TROY TECHNICAL

OPTICAL COMMUNICATIONS & PHOTONICS

WEEKLY REPORT

November 14 - November 20, 2026 | Issue 2026-W46

Link budget, packaging, thermal reliability and deployable supply

11	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-11-20 | 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 | LIGHT SOURCE

Ciena and Internet2: 800 Gb/s Coherent Pluggable Link Record

Ciena and Internet2 have established an industry record for the longest terrestrial 800 Gb/s coherent pluggable connection over a live production network.

SIGNAL 02 | PHOTONIC DEVICE

NTT Optical R&D: Roadmap for AI Energy Efficiency and Quantum Computing

NTT is integrating optical-electronic convergence and optical quantum computing to mitigate the massive energy demands of AI, such as xAI's Grok 4 which consumes approximately 310GWh.

SIGNAL 03 | PACKAGING

NTT IOWN Roadmap: Optical-Electronic Convergence and GPU Power Reduction

NTT is advancing its IOWN initiative to reduce power consumption in AI infrastructure by integrating optical-electronic convergence devices.

SIGNAL 04 | NETWORK SYSTEM

KNN Optical Modulators: 180 Gbaud Performance and Specs

Kyushu University and Sumitomo Chemical have demonstrated a potassium sodium niobate (KNN) thin-film optical modulator capable of ultrafast operation at 180 Gbaud.

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.

Numbers and evidence anchors that require conditions

800 G
A05

SOURCE-BOUND CONDITION
Ciena and Internet2 have established an industry record for the longest terrestrial 800 Gb/s coherent pluggable connection over a live production network.

4 w
A09

SOURCE-BOUND CONDITION
NTT is integrating optical-electronic convergence and optical quantum computing to mitigate the massive energy demands of AI, such as xAI's Grok 4 which consumes approximately 310GWh.

1 million
A02

SOURCE-BOUND CONDITION
The company plans to commercialize 102.4 Tbps optical switches by the end of FY2026 and scale production of optical chiplets to 1 million units by 2033.

180 G
A07

SOURCE-BOUND CONDITION
Kyushu University and Sumitomo Chemical have demonstrated a potassium sodium niobate (KNN) thin-film optical modulator capable of ultrafast operation at 180 Gbaud.

15x
A01

SOURCE-BOUND CONDITION
Benchmarks show CPO delivers lower latency and up to 15x higher reliability than conventional pluggable optics.

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

Ciena and Internet2 have established an industry record for the longest terrestrial 800 Gb/s coherent pluggable connection.

2

Photonic device

P02/P07

NTT is integrating optical-electronic convergence and optical quantum computing to mitigate the massive energy demands of AI.

3

Packaging

P03/P08

NTT is advancing its IOWN initiative to reduce power consumption in AI infrastructure by integrating optical-ele ctronic.

4

Network system

P04/P09

Kyushu University and Sumitomo Chemical have demonstrated a potassium sodium niobate (KNN) thin-film optical modulator.

5

Operations

P05/P10

Researchers from Shanghai Jiao Tong University and the Hefei National Laboratory achieved a record 19.48 Mbps secure key rate.

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



P01	Ciena and Internet2: 800 Gb/s Coherent Pluggable Link Record Business / rules | cue: infrastructure
P02	NTT Optical R&D: Roadmap for AI Energy Efficiency and Quantum Computing System / adoption | cue: integrating
P03	NTT IOWN Roadmap: Optical-Electronic Convergence and GPU Power Reduction Business / rules | cue: infrastructure
P04	KNN Optical Modulators: 180 Gbaud Performance and Specs Tech / process | cue: no system/business cue
P05	Passive Quantum Network: 19.48 Mbps Key Rate via PSP-CVQKD Business / rules | cue: infrastructure
P06	Mitsubishi Electric LiDAR: 600m Rail Detection Specs and 2027 Timeline System / adoption | cue: commercial
P07	Lambda CPO Deployment: NVIDIA Photonics Switches and 10,000+ GPUs System / adoption | cue: Deployment
P08	NICT DUV Micro-LEDs: Optics-Free Gbps Wireless Communication System / adoption | cue: system
P09	TFLN Photodetectors: 10Gbit/s Visible Light Data Reception System / adoption | cue: integrating
P10	AIS Thailand: World's First AN L4 Certification in Optical Transport Business / rules | cue: Certification

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.

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

P01 Ciena and Internet2: 800 Gb/s Coherent Pluggable Link Record

A05 | Light source | Product adoption

2026-11-17

FACT

Ciena and Internet2 have established an industry record for the longest terrestrial 800 Gb/s coherent pluggable connection over a live production network. The trial achieved a distance of 2,104 km, demonstrating a scalable, power-efficient infrastructure for AI-ready research and education networks.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 22/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P02 NTT Optical R&D: Roadmap for AI Energy Efficiency and Quantum Computing

A09 | Photonic device | Research

2026-11-19

FACT

NTT is integrating optical-electronic convergence and optical quantum computing to mitigate the massive energy demands of AI, such as xAI's Grok 4 which consumes approximately 310GWh. The strategy focuses on reducing power consumption via optical chiplets and tensor cores while scaling quantum computing toward 1 million qubits by 2030.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 21/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P03 NTT IOWN Roadmap: Optical-Electronic Convergence and GPU Power Reduction

A02 | Packaging | Product adoption

2026-11-18

FACT

NTT is advancing its IOWN initiative to reduce power consumption in AI infrastructure by integrating optical-electronic convergence devices. The company plans to commercialize 102.4 Tbps optical switches by the end of FY2026 and scale production of optical chiplets to 1 million units by 2033.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 21/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P04 KNN Optical Modulators: 180 Gbaud Performance and Specs

A07 | Network system | Research

2026-11-14

FACT

Kyushu University and Sumitomo Chemical have demonstrated a potassium sodium niobate (KNN) thin-film optical modulator capable of ultrafast operation at 180 Gbaud. The device achieves a VπL value of less than 0.7 Vcm, offering nearly three times the modulation efficiency of Thin-Film Lithium Niobate (TFLN). This development provides a low-cost, high-efficiency alternative for photonics-electronics convergence in AI data centers.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: TECH / PROCESS

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

P05 Passive Quantum Network: 19.48 Mbps Key Rate via PSP-CVQKD

A10 | Operations | Pilot

2026-11-19

FACT

Researchers from Shanghai Jiao Tong University and the Hefei National Laboratory achieved a record 19.48 Mbps secure key rate per user in a fully passive quantum access network. By utilizing a thermal light source and passive state preparation, the system enables scalable, high-speed quantum key distribution compatible with existing optical infrastructure.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: BUSINESS / RULES

P06 Mitsubishi Electric LiDAR: 600m Rail Detection Specs and 2027 Timeline

A11 | Light source | Scale-up

2026-11-18

FACT

Mitsubishi Electric has developed a high-performance LiDAR sensor capable of detecting objects 600 meters away, targeting a 2027 commercial launch for railway vehicles. The system integrates AI and cameras to identify obstacles as small as 20 centimeters, addressing the long braking distances required for trains and the need for autonomous rail operations.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 20/25 | MATURITY 5/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P07 Lambda CPO Deployment: NVIDIA Photonics Switches and 10,000+ GPUs

A01 | Photonic device | Pilot

2026-11-16

FACT

Lambda has implemented the world's first large-scale deployment of co-packaged optics (CPO) networking to connect over 10,000 NVIDIA Blackwell Ultra GPUs. Benchmarks show CPO delivers lower latency and up to 15x higher reliability than conventional pluggable optics. This infrastructure reduces signal loss and power consumption to support next-generation AI clusters.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P08 NICT DUV Micro-LEDs: Optics-Free Gbps Wireless Communication

A04 | Packaging | Research

2026-11-17

FACT

NICT has achieved the world's first Gbps-class optical wireless communication using "optics-free" deep ultraviolet (DUV) micro-LEDs, reaching speeds of 2.1 Gbps. By eliminating the need for expensive external lenses through nano-structure beam control, the system significantly reduces costs while improving signal-to-noise ratios.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P09 TFLN Photodetectors: 10Gbit/s Visible Light Data Reception

A08 | Network system | Pilot

2026-11-20

FACT

Researchers from Jiufengshan Laboratory and Huazhong University of Science and Technology have developed a high-speed visible light photodetector integrating tungsten selenide (WSe2) on a thin-film lithium niobate (TFLN) platform. The device achieves a bandwidth of 1.12 GHz and a data reception rate of 10Gbit/s, providing a critical component for chip-level optical interconnects.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P10 AIS Thailand: World's First AN L4 Certification in Optical Transport

A06 | Operations | Research

2026-11-20

FACT

AIS Thailand has achieved the world's first Autonomous Network (AN) Level 4 certification in optical transport network fault management. Utilizing Huawei's Next Generation OTN intelligent O&M solution, the carrier improved service availability from 99.99% to 99.999%.

