

TROY TECHNICAL

OPTICAL COMMUNICATIONS & PHOTONICS WEEKLY REPORT

October 10 - October 16, 2026 | Issue 2026-W41

**Link budget, packaging, thermal reliability and
deployable supply**

11

ANALYZED ARTICLES

10

PRIORITY THEMES

Issued 2026-10-16 | English edition | fixed approved cover artwork



Optical Communications & Photonics: the boundary moved from isolated claims to qualification evidence

11 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | BUSINESS / RULES

Nokia Multi-PON Solution: 50G/25G/10G/GPON Roadmap and Specs

Primary-source report: Nokia has introduced a 16-port line card supporting GPON, 10G, 25G, and 50G PON on every port to enable flexible fiber network evolution.

SIGNAL 02 | SYSTEM / ADOPTION

Photonic Integrated Engine: Single-Chip Cold Atom Generation 2026

Primary-source report: Researchers have developed a single-chip photonic engine that integrates light generation, control, and delivery to create cold atoms in a rubidium 3-dimensional magneto-optical trap (3D-MOT).

SIGNAL 03 | BUSINESS / RULES

Celestica DS6005: 102.4Tbps CPO Switch Specs for AI Data Centers

Collected report (not independently verified): Celestica has introduced the DS6005, a fully liquid-cooled co-packaged optics (CPO) switch delivering 102.4Tbps capacity for AI and machine learning networks.

SIGNAL 04 | SYSTEM / ADOPTION

Astera Labs Aries 7: PCIe 7 Optical Roadmap and NPO Timeline

Collected report (not independently verified): Astera Labs has launched Aries 7, the first PCIe 7 signal conditioning portfolio integrating copper and optical interconnects to support 128 GT/s data rates.

DECISION

Focus this week's management attention on link budget, packaging, thermal reliability and deployable supply. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: evaluate optical architectures by reach, power, latency, interoperability and field service.
2. Suppliers: pair optical performance with packaging yield, test, thermal drift and qualified capacity.
3. Executives: track yield, coupling loss, temperature drift, interoperability, volume and cost.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Five numbers or evidence anchors that require conditions

16 ports A06	SOURCE-BOUND CONDITION Nokia GPON-to-50G multi-PON line card
50 Gbps A06	SOURCE-BOUND CONDITION Nokia supported rate; planned 2027 GA
>1 millio n A08	SOURCE-BOUND CONDITION Integrated engine; atoms in the trap
350 uK A08	SOURCE-BOUND CONDITION Rb 3D-MOT average atom temperature
OPEN A06	SOURCE-BOUND CONDITION Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.
HOW TO USE THESE NUMBERS Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.	

Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

Light source

P01/P06

Primary-source report: Nokia has introduced a 16-port line card supporting GPON, 10G, 25G, and 50G PON on every port to enable flexible fiber network evolution.

2

Photonic device

P02/P07

Primary-source report: Researchers have developed a single-chip photonic engine that integrates light generation, control, and delivery to create cold atoms in a rubidium 3-dimensional magneto-optical trap (3D-MOT).

3

Packaging

P03/P08

Collected report (not independently verified): Celestica has introduced the DS6005, a fully liquid-cooled co-packaged optics (CPO) switch delivering 102.4Tbps capacity for AI and machine learning networks.

4

Network system

P04/P09

Collected report (not independently verified): Astera Labs has launched Aries 7, the first PCIe 7 signal conditioning portfolio integrating copper and optical interconnects to support 128 GT/s data rates.

5

Operations

P05/P10

Collected report (not independently verified): Wiwynn, Ayar Labs, and GUC have demonstrated a live compute system integrating co-packaged optics (CPO) at the OCP Global Summit 2026.

EVIDENCE REQUIRED AT EACH HANDOFF

Light source to Photonic device	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost.
Photonic device to Packaging	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost.
Packaging to Network system	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost.
Network system to Operations	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck yield, coupling loss, temperature drift, interoperability, volume and cost.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented yield, coupling loss, temperature drift, interoperability, volume and cost.

Priority map: maturity and next decision locus



REPRODUCIBLE POSITIONING RULE
Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

For legibility, scores of 18 or below use an 18-pt bubble diameter; underlying scores are unchanged.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01

Nokia Multi-PON Solution: 50G/25G/10G/GPON Roadmap and Specs

A06 | Business / rules | Product adoption

2026-10-12

FACT

Primary-source report: Nokia has introduced a 16-port line card supporting GPON, 10G, 25G, and 50G PON on every port to enable flexible fiber network evolution. Built on the Quillion chipset, the solution provides speeds up to 50Gbps and is scheduled for general availability in 2027. This infrastructure aims to meet the increased capacity and low-latency demands driven by AI-driven applications.

WHY IT MATTERS

In practical terms, Nokia Multi-PON Solution needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For Nokia Multi-PON Solution, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Nokia Multi-PON Solution on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P02

Photonic Integrated Engine: Single-Chip Cold Atom Generation 2026

A08 | System / adoption | Prototype

2026-10-14

FACT

Primary-source report: Researchers have developed a single-chip photonic engine that integrates light generation, control, and delivery to create cold atoms in a rubidium 3-dimensional magneto-optical trap (3D-MOT).

WHY IT MATTERS

In practical terms, Photonic Integrated Engine needs separate tests of bandwidth and power before the result becomes an adoption case.

BUSINESS READ

For Photonic Integrated Engine, compare bandwidth and power under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Photonic Integrated Engine on bandwidth against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific power, reproducibility and deployment terms remain unproven. Published claims are not customer-qualified performance.

EDITORIAL SCORE 17/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03

Celestica DS6005: 102.4Tbps CPO Switch Specs for AI Data Centers

A02 | Business / rules | Product adoption

2026-10-12

FACT

Collected report (not independently verified): Celestica has introduced the DS6005, a fully liquid-cooled co-packaged optics (CPO) switch delivering 102.4Tbps capacity for AI and machine learning networks. Built on Broadcom's Tomahawk 6 - Davisson silicon, the system reduces power consumption and latency compared to traditional pluggable optics.

WHY IT MATTERS

In practical terms, Celestica DS6005 needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For Celestica DS6005, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Celestica DS6005 on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 17/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P04

Astera Labs Aries 7: PCIe 7 Optical Roadmap and NPO Timeline

A03 | System / adoption | Research

2026-10-09

FACT

Collected report (not independently verified): Astera Labs has launched Aries 7, the first PCIe 7 signal conditioning portfolio integrating copper and optical interconnects to support 128 GT/s data rates. The expansion into optical drivers and TIAs targets the 2027 ramp of near-package optics (NPO) to overcome the physical reach limitations of PCIe 7 copper traces.

