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CONTENT AND MARKETING TEAM

Tel: +44 (0)1223 221030

Editor

Keely Portway

keely.portway@europascience.com

Audience development manager

Andrew Knight

andrew.knight@europascience.com

Senior designer

Zoe Wade

zoe.wade@europascience.com

ADVERTISING AND PRODUCTION TEAM

Publisher

Kris Collins

kris.collins@europascience.com

Production manager

Nick Clark

nick.clark@europascience.com

CORPORATE TEAM

Chief executive officer

Warren Clark

warren.clark@europascience.com

Chief operating officer

Mark Elliott

mark.elliott@europascience.com

Fibre Systems is published twice a year by Europa Science Ltd, St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS.

Tel: +44 (0)1223 221030

Fax: +44 (0)1223 213385



Sign up to receive our
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Keely's Corner

Building resilience: why infrastructure security matters more than speed

Welcome to the Autumn edition of Fibre Systems. The industry really has shifted a lot since Spring.

Then, we were focused on growth: could we build fast enough to keep pace with 1.6T adoption and exploding AI infrastructure demand? By Autumn, that question is answered: yes, we can build! Now the conversation has evolved: how do we build resilient infrastructure that doesn't create dangerous dependencies?

The trillion-dollar data centre capex boom continues accelerating, yet organisations are simultaneously investing in supply chain resilience and strategic control.

Nvidia and Corning's partnership commits to 10-fold capacity expansion including three new manufacturing facilities creating 3,000 jobs. Molex and Prysmian's €5.5bn, 10-year agreement commits €1.25bn in

capital investment through 2031. These extraordinary commitments reflect genuine confidence that demand will consume everything manufacturers can produce.

Hyperscalers are investing directly in regional infrastructure they own and control, demonstrating how seriously they take infrastructure resilience. Infrastructure has evolved from commodity utility to strategic asset. The mega-supply agreements, regulatory modernisation, geographic diversification of infrastructure and manufacturing capacity race all reflect this maturation. Infrastructure decisions made today will shape technology ecosystems for years to come.

Organisations investing now in manufacturing resilience, supply chain transparency and strategic partnerships will establish competitive advantage spanning years. This issue examines where this transformation is heading, and the industry's momentum unarguably continues. The mission has evolved to building infrastructure capable of supporting AI at scale whilst remaining resilient and strategically sound.

Keely Portway, Editor

Securing the infrastructure: AI's supply chain arms race drives regulatory overhaul and strategic investment

A roundup of the key commercial, regulatory, and technological developments reshaping the optical communications supply chain as the race for AI infrastructure accelerates

The global optical communications industry faces a fundamental shift in how infrastructure is planned, built and secured. Converging government policy, hyperscaler procurement strategy and regulatory frameworks reveal a single overarching theme: infrastructure sovereignty and supply chain resilience have become as strategically important in 2026 as technical performance or capacity.

Manufacturing expansion accelerates as mega-supply agreements reshape optical industry

Nvidia and Corning announced a multi-year partnership dramatically expanding optical connectivity manufacturing. Corning will increase optical connectivity manufacturing capacity by 10 times and expand fibre production capacity by more than 50%, including the construction of three new advanced manufacturing facilities in North Carolina and Texas, creating more than 3,000 new jobs. This represents one of the largest manufacturing expansions in the optical industry's history.

Jensen Huang, founder and CEO of Nvidia, characterised the AI infrastructure buildout as "the largest infrastructure buildout of our time". The partnership reflects genuine urgency: as AI factories grow larger and more numerous, the optical connectivity layer has become a critical bottleneck.

Parallel to the Nvidia-Corning partnership, Molex and Prysmian signed a 10-year supply agreement worth up to €5.5bn (\$6.4bn) to provide high-density optical cabling for hyperscaler and data centre environments. Molex's upfront €550m commitment underscores the critical importance hyperscalers assign to accessing reliable optical cabling capacity. Prysmian will execute a €1.25bn capital investment through 2031 to expand its manufacturing footprint across North America and Europe, more than doubling its domestic United

States optical fibre capacity, including glass preform manufacturing. These mega-agreements demonstrate how hyperscalers moved beyond spot market procurement toward structural supply chain partnerships guaranteeing capacity, pricing and delivery. Rather than relying on open commodity markets, organisations directly funded upstream capital expenditure to lock in multi-year lead times. This shift reflects genuine supply anxiety: organisations recognised traditional procurement approaches could not keep pace with AI infrastructure demand growth.

Meta's \$6bn (€5.5bn) agreement with Corning to supply optical fibre, cable and connectivity solutions for Meta's data centre expansion reinforced this pattern. Meta's Louisiana data centre alone is projected to require eight million miles of optical fibre.

"We are inventing the future of computing with advanced optical technologies, building the foundation for AI infrastructure where intelligence moves at the speed of light"



Corning

Optical fibre manufacturers are ramping up production capacity to support multi-billion-pound data centre supply deals



Representatives of NEC Corporation, Lightstorm, Microsoft, Singtel, and Tata Communications, at the launch of the India-Southeast Asia (I-2SEA) submarine cable system. Commercial operations are scheduled to start in 2029

Global capex surge driven by AI infrastructure acceleration outpacing component supply

Data centre capital expenditure reached unprecedented levels in early 2026, with the global 2026 capex outlook now raised to more than \$1tn, according to Dell'Oro Group. The top four United States cloud providers, Amazon, Google, Meta and Microsoft, increased data centre capex by 78%, driven primarily by AI infrastructure acceleration.

Baron Fung, Senior Research Director at Dell'Oro Group, noted that rising memory and storage pricing substantially increased overall server system costs whilst AI infrastructure deployments continued accelerating rapidly. Hyperscalers expanded general-purpose infrastructure supporting public cloud growth, agentic AI workloads and rising AI-related storage requirements. Despite exceptionally strong first-half 2026 spending, capex growth is expected to accelerate further in the second half of 2026, driven by the Nvidia Rubin system ramp and refresh cycles for hyperscaler custom accelerator platforms.

Yet even these massive investments face an emerging bottleneck: indium phosphide laser production. Lumentum Chief Executive Michael Hurlston warned that InP laser production capacity represents a supply bottleneck potentially more acute than memory chip constraints. The challenge stems from architectural evolution: copper interconnection between GPUs becomes physically limited at speeds reaching 1.6T.

Hurlston outlined how AI data centre architecture is evolving across four stages: scale-across connectivity links separate data centre buildings over kilometres; scale-out transceivers handle connections between server racks over tens of metres; scale-up optical links replace copper inside compute racks themselves, expected to begin initial deployment in mid-2027; scale-in represents future chip-to-chip optical integration.

The scale-up phase represents an order-of-magnitude leap in component demand. Scale-up is projected to increase optical lane deployment by 100 times relative to scale-across baselines. A single compute rack using external optical light sources can require approximately 1,000 pluggable units containing eight lasers each, totalling 8,000 lasers per rack. Unlike standard silicon microelectronics, these lasers rely on compound semiconductor materials, primarily indium phosphide. Scaling production requires moving from thousands of wafers historically to millions today. Hurlston warned the InP laser supply gap could remain a primary constraint as scale-up deployments accelerate.