WHY IT MATTERS

The decision relevance is link budget, packaging, thermal reliability and deployable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, pair optical performance with packaging yield, test, thermal drift and qualified capacity.

ACTION

Within 30 days, evaluate optical architectures by reach, power, latency, interoperability and field service; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: yield, coupling loss, temperature drift, interoperability, volume and cost.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

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	Lambda CPO Deployment: NVIDIA Photonics Switches and 10,000+ GPUs	https://finance.yahoo.com/technology/ai/articles/lambda-announces-world-first-large-131500308.html
A02	NTT IOWN Roadmap: Optical-Electronic Convergence and GPU Power Reduction	https://eetimes.itmedia.co.jp/ee/articles/2611/18/news059.html
A03	CsPbBr3 Perovskite Circuits: Room-Temperature Photonic Computing	https://www.dongascience.com/en/news/80972
A04	NICT DUV Micro-LEDs: Optics-Free Gbps Wireless Communication	https://www.kyodo.co.jp/pr/2026-11-17_4049721/
A05	Ciena and Internet2: 800 Gb/s Coherent Pluggable Link Record	https://finance.yahoo.com/technology/articles/ciena-internet2-reach-industry-record-140000532.html
A06	AIS Thailand: World's First AN L4 Certification in Optical Transport	https://developingtelecoms.com/telecom-business/operator-news/21163-ais-thailand-and-huawei-achieve-the-worlds-first-an-l4-certification-in-optical-transport.html
A07	KNN Optical Modulators: 180 Gbaud Performance and Specs	https://bioengineer.org/knn-thin-film-optical-modulators-demonstrate-ultrafast-operation-at-180-gbaud/
A08	TFLN Photodetectors: 10Gbit/s Visible Light Data Reception	https://www.sohu.com/a/1104045166_122014422
A09	NTT Optical R&D: Roadmap for AI Energy Efficiency and Quantum Computing	https://k-tai.watch.impress.co.jp/docs/news/2157633.html
A10	Passive Quantum Network: 19.48 Mbps Key Rate via PSP-CVQKD	https://quantumzeitgeist.com/shanghai-jiao-19-48-mbps-key-rate/
A11	Mitsubishi Electric LiDAR: 600m Rail Detection Specs and 2027 Timeline	https://www.nikkei.com/article/DGXZQOCC186M90Y6A111C2000000/

Photonics — Selected Articles

Date: 2026-11-21

Articles: 11

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#05 Ciena and Internet2: 800 Gb/s Coherent Pluggable Link Record

#06 AIS Thailand: World's First AN L4 Certification in Optical Transport

#07 KNN Optical Modulators: 180 Gbaud Performance and Specs

#08 TFLN Photodetectors: 10Gbit/s Visible Light Data Reception

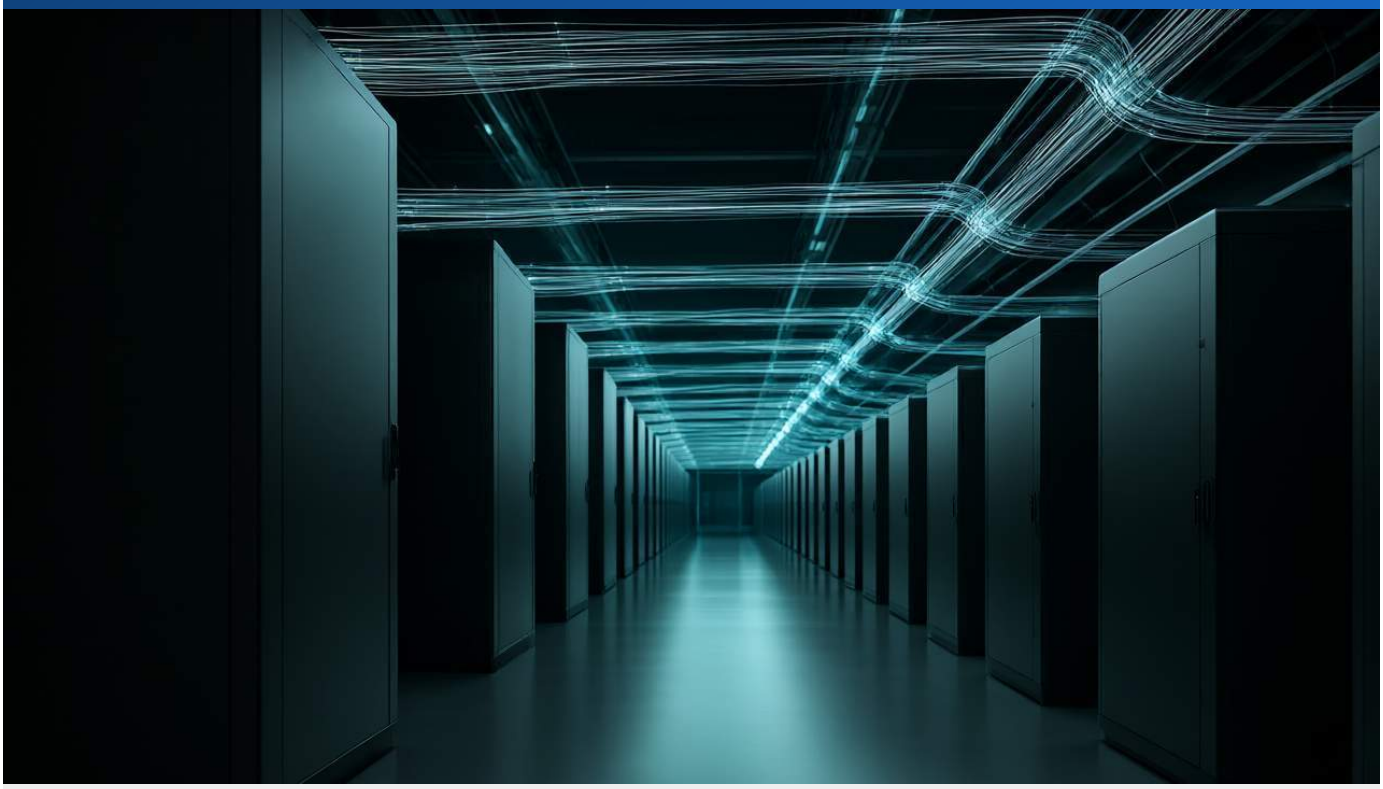
#09 NTT Optical R&D: Roadmap for AI Energy Efficiency and Quantum Computing

#10 Passive Quantum Network: 19.48 Mbps Key Rate via PSP-CVQKD

#11 Mitsubishi Electric LiDAR: 600m Rail Detection Specs and 2027 Timeline

#01 Lambda CPO Deployment: NVIDIA Photonics Switches and 10,000+ GPUs

Published November 16, 2026　Yahoo Finance（Lambda発表）　USA



OVERVIEW

Lambda has implemented the world's first large-scale deployment of co-packaged optics (CPO) networking to connect over 10,000 NVIDIA Blackwell Ultra GPUs. Benchmarks show CPO delivers lower latency and up to 15x higher reliability than conventional pluggable optics. This infrastructure reduces signal loss and power consumption to support next-generation AI clusters.

