high power consumption and thermal crosstalk. In contrast, LC offers an attractive alternative due to the following advantages:

- **Large Refractive Index Change:** Enables a significant refractive index change with applied voltage, allowing for efficient phase modulation.
- **Low Power Consumption:** Requires significantly less power for operation compared to traditional thermo-optic modulators, offering superior energy efficiency. This research achieved CMOS-compatible performance (Vpi * L < 1 V-mm).
- **Reduced Thermal Crosstalk:** Since LC is not thermally dependent, it minimizes the impact of thermal crosstalk in highly integrated circuits.
- **Industrial Maturity:** Benefits from industrial maturity gained in liquid crystal displays, offering a relatively clear path to mass production.

Demonstration of High-Visibility Quantum Interference and Scalability

The research team conducted a two-photon interference experiment using this LC-integrated SiN MZI, demonstrating quantum interference with an extremely high visibility of approximately 98.5%. This signifies that high-fidelity quantum operations are possible with this new platform in optical quantum computing. This technology establishes the potential of SiN-LC integration as a scalable, electrically reconfigurable, and energy-efficient platform for quantum photonic circuits.

Contribution to the Future of Quantum Technology

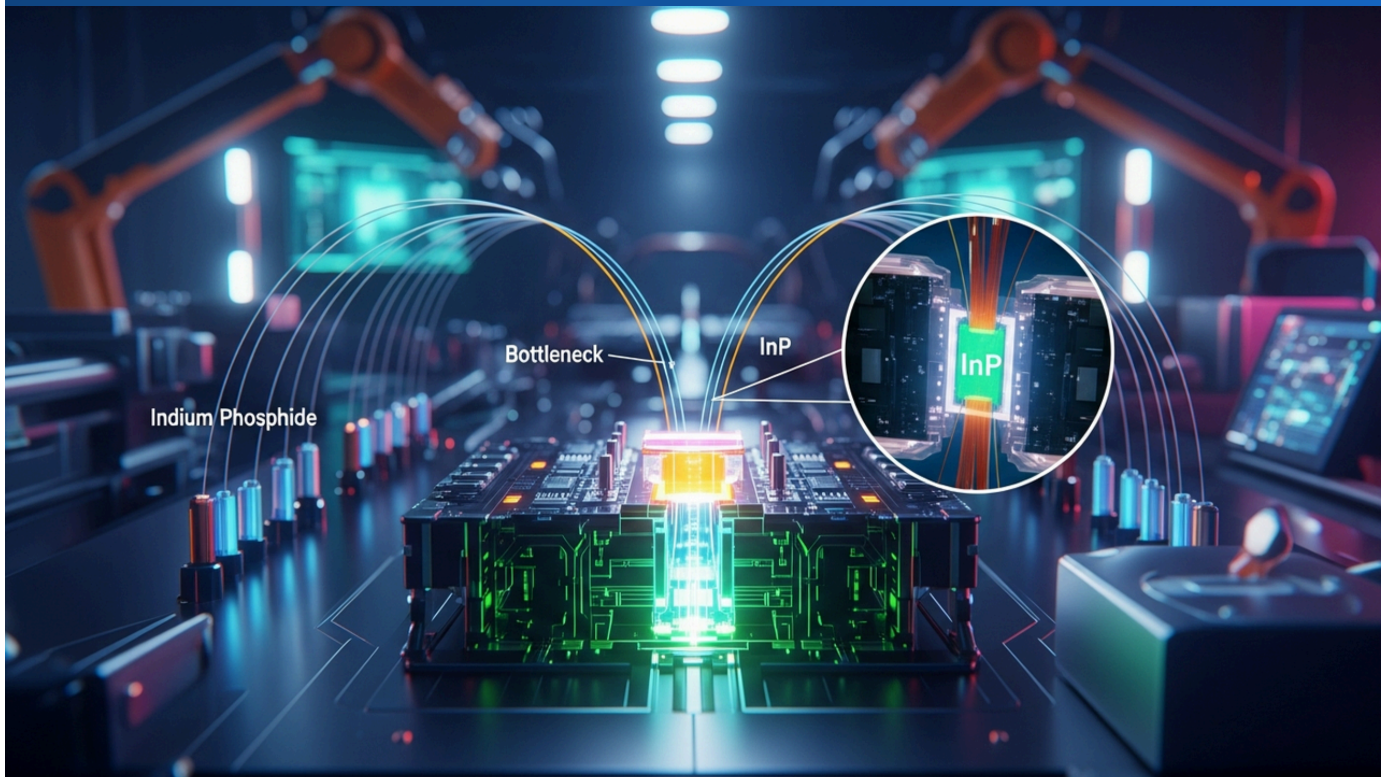
This SiN and LC integration technology is expected to significantly contribute to the chip-level implementation and scalability of quantum computing, potentially influencing the commercialization roadmap for future quantum computers. As NTT aims for a 1 million-qubit optical quantum computer by 2030, such low-power and reconfigurable phase modulators will be indispensable for realizing large-scale quantum circuits. Moving forward, challenges include establishing stable integration processes for LC materials and SiN platforms, and further validating the long-term reliability of devices, but this marks a crucial step in accelerating the development of quantum technology.