Regulatory modernisation and equipment restrictions secure supply chains

The US Federal Communications Commission approved a landmark regulatory framework modernising submarine cable governance whilst introducing direct federal oversight of landing station equipment for the first time. The rules represent the most



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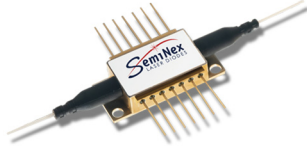
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A team of researchers at Northwestern University in the USA has demonstrated quantum entanglement surviving alongside commercial telecommunications traffic on the same optical fibre

➤ critical modernisation of American subsea cable governance in decades, arriving as submarine networks handle approximately 99 per cent of all transcontinental internet and AI data traffic.

The centrepiece was the creation of a presumptive exemption from the traditionally lengthy interagency review process. Qualified applicants meeting stringent security criteria can bypass mandatory Team Telecom referral, transforming licensing into a streamlined process. Simultaneously, rules closed a long-standing security vulnerability: Submarine Line Terminal Equipment (SLTE) now faces direct FCC licensing oversight. SLTE licensees face explicit prohibitions regarding equipment from foreign adversaries, structurally reordering the subsea supply chain.

More recently, the US reportedly began implementing restrictions on Chinese-manufactured data centre equipment and components, extending its focus on semiconductor supply chain security into optical and infrastructure equipment markets. Restrictions target core data centre components: optical transceivers, networking equipment, power distribution systems and cooling infrastructure.

Strategic submarine infrastructure links regional AI corridors

NEC secured a major supply contract for the India-Southeast Asia (I-2SEA) submarine cable system, linking India's AI data centre concentrations with Singapore's regional cloud hub and Malaysia's data centre corridor. Scheduled for 2029 commercial operations, the system reflected a broader trend: cloud hyperscalers including Microsoft is increasingly a direct co-owner of physical infrastructure rather than a merely anchor tenant.

Route design targeted specific geographic nodes of hyperscaler activity: dual Indian landings providing the shortest backhaul to Hyderabad's GPU clusters, Singapore serving as the primary regional aggregation point, and a Malaysia gateway connecting into Kuala Lumpur's emerging data centre corridor. This direct connectivity between hyperscaler concentrations significantly reduces latency when compared to legacy routing through third-party transit hubs.

Future technologies address long-term capacity challenges

While the industry addresses immediate supply constraints, research institutions are preparing technologies for future scaling. The MATCH doctoral training network, funded by the European Commission under Marie Skłodowska-Curie Actions, is advancing fundamental research into multicore fibre technology to address

growing physical capacity limits in conventional optical systems.

Multicore fibres integrate multiple independent cores within a single glass strand, enabling parallel spatial channels, and this spatial division multiplexing approach enables order-of-magnitude bandwidth growth over existing duct footprints without requiring new cable builds. MATCH doctoral candidates are tackling critical engineering barriers across the entire multicore fibre value chain, including weakly-coupled core designs, specialised optical amplifiers and machine learning models for real-time network optimisation. As AI cluster interconnect requirements continue pushing conventional optical infrastructure toward physical non-linear limits, multicore fibre commercialisation is anticipated to transition from specialised hyperscaler builds into broader carrier networks over the coming decade.

Research enables quantum networks on commercial fibre

Researchers at Northwestern University demonstrated quantum entanglement surviving alongside commercial telecommunications traffic on the same optical fibre, marking the first real-world proof that quantum networks could operate over existing fibre infrastructure rather than requiring dedicated quantum-only cables.

The team of researchers successfully transmitted entangled photons across 24.4km of fibre connecting Evanston and downtown Chicago whilst the same fibre simultaneously carried high-capacity internet traffic. Quantum signals maintained entanglement fidelity exceeding 94 per cent despite the fibre carrying approximately 36Tbps of classical data.

Northwestern's team demonstrated that quantum signals and classical data can share fibre through spectral separation and advanced signal processing. Entangled photons were transmitted in the O-band (around 1310 nanometres), whilst commercial telecommunications traffic operated in the C-band (around 1550 nanometres). Special optical filters reduce noise from commercial traffic, whilst a White Rabbit optical timing system achieved picosecond-level synchronisation between network endpoints.

The demonstration marked a very significant milestone: the first real-world entanglement distribution between remote nodes over commercial telecommunications traffic. For telecommunications operators, the exciting implications include leveraging existing fibre for future quantum services without new deployment and incorporating quantum wavelength allocation into long-term spectrum management. **FS**



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Optical communications confronts AI infrastructure demands in Malaga

Europe's premier optical technology conference brings together 8,000 professionals to explore innovations shaping next-generation networks and DCI

ECOC 2026, Europe's optical communications conference and exhibition, comes to Malaga from 20 to 24 September as the industry confronts the latest challenges reshaping optical infrastructure. With more than 8,000 attendees expected, 340 global exhibitors, and comprehensive technical programming spanning optical transmission, photonic integration, quantum technologies, and emerging applications, the event will examine how optical innovation is scaling to support AI infrastructure expansion and next-generation network requirements.

AI data centre deployments have accelerated dramatically over the past 18 months, creating unprecedented demands for optical bandwidth, power efficiency, and architectural flexibility. Simultaneously, emerging technologies including hollow-core fibre, silicon photonics, and quantum communications are transitioning from

research toward commercial deployment. ECOC 2026 will showcase how these innovations intersect to address real infrastructure challenges.

The event arrives as European operators and vendors increasingly recognise that optical technology, not compute capacity, constrains AI infrastructure scaling. Power consumption, interconnect density, and transmission reach have become critical limiting factors. Conference programming addresses these practical challenges alongside fundamental research exploring what optical communications can become.

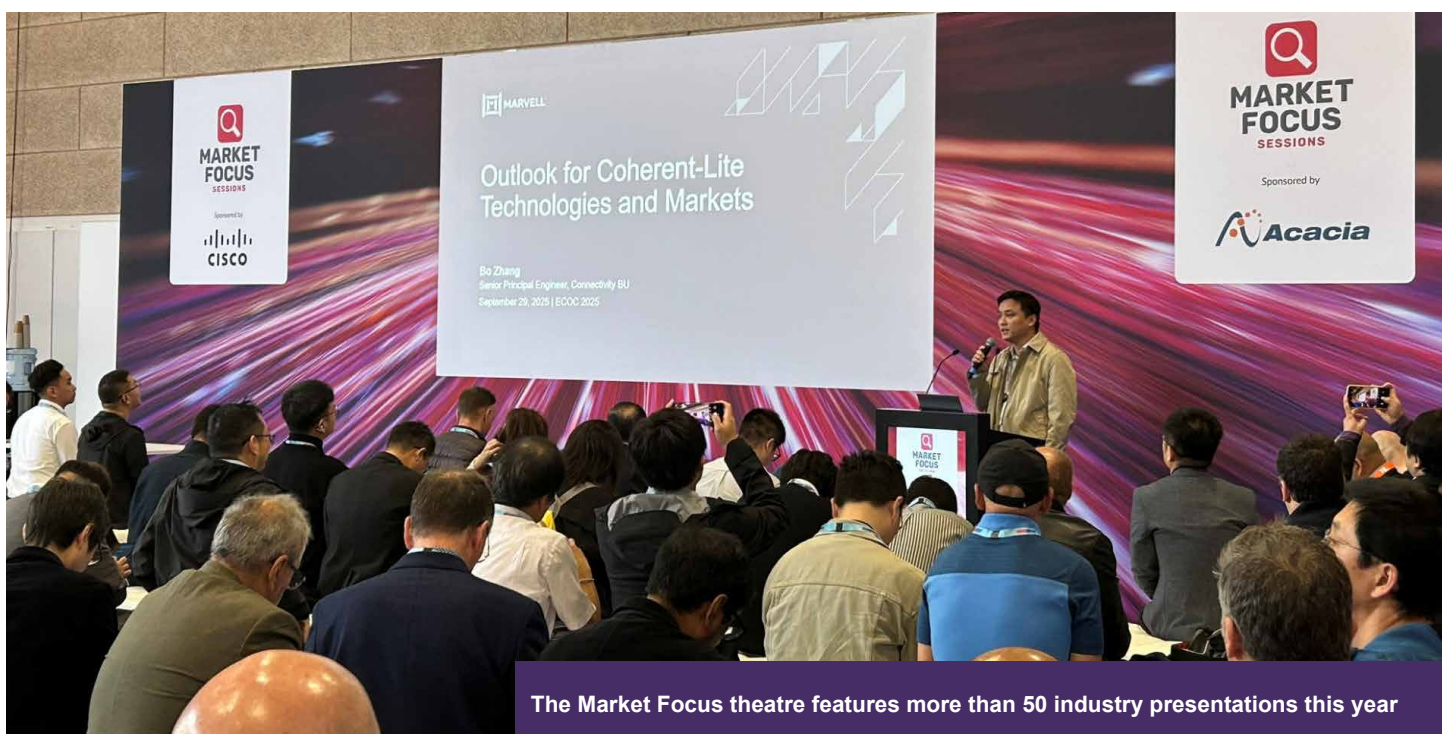
AI data centres dominate the technical agenda