IN DEPTH

Key Findings

Lambda has deployed NVIDIA Photonics networking switches at its Quebec campus, connecting more than 10,000 NVIDIA Blackwell Ultra GPUs. Comparative benchmarks against conventional pluggable optics demonstrate that CPO provides lower latency across all scales: the latency gap improves from 3.8 percent at the rack level to 10.1 percent at the pod level. Additionally, CPO optics operated at a median temperature of 36°C, significantly lower than the 51°C recorded for conventional optics, contributing to up to 15x higher reliability for large training jobs.

Technical Details

The deployment utilizes NVIDIA Photonics switches equipped with 144 800Gb/s ports, liquid cooling, and 18 removable external light sources. Unlike conventional pluggable optics that convert electrical signals to light at the switch's front panel, CPO integrates optical engines directly alongside the switch ASIC. This architectural shift shortens the electrical path from inches to millimeters, which eliminates the need for retimer chips, reduces signal loss, and improves signal integrity and network resiliency.

Background and Context

Lambda first announced its early adoption of NVIDIA CPO networking in November 2025. The current large-scale implementation is situated at a Quebec-based campus designed for energy efficiency. The facility operates with 142 MW of secured capacity, utilizing nearly 100% renewable energy. The campus achieves a PUE of 1.2 and leverages free cooling for up to 80% of the year, ensuring no process water is consumed for server cooling.

Significance and Outlook

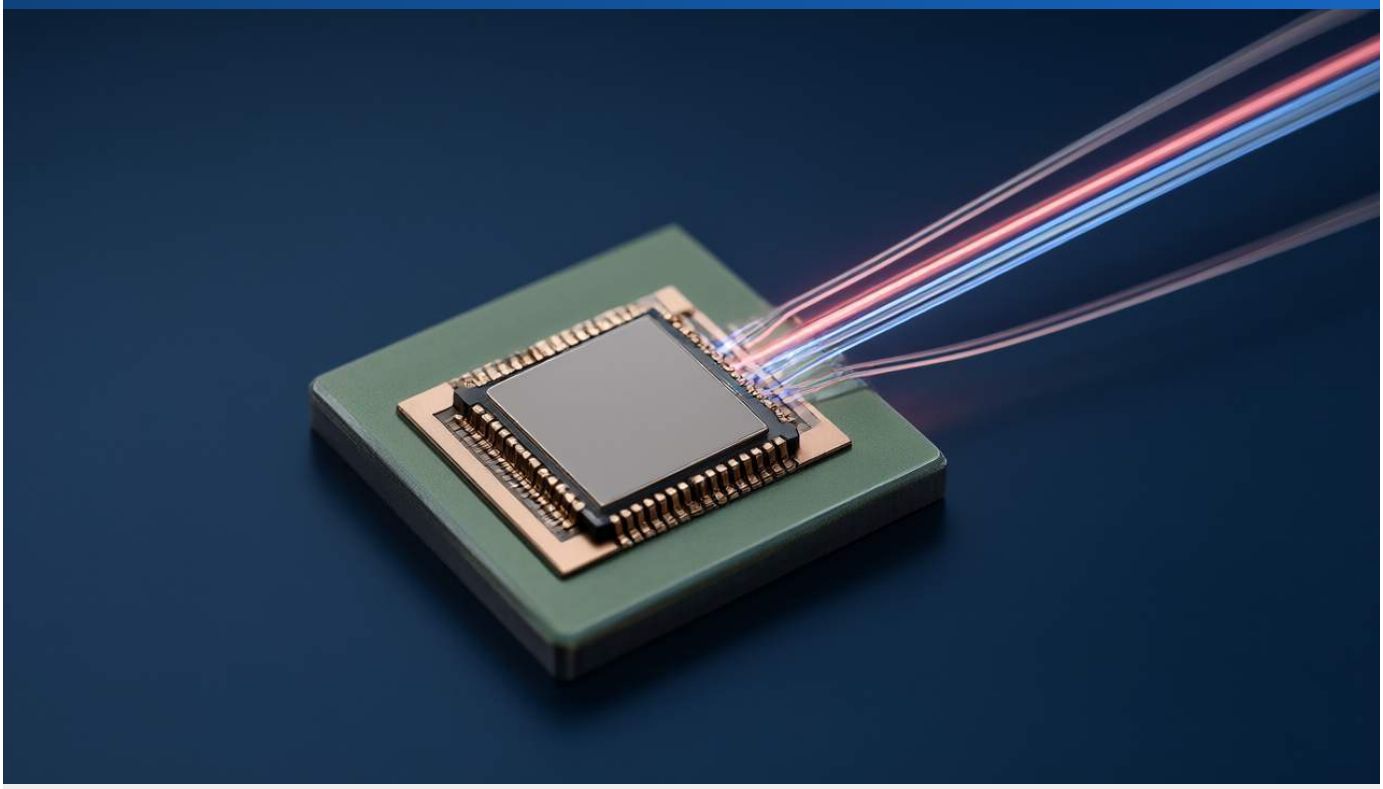
As AI clusters expand, the efficiency of the networking infrastructure becomes a critical factor in GPU productivity. By reducing network power and increasing resiliency, CPO minimizes interruptions that stall AI training jobs. This deployment will be featured in NVIDIA's SC26 special address, providing further technical insight into the implementation of CPO networking at scale.

Source: https://finance.yahoo.com/technology/ai/articles/lambda-announces-world-first-large-131500308.html

Collected: November 21, 2026 | Automated Research System (AI)

#02 NTT IOWN Roadmap: Optical-Electronic Convergence and GPU Power Reduction

Published November 18, 2026 EE Times Japan Japan



OVERVIEW

NTT is advancing its IOWN initiative to reduce power consumption in AI infrastructure by integrating optical-electronic convergence devices. The company plans to commercialize 102.4 Tbps optical switches by the end of FY2026 and scale production of optical chiplets to 1 million units by 2033.

IN DEPTH

Key Findings

NTT is expanding its IOWN (Innovative Optical & Wireless Network) framework to address power and heat issues in large-scale AI clusters. The company is transitioning from interconnecting data centers (IOWN 1) to integrating optical technology within servers (IOWN 2), between chips (IOWN 3), and inside chips (IOWN 4). A primary goal is to reduce the energy overhead associated with the massive GPU arrays required for Large Language Models (LLMs).

Technical Details

To mitigate power loss in electrical wiring within switches, NTT developed the "PEC-2" (Photonics-Electronics Convergence-2) optical communication module. By implementing the information processing IC chip and the optical engine on a single substrate, NTT reduced the electrical communication distance from approximately 30 cm to 3 cm. In collaboration with Broadcom and Accton Technology, NTT is developing an optical switch featuring PEC-2 with a communication capacity of 102.4 Tbps, scheduled for commercialization by the end of FY2026.

Furthermore, NTT has established "PEC-3" optical chiplet technology for chip-level integration. At the research level, this technology achieves a transmission speed of 64 Gbps and a minimum power consumption of 0.75 picojoules (pJ) per bit.

Background & Context

The development of these technologies is supported by significant funding. In October 2026, the New Energy and Industrial Technology Development Organization (NEDO) announced a 16 billion yen grant to establish mass production techniques. This brings the total project cost to 24 billion yen.