WHY IT MATTERS

In practical terms, Astera Labs Aries 7 needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For Astera Labs Aries 7, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Astera Labs Aries 7 on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 15/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05

Optical I/O: Wiwynn, Ayar Labs and GUC System-Level Proof 2026

A04 | System / adoption | Product adoption

2026-10-13

FACT

Collected report (not independently verified):
Wiwynn, Ayar Labs, and GUC have demonstrated a live compute system integrating co-packaged optics (CPO) at the OCP Global Summit 2026. The system moves beyond architectural validation to prove that optical I/O can be operated, managed, and serviced in a production-format chassis.

WHY IT MATTERS

In practical terms, Optical I/O needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For Optical I/O, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Optical I/O on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 17/25 | MATURITY 4/5 | DECISION LOCUS: SYSTEM / ADOPTION

P06

Credo 1.6T ZeroFlap ALC: Specs, Power Efficiency and 2027 Timeline

A10 | Business / rules | Research

2026-10-13

FACT

Collected report (not independently verified): Credo has launched the 1.6T ZeroFlap Active Light Cable (ALC), designed for next-generation AI infrastructure with a target shipment date of 2027. The solution reduces power consumption by nearly 30% and weight by 10 times compared to active electrical cables (AECs). This expansion targets the growing bandwidth and reliability requirements of expanding GPU clusters.

WHY IT MATTERS

In practical terms, Credo 1.6T ZeroFlap ALC needs separate tests of interface function and aging and process window before the result becomes an adoption case.

BUSINESS READ

For Credo 1.6T ZeroFlap ALC, compare interface function and aging and process window under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Credo 1.6T ZeroFlap ALC on interface function against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific aging and process window, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 14/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07

Arelion and Nokia: 21% Optical Spectrum Gain on 500 km Route

A11 | Business / rules | Product adoption

2026-10-08

FACT

Collected report (not independently verified): Arelion and Nokia have demonstrated a 21% increase in usable optical spectrum on a live 500-kilometer route between Amsterdam and London. The trial utilizes Super C+L technology to expand capacity on existing fiber infrastructure without deploying new cables. This advancement addresses the rising demand for AI, cloud connectivity, and data center interconnect (DCI) services.

WHY IT MATTERS

In practical terms, Arelion and Nokia needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For Arelion and Nokia, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Arelion and Nokia on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 17/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P08

AI Pluggable Optics: Nvidia and Cisco's New Format vs CPO

A01 | System / adoption | Research

2026-10-12

FACT

Collected report (not independently verified): Nvidia, Cisco, TE Connectivity, and Amphenol have introduced a new pluggable optics form factor designed to reduce costs and increase data speeds in AI data centers. This move complements Nvidia's push for co-packaged optics (CPO), ensuring flexibility across different network layers.

WHY IT MATTERS

In practical terms, AI Pluggable Optics needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For AI Pluggable Optics, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare AI Pluggable Optics on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 15/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09

Aluminum Nitride Substrates: 1.6T AI Optical Module Bottleneck

A09 | Business / rules | Product adoption

2026-10-09

FACT

Collected report (not independently verified): Aluminum Nitride (AlN) thin-film substrates have emerged as a critical production bottleneck for 800G and 1.6T high-speed AI optical modules due to extreme thermal demands. Supply shortages are prompting capacity expansions from key players including Tokuyama and MARUWA to support the rapid ramp-up of AI data center networks.

WHY IT MATTERS

In practical terms, Aluminum Nitride Substrates needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For Aluminum Nitride Substrates, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Aluminum Nitride Substrates on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 17/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P10

Optical Frequency Combs: Chip-Scale Miniaturization Roadmap 2026

A05 | Tech / process | Prototype

2026-10-08

FACT

Collected report (not independently verified): Researchers from the University of Auckland and US institutions have developed a method to shrink optical frequency combs to chip size using a dual-laser approach. This breakthrough enables the transition of ultra-precise "light rulers" from laboratory settings to portable applications in navigation, communications, and atomic clocks.

WHY IT MATTERS

In practical terms, Optical Frequency Combs needs separate tests of optical loss and power and packaging and interoperability before the result becomes an adoption case.

BUSINESS READ

For Optical Frequency Combs, compare optical loss and power and packaging and interoperability under the same application conditions. Request source protocols before extrapolating to customer use. This is an editorial inference.

ACTION

Within 30 days, R&D and quality should compare Optical Frequency Combs on optical loss and power against a baseline; deliver an acceptance and stop-rule sheet.

UNKNOWN

Application-specific packaging and interoperability, reproducibility and deployment terms remain unproven. Confirm the original primary record.

EDITORIAL SCORE 15/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW 0-30 DAYS	NEXT 1-12 MONTHS	LATER 1-5 YEARS
Operating companies	evaluate optical architectures by reach, power, latency, interoperability and field service	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	pair optical performance with packaging yield, test, thermal drift and qualified capacity	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map yield, coupling loss, temperature drift, interoperability, volume and cost.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW 0-30 DAYS Evidence ledger Owner: Strategy + quality Deliverable: claim, source, condition, owner	NOW 0-30 DAYS Risk screen Owner: Procurement + legal Deliverable: unknowns, alternatives, stop	NEXT 1-12 MONTHS Joint qualification Owner: R&D + supplier Deliverable: process window and failure data
NEXT 1-12 MONTHS Commercial gate Owner: Business + finance Deliverable: unit economics and capacity	LATER 1-5 YEARS Platform strategy Owner: Executive team Deliverable: portfolio and interface roadmap	LATER 1-5 YEARS Service layer Owner: Operations + channel Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

GATE	OWNER	REQUIRED EVIDENCE	NO-GO CONDITION
G1 Evidence	Quality	Source, test conditions and reproducibility	No traceable evidence
G2 Integration	R&D	Interface, process window and failure analysis	Cannot meet system conditions
G3 Commercial	Business	Capacity, total cost, contract and alternatives	Economics or supply cannot be supported
G4 Lifecycle	Operations	Monitoring, maintenance, change notice and exit	No accountable operating plan