As one might expect, the ECOC conference programme explicitly structures sessions around AI infrastructure requirements. Multiple dedicated streams address how optical technology must evolve to support

hyperscaler deployments. One major discussion examines light sources for next-generation optical communication systems specifically targeting AI data centres. Rather than a generic light source discussion, the session focuses on requirements emerging from GPU clusters, distributed training systems, and emerging workloads. Questions will address power efficiency challenges, wavelength diversity, and integration approaches enabling hyperscalers to deploy optical sources matching specific system architectures.

Another session directly questions whether AI workloads require end-to-end optimised network infrastructure. The framing reflects an emerging recognition that conventional network architectures may not match AI traffic patterns and performance requirements. Discussion will examine whether traditional over-subscription ratios apply to AI systems, how optical networking

ECOC 2025



can better match compute clustering, and what architectural changes may be necessary as things evolve.

The “winning interconnects for AI” session looks to address scale-up versus scale-out technology choices, examining whether conventional data centre interconnect approaches remain optimal as GPU clusters grow denser and more interconnected. This crucial discussion matters practically as

“European operators and vendors increasingly recognise that optical technology, not compute capacity, constrains AI infrastructure scaling”

operators decide between pluggable optics, co-packaged solutions, and a range of other emerging approaches.

Power consumption receives sustained attention. One major session addresses whether the industry can overcome the power wall across optical communication systems, spanning AI clusters to submarine networks. The discussion acknowledges the uncomfortable reality: power consumption increasingly constrains network expansion, not fibre availability. Sessions examine how optical innovations can reduce power per bit whilst supporting higher aggregate capacity.

Hollow-core fibre moves toward mainstream deployment

Hollow-core fibre (HCF) transitions from a research curiosity toward a practical infrastructure technology, featuring prominently across multiple conference sessions. Unlike conventional solid-core fibres, HCF transmits light through a hollow centre surrounded by air gaps, enabling lower latency, reduced nonlinearity, and improved power efficiency.

Sessions examine HCF fabrication challenges and commercial deployment pathways. Discussion addresses practical questions: what manufacturing processes enable volume production? How do optical properties scale across different fibre

designs? What deployment scenarios justify the HCF economics?

One particularly significant discussion examines whether hundreds-of-kilometre unrepeaters HCF links could redefine the economics and design of terrestrial and submarine networks. The question reflects some genuine potential: if HCF enables transmission over much longer distances without intermediate amplification, network architecture and economics could transform substantially in the years ahead. Regional operators and submarine cable designers would therefore have fundamentally different options for network planning.

HCF characterisation and standardisation sessions address a number of practical deployment requirements. Before widespread deployment, the industry must first agree on measurement methods, performance specifications, and reliability standards. ECOC 2026 discussion will help define these standards to enable confident commercial deployment.

Quantum technologies progress toward field trials

Quantum communications represent an emerging optical infrastructure opportunity. ECOC programming examines recent progress in quantum repeaters, long-range quantum key distribution, and quantum state >

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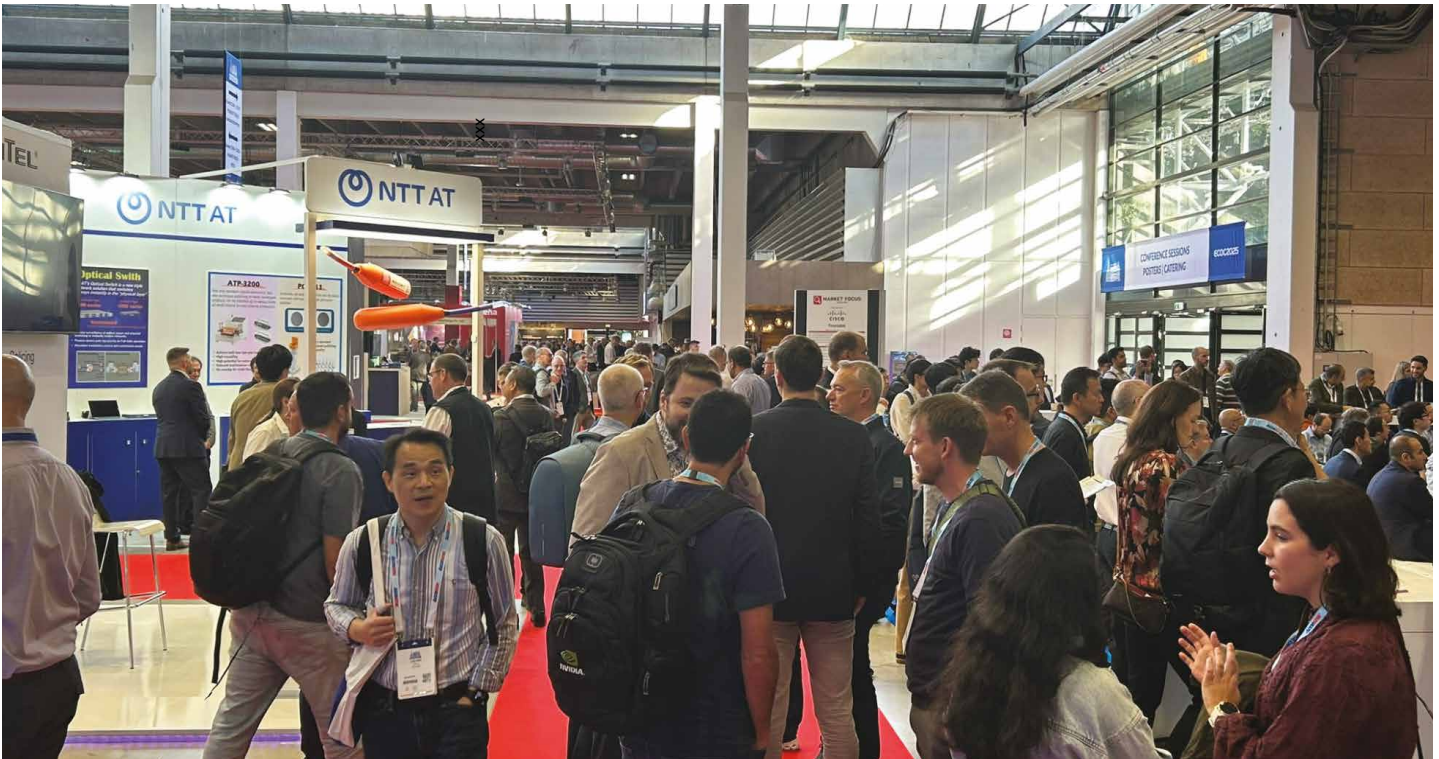
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Around 340 global exhibitors are set to attend ECOC, which moves to Spain this September after last year's Copenhagen success

> transmission. Discussion includes some insightful field trial updates and the path toward production deployment.