Source: https://arxiv.org/abs/2605.07281

Collected: May 15, 2026 | Automated Research System (Gemini API)

NewMaxx Analysis: Indium Phosphide (InP) Identified as the True Bottleneck for 1.6T Optical Modules in AI Buildouts

Published May 15, 2026 NewMaxx's SSD Page USA



OVERVIEW

Despite the attention on silicon photonics, Indium Phosphide (InP) is reportedly the true bottleneck for 800G and 1.6T optical transceivers in AI data centers. Silicon cannot emit light, making InP lasers indispensable as light sources, but supply struggles to meet demand. Lumentum is the sole volume supplier for 200G/lane Electro-Absorption Modulated Lasers (EMLs) needed for 1.6T pluggables, prompting NVIDIA to pre-contract for EML supply post-2027. This InP shortage poses a critical 'chokepoint' hindering AI data center growth.

IN DEPTH

Explosive Growth of AI Data Centers and Demand for Optical Modules

The exponential proliferation of generative AI is accelerating the construction of hyperscale AI data centers, leading to a surge in demand for ultra-high-speed optical transceivers like 800G and 1.6T. TrendForce forecasts an increase in 800G+ optical transceiver shipments from approximately 24 million units in 2025 to 63 million in 2026, with 1.6T-related demand projected to double or triple in 2026. To meet such demands, the development and deployment of Co-Packaged Optics (CPO) and high-bandwidth pluggable transceivers are underway.

Limitations of Silicon Photonics and the Indispensability of InP

While silicon photonics (SiPh) is garnering attention as the foundation for integrated optical circuits, silicon inherently cannot emit light. Therefore, an external light source is crucial for generating optical signals, and currently, Indium Phosphide (InP)-based lasers fulfill this role. InP lasers provide high output, reliability, and high-speed modulation capabilities essential for CPO and NPO architectures, making them indispensable components for enhancing AI data center performance. However, the supply capacity of these InP lasers is being identified as the primary bottleneck—the 'true chokepoint'—for optical modules in AI applications.

Bottlenecks in InP Supply Chain and Major Players' Responses

Specifically, Electro-Absorption Modulated Lasers (EMLs) at 200G/lane, required for 1.6T pluggable optical transceivers, are currently volume-supplied solely by Lumentum. To address this supply constraint, NVIDIA has reportedly entered into a pre-contract with Lumentum to secure EML supply capacity for 2027 and beyond. Coherent is also making significant investments to expand supply, planning to double InP production capacity in 2026 and again in 2027, including the industry's first transition to 6-inch InP wafers. Nevertheless, expanding InP wafer production capacity, particularly for EMLs, is an urgent need, and resolving the overall supply chain bottleneck is anticipated to take several years.

Industry Impact and Future Outlook

This InP supply shortage directly impacts the construction speed and costs of AI data centers, posing a potential risk that could impede the explosive growth of AI infrastructure. For optical device manufacturers, increasing production and technological development of InP-related components is an urgent challenge, while for AI data center operators, it represents a procurement risk. Moving forward, strengthening the entire InP supply chain, developing alternative technologies, and diversifying material and component supply will be crucial for ensuring the sustainable growth of the AI-era optical communications industry.

Source: https://borecraft.com/2026/05/15/inp-is-the-real-chokepoint-behind-every-1-6t-optical-module-shipping-into-ai-buildouts/

Collected: May 15, 2026 | Automated Research System (Gemini API)

arXiv Paper: On-chip 1 TOPS Hyperdimensional Photonic Tensor Core Achieved with WDM Silicon Photonic Crossbar

Published May 14, 2026 arXiv (学術論文プレプリント) その他

OVERVIEW

This paper demonstrates an on-chip 0.96 TOPS (tera-operations per second) hyperdimensional photonic tensor core utilizing a Time-, Spatial-, and Wavelength-Division Multiplexing (TSWDM) silicon photonic crossbar. This novel architecture unfolds large matrix-vector and tensor-vector products in time, distributing computational loads across different spatial and wavelength channels. Experimental operation of a 4-channel 2-input TSWDM crossbar incorporating 56 GHz electroabsorption modulators (EAMs) and a 4-channel integrated multiplexing stage was shown, with its AI accelerator performance evaluated on the Iris dataset classification.