ANALYZED ARTICLES | ITEMS 01-11

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	AI Pluggable Optics: Nvidia and Cisco's New Format vs CPO	https://cryptobriefing.com/nvidia-cisco-pluggable-optics-ai-data-centers/
A02	Celestica DS6005: 102.4Tbps CPO Switch Specs for AI Data Centers	https://www.unite.ai/celestica-unveils-ds6005-co-packaged-optics-switch-for-ai-data-centers/
A03	Astera Labs Aries 7: PCIe 7 Optical Roadmap and NPO Timeline	https://futuresgroup.com/insights/astera-labs-aries-7-goes-optical-can-pcie-7-outgrow-the-retimer-plateau/
A04	Optical I/O: Wiwynn, Ayar Labs and GUC System-Level Proof 2026	https://andersstorm.substack.com/p/the-light-is-on-wiwynn-ayar-labs
A05	Optical Frequency Combs: Chip-Scale Miniaturization Roadmap 2026	https://www.photonicsonline.com/doc/university-s-research-advances-ultra-precision-laser-tech-0001
A06	Nokia Multi-PON Solution: 50G/25G/10G/GPON Roadmap and Specs	https://www.nokia.com/newsroom/nokia-launches-flexible-50g25g10gpon-solution-to-accelerate-ai-ready-fiber-broadband/
A07	Nokia Coherent Pluggable Optics: Subsea Expansion and Specs	https://www.mobileeurope.co.uk/nokia-subsea-expansion-pluggable/
A08	Photonic Integrated Engine: Single-Chip Cold Atom Generation 2026	https://arxiv.org/html/2610.17918v1
A09	Aluminum Nitride Substrates: 1.6T AI Optical Module Bottleneck	https://eu.36kr.com/en/p/4017931349528453
A10	Credo 1.6T ZeroFlap ALC: Specs, Power Efficiency and 2027 Timeline	https://www.zacks.com/stock/news/3006128/credo-expands-ai-connectivity-portfolio-with-16t-zeroflap-alc
A11	Arelion and Nokia: 21% Optical Spectrum Gain on 500 km Route	https://convergedigest.com/arelion-nokia-super-cl-optical-spectrum-amsterdam-london/

Scope: retrieving a source does not independently validate performance, cost or clinical utility. The claim ledger distinguishes announcements, papers and secondary reporting. Material published before the reporting week is continuing context, not a new event. Editorial inferences and actions are not investment or medical advice.

Photonics — Selected Articles

Date: 2026-10-18

Articles: 11

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- #06 Nokia Multi-PON Solution: 50G/25G/10G/GPON Roadmap and Specs
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- #08 Photonic Integrated Engine: Single-Chip Cold Atom Generation 2026
- #09 Aluminum Nitride Substrates: 1.6T AI Optical Module Bottleneck
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- #11 Arelion and Nokia: 21% Optical Spectrum Gain on 500 km Route

#01 AI Pluggable Optics: Nvidia and Cisco's New Format vs CPO

Published October 12, 2026 (Specific media not identified in snippet, but context indicates a tech news outlet) USA



OVERVIEW

Nvidia, Cisco, TE Connectivity, and Amphenol have introduced a new pluggable optics form factor designed to reduce costs and increase data speeds in AI data centers. This move complements Nvidia's push for co-packaged optics (CPO), ensuring flexibility across different network layers. The initiative targets a market where 800G-and-faster transceiver shipments are projected to exceed 24 million units in 2025.

Key Findings

Nvidia, Cisco, TE Connectivity, and Amphenol are backing a new pluggable optics form factor to address the increasing data movement demands of AI networks. While Nvidia is simultaneously promoting co-packaged optics (CPO), this new pluggable standard provides a modular alternative that allows operators to mix vendors and replace failed modules without replacing the entire switch.

Technical Details

The partnership leverages specific technological strengths from each member:

- **Cisco:** Expanding its lineup with 1.6T OSFP modules and 800G Linear Pluggable Optics (LPO). Cisco's 800G LPO solutions reduce power consumption by approximately 50% for optical modules and around 30% for the overall switch by removing certain signal-processing electronics. Additionally, Cisco's Silicon One G300 switching silicon, unveiled February 10, 2026, can switch data at 102.4 Tbps.
- **TE Connectivity and Amphenol:** Providing high-density connectors and interconnect hardware for both linear pluggable and co-packaged architectures.
- **Nvidia:** Developing CPO via Spectrum-X Photonics and Quantum-X Photonics switches. CPO reduces the required number of lasers by four times and improves power efficiency by 3.5 times and signal integrity by 63 times compared to traditional pluggables. CPO also reduces electrical signal loss from roughly 22 dB to roughly 4 dB.

Background and Context

Nvidia announced its CPO-based switches on March 18, 2025. Quantum-X Photonics switches (up to 115 Tb/s) are expected between late 2025 and early 2026, while Spectrum-X Photonics (up to 409.6 Tb/s) is expected in the second half of 2026. However, pluggables remain essential for flexibility and easier maintenance compared to the complex repair process required for CPO optical engines.

Significance and Outlook

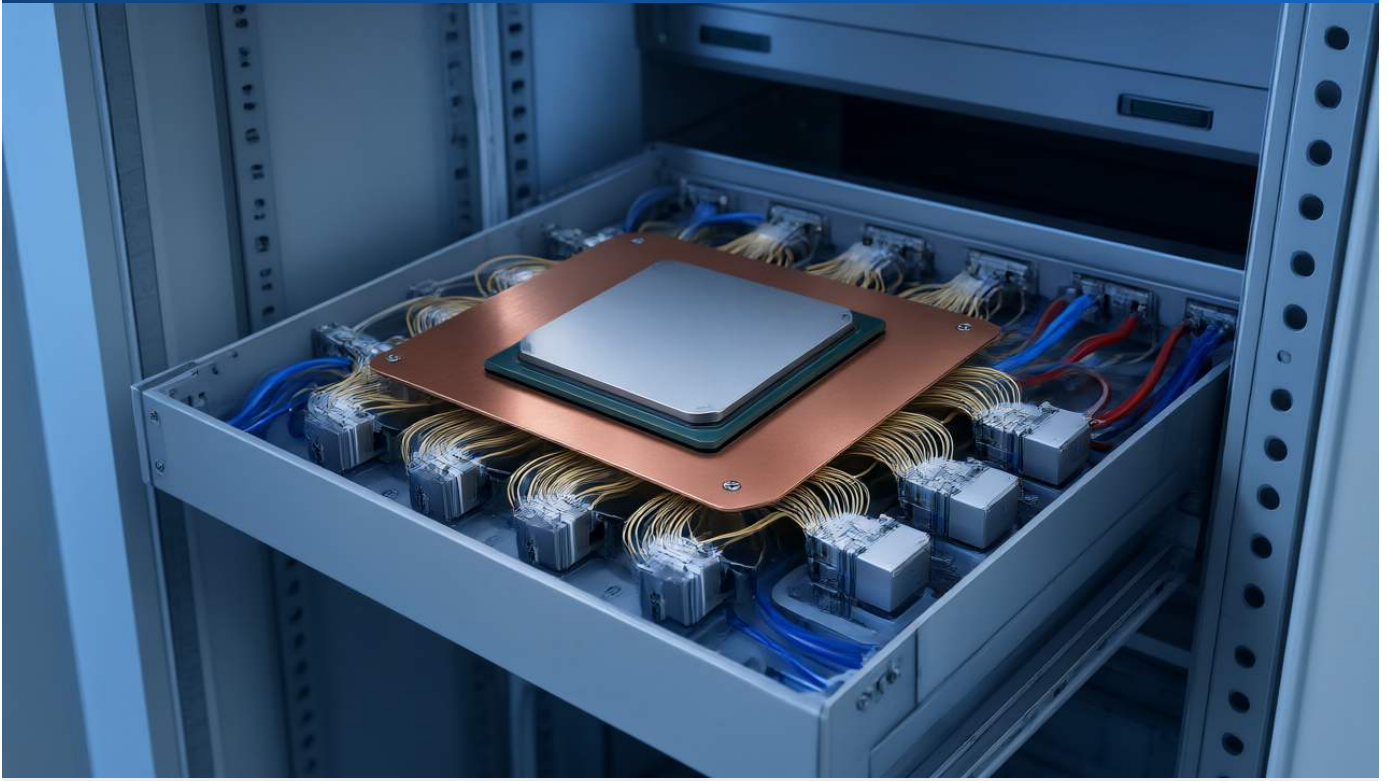
The dual-track strategy allows Nvidia to capture market share regardless of whether a customer chooses CPO or pluggable architectures for specific network layers. For Cisco, a common pluggable format protects its business against fully integrated designs. With 800G+ transceiver shipments expected to top 24 million units in 2025, the power savings offered by LPO provide significant advantages for data center power budgets.