The quantum repeaters session addresses a fundamental challenge: quantum states decay over distance. Repeaters amplify quantum information without destroying quantum properties, enabling long-distance quantum communication. Recent progress brings practical deployment closer, though significant engineering challenges remain.

Long-range quantum key distribution discussion examines how quantum security can extend to metropolitan and longer distances. We know the current implementations typically operate over limited ranges. Extending range enables practical quantum-secured network deployments for a broader operator base.

Quantum networks discussion addresses architecture and system design questions. Rather than isolated quantum links, operators will eventually want quantum networks where multiple nodes can share quantum entanglement. ECOC 2026 sessions explore how quantum networks could be structured and what applications justify deployment.

6G and beyond: architecting future networks

Beyond immediate AI infrastructure requirements, the conference extensively addresses 6G technology development. Sessions examine the UK research strategy for 6G, spectrum policies for next-generation networks, and how academic innovation translates toward commercial deployment.

“The discussion acknowledges the uncomfortable reality: power consumption increasingly constrains network expansion, not fibre availability”

Integrated photonics innovation accelerates sharply

Silicon photonics and broader integrated photonics development feature extensively. Sessions examine photonic-driven architectures for access networks and AI clusters, examining how integration enables performance and efficiency improvements impossible with discrete components.

Discussion addresses the transition from research to production. Manufacturing at scale requires solving integration challenges, achieving yield, and developing packaging approaches. Sessions cover advanced modulators, receivers, switches, and other integrated components moving from prototype toward commercial availability.

One notable session addresses optical computing architectures using integrated

photonics. Rather than using optics purely for transmission, optical approaches could potentially perform computation directly. Early research explores photonic neural networks and other computing paradigms. ECOC discussion helps assess whether optical computing represents a practical alternative or remains a research curiosity.

Access networks evolution and PON advancement

Beyond the hyperscale data centre focus, the conference addresses the continuing evolution of access network technology. Sessions examine very high-speed PON systems, hybrid coherent and intensity-modulated direct-detection (IMDD) approaches, and architectural choices as operators upgrade access infrastructure.

Discussion addresses a practical operator question: how do access networks scale to support gigabit and multi-gigabit services? Traditional PON technologies reach practical limits. Advanced PON approaches using coherent transmission or other techniques enable higher speeds but introduce complexity tradeoffs. ECOC sessions help operators evaluate options for next-generation access deployments.

Optical sensing and spectrum expansion

Increasingly, optical fibres serve dual purposes: transmission and sensing. The conference extensively explores distributed optical sensing applications ranging from structural health monitoring to earthquake detection. Sessions examine how telecom fibre can become a geophysical sensor network detecting seismic activity and

other phenomena. A series of free-space optical communications sessions address atmospheric challenges limiting optical wireless systems. Recent progress in turbulence mitigation enables longer, more reliable free-space optical links. Applications include ground-to-space communications, underwater optical links, and challenging terrestrial scenarios.

Exhibition and networking emphasis

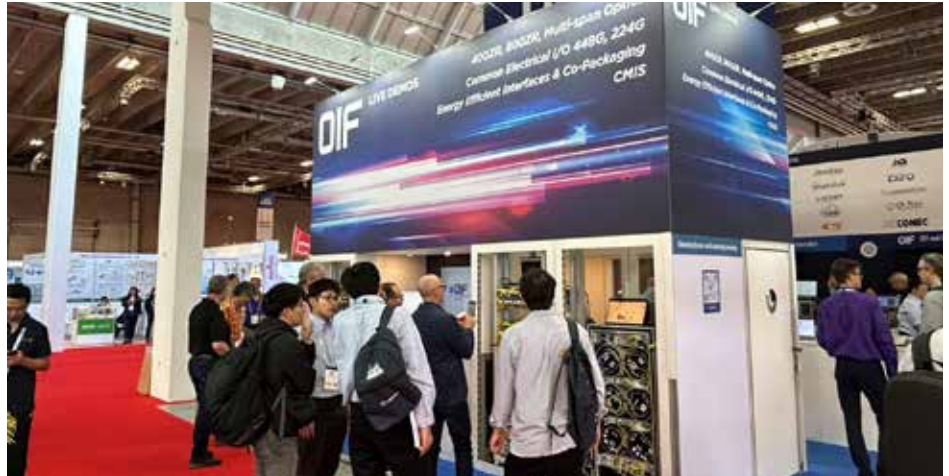
Alongside conference programming, the exhibition remains Europe's largest optical communications showcase. The Product Focus theatre will highlight the latest innovations and product announcements. The FTTx Focus area brings together fibre access solutions in a dedicated showcase, while the Demo Zone provides hands-on experience with cutting-edge systems and components.

The Market Focus theatre features more than 50 presentations from industry experts discussing commercial trends alongside technical innovation. Speakers will address market drivers, deployment timelines, and emerging business models.

Significance for optical infrastructure professionals

ECOC 2026 reflects the optical communications industry at a point where AI infrastructure expansion is driving

ECOC 2025



Organisers anticipate more than 8,000 attendees, as the sector grows at pace

unprecedented demands for optical innovation. Simultaneously, emerging technologies are becoming commercially viable, offering solutions to longstanding challenges. This convergence creates both opportunities and uncertainties.

For infrastructure professionals, vendors, and researchers, ECOC provides an essential forum for understanding technology trajectories and commercial implications. Discussions will address practical deployment challenges alongside fundamental innovation. Operators will share

experiences scaling optical infrastructure to unprecedented levels, researchers will present breakthrough results, and vendors will showcase technologies addressing real infrastructure needs.

As optical communications transitions from a mature technology toward active innovation addressing AI infrastructure requirements, ECOC 2026 will demonstrate why optical technology remains essential to digital infrastructure and how ongoing innovation is reshaping what optical systems can accomplish. **FS**

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Scaling to 1.6 terabit and beyond

With AI traffic pushing data centre connectivity into terabit territory, we discuss the architectural shifts, fibre innovations, and supply chain strategies needed to prevent a physical-layer bottleneck

Hyperscaler expansion across distributed data centres is driving huge shifts in transceiver architecture, fibre technology and network testing approaches as the industry races to keep pace with AI workload requirements.

These shifts are happening quickly: barely two years ago, 800-gigabit (G) optical systems represented cutting-edge capability. Today, 1.6-terabit (T) transceivers are operational, 3.2T systems are in testing, and industry insiders are already discussing 6.4 and beyond. Yet this rapid scaling presents some deeper architectural challenges. For example, how can the physical layer, optical components and testing infrastructure keep pace with AI workloads that seem to have no bandwidth ceiling? Three experts recently convened

to address this challenge: Mitch Simcoe (Ribbon Communications), Kevin Boll (Nextrom), and François Marcotte (EXFO). Their discussion reveals that scaling further requires a fundamental rethinking across multiple infrastructure domains.