IN DEPTH

The Potential of Optical Computing in AI Acceleration

AI workloads, such as deep learning, necessitate the execution of an immense number of matrix operations at high speed and low power. Traditional electronic AI accelerators face physical limits in power consumption and computational speed for this task, making optical computing, which performs calculations using light, a promising alternative. Particularly, silicon photonics integrated with Wavelength Division Multiplexing (WDM) technology holds the potential to significantly enhance computational power and power efficiency.

Realization of On-chip 1 TOPS Photonic Tensor Core

This paper demonstrates a "hyperdimensional photonic tensor core" with a high computational power of 0.96 TOPS (tera-operations per second) on-chip, utilizing a Time-, Spatial-, and Wavelength-Division Multiplexing (TSWDM) silicon photonic crossbar. This is a groundbreaking achievement in performing AI acceleration in the optical domain at the chip level. This new architecture features the following key characteristics:

- **High Efficiency Through Multiplexing:** By distributing the computational load of large matrix-vector and tensor-vector products across time, different spatial channels, and wavelength channels, it enables efficient parallel processing.
- **High-Performance Components:** Experimental operation of a 4-channel 2-input TSWDM crossbar incorporating 56 GHz electroabsorption modulators (EAMs) and a 4-channel integrated multiplexing stage was shown. EAMs are critical devices for achieving high-speed optical modulation.
- **AI Performance Evaluation:** Its performance as an AI accelerator was evaluated on the Iris dataset classification task, achieving a high experimental accuracy of 93.3% at data rates of 4x10 to 4x30 GBd (gigabaud per second). When increasing the data rate to 4x60 GBd, the accuracy was 83.3%.

Technical Significance and Industry Impact

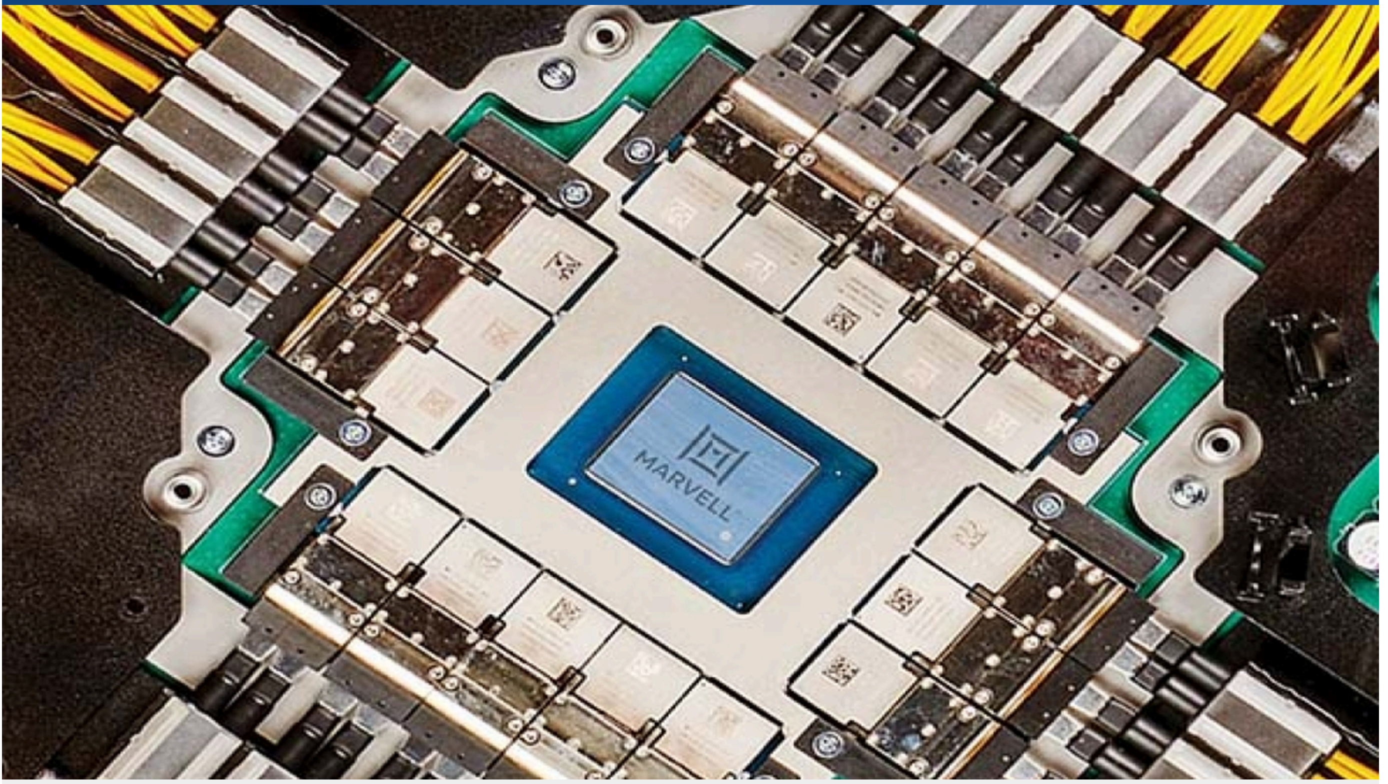
This achievement holds the potential to significantly enhance the performance of AI acceleration through optical computing at the chip level. The introduction of WDM reduces laser operating power and increases the possibility of building photonic accelerators with POPS (Peta-operations per second) level computational throughput. For the power consumption challenges associated with increasing AI model computational load, power-efficient and high-speed acceleration via optical computing contributes to reducing data center operational costs and improving performance. While currently a laboratory-level achievement, requiring further application to larger AI workloads, reliability, and establishment of mass production technologies, this research indicates an important direction for shaping the future of AI computing.