Source: <https://cryptobriefing.com/nvidia-cisco-pluggable-optics-ai-data-centers/>

Collected: October 17, 2026 | Automated Research System (AI)

#02 Celestica DS6005: 102.4Tbps CPO Switch Specs for AI Data Centers

Published October 12, 2026 Unite.AI USA



OVERVIEW

Celestica has introduced the DS6005, a fully liquid-cooled co-packaged optics (CPO) switch delivering 102.4Tbps capacity for AI and machine learning networks. Built on Broadcom's Tomahawk 6 – Davison silicon, the system reduces power consumption and latency compared to traditional pluggable optics. This platform addresses the critical bandwidth and thermal constraints of next-generation AI scale-up and scale-out fabrics.

Key Findings

The Celestica DS6005 is a high-capacity switching system designed for AI data centers, providing 102.4Tbps of switching capacity. The system utilizes co-packaged optics (CPO) to place optical engines directly on the switch ASIC package, eliminating conventional front-panel pluggable optics to optimize bandwidth density and power efficiency. The DS6005 is fully liquid-cooled and housed in a 1.5OU enclosure compliant with OCP ORv3-HPR rack specifications.

Technical Details

The hardware is built around the Broadcom Tomahawk 6 – Davisson switch chip and an AMD Ryzen x86 CPU. Key technical specifications include:

- **Capacity:** 102.4Tbps total switching capacity via 64 ports of 1.6TbE.
- **Connectivity:** 64 optical interconnects utilizing 16x 4x MMC-16 connectors.
- **Interfaces:** 16 ELSFP interfaces for field-replaceable external laser modules, one 100GbE QSFP28 port, RJ45 console, out-of-band GbE management, one USB 3.0 Type A port, and one USB-C console port.
- **Software:** Support for SONiC to enable an open architecture.

Background and Context

The DS6005 leverages Broadcom's Tomahawk 6 – Davisson silicon, which Broadcom began shipping on October 8, 2025. This third-generation CPO Ethernet switch integrates 16 Davisson DR optical engines (6.4Tbps each) using TSMC's COUPE technology and advanced substrate-level multi-chip packaging. Broadcom reports that this integration reduces optical interconnect power consumption by 70%, which is more than 3.5 times lower than traditional pluggable solutions. The chip supports scale-up clusters of 512 XPU and two-tier networks of over 100,000 XPU at 200Gbps per link.

Significance and Outlook

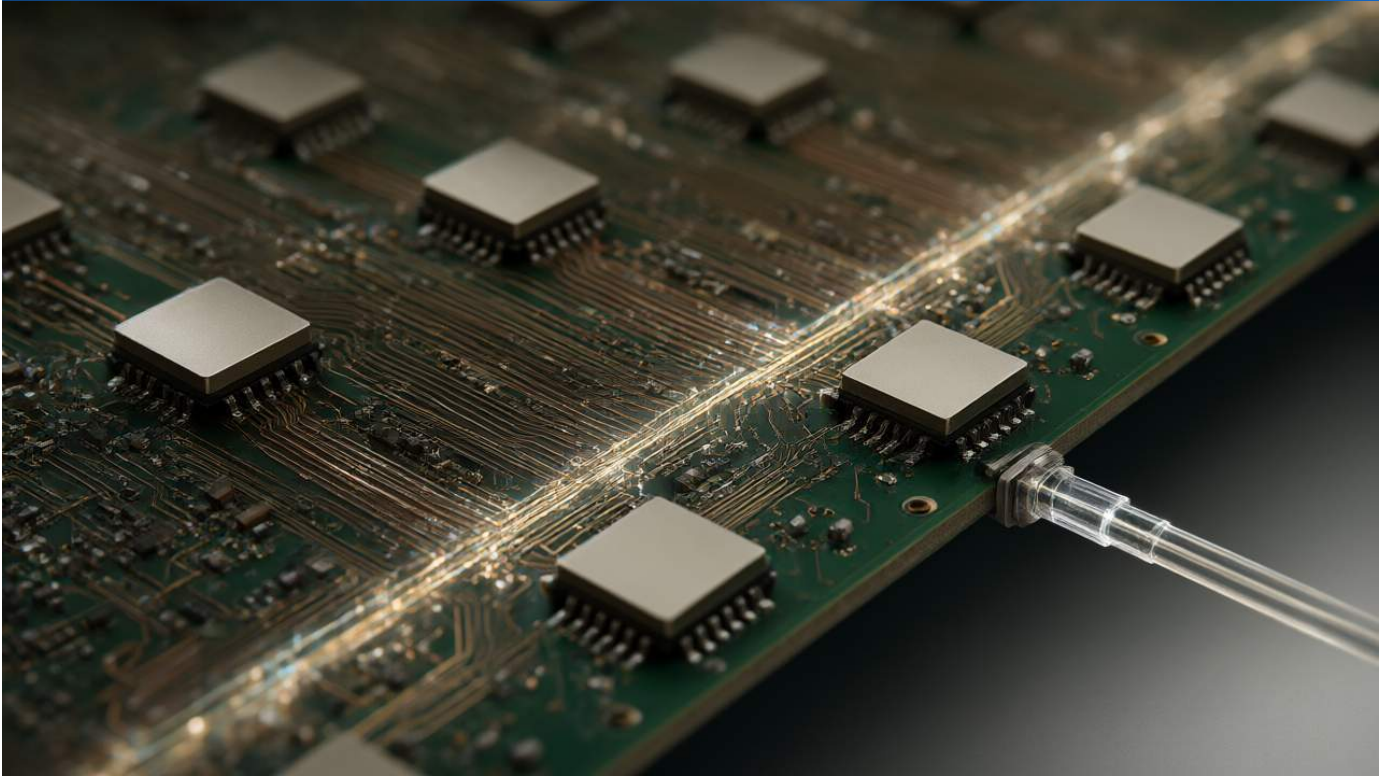
The system is optimized for high-performance computing, frontier cloud and enterprise AI models, and hyperscale infrastructure. Industry analysts from Dell'Oro Group and 650 Group note that AI networking constraints are shifting from compute to physical infrastructure, specifically power and density. The transition of CPO from an industry theme to production-ready systems like the DS6005 provides a path to address these constraints in high-density scale-out fabrics.