Distributed deployment reshapes connectivity requirements

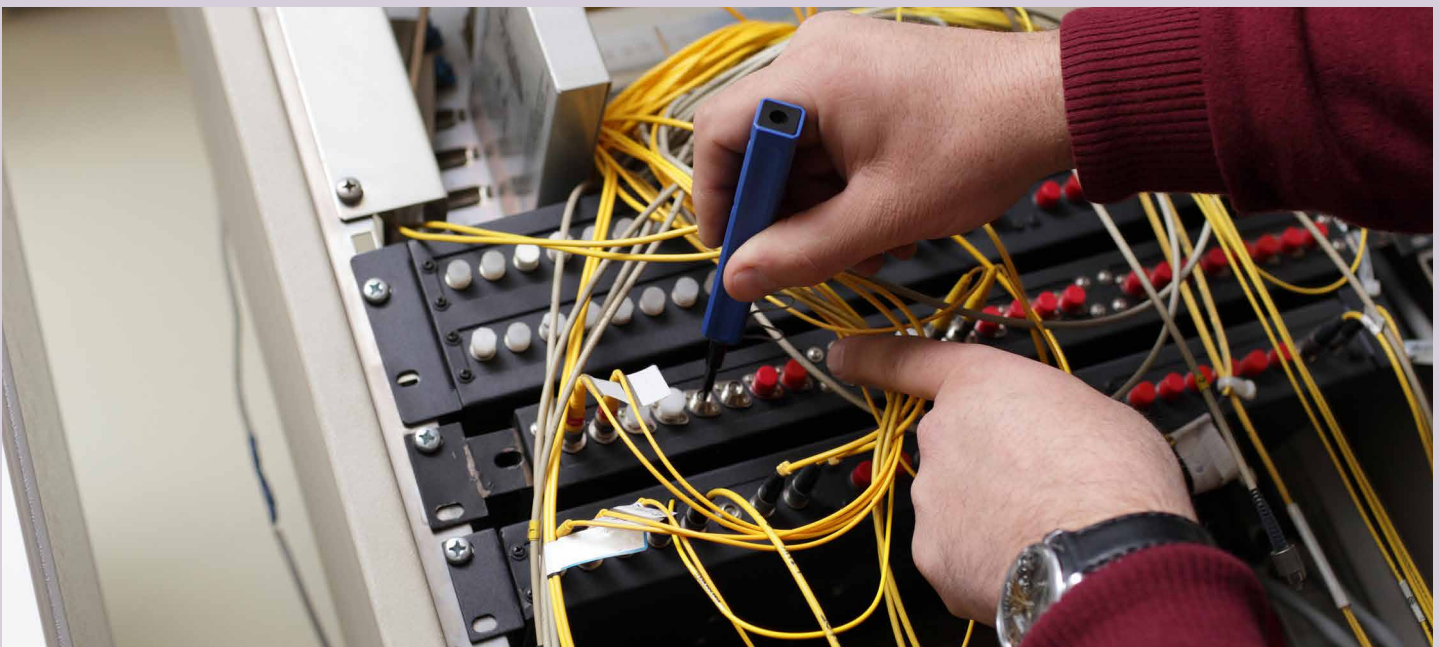
The geography of AI infrastructure is transforming how optical networks must be built. Rather than concentrating data centres in established technology hubs, hyperscalers are distributing new facilities across regional areas.

Mitch Simcoe, IP Optical Solutions Marketing at Ribbon Communications, explains why distribution has become inevitable: "When these hyperscalers are

building out these new data centres to support AI, typically these data centres are consuming huge amounts of power and especially need water for cooling. The result is the places they traditionally would have built data centres for the internet really are no longer sustainable to support that power and cooling needs. We're starting to see now that data centres are really built in more rural areas."

This geographic shift dramatically increases inter-data-centre connectivity requirements. Simcoe notes: "The amount of bandwidth we're needing for this is into the terabits of bandwidth – so just huge, huge amounts of capacity."

Supporting this requires massive fibre infrastructure expansion. Simcoe emphasises the scale: "Fibre construction



Practical experience starkly illustrates the critical importance of cleanliness at such high speeds



Hollow-core fibre, such as Microsoft Azure's HCF, represents a particularly promising innovation for data centres

“Fibre construction is back. The fibre cables and routes built for the first generation of the internet are no longer sufficient to handle this huge amount of traffic as a result of AI”

is back. To support these huge construction requirements, the fibre cables and routes that were built for the first generation of the internet are no longer really sufficient to handle this huge amount of traffic as a result of AI.”

Critically, operators demand multiple diverse routes. Simcoe explains: “Basically, if a cable were to be taken out due to someone with a backhoe, you basically lose millions of dollars of revenue from those AI workflows in that data centre. So, they’re looking for backup... they’re looking for diverse routes.”

Pluggable transceivers enable multi-vendor flexibility

Shift toward distributed AI infrastructure is accelerating architectural changes in optical networking. Integrated transponder approaches are giving way to disaggregated thin transponder models where pluggable transceivers can be sourced independently.

Simcoe neatly outlines the transition: “Traditionally, when optical networks were built, vendors built what’s called an integrated transponder, basically building everything all together. But as we move to this new AI era, it’s no longer necessarily the best model. What we’re moving to is what we call a thin transponder, where we take the optical transceiver out and deliver it as a pluggable.”

This model proves essential during supply chain constraints. Simcoe notes: “The supply chain in the optical area is starting to squeeze. Most of the big vendors now have basically announced

you can’t place an order for optical equipment today, you won’t get it for 18 months. You really need supply chain resilience. You need to have the ability to select multiple vendors for your optical equipment, and that’s going to give you much more flexibility during this constrained period.”

Fibre infrastructure evolution is accelerating fast

Beyond transceivers, the fibre layer itself is undergoing rapid evolution. Kevin Boll, Technical Director at Nextrom, addresses fundamental trends in fibre deployment: “The requirements of AI and the increased bandwidth requirements for lower latency, just more and more data is driving from copper to glass. The copper connections that were traditionally used either can’t keep up with the transmission rates or the power is too high.”

Hollow-core fibre represents a particularly promising innovation. Boll outlines the advantages: “There’s about a 50% reduction in latency because the light is travelling through air rather than silica. Hollow core also has lower attenuation compared to a standard single mode fibre... It also has a reduction in nonlinear effects. So you can have higher power, higher pump power, which gives you a longer distance.”

However, manufacturing complexity presents a complex challenge. Boll acknowledges: “The challenge is the manufacturing. It’s a very complicated process, very precise requirements are needed on the entire production chain...”



Testing high-density configurations currently presents a number of evolving operational challenges

- It's done at much lower speeds than a standard single mode fibre is done today." Multicore fibre offers an alternative approach to increasing capacity within tight spaces. Boll explains: "Instead of a single core, you have multiple cores within the fibre itself. Being able to put multiple cores within a single fibre just allows more data per space."

1.6T scaling and transceiver deployment

The transition to 1.6T and higher capacity systems is now occurring alongside multicore fibre integration within the transceivers themselves.

François Marcotte, Business Development Manager for high-speed rates testing at EXFO, describes the current landscape: "Multicore fibre is being introduced into the transceiver... We are already testing 3.2Tbps."