Source: https://arxiv.org/abs/2605.13224

Collected: May 15, 2026 | Automated Research System (Gemini API)

Scaling AI Networks Demand Transformative Optical Testing: Shifting Manufacturing Bottleneck to Test

Published May 11, 2026 Photonic Integrated Circuits News USA



OVERVIEW

The major challenge in modern AI infrastructure is not merely individual accelerator performance but scaling thousands of accelerators into clusters. This scale-up makes Co-Packaged Optics (CPO) and Near-Packaged Optics (NPO) inevitable, as copper's electrical links reach physical limits. However, this transition shifts the manufacturing bottleneck to 'testing,' necessitating highly parallelized, automated optical testing and Design-for-Test (DfT) from the design stage, as traditional low-volume optical testing methods are insufficient.

IN DEPTH

Scale-Up Challenges in AI Infrastructure and the Need for Opticalization

In the era of generative AI, data center performance is determined not just by the capabilities of individual GPUs or ASICs, but by the ability to efficiently coordinate thousands of accelerators in a 'scale-up' fashion. This large-scale cooperative operation requires a network that transfers massive amounts of data at ultra-high speed and low latency. However, traditional copper-based electrical links have reached their physical limits in terms of power consumption, signal attenuation, and bandwidth. Consequently, the transition to Co-Packaged Optics (CPO) and Near-Packaged Optics (NPO), which integrate electrical-to-optical conversion very close to the ASIC package, has become an inevitable choice for resolving AI infrastructure performance bottlenecks.

Manufacturing Bottleneck Shifts to 'Testing'

The transition to CPO/NPO introduces new challenges to the manufacturing process of optical components. While traditional optical module manufacturing primarily relied on testing after final assembly, with CPO, where optical engines are integrated into the ASIC package, the manufacturing bottleneck shifts from conventional assembly processes to 'optical testing.' This is because complex devices, with tightly integrated optical and electrical functionalities, need to be efficiently and reliably tested at the mass production scale of the semiconductor industry.

Demand for Scalable Optical Testing and the Importance of DfT

Traditional custom-built, low-volume optical testing methods are inadequate for CPO devices, which feature a high channel count and large production volumes. Therefore, innovative optical testing approaches are urgently required, including:

- **High-Parallel Processing and Automation:** To efficiently test CPO devices with hundreds to thousands of optical channels, automated optical testing systems capable of high-parallel processing are necessary. This includes wafer-level optical testing and the integration of opto-electronic probe cards.
- **Design-for-Test (DfT):** Implementing Design-for-Test (DfT) from the design stage is essential. This allows for the identification of Known Good Dies (KGD) early in the manufacturing process, significantly reducing costs associated with integrating defective silicon downstream.