Significance & Outlook

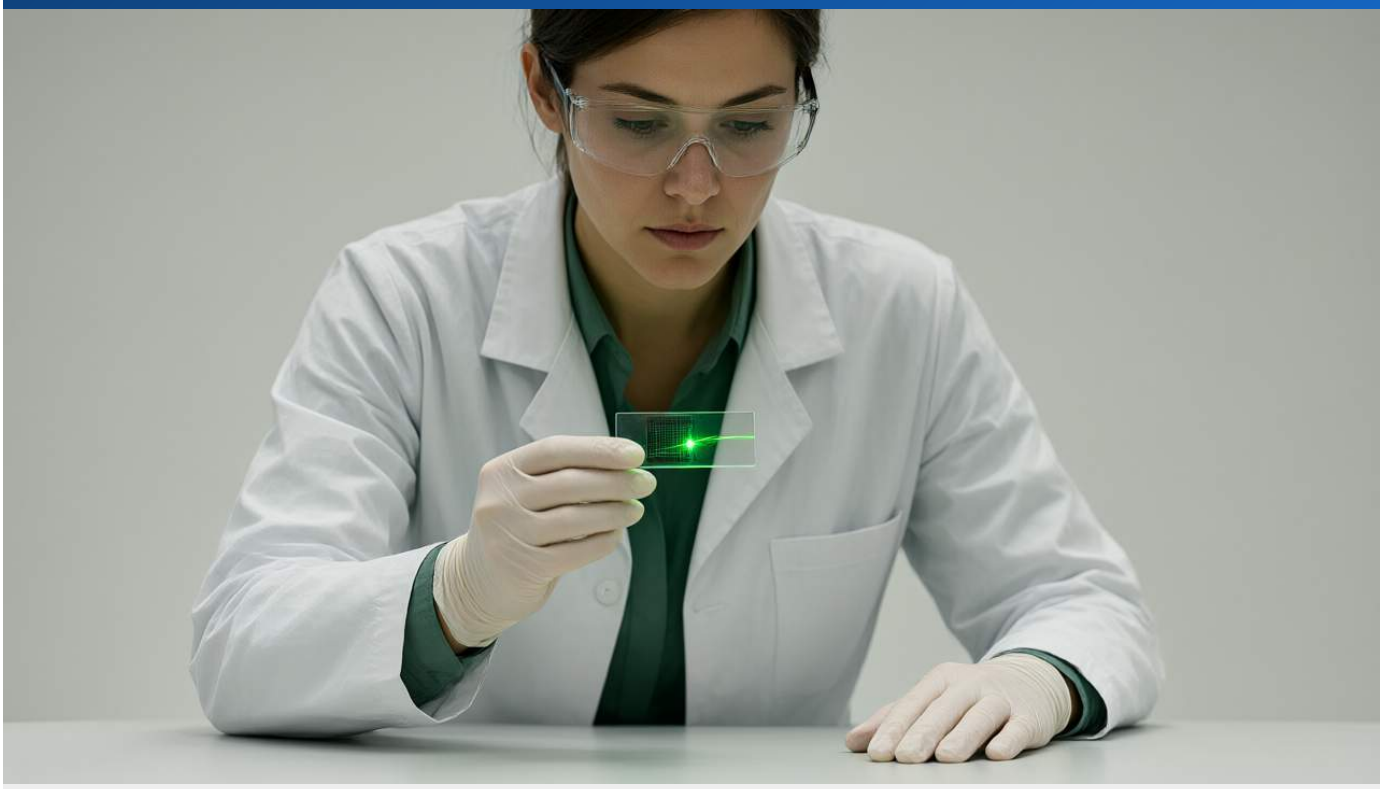
NTT intends to capture 30% of the global market share for these components. The production roadmap targets the manufacture of 100,000 units by 2031, scaling up to 1 million units by 2033. By moving optical capabilities directly into the computing and switching domains, NTT seeks to overcome the physical limitations of electrical interconnects in high-performance computing environments.

Source: https://eetimes.itmedia.co.jp/ee/articles/2611/18/news059.html

Collected: November 21, 2026 | Automated Research System (AI)

#03 CsPbBr3 Perovskite Circuits: Room-Temperature Photonic Computing

Published November 19, 2026 DongA Science South Korea



OVERVIEW

An international CNR-led team has developed an ultra-compact optical circuit using cesium lead bromide (CsPbBr3) perovskite that integrates laser generation, amplification, and all-optical switching. Operating at room temperature, the device leverages exciton-polaritons to control light signals with high efficiency, providing a potential foundation for next-generation optical information processing.

IN DEPTH

Key Findings

Researchers have successfully integrated three critical photonic functions—laser generation, optical amplification, and optical signal control—onto a single submicrometer $CsPbBr_3$ perovskite waveguide. The circuit operates at room temperature and utilizes a fabrication process that minimizes surface damage by avoiding multiple post-processing steps after crystal growth.

Technical Details

The circuit is constructed using a silicon mold replicated in a soft polymer, into which liquid perovskite precursor is injected. The resulting waveguide has a thickness of approximately 250 nm and a width of several micrometers. The team implemented the following functionalities:

- **Laser Generation:** By forming a resonator between two gratings, the team generated lasers. Adjusting the grating spacing from 270 nm to 250 nm shifted the emitted light energy from 2.28 eV to 2.315 eV.
- **Optical Amplification:** By shining an external laser to create a population of excitons, signal light intensity was increased by nearly a factor of 100.
- **Optical Switching:** Using a Mach–Zehnder interferometer, the team controlled the output of a light signal by illuminating one of two paths. They achieved a phase difference adjustment of up to one full cycle (360 degrees) within an area of approximately 20 square micrometers.

Background & Context

Optical computing offers advantages over electronic computing in terms of speed and power consumption due to the ability to transmit different wavelengths simultaneously. However, because photons are neutral and interact weakly, controlling them typically requires massive energy or large devices. To overcome this, the team utilized "exciton-polaritons"—quasi-particles formed when an exciton (a bound pair of an electron and a hole) couples strongly with a photon. These polaritons combine the rapid propagation of light with the strong interaction properties of matter.

Significance & Outlook

The integration of generation, amplification, and switching on a single perovskite platform reduces the complexity of optical circuits. By enabling room-temperature operation and a relatively simple fabrication process, this technology addresses a key challenge in the development of practical optical computers.

Source: https://www.dongascience.com/en/news/80972

Collected: November 21, 2026 | Automated Research System (AI)

#04 NICT DUV Micro-LEDs: Optics-Free Gbps Wireless Communication

Published November 17, 2026　共同通信PRワイヤー（NICT発表）　Japan



OVERVIEW

NICT has achieved the world's first Gbps-class optical wireless communication using "optics-free" deep ultraviolet (DUV) micro-LEDs, reaching speeds of 2.1 Gbps. By eliminating the need for expensive external lenses through nano-structure beam control, the system significantly reduces costs while improving signal-to-noise ratios.

IN DEPTH

Key Findings

Researchers at the National Institute of Information and Communications Technology (NICT) have successfully demonstrated a high-speed optical wireless communication system using DUV micro-LEDs that require no external lenses. The system achieved a maximum data transmission speed of 2.1 Gbps, which is approximately 4.5 times faster than conventional structures that reached a maximum of 469 Mbps.

Technical Details

To overcome the limitations of small emission areas and wide radiation angles in micro-LEDs, the research group implemented a phase-type Fresnel Zone Plate (FZP) nano-structure on the light extraction surface. This technical approach yielded the following results:

- **Beam Control:** The radiation angle was narrowed from 117° in conventional structures to 14°.
- **Efficiency:** Light extraction efficiency was improved by more than twofold.
- **Signal Quality:** The signal-to-noise (S/N) ratio increased from 10 dB to 35 dB, representing a power ratio improvement of approximately 300 times at the receiver.
- **Modulation:** By combining Orthogonal Frequency Division Multiplexing (OFDM) with Quadrature Amplitude Modulation (QAM), the team enabled higher-order QAM on subcarriers to reach the 2.1 Gbps threshold.

Background and Context

DUV light at wavelengths below 280 nm operates in the "solar-blind" region, meaning it is not affected by background noise from sunlight. While DUV micro-LEDs allow for high-speed modulation, they typically require expensive high-purity synthetic quartz lenses to focus light, as standard optical glass absorbs DUV radiation. This requirement has historically increased system costs and limited light utilization efficiency.