Source: <https://www.unite.ai/celestica-unveils-ds6005-co-packaged-optics-switch-for-ai-data-centers/>

Collected: October 17, 2026 | Automated Research System (AI)

#03 Astera Labs Aries 7: PCIe 7 Optical Roadmap and NPO Timeline

Published October 09, 2026 (Specific media not identified in snippet, but context indicates a tech news outlet) USA



OVERVIEW

Astera Labs has launched Aries 7, the first PCIe 7 signal conditioning portfolio integrating copper and optical interconnects to support 128 GT/s data rates. The expansion into optical drivers and TIAs targets the 2027 ramp of near-package optics (NPO) to overcome the physical reach limitations of PCIe 7 copper traces.

Key Findings

Astera Labs has introduced the Aries 7 portfolio, marking the company's first entry into optical interconnects for PCIe 7. The suite expands beyond traditional retimers to include Smart Redrivers, Smart Optical Drivers, and Optical Transimpedance Amplifiers (TIAs). Sampling is scheduled to begin in Q4 2026 for select OEM, NPO, and hyperscale customers, with demonstrations planned for the OCP Global Summit from October 12-15, 2026.

Technical Details

The Aries 7 portfolio is designed to handle PCIe 7's 128 GT/s data rate, extending connectivity from centimeters of PCB trace to over 50 meters via optical cables. To address the physics of PCIe 7—where the insertion loss budget increases from 32 dB to 36 dB, reducing usable PCB trace from approximately 14 inches to 10 inches—Astera Labs has introduced:

- **Smart Optical Drivers and TIAs:** Designed for low-power, high-density near-package optics (NPO) and linear pluggable optics (LPO) that omit a DSP.
- **Smart Redrivers:** Analog devices that apply smart-analog patterns to copper links.
- **OCP Signal Conditioner Standard Footprint:** Support for "Smart Swap," allowing customers to change signal conditioners without redesigning the board.
- **COSMOS Software:** A unified suite for fleet management, deep diagnostics, and dynamic tuning across the portfolio.

Background and Context

The shift toward optical solutions follows a maturing retimer market. While Aries set a quarterly revenue record in Q2 2026, its share of company revenue dropped from roughly 90% in 2023 to 53% in Q2 2026, as Scorpio fabric switches and Taurus Ethernet modules grew faster. AMD and Intel have validated Aries Smart Retimers from PCIe 4 through PCIe 6 and are collaborating on the PCIe 7 transition.

Significance and Outlook

The transition to linear optics is critical as scale-up topologies move toward multi-rack AI fabrics. Astera Labs expects joint copper and optical deployments in late 2026 and early 2027, with NPO entering volume deployment with tier 1 customers in 2027 and CPO architectures following in 2028.

Source: <https://futurumgroup.com/insights/astera-labs-aries-7-goes-optical-can-pcie-7-outgrow-the-retimer-plateau/>

Collected: October 17, 2026 | Automated Research System (AI)

#04 Optical I/O: Wiwynn, Ayar Labs and GUC System-Level Proof 2026

Published October 13, 2026 Anders Storm (ブログ) USA



OVERVIEW

Wiwynn, Ayar Labs, and GUC have demonstrated a live compute system integrating co-packaged optics (CPO) at the OCP Global Summit 2026. The system moves beyond architectural validation to prove that optical I/O can be operated, managed, and serviced in a production-format chassis.

Key Findings

On October 13, 2026, Wiwynn, Ayar Labs, and GUC demonstrated a live compute system featuring a GUC ASIC package, Ayar Labs TeraPHY optical engines, and SuperNova light sources. Unlike previous architectural demonstrations, this system streams real-time health telemetry, shifting the industry focus from whether optical I/O works to whether it can be deployed and managed at scale.

Technical Details

The demonstration provides functional proof of system-level operation through three primary technical achievements:

- **Live Telemetry:** The system continuously polls and displays telemetry from the optical engines within the multi-chip packages, confirming the optical link is active.
- **Thermal Drift Management:** The tuning subsystem tracks thermal and wavelength drift (TX heater activity). During this process, the extinction ratio, OMA, and eye height remain steady alongside ELSFP and optical engine temperatures, addressing a classic objection to ring-based optical I/O.
- **Serviceability:** The system incorporates a detachable fiber attach unit and in-chassis fiber routing to prove manufacturability and serviceability at the compute-system level.

Background and Context

This event marks the third step in a nine-month progression toward optical scale-up. On March 11, 2026, Ayar Labs and Wiwynn announced an HVDC-enabled rack-level architecture designed for 1,024 accelerators with over 100 Tbps of optical connectivity each. This was followed by a Computex May 2026 demonstration of a full optical scale-up rack consisting of 32 compute trays, 64 AI ASICs, and over 800 TB/s of optical bandwidth using SuperNova light sources.

Significance and Outlook

The transition from architectural validation to a running system fills a gap in the optical roadmap previously highlighted by Goldman Sachs. In an April 2026 report, Goldman Sachs modeled optical networking growth from approximately \$15 billion to \$154 billion by 2028, with \$106 billion attributed to scale-up. The ability to manage telemetry and drift in a production chassis is a critical requirement for hyperscaler operations teams before adopting new interconnects.