Testing these high-density configurations presents a range of novel operational challenges. Principal among them is the practical experience illustrating the importance of cleanliness at these speeds. Marcotte recounts a real-world scenario: "I was with a customer three weeks ago. He had a box and he said 'Oh, those are 400G, they don't work.' We put them into a test set... We saw it was dirty. We cleaned it. We tested again and everything passed. The optical levels were back to normal."

Marcotte emphasises: "In an AI-driven environment, everything has to be clean. Everything has to be validated before, because otherwise if you have issues already with the transceiver, it may be failing because of a dirty connector on a transceiver, and not because the AI algorithm was not set properly."

Co-packaged optics and future integration

As data centres scale toward 1.6T and beyond, optical integration within compute packages becomes increasingly critical. Kevin Boll describes the emerging architecture: "The trend is definitely towards higher integration, with the ultimate goal being a true co-packaged optic with the integrated laser or pump source directly on the chip itself and connecting the fibre directly onto the chip."

Multiple technical approaches are emerging. Boll outlines the possibilities: "This can be done by using microLED, which is an extremely low power LED placed on the chip. The advantage of the LED is, in addition to the low power, it also has a much higher temperature tolerance, so it can handle the higher temperatures right on the chip. This is typically then connected with a fibre bundle which are large volume packages and bundles of fibres that each fibre is carrying a very low data rate or low amount of data. But it's multi-channel. So it can handle a large overall volume. This is good for distances up to 5 or 10 metres."

Alternative approaches exist. Boll notes: "Alternatively, it can be using more of a standard, maybe a multimode fibre with a VCSEL source. And then there's also some developments using single mode fibres. There's a lot of work ongoing in the industry with startups that are working towards finding solutions for this."

Manufacturing scalability remains a critical challenge for the sector. Boll addresses the constraint: "The fibre volumes are very large, and the prices need to be very low, and that's probably

going to be one of the challenges moving forward is how to create the infrastructure to create such volumes of fibre."

Continuous validation becomes an operational imperative

As networks scale to 1.6T and beyond, testing capabilities become an ongoing operational necessity rather than a one-off installation procedure. François Marcotte outlines emerging continuous testing approaches: "You have a simple traffic... always continuous between two points. And then you're activating your AI... You want to see what's the impact on the bit error rate and what's the impact on the frame checksum error rate."

The cost implications of transceiver failures justify investment in upfront and ongoing testing. Marcotte cites recent industry data to make the point: "There are studies mentioning 1 to 2% transceiver failure rate per year. And the cost is around \$20m to fix them because you have to search... That's a \$25m repair cost for a 100,000 transceiver facility."

Looking ahead...

The scaling progression from 800G to 1.6T and 3.2T reflects a reality where AI infrastructure requirements have no obvious ceiling. Marcotte captures the trajectory: "I have demands already for 1.6Tbps links. And there's already discussion about 12.8. So it never ends."

For infrastructure professionals, success depends on ecosystem maturity across multiple technology domains: component sourcing, fibre technology maturation, continuous testing capability and architectural flexibility. **FS**

THE FUTURE OF OPTICAL LINE SYSTEMS IS PLUGGABLE.

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Pluggable Optical Line System (POLS) from Coherent brings the flexibility of pluggable optics to optical transport – simplifying deployment and enabling networks to scale as demand grows.

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COHERENT

From long-haul specialist to data centre essential

Technology evolution enables coherent transceiver deployment at the network edge, reshaping AI infrastructure connectivity requirements

Coherent optical technology has undergone a remarkable transformation over the past 15 years. Once optimised exclusively for transmitting maximum capacity across thousands of kilometres of subsea and long-haul fibre, coherent systems are now emerging as critical infrastructure for data centre interconnect (DCI) and campus-scale AI workloads.

“Historically, coherent technology was optimised for a very specific job: transmitting the highest possible capacity over thousands of kilometres, where every design decision prioritised reach and performance,” explains Helen Xenos, Senior Director of Product Management at Ciena. “The story of coherent optics over the past decade is about moving from that single architecture to many architectures.”

This expanding footprint is driven by changing data flow patterns across global

networks. As Rob Shore, Technology and Strategy Lead at Nokia, notes, coherent optics have systematically pushed into portions of the infrastructure previously serviced by intensity-modulated direct detection (IMDD) modules.

“In subsea and long-haul networks, coherent engines continue to push performance boundaries to maximise fibre capacity across transoceanic paths,” says Shore. “Within metro networks, this transition enables operators to boost transmission capacity and avoid deploying new, expensive fibre.”

Scale-across networking and the current AI push

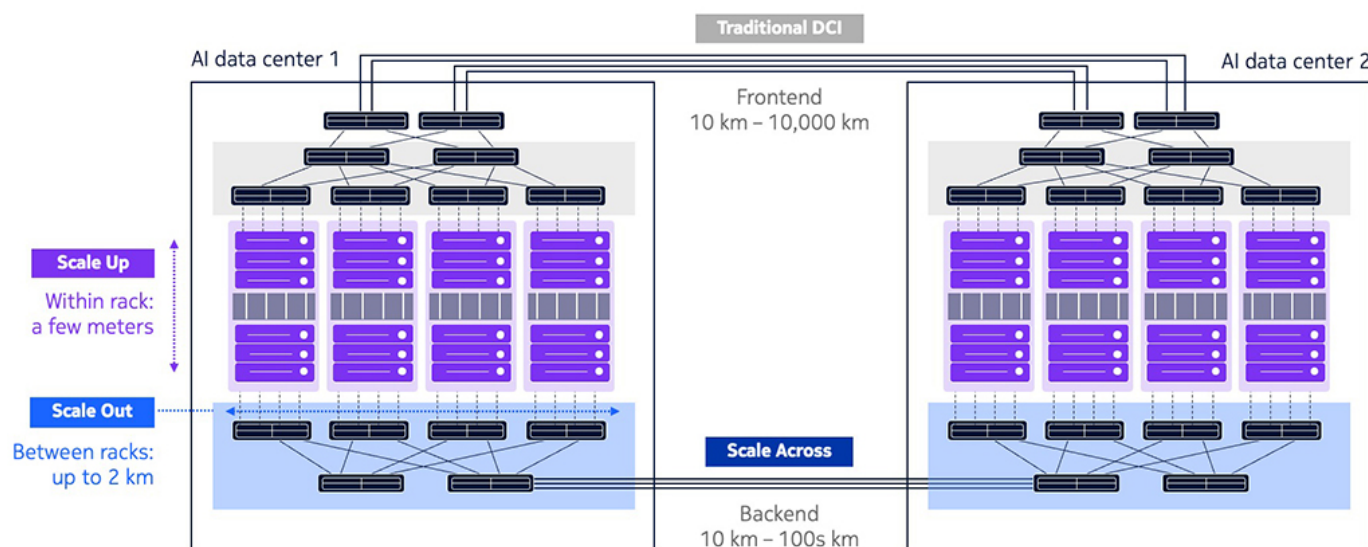
Alongside traditional DCI, which grew by more than 40% in the first quarter of 2026 alone, a specialised category has emerged: scale-across networking for back-end AI infrastructure. Driven by severe power

and space constraints inside individual facilities, hyperscalers are turning to scale-across architectures. This approach distributes massive graphics processing unit (GPU) and accelerator (XPU) clusters across geographically separated data centres, which are creating unified computational super-clusters over tens to hundreds of kilometres.