Significance and Outlook

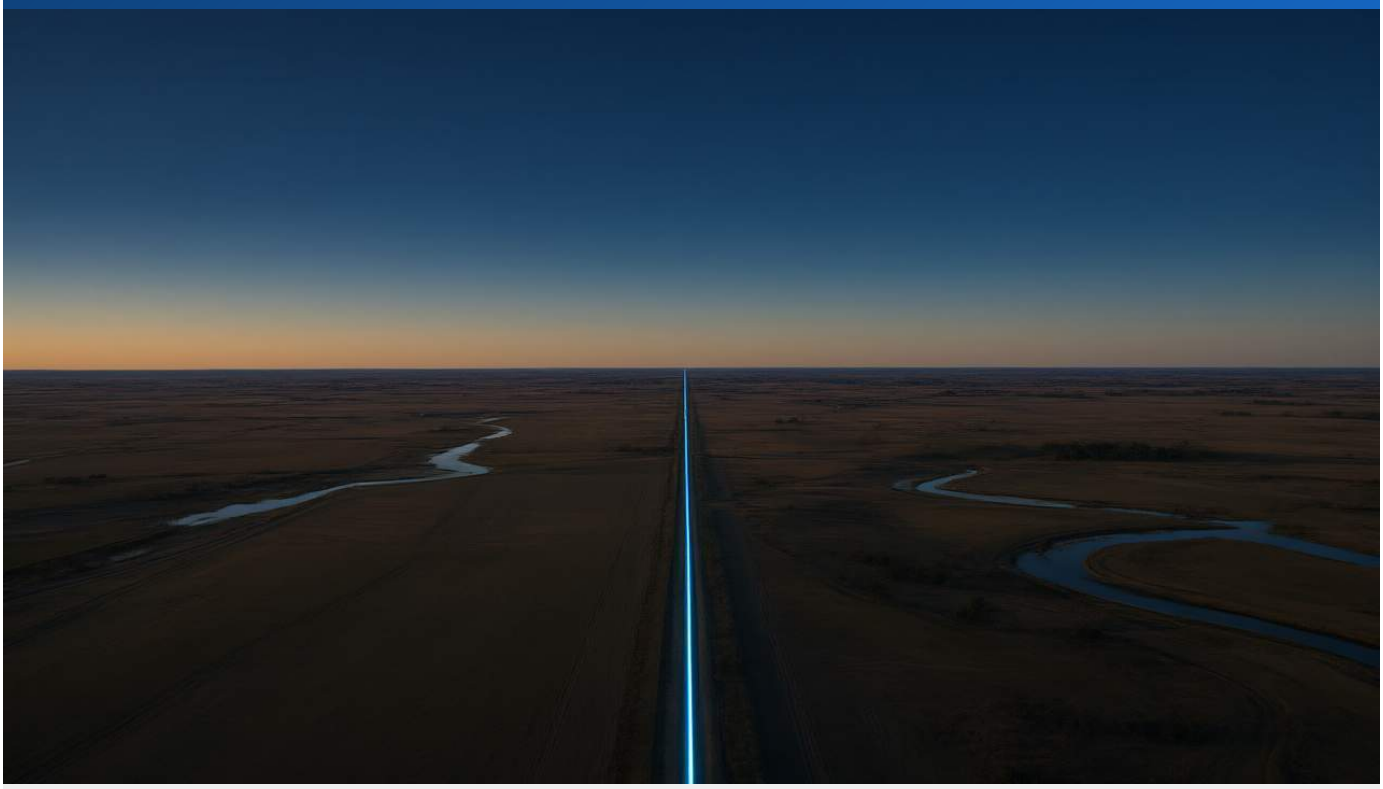
By integrating beam control directly into the LED, NICT has removed the dependency on costly external optics. This advancement simplifies the system architecture and lowers costs, paving the way for practical deployments in low-noise outdoor high-speed communication, vehicle-to-vehicle (V2V) communication, and non-line-of-sight (NLOS) wireless links. The results were published in the journal *Optics Express* on November 16, 2026.

Source: https://www.kyodo.co.jp/pr/2026-11-17_4049721/

Collected: November 21, 2026 | Automated Research System (AI)

#05 Ciena and Internet2: 800 Gb/s Coherent Pluggable Link Record

Published November 17, 2026　Yahoo Finance（Ciena発表）　USA



OVERVIEW

Ciena and Internet2 have established an industry record for the longest terrestrial 800 Gb/s coherent pluggable connection over a live production network. The trial achieved a distance of 2,104 km, demonstrating a scalable, power-efficient infrastructure for AI-ready research and education networks.

IN DEPTH

Key Findings

Ciena and Internet2 have successfully completed a trial achieving the industry's longest terrestrial 800 Gb/s coherent pluggable link. The connection spanned 2,104 kilometers, running from the SC26 show floor in Chicago across Internet2's backbone to a point of presence in Kansas City, Missouri, and back.

Technical Details

The trial utilized Ciena's WaveLogic 6 Nano (WL6n) coherent pluggables. To extend the 800G reach, the demonstration employed Ciena's 135 GBaud PKT-MAX transmission mode. The optical network design relied on a Ciena photonic line system utilizing EDFA-only amplification, which provides a more cost-effective and simpler architecture compared to more complex amplification schemes.

Background and Context

The collaboration addresses the growing demands of AI and high-capacity data center interconnects. Research and education (R&E) networks, such as Internet2, require the ability to move massive datasets with high speed and reliability while reducing power consumption and cost-per-bit. By using compact 800 Gb/s pluggables, the network can deliver increased bandwidth while occupying less space and consuming less power.

Significance and Outlook

This milestone proves that long-haul capacity can be delivered using compact pluggable modules, allowing R&E communities to scale their networks sustainably. According to Tripti Sinha, President and CEO of Internet2, validating these next-generation optical technologies under real-world conditions is essential for building the AI-ready infrastructure needed for unprecedented scientific breakthroughs.

Additionally, Ciena is showcasing further innovations at SC26, including:

- Quantum-secure communications powered by Waveserver.
- Quantum entanglement distribution with C&L-band signals over deployed fiber.
- Cryogenic electron microscopy over Ciena FABRIC nodes.
- Privacy-preserving federated learning and Kubernetes-native security.

- Data Center Out-of-Band Management (DCOM).

Source: https://finance.yahoo.com/technology/articles/ciena-internet2-reach-industry-record-140000532.html

Collected: November 21, 2026 | Automated Research System (AI)

#06 AIS Thailand: World's First AN L4 Certification in Optical Transport

Published November 20, 2026 Developing Telecoms



OVERVIEW

AIS Thailand has achieved the world's first Autonomous Network (AN) Level 4 certification in optical transport network fault management. Utilizing Huawei's Next Generation OTN intelligent O&M solution, the carrier improved service availability from 99.99% to 99.999%.

IN DEPTH

Key Findings

At Innovate Asia 2026, TM Forum CEO Nik Willetts announced that AIS Thailand has completed the autonomous network (AN) level assessment for optical transport network fault management. AIS Thailand is the first carrier globally to achieve AN L4 certification in this domain, following its Autonomous Network Operator Leadership Award at FutureNet Asia 2026.

Technical Details

AIS implemented a closed-loop fault management system using Huawei's Next Generation OTN intelligent O&M solution. The system focuses on three primary capabilities:

- **Proactive Prevention:** The network identifies potential risks within 5 minutes, using online risk analysis and proactive alarm reporting to prevent faults.
- **Fast Self-Healing:** Millisecond-level automatic rerouting is triggered during service interruptions, increasing service availability from 99.99% to 99.999% without requiring manual repair.
- **Precise Fault Locating:** Using NOEMate—an interactive O&M assistant based on natural language intent understanding, intelligent hardware, and fault propagation models—fiber fault locating time was reduced from several hours to 30 minutes.

The certification assessment evaluated six typical optical transport network fault scenarios across five cognitive dimensions: intent, awareness, analysis, decision-making, and execution. AIS Thailand received a rating of A for all items.