Source: <https://andersstorm.substack.com/p/the-light-is-on-wiwynn-ayar-labs>

Collected: October 17, 2026 | Automated Research System (AI)

#05 Optical Frequency Combs: Chip-Scale Miniaturization Roadmap 2026

Published October 08, 2026 Photonics Online ニュージーランド



OVERVIEW

Researchers from the University of Auckland and US institutions have developed a method to shrink optical frequency combs to chip size using a dual-laser approach. This breakthrough enables the transition of ultra-precise "light rulers" from laboratory settings to portable applications in navigation, communications, and atomic clocks.

Key Findings

A research team led by Professor Miro Erkintalo of the University of Auckland, in collaboration with the University of Maryland and the US National Institute of Science and Technology, has demonstrated a viable path for miniaturizing optical frequency combs to a chip-scale architecture. The team successfully used the chip-based system to perform three core tasks: generating precise optical frequencies, producing low-noise millimetre-wave signals, and integrated optical clock readout.

Technical Details

The new design departs from conventional architectures where light from a single laser cascades outward to cover a spectrum. Instead, this approach utilizes two lasers positioned an octave apart (a doubling of frequency) at opposite ends of the spectrum. The system automatically fills in the light frequencies between these two boundaries, overcoming the control and stabilization challenges that have previously hampered chip-integrated combs. This proof-of-concept, which began as a prediction in 2021 and was demonstrated in the lab in 2024, was further refined in 2026 to realize these breakthrough applications.

Background & Context

Optical frequency combs, pioneered in the late 1990s by Nobel Prize winners John Hall and Theodor Hänsch, act as "light rulers" by creating millions of perfectly spaced frequencies of light. While these tools are essential for measuring time, distance, and chemical signals with extreme accuracy, their size and expense have historically confined them to laboratory environments.

Significance & Outlook

Reducing the size, weight, power, and cost of this technology enables mass production and consumer-level deployment. Potential applications include:

- Portable optical atomic clocks for mapping underground mineral deposits.
- Navigation systems that operate independently of GPS satellite signals.
- Synchronization in telecommunications networks.

- Precision sensors capable of detecting minute environmental changes.

Erkintalo, Moille, and Srinivasan have submitted a provisional patent application based on this work.

Source: <https://www.photonicsonline.com/doc/university-s-research-advances-ultra-precision-laser-tech-0001>

Collected: October 17, 2026 | Automated Research System (AI)

#06 Nokia Multi-PON Solution: 50G/25G/10G/GPON Roadmap and Specs

Published October 12, 2026 Nokia フィンランド



OVERVIEW

Nokia has introduced a 16-port line card supporting GPON, 10G, 25G, and 50G PON on every port to enable flexible fiber network evolution. Built on the Quillion chipset, the solution provides speeds up to 50Gbps and is scheduled for general availability in 2027. This infrastructure aims to meet the increased capacity and low-latency demands driven by AI-driven applications.

Key Findings

Nokia has launched a high-density 16-port line card that supports multiple PON generations—GPON, 10G, 25G, and 50G—on every individual port. This architecture allows network operators to deploy and mix different PON technologies on the same port and fiber based on market demand, rather than committing to a single capacity path in advance.

Technical Details

The solution is powered by Nokia's proprietary Quillion chipset and multi-PON optical modules. Key technical specifications and enhancements include:

- **Speed:** Fiber access speeds reaching up to 50Gbps.
- **Latency:** Up to 4x lower upstream latency to support data-intensive applications.
- **Security:** Integration of quantum-safe encryption and authentication to protect against emerging threats.
- **Resilience:** End-to-end resilience designed without a single point of failure for mission-critical services.

Background & Context

The development of this multi-PON solution responds to shifting traffic patterns caused by AI, which increase requirements for upstream traffic, cloud interaction, and richer content. Previous line card designs often limited operators to a narrower set of PON technologies, necessitating hardware additions as needs changed. The new flexible line card allows for incremental upgrades; for instance, an operator can deploy 10G and 25G PON initially and integrate 50G PON as demand accelerates, or vice versa.

Significance & Outlook

By decoupling the hardware deployment from a fixed technology path, Nokia aims to lower the risk associated with next-generation PON investments. The ability to mix and match PON generations on a single port allows operators to capture multiple revenue streams while adapting to unpredictable bandwidth and latency requirements. General availability for the solution is planned for 2027.

Source: <https://www.nokia.com/newsroom/nokia-launches-flexible-50g25g10gpon-solution-to-accelerate-ai-ready-fiber-broadband/>

Collected: October 17, 2026 | Automated Research System (AI)

#07 Nokia Coherent Pluggable Optics: Subsea Expansion and Specs

Published October 12, 2026 Mobile Europe UK



OVERVIEW

Nokia is expanding its coherent pluggable optics technology from terrestrial to subsea networks to reduce power consumption and cost per bit. Trials with Telxius demonstrated 600G per wavelength over 2,841km and 400G over 5,862km. This shift provides operators a scalable alternative to traditional equipment for specific route lengths.

Key Findings

Nokia has demonstrated that coherent pluggable optics can be applied to subsea cable networks to lower costs, reduce power consumption, and increase data capacity. In trials conducted with Telxius on the Brazil-USA (BRUSA) submarine cable, Nokia's ICE-X 800G technology achieved transmission speeds of 600G per wavelength over a distance of 2,841km. Additionally, the companies recorded a transmission milestone of 400G per wavelength over 5,862km.

Technical Details

Coherent pluggable optics are compact devices designed to transport large volumes of data over fiber networks. Compared to traditional equipment, these pluggables require less physical space and consume less power. The technology has evolved through advancements in digital signal processors (DSPs), with speeds increasing from 100G and 200G to 800G. These modules can be deployed either directly in routers or within thin transponders.

Background and Context

While coherent pluggables are already established in metro and long-haul terrestrial networks, their application in subsea environments is a newer development. Serge Melle, Nokia's Optical Networks Product & Solutions Marketing lead, noted that the proven benefits in land-based networks—specifically system density and reduced cost per bit—have led subsea operators to seek similar efficiencies for underwater applications.

Significance and Outlook

The adoption of pluggable optics allows subsea operators to optimize for space and power; however, they do not entirely replace traditional hardware. Nokia stated that more powerful traditional optical equipment remains essential for the most demanding routes, such as those stretching 15,000km or more. Looking forward, Nokia expects future iterations of its pluggable technology to support speeds of 800G or higher across ocean-spanning cables, providing a flexible balance between reach and capacity.