Unlike the range of legacy long-haul systems engineered for steady-state communications, scale-across connectivity demands a fine balance between reach, extreme burst-traffic bandwidth, low latency, and rapid operational deployment. Moving coherent engines to the network edge to support these clusters has been enabled by four major technical pillars:

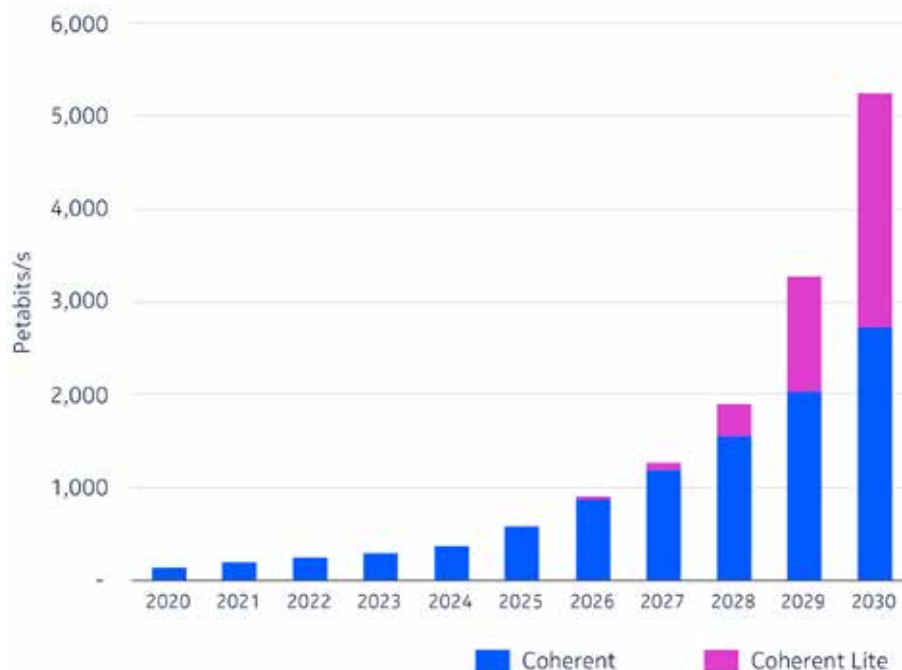
- Photonic integration and electro-optic miniaturisation: enabling drastically smaller, highly integrated optical engines.
- Advanced CMOS nodes: allowing richer

Nokia



Data centre scale paradigms – the technology is accelerating at pace

LightCounting, April 2026



The growth in bandwidth that's carried over coherent optics across this decade

“Historically, coherent technology was optimised for a very specific job: transmitting maximum capacity over thousands of kilometres. The story of the past decade is moving from that single architecture to many”

digital signal processing (DSP) capabilities inside tighter power envelopes.

- Pluggable form factors: simplifying deployment directly into host routers and switches without requiring standalone optical transport gear.
- DSP algorithms: improving spectral efficiency to extract maximum bitrates from existing fibre plants.

“The adoption of pluggables is being driven primarily by cloud and hyperscaler customers deploying them in high volumes for links under 100 km,” observes Xenos. “However, as technology matures, operators are actively planning to deploy pluggables across distances reaching up to 1,000 km in the near term.”

Bridging the gap with ‘Coherent lite’

As coherent technology approaches shorter reaches, the optical industry faces a steep cost and power barrier. For links between 10 km and 40 km, traditional ZR and ZR+ coherent optics prove unnecessarily complex, expensive, and power-hungry. Conversely, standard IMDD optics struggle with chromatic dispersion limitations and insertion losses at data rates of 800G and 1.6Tb/s.

To resolve this challenging middle-mile friction, vendors are developing ‘coherent lite’ – an architectural simplification that is designed explicitly for high-capacity, short-reach links.

“Coherent lite drastically simplifies the DSP architecture by removing or scaling back heavy chromatic dispersion compensation, which is unnecessary over shorter distances,” Shore explains. “It also reduces hardware costs and power

consumption by swapping expensive, tunable lasers for fixed-wavelength designs and operating in the O-band spectrum near standard single-mode fibre’s zero-dispersion region.”

By paring back unnecessary long-haul processing, coherent lite delivers the receiver sensitivity and phase information of coherent detection while approaching the low cost, latency, and power profile of direct detection. This creates two immediate deployment sweet spots across modern facilities:

1. Campus DCI and scale-across AI networks: interconnecting distributed data centre buildings across 10–40 km campus environments without installing costly optical amplification infrastructure.
2. Optical circuit switching (OCS) integration: modern data centre architectures incorporating dynamic OCS matrixes introduce significant optical insertion losses across switching nodes, often exceeding IMDDlink budgets. Coherent lite provides the requisite receiver sensitivity to overcome these losses without incurring the power penalty of full-performance coherent transceivers.

Coherent versus IMDD – a complementary toolkit

Despite coherent’s rapid expansion toward the edge, it is not slated to replace IMDD entirely. For intra-data-centre connections under 2km (such as server-to-switch and top-of-rack links), IMDD remains inherently simpler, cheaper, and lower power. Instead, ➤

Bit rate	800 Gb/s	1600 Gb/s	2400 Gb/s
CMOS process	3 nm	2 nm	2 nm
Baud rate (GBaud)	140 GBaud	260 GBaud	+270 GBaud
Reach at maximum rate (km)	1,700 km	1,500 km	700 km

Coherent optics evolution – from a single purpose transport solution into a versatile, modular toolkit

“Coherent lite drastically simplifies the DSP architecture... achieving the superior data capacity and receiver sensitivity of coherent modulation at lower cost and power”

- > coherent enters the frame precisely when IMDD hits physical limits, particularly as port speeds scale to 1.6Tb/s and beyond. At these ultra-high baud rates, pulse broadening from chromatic dispersion degrades IMDD reach rapidly, making coherent mandatory for campus-length links. Furthermore, coherent offerings themselves are diversifying into distinct structural tiers to match varying network economics:
- Performance-optimised transceivers: operating at 1.6Tb/s per wavelength with custom, high-gain DSPs, these units maximise spectral efficiency over subsea, long-haul, and dense metro DCI routes. They deliver up to 50% more capacity per fibre than standard pluggables, making them ideal for neoscalers and operators facing severe fibre constraints.
 - 800G and 400G coherent pluggables: form the flexible workhorse for router-integrated DCI, campus networks, and regional AI cluster interconnection. Modules like 400G ZR/ZR+ (such as Ciena's WaveLogic 5 Nano) allow operators to plug optics directly into switches, bypassing traditional transponder chassis.
 - Full-spectrum transponders: deliver a single-fibre output that fills the entire C-band spectrum out of a single device. Developed specifically for hyperscalers needing to turn up tens or hundreds of dark fibres rapidly, these systems prioritise turn-up velocity over granular channel tuning.

Engineering the next-generation envelope

Scaling coherent technology to keep pace with AI data demands presents fierce component-level physical constraints. Higher symbol rates (exceeding 260 GBaud) and sub-2nm CMOS DSPs dramatically increase power density inside tiny, hot-pluggable module footprints. At these high frequencies, electrical signal attenuation between the DSP and the

analogue optical modulator increases significantly, placing strict demands on signal integrity.