Background and Context

AIS has integrated AN as a core strategy for its transition into a Cognitive Tech-Co. The move addresses critical vulnerabilities in optical transport networks, where fiber and cable issues account for over 70% of network faults. Traditional O&M approaches struggle to identify intermittent disconnections and risks associated with co-cabled working and protection trails, which can lead to protection failure and impact service SLAs.

Significance and Outlook

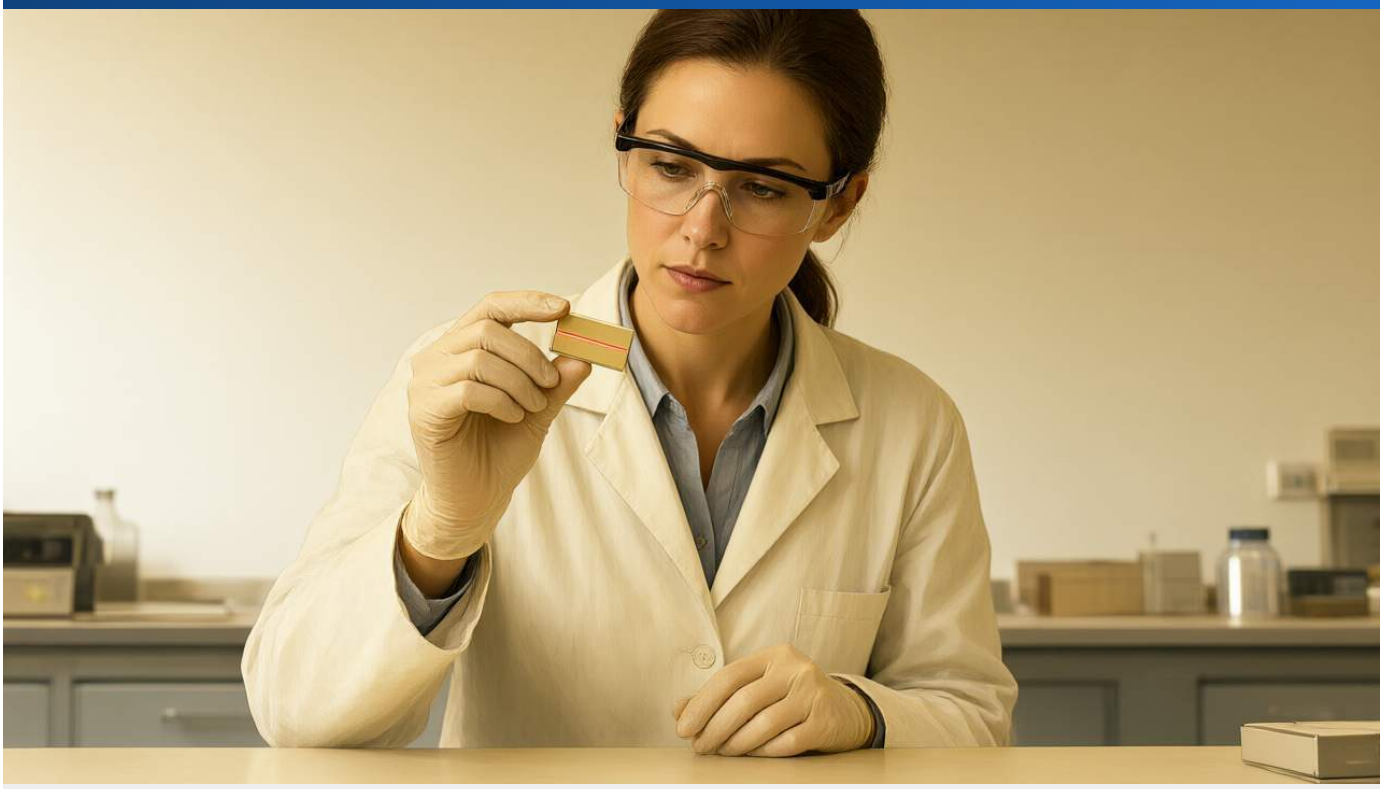
The upgrade to AN L4 ensures the continuity of high-value services, specifically AIDC and AI computing, where the transport network serves as the foundation for compute connectivity and scheduling. This achievement establishes a technical benchmark for other carriers transitioning to Next Generation OTN AN and provides a commercial model for high-quality AIDC connections.

Source: https://developingtelecoms.com/telecom-business/operator-news/21163-ais-thailand-and-huawei-achieve-the-worlds-first-an-l4-certification-in-optical-transport.html

Collected: November 21, 2026 | Automated Research System (AI)

#07 KNN Optical Modulators: 180 Gbaud Performance and Specs

Published November 14, 2026 BIOENGINEER.ORG Japan



OVERVIEW

Kyushu University and Sumitomo Chemical have demonstrated a potassium sodium niobate (KNN) thin-film optical modulator capable of ultrafast operation at 180 Gbaud. The device achieves a VπL value of less than 0.7 Vcm, offering nearly three times the modulation efficiency of Thin-Film Lithium Niobate (TFLN). This development provides a low-cost, high-efficiency alternative for photonics-electronics convergence in AI data centers.

IN DEPTH

Key Findings

Researchers from Kyushu University and Sumitomo Chemical have verified that potassium sodium niobate (KNN) thin-film wafers enable high optical modulation efficiency and ultrafast operation at 180 Gbaud. The modulator achieved a $V_{\pi}L$ value—an index of modulation efficiency—of less than 0.7 Vcm. This performance represents nearly three times the efficiency of Thin-Film Lithium Niobate (TFLN), a competing next-generation material.

Technical Details

The development was a collaborative effort where Sumitomo Chemical produced the KNN thin-film wafers and Kyushu University handled the design, fabrication, and performance evaluation. Key technical advantages of KNN include:

- **Manufacturing:** The material can be formed into thin films via sputtering and is highly compatible with existing semiconductor manufacturing processes.
- **Cost:** KNN is expected to be manufacturable at a lower cost than TFLN wafers.
- **Scalability:** Sumitomo Chemical leverages existing mass-production capabilities developed through its work on piezoelectric Micro Electro Mechanical Systems (MEMS).

Background and Context

Optical modulators are critical for replacing electrical signal transmission with light to enable high-speed, large-capacity data communications with reduced power consumption. This is particularly relevant for co-packaged optics (CPO), which integrates electrical and optical circuits into a single package to shorten wiring and prevent signal degradation. The demand for such technology is driven by the growth of generative AI, which has increased the processing load and power consumption in AI data centers. While silicon-based modulators exist, they struggle to achieve high-speed operation and low power consumption simultaneously.