Source: <https://www.mobileeurope.co.uk/nokia-subsea-expansion-pluggable/>

Collected: October 17, 2026 | Automated Research System (AI)

#08 Photonic Integrated Engine: Single-Chip Cold Atom Generation 2026

Published October 14, 2026 arXiv USA



OVERVIEW

Researchers have developed a single-chip photonic engine that integrates light generation, control, and delivery to create cold atoms in a rubidium 3-dimensional magneto-optical trap (3D-MOT). The system traps more than 1 million atoms at an average temperature of 350 μK , enabling the miniaturization of optical infrastructure that typically occupies over 80% of cold-atom experiment volume.

Key Findings

The reported photonic integrated engine achieves the first single-chip integration of the entire beamline required for cold-atom generation. The system successfully supports sustained 3D-MOT operation, trapping more than 1 million atoms at an average temperature of 350 μ K. This integration allows for full electrical control over the process, supporting both atom-number and temperature measurements.

Technical Details

The single-chip architecture integrates several critical components:

- Two frequency-agile self-injection-locked lasers.
- Laser frequency and intensity control mechanisms.
- Passive beam combining and splitting.
- Signal monitoring and routing for laser offset locking.
- Optical power modulation.
- High-efficiency beam delivery capable of providing 3 mW across three beams to the physics package.

The engine provides stable, low-noise cooling and repump light, utilizing integrated resonator-based lasers that offer linewidth and frequency noise stability comparable to or exceeding traditional tabletop external-cavity diode lasers (ECDLs).

Background & Context

Cold atoms are essential for quantum sensing, precision metrology, computing, and timekeeping. Traditionally, the "beamline"—the path from light generation to delivery—consists of table- and rack-scale technologies using discrete optics and optical fibers. These bulky configurations limit the deployment of cold-atom technology outside of laboratory settings and restrict use by non-experts. While previous efforts have miniaturized vacuum cells and individual laser sources, integrating the entire generation and control sequence onto one substrate remained a significant challenge.

Significance & Outlook

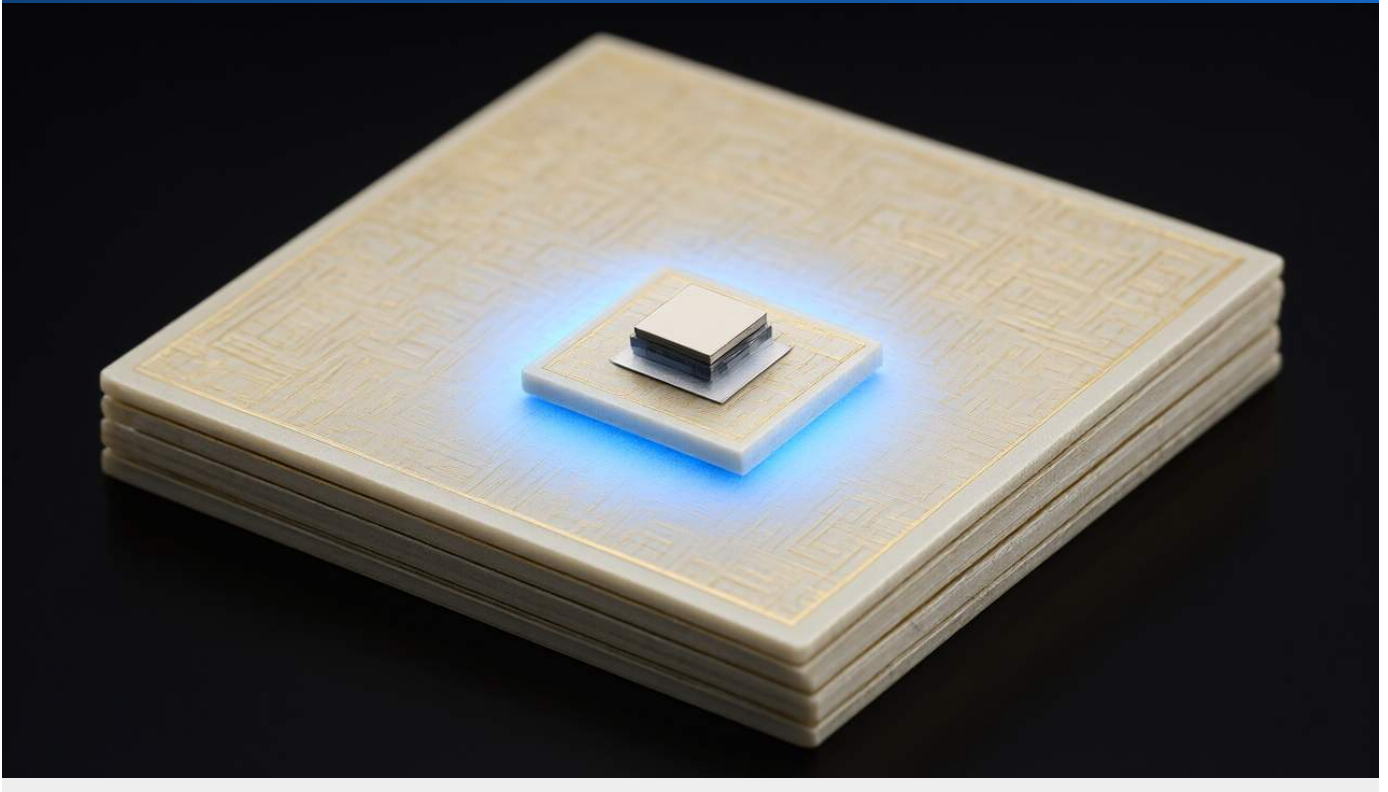
By co-locating light generation and delivery on a common substrate, the system reduces laser output power requirements and suppresses accumulated phase noise and sensitivity to environmental vibrations. This miniaturization improves robustness, reliability, and manufacturability while reducing cost. The development provides a path toward portable, space-based precision measurements and the creation of compact cold-atom clocks and sensors.

Source: <https://arxiv.org/html/2610.17918v1>

Collected: October 17, 2026 | Automated Research System (AI)

#09 Aluminum Nitride Substrates: 1.6T AI Optical Module Bottleneck

Published October 09, 2026 36Kr (中国語記事の翻訳と推定) China



OVERVIEW

Aluminum Nitride (AlN) thin-film substrates have emerged as a critical production bottleneck for 800G and 1.6T high-speed AI optical modules due to extreme thermal demands. Supply shortages are prompting capacity expansions from key players including Tokuyama and MARUWA to support the rapid ramp-up of AI data center networks.

Key Findings

Aluminum Nitride (AlN) thin-film substrates are currently in a state of supply falling short of demand, acting as a bottleneck for the delivery of high-speed AI optical modules. This shortage is evident across the supply chain, with Tokuyama announcing a production capacity expansion of approximately 30% and MARUWA expanding capacity for next-generation high-speed communications. Zhongci Electronics also identified AlN substrates as a key packaging material for low-cost non-hermetic packaging solutions currently facing supply constraints.