- **IC-Style Manufacturing Test Framework:** It is necessary to apply established semiconductor manufacturing test expertise to optical testing and build a unified manufacturing test framework.

Impact on Industrialization and Data Center Demand

The widespread adoption of CPO/NPO in AI data centers requires a high-reliability and cost-efficient supply of optical engines, and scalable optical testing technology is key to achieving this. As test technology maturity will determine the pace of industrialization, capital investment in optical test automation and high-parallelization, establishment of DfT-aware design flows, and standardization of optical test technology will be crucial challenges for future industrial development.

Source: https://picmagazine.net/article/124179/Why_scale-up_AI_networks_demand_scalable_optical_test

Collected: May 15, 2026 | Automated Research System (Gemini API)

Marvell's Acquisition of Celestial AI Signals Strategic Value of Photonics in Shaping the Future of AI Data Centers

Published May 14, 2026 IDTechEx USA

Modulators for Photonic Integrated Circuits

IDTechEx Research

Modulators are an essential part of a photonic integrated circuit that encode a digital signal on the continuous wave (CW) light produced by the laser. There are 3 approaches used in industry today, and IDTechEx has listed the approach taken by several key players in the industry below.

Micro-Ring Modulators (MRM)

LIGHTMATTER

NVIDIA

AyarLabs

Mach-Zender Modulator (MZM)

LUMENTUM

COHERENT

BROADCOM

Electroabsorbption Modulators (EAM)

In December 2025, Marvell purchased Celestial AI, a company developing germanium-based EAMs. This indicates Marvell will be shifting its core modulation technology from MZI to EAM.

OVERVIEW

In December 2025, Marvell acquired Celestial AI for $3.25 billion, part of active photonics investments including NVIDIA's $2 billion stakes in Coherent and Lumentum. AI data centers' need for immense data transfer between GPU clusters exceeds traditional copper interconnect limits, driving the industry to optics. Photonic Integrated Circuits (PICs), capable of processing both optical and electrical signals, are emerging as key components, with optical transceivers being a primary application. Silicon photonics, a type of PIC, aims to efficiently scale photonics using existing silicon semiconductor infrastructure.

IN DEPTH

Increasing Strategic Value of Optical Connectivity in AI Data Centers

The explosive growth of generative AI workloads is forcing a fundamental transformation in AI data center infrastructure design. Specifically, the need to transmit vast amounts of data at high speeds and efficiency within and between GPU clusters is pushing traditional copper interconnects to their physical limits in terms of power consumption, bandwidth, and latency. In this context, the strategic value of optical interconnect technology is rapidly increasing, stimulating active investment and M&A activities in the photonics sector by leading semiconductor companies.

Marvell's Acquisition of Celestial AI

Embodying this trend, in December 2025, semiconductor giant Marvell acquired Celestial AI, a developer of photonics chip technology, for a substantial $3.25 billion. Similar to NVIDIA's $2 billion investments in optical component suppliers Coherent and Lumentum to secure supply, this suggests that AI-era optical connectivity is an indispensable competitive advantage for chip manufacturers. Marvell's acquisition strongly indicates the recognition that optoelectronic integration technology, particularly optical I/O and photonic fabrics, will be central to next-generation AI chips and data center architectures.

Photonic Integrated Circuits (PICs) and Silicon Photonics

Central to this field are Photonic Integrated Circuits (PICs). PICs are integrated circuits capable of processing both optical and electrical signals, with optical transceivers emerging as their primary application. Silicon photonics, a type of PIC, offers the significant advantage of leveraging existing silicon semiconductor manufacturing infrastructure. This enables efficient scale-up and cost reduction of photonic devices, accelerating their mass deployment in AI data centers.

Industry Impact and Future Outlook

Marvell's acquisition of Celestial AI highlights how the explosive growth of AI data centers is accelerating the industrialization of optical connectivity technology, with key players consolidating intellectual property and capabilities through vertical integration and strategic partnerships. However, technical challenges, such as integrating light sources (lasers) in silicon photonics and the complexity of integrating different technologies, still remain to be solved. As AI infrastructure evolves, the importance of optical connectivity technology, which offers higher bandwidth and power efficiency, will further increase, and competition and innovation in this sector are expected to accelerate.

Source: https://www.idtechex.com/en/research-article/what-does-marvells-acquisition-of-celestial-ai-mean-for-photonics/34741

Collected: May 15, 2026 | Automated Research System (Gemini API)