Significance and Outlook

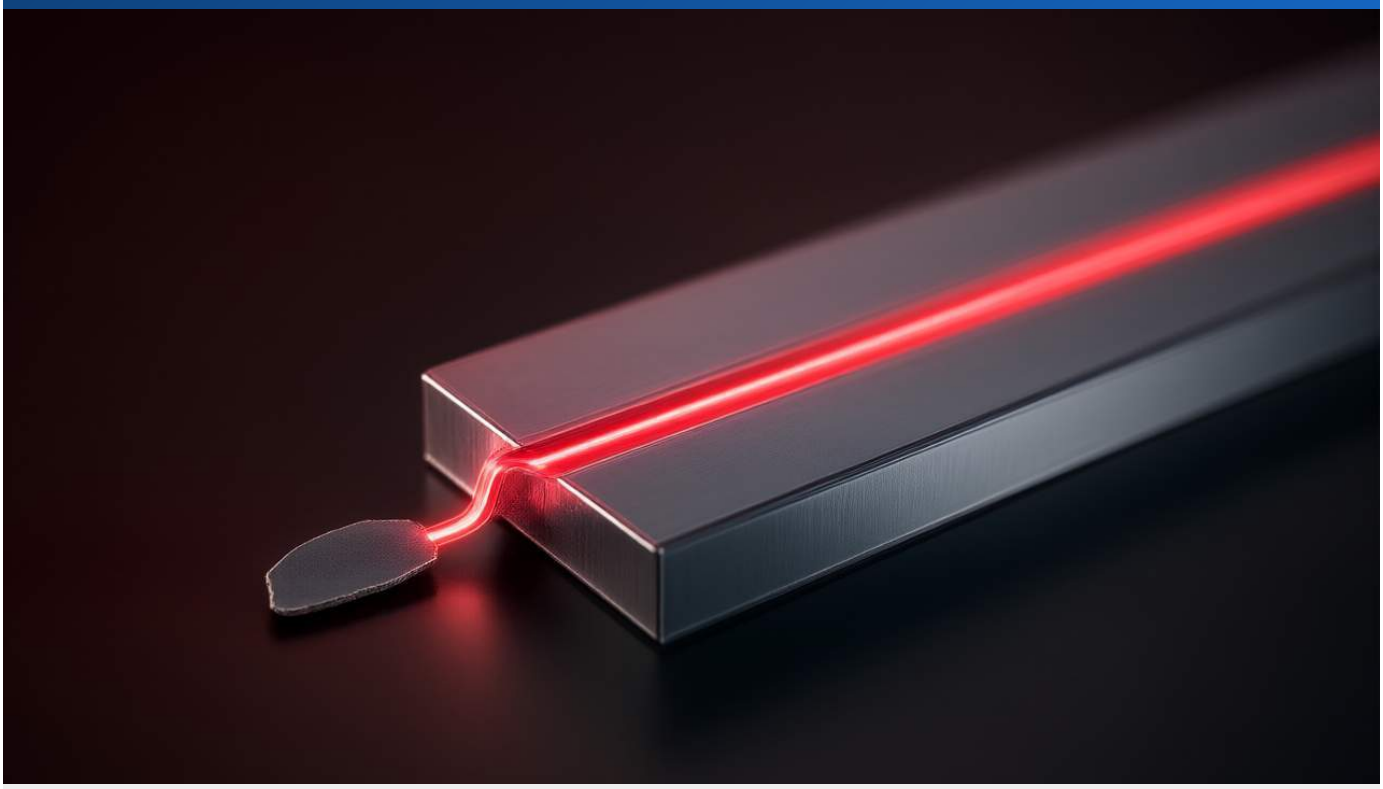
The research results were presented as a post-deadline paper titled “180-GBaud OOK Modulation Using a KNN Crystal-Based Electro-Optic Waveguide Modulator” at the 52nd European Conference on Optical Communications (ECOC 2026) in Spain. By combining high modulation efficiency with low-cost manufacturing, KNN is positioned as a compelling candidate for commercial applications in photonics-electronics convergence.

Source: https://bioengineer.org/knn-thin-film-optical-modulators-demonstrate-ultrafast-operation-at-180-gbaud/

Collected: November 21, 2026 | Automated Research System (AI)

#08 TFLN Photodetectors: 10Gbit/s Visible Light Data Reception

Published November 20, 2026　搜狐（来源：第三代半导体产业）　China



OVERVIEW

Researchers from Jiufengshan Laboratory and Huazhong University of Science and Technology have developed a high-speed visible light photodetector integrating tungsten selenide (WSe_2) on a thin-film lithium niobate (TFLN) platform. The device achieves a bandwidth of 1.12 GHz and a data reception rate of 10Gbit/s, providing a critical component for chip-level optical interconnects.

IN DEPTH

Key Findings

The research team has successfully designed and fabricated a lateral WSe_2 p-i-n photodetector integrated with TFLN waveguides. The device demonstrates a bandwidth of 1.12 GHz and a maximum data reception rate of 10Gbit/s in the visible light spectrum. At a wavelength of 638nm, the detector exhibits a responsivity of approximately 492mA·W^{-1} and an external quantum efficiency of 95.6%.

Technical Details

To overcome the slow carrier diffusion and defect trapping typically found in lateral TMDC detectors, the team implemented several engineering strategies:

- **Doping and Contact Engineering:** A local self-aligned doping process was used to eliminate slow carrier diffusion. N-type ohmic contacts were achieved via selenium vacancy defect engineering, while p-type ohmic contacts were realized using a high-work-function molybdenum oxide (MoO_x) buffer layer.
- **Mobility Enhancement:** The high dielectric constant of the lithium niobate substrate was utilized to suppress ionized impurity scattering, resulting in electron and hole mobilities both exceeding 350 $cm^2/V·s$.
- **Transport Mechanism:** These optimizations established a drift-dominant carrier transport mechanism. Combined with the low junction capacitance of the lateral p-i-n architecture, this allowed for GHz-level bandwidth.

Background and Context

TFLN is considered a promising platform for next-generation integrated optoelectronics due to its optical properties. However, integrating traditional materials onto TFLN is challenging due to lattice constant and thermal expansion coefficient mismatches. Two-dimensional materials like WSe_2 are ideal candidates because they are compatible with bulk substrates and offer strong light-matter interaction and high carrier mobility.

Significance and Outlook

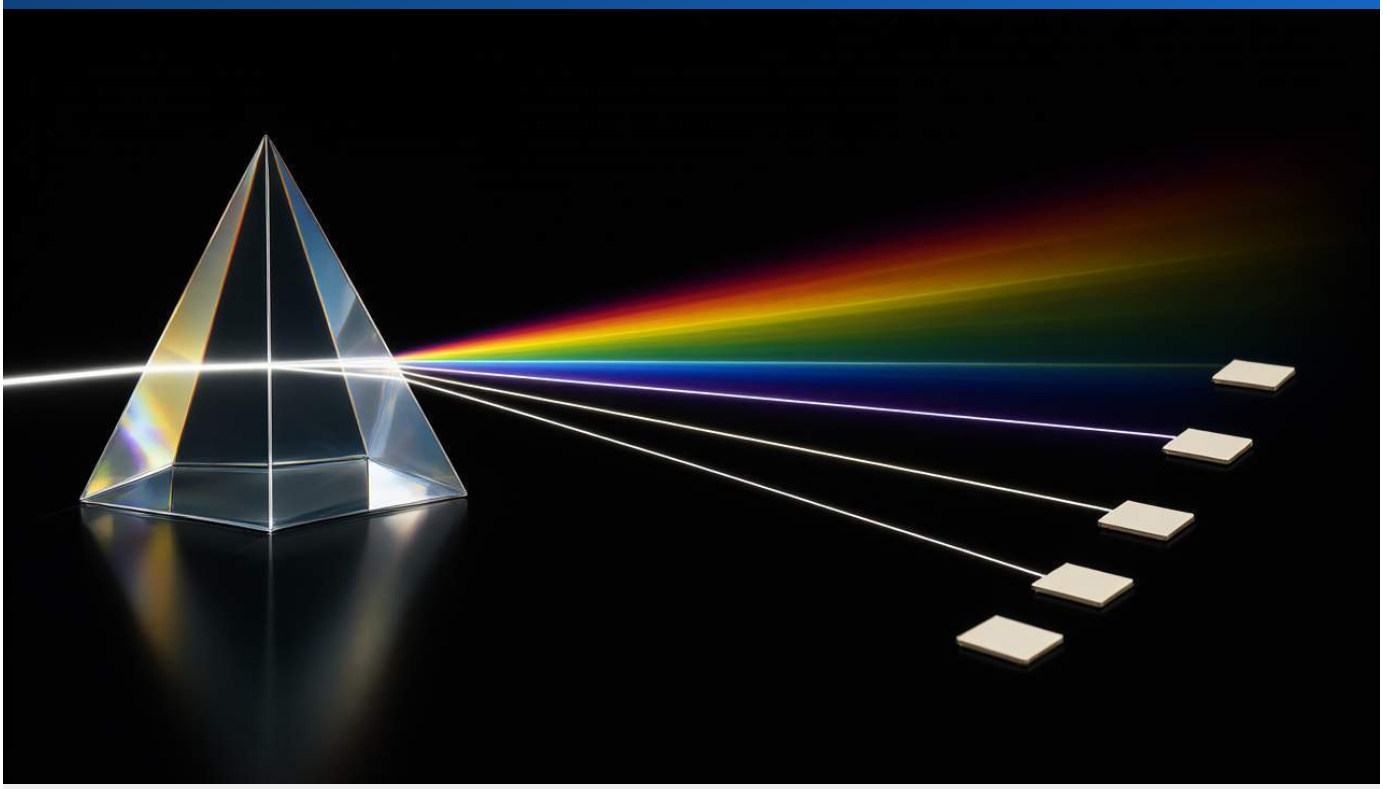
The study, published in *Nature Communications* on November 12, 2026, demonstrates a CMOS-compatible process path for high-speed visible light detection. The authors note that the current bandwidth is limited by the modulation bandwidth of the test laser, suggesting further potential for speed increases. This technology is positioned to support high-bandwidth, low-power chip-to-chip interconnects for high-performance computing, large language models, and digital twins.