Technical Details

AlN thin-film substrates serve as the carrying platform for optoelectronic chips, such as lasers. They are manufactured from aluminum nitride ceramic base material through precision grinding, polishing, and thin-film processes including sputtering, photolithography, etching, and electroplating to create metal circuits and pads.

- **Thermal Conductivity:** MARUWA data shows AlN ceramic substrates reach 180-230W/(m·K) at 25°C, significantly higher than ordinary alumina ceramics, which provide approximately 24W/(m·K).
- **Thermal Expansion:** AlN has a thermal expansion coefficient of about $4.6 \times 10^{-6}/K$, closely matching semiconductor materials like silicon to reduce mechanical stress during thermal cycling.
- **Functionality:** The material provides simultaneous electrical insulation, mechanical support, and high-frequency circuit wiring.

Background and Context

The shift toward 800G and 1.6T modules increases power consumption and heat density. In the 1.6T era, typical power consumption for high-speed pluggable modules reaches 20-30W, with some OSFP systems requiring thermal design capacity above 30W. Because lasers are highly sensitive to temperature—where heat causes wavelength drift and output power variation—efficient heat dissipation is mandatory for long-term reliability.

Significance and Outlook

Market demand is accelerating rapidly. TrendForce estimates the global AI optical transceiver module market will reach approximately 26 billion U.S. dollars in 2026, with a year-on-year increase of over 57%. LightCounting predicts 800G shipment volumes will more than double in 2026, while 1.6T shipments will rise from a small scale in 2025 to tens of millions of ports.

Source: <https://eu.36kr.com/en/p/4017931349528453>

Collected: October 17, 2026 | Automated Research System (AI)

#10 Credo 1.6T ZeroFlap ALC: Specs, Power Efficiency and 2027 Timeline

Published October 13, 2026 Zacks Investment Research USA



OVERVIEW

Credo has launched the 1.6T ZeroFlap Active Light Cable (ALC), designed for next-generation AI infrastructure with a target shipment date of 2027. The solution reduces power consumption by nearly 30% and weight by 10 times compared to active electrical cables (AECs). This expansion targets the growing bandwidth and reliability requirements of expanding GPU clusters.

Key Findings

Credo Technology Group Holding Ltd. (CRDO) has introduced the 1.6T ZeroFlap Active Light Cable (ALC) to address AI network connectivity. The solution is designed for AI scale-out and front-end networks, focusing on energy efficiency and reliability. Shipments for the ALC are expected to begin in 2027.

Technical Details

The ZF ALC utilizes lightweight fiber bundles integrated with dense arrays of photodetectors and micro-emitters. Key technical specifications include:

- **Power Consumption:** 12 watts per cable end, which is nearly 30% less than comparable AECs.
- **Weight:** 10 times lighter than AECs.
- **Reach and Reliability:** Supports a reach of up to 50 meters with a mean time between failures of 100 million hours.
- **Resilience:** Features ZeroFlap link monitoring and built-in channel redundancy to enable hitless failover.

Background and Context

This launch follows Credo's September 15, 2026, release of 224G-based ZF optical transceivers, which support 1.6T port speeds via 2xDR4, 2xFR4, and DR8 configurations. These transceivers combine the Kfir200 silicon photonics-based PICs, 224G-per-lane optical DSP, and the PILOT diagnostics platform. Credo also acquired DustPhotonics in May to enhance its silicon photonics capabilities. Additionally, the company has launched the Short-Reach Micro-Emitter Optics Workstream within the Open Compute Project community, supported by partners including BizLink, ams OSRAM, and AFL.

Significance and Outlook

The 1.6T ALC expands Credo's addressable market as AI infrastructure scales, though the company faces competition from Broadcom, Marvell Technology, and Astera Labs. Broadcom is showcasing its Tomahawk 6 and Jericho 4 switches, while Marvell is presenting its 1.6T AEC and Ara DSP 1.6T transmit-retimed optics. While Marvell suggests copper and optical interconnects will coexist for several years, the industry is seeing a migration toward optics for larger-scale deployments. Credo's current market position is reflected in a forward 12-month P/E ratio of 26.29X.

Source: <https://www.zacks.com/stock/news/3006128/credo-expands-ai-connectivity-portfolio-with-16t-zero flap-alc>

Collected: October 17, 2026 | Automated Research System (AI)

#11 Arelion and Nokia: 21% Optical Spectrum Gain on 500 km Route

Published October 08, 2026 Converge Digest USA



OVERVIEW

Arelion and Nokia have demonstrated a 21% increase in usable optical spectrum on a live 500-kilometer route between Amsterdam and London. The trial utilizes Super C+L technology to expand capacity on existing fiber infrastructure without deploying new cables. This advancement addresses the rising demand for AI, cloud connectivity, and data center interconnect (DCI) services.

Key Findings

The primary result of the field trial is a 21% increase in usable optical spectrum across an existing 500 km fiber route. Rather than focusing on a per-wavelength speed record, the trial demonstrates the ability to expand the available spectrum for Dense Wavelength Division Multiplexing (DWDM) transmission, allowing for additional wavelengths on heavily utilized backbone and DCI corridors where adding new fiber is expensive or constrained.

Technical Details

The deployment utilized Nokia's 1830 Global Express (GX) Super C and Super L open line system. This Super C+L optical technology extends the usable spectrum beyond conventional wavelength bands. The architecture integrated the following components to provide flexibility in aggregating and transporting 400G and 800G services:

- CHMQ6 thin transponder modules
- ICE-X 400G and 800G ZR+ coherent pluggable optics

The source notes that while the usable spectrum increased by 21%, actual traffic capacity remains dependent on route engineering, OSNR, spectral efficiency, modulation, and channel spacing.

Background and Context

Arelion is evaluating this technology for its global backbone and Managed Optical Fiber Network (MOFN) services, which provide dedicated optical connectivity between infrastructure locations and data centers. The trial specifically targets the requirements of enterprises, neocloud providers, and hyperscalers that distribute AI workloads across multiple facilities.

Significance and Outlook

The trial highlights the synergy between spectrum expansion and coherent pluggables as complementary scaling mechanisms. By pairing the 1830 GX Super C/Super L system with CHMQ6 transponders and ICE-X optics, Arelion can extract more capacity from existing fiber assets to support distributed AI and cloud infrastructure. The next milestone for the project is determining if Arelion will move the Super C+L technology from field validation into broader commercial deployment.

Source: <https://convergedigest.com/arelion-nokia-super-cl-optical-spectrum-amsterdam-london/>

Collected: October 17, 2026 | Automated Research System (AI)