Source: https://www.sohu.com/a/1104045166_122014422

Collected: November 21, 2026 | Automated Research System (AI)

#09 NTT Optical R&D: Roadmap for AI Energy Efficiency and Quantum Computing

Published November 19, 2026　ケータイ Watch　Japan



OVERVIEW

NTT is integrating optical-electronic convergence and optical quantum computing to mitigate the massive energy demands of AI, such as xAI's Grok 4 which consumes approximately 310GWh. The strategy focuses on reducing power consumption via optical chiplets and tensor cores while scaling quantum computing toward 1 million qubits by 2030.

IN DEPTH

Key Findings

NTT is implementing a three-pronged R&D strategy to ensure sustainable AI development by replacing electrical processes with optical technology. A primary goal is the development of "optical tensor cores" that aim to achieve the performance of GPUs from 1–2 generations prior with approximately one-tenth the power consumption by 2030.

Technical Details

The company's AI infrastructure roadmap is divided into several phases:

- **IOWN 2.0:** Focuses on optical engines for optical-electronic conversion near switch ASICs. Developed with Broadcom and Acton, commercialization is planned for the end of FY2026. Reducing electrical wiring distance from 30cm to 3cm has demonstrated a 50% reduction in power consumption.
- **IOWN 3.0:** Targets "optical chiplet technology" for chip-to-chip connectivity. NTT, alongside Furukawa Electric, Japan Semiconductor, and Shinko Electric Industries, aims for a production capacity of 1 million units per year and a 30% global market share by 2033.
- **Optical Tensor Cores:** Utilizing Mach-Zehnder Interferometers (MZI) to control refractive indices via heat, NTT aims for near-zero power consumption for parallel matrix operations.
- **AICP (AI Computing Platform):** A system to dynamically allocate GPU resources across distributed data centers and route tasks between lightweight LLMs and frontier AI based on confidentiality and difficulty.

Quantum Computing and Security

NTT has partnered with OptQC to develop optical quantum computers. The first machine, "MoQuren," is operational. The roadmap targets 10,000 qubits by FY2027 and 1 million qubits by FY2030, leveraging wavelength division multiplexing to exceed 1THz. To counter the threat of quantum decryption, NTT is developing the NTRU encryption/key exchange and QR-UOV digital signature methods.

Background and Significance

The urgency is driven by escalating energy needs; US AI data center power demand is projected to reach 123GW by 2035, comparable to Japan's total national power demand. Additionally, NTT is developing autonomous security AI to handle vulnerability detection and remediation on-premises, currently achieving 70–80% of the detection capabilities of frontier AI.

Source: https://k-tai.watch.impress.co.jp/docs/news/2157633.html

Collected: November 21, 2026 | Automated Research System (AI)

#10 Passive Quantum Network: 19.48 Mbps Key Rate via PSP-CVQKD

Published November 19, 2026 Quantum Zeitgeist China



OVERVIEW

Researchers from Shanghai Jiao Tong University and the Hefei National Laboratory achieved a record 19.48 Mbps secure key rate per user in a fully passive quantum access network. By utilizing a thermal light source and passive state preparation, the system enables scalable, high-speed quantum key distribution compatible with existing optical infrastructure.

IN DEPTH

Key Findings

A new fully passive quantum access network protocol has experimentally achieved a record-breaking secure key generation rate of 19.48 Mbps per quantum network unit (QNU). This achievement marks a significant advancement in continuous-variable quantum key distribution (CVQKD) by extending the Passive State Preparation (PSP) protocol from point-to-point (PTP) systems to point-to-multi-point (PTMP) networks.

Technical Details

The architecture, termed a quantum passive optical network (QPON), consists of quantum line terminals (QLT) and QNUs connected via passive optical components, including 1:N passive splitters and single-mode fibers. Key technical specifications include:

- **Light Source:** The system employs a thermal source rather than traditional single-photon emitters. A beam splitter with a 99:1 splitting ratio is used to minimize excess noise.
- **Channel Configuration:** A hybrid channel combining 5 kilometers of single-mode fiber and a free-space segment (average attenuation of -4 dB), resulting in a total average attenuation of -10.96 dB.
- **Hardware Components:** The system integrates amplified spontaneous emission, local oscillators, bandpass filters, polarization controllers, and polarization beam splitters. An integrated coherent receiver is used at the receiving end to enhance signal detection.
- **Signal Management:** Red, blue, and yellow fibers are utilized to distinguish the local oscillator, quantum signal, and polarization multiplexing signal, respectively.

Background & Context

Traditional quantum access networks often face a trade-off between the number of connected units and the resulting key rate. The PSP-QPON design circumvents these limitations through passive state preparation and distribution, which optimizes both scalability and security performance. Researchers noted that the contribution of χ B_iE typically exceeds that of I(B i :B_i), simplifying secure key rate calculations and ensuring that correlations between QNUs do not degrade protocol performance.

Significance & Outlook

The use of thermal sources and passive components reduces resource consumption and increases system stability compared to active modulation. Because the design is compatible with existing classical optical communication infrastructure, it provides a viable pathway for deploying quantum-secured local area networks in homes and for mobile devices.

Source: https://quantumzeitgeist.com/shanghai-jiao-19-48-mbps-key-rate/

Collected: November 21, 2026 | Automated Research System (AI)

#11 Mitsubishi Electric LiDAR: 600m Rail Detection Specs and 2027 Timeline

Published November 18, 2026　日本経済新聞　Japan



OVERVIEW

Mitsubishi Electric has developed a high-performance LiDAR sensor capable of detecting objects 600 meters away, targeting a 2027 commercial launch for railway vehicles. The system integrates AI and cameras to identify obstacles as small as 20 centimeters, addressing the long braking distances required for trains and the need for autonomous rail operations.

IN DEPTH

Key Findings

Mitsubishi Electric is preparing to commercialize a long-range LiDAR sensor for railway vehicles in fiscal year 2027. The sensor can detect the presence of people or fallen objects approximately 20 centimeters in size at a distance of 600 meters. According to the company, this is the first LiDAR of its kind specifically for railway applications.

Technical Details

The system utilizes laser light to measure the shape and distance of objects. To enhance detection capabilities, Mitsubishi Electric is proposing a "forward monitoring system" that combines the LiDAR sensor with cameras. This integrated system features artificial intelligence (AI) for object detection, allowing the system to distinguish between different types of obstacles, such as vehicles or pedestrians, which may be difficult to identify using the sensor alone.

Background and Context

The development addresses a critical gap in existing sensor technology. While automotive LiDARs typically reach detection distances of approximately 300 meters, railway vehicles require significantly longer detection ranges—exceeding 600 meters—due to the extended time and distance required for braking. This technology is positioned to support the transition toward autonomous train operations, a priority driven by severe driver shortages in the railway industry.

Significance and Outlook

On November 18, the company demonstrated the technology through verification tests at the Mitsubishi Heavy Industries railway technology test center in Mihara City, Hiroshima Prefecture. While the primary target is the railway sector, Mitsubishi Electric indicates that the sensor has potential applications for infrastructure monitoring in other environments, including airports and roads.

Source: https://www.nikkei.com/article/DGXZQOCC186M90Y6A111C2000000/