Overcoming these bottlenecks requires a tight convergence of emerging material science and thermal engineering:

- Advanced photonic materials: shifting toward materials such as Thin-Film Lithium Niobate (TFLN), Indium Phosphide (InP), and advanced Silicon Photonics (SiPh). TFLN and InP offer exceptionally high electro-optic bandwidth and linearity with low drive voltages, reducing thermal dissipation in the optical sub-assembly.
- Alternative form factors and cooling: standard QSFP-DD and OSFP form factors are approaching their thermal limits. Next-generation 1.6T and 3.2T architectures will rely on wider thermal envelopes, such as OSFP1600-XD or XPO, alongside liquid cooling and direct-to-chip heat sinks to pull thermal energy away from high-density DSP packaging.

The strategic road ahead

As cloud providers, telcos, and enterprise operators adjust to the storage and compute demands of large-scale AI models, the historical boundaries between line-side transport and client-side optics are permanently dissolving.

“Coherent optics have entered a new phase of accelerated growth,” Shore concludes. “What began as a premium technology for long-haul transport has become the backbone of modern optical networking. With coherent lite now extending into shorter-reach data centre applications, its addressable market is expanding faster than ever.”

Ultimately, coherent optics has now evolved from a single-purpose transport solution into a versatile, modular toolkit.

The future of data centre and edge connectivity lies not in single-technology dominance, but in intelligent architectural selection, matching the appropriate coherent variant to the exact distance, density, power, and spectral constraints of the network. **FS**

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**FiBRE
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Sustainability in network infrastructure starts with smaller decisions

Net-zero goals matter, but real network sustainability often comes down to incremental, practical engineering wins, explains **Ed Solis**



Sustainability in network infrastructure is often framed in big terms. Net-zero goals. Renewable energy targets. New regulations. Major overhauls. While those conversations matter, some of the most meaningful progress happens in much smaller and less visible ways.

It happens in the way a product is built so it stays in place and doesn't need to be fixed again a few months later. It happens when an install kit saves time for a field crew, when a fibre system fits more capacity into the same footprint, or when

packaging shifts from plastic and foam to recyclable cardboard. It also happens in factories that reuse incoming materials, cut down on waste, and make shipping more efficient.

In telecom and data centre infrastructure, sustainability often comes from practical decisions that reduce waste, avoid repeat work and make better use of the assets that are already in place. Those decisions may not make headlines on their own, but repeated across thousands of deployments, they really add up. That broader mindset is increasingly

being formalised across a range of large manufacturers as well, with more attention on packaging reduction, product design and supply chain efficiency, rather than sustainability as a standalone initiative.

Better design can cut waste before it starts...

One of the clearest examples is product reliability. As demand for AI and 5G continues to grow, the industry is expected to add 13 million fibre miles by 2029. That scale makes even small installation issues more consequential. If a component isn't



On the latest estimates, the industry is currently predicted to add 13 million fibre miles by 2029

“For passive optical solutions, how a component is secured in the field matters”

installed securely or fails prematurely, someone may need to go back out to the site, diagnose the problem, replace the part and then restore the service. That means fuel, labour, time and – often – additional material use.

That's why design details matter. For passive optical solutions, how a component is secured in the field matters. A stronger, more stable installation means it's less likely to shift, come loose, or need to be fixed later. That ultimately helps crews avoid repeat trips, and fewer visits mean less waste and less strain on already stretched field resources.

Installation design matters, too. Kits that reduce labour time do more than improve workflow. They help crews complete work more efficiently and reduce the time and effort required for each deployment. In an industry where labour availability is often a challenge, efficiency isn't just an operations issue. It's also part of the sustainability equation.

The advantage of passive optical technology

Passive optical technology offers another practical advantage: it doesn't require electrical power to do its job. Optical passives operate in the optical domain, with light in and light out. In a sector under constant pressure to manage energy use, that matters. Not every gain comes from a new source of power. Sometimes, it comes from using less of it in the first place.

Power distribution is evolving in the same practical direction. Intelligent data centre power systems, including technologies like nrgILS, give operators more visibility and control over power conditions at the circuit level. That can help teams prioritise loads, adjust remotely and reduce the need for on-site intervention when issues occur. Fewer truck rolls mean lower fuel use, less labour and a smaller operational footprint over time.

These systems can also help identify equipment that may be idle during parts of the day, making it easier to reduce unnecessary power use and ease strain on upstream energy resources.

There's also the question of density. Space isn't free, whether the setting is a field enclosure, a telecom room or a data centre. Products with a smaller footprint can help operators get more use out of

the housings, chassis and closures they already have. High-density fibre systems push that even further by allowing more capacity in the same amount of space.

At Amphenol Network Solutions, for example, we position our data centre portfolio around scalable, space-efficient infrastructure designed for modern deployments. Product designs are often engineered through close collaboration with customers, where real-world installation challenges and operational constraints help shape the final solution. That feedback loop helps ensure systems are not only easier to deploy, but also reduce repeat work, material waste and unnecessary energy use over time.

That kind of design doesn't just support growth. It can help delay unnecessary expansion, reduce material demand and make better use of existing infrastructure.

Less visible decisions matter

At companies such as Amphenol, which is our parent company, sustainability often comes down to the less visible choices that shape how infrastructure is built and supported over time.

It can mean designing products that stay secure after installation, so crews are less likely to return to fix the same issue twice. Customer input helps ground those decisions in real-world conditions, from more reliable designs that reduce truck rolls, to zero-power optical passives, to packaging and sourcing choices that cut down on material use and waste. It can mean reducing packaging, choosing more recyclable materials, sourcing components we need closer to the manufacturing site and reusing materials that might otherwise just be discarded.

None of those moves qualifies as a headline-grabbing innovation. But, together, they point to a more useful way to think about sustainability in network infrastructure: not as a single breakthrough, but as a steady accumulation of practical decisions that reduce waste, limit inefficiency and make the broader system work better. **FS**

Ed Solis is VP of Global Marketing at Amphenol Network Solutions

PCSEL technology debuts in real-world FSOC trial

Dr Richard Taylor discusses how Vector Photonics and Fraunhofer CAP have demonstrated PCSEL technology in a real-world free-space optical communications trial across the River Clyde in Glasgow



On 31 March this year, photonic crystal surface emitting lasers (PCSELs) were used to transmit data over a distance of 500m outside of a laboratory environment.

The milestone represents the first public demonstration of PCSEL technology for free-space optical communications (FSOC), opening up new deployment options for high-speed,

secure optical links between buildings, campuses, and satellite nodes without reliance on fibre cabling or RF links.

PCSELs represent an all-semiconductor laser architecture that combines the high output power of edge-emitting lasers with the speed, low cost, and surface emission of vertical-cavity surface-emitting lasers (VCSELs). They offer several operational advantages over

conventional diode sources:

- **High single-mode power**

Featuring a larger active area than standard VCSELs, PCSELs achieve higher single-mode output powers, making them well suited for scalable, high-speed optical links.

- **Surface emission**

Emitting perpendicular to the substrate simplifies surface mounting onto PCBs

Fraunhofer CAP / Vector Photonics



Signals were beamed across the River Clyde from the Glasgow Science Centre to the Clydeside Distillery

and eases integration into broader electronic assemblies.

- **Low beam divergence**

Narrow, high-brightness beam profiles with low divergence reduce or eliminate the need for complex external beam-shaping optics.

- **Wavelength flexibility**

Coverage spans from the ultraviolet to the far infrared, enabling diverse deployment scenarios.

- **Semiconductor manufacturing compatibility**

As an all-semiconductor device, PCSELS leverage established, volume semiconductor fabrication processes.

While PCSELS offer immediate promise for secure, free-space optical communication systems where signal loss over distance must be minimised, their broad spectral range also extends to artificial intelligence (AI) data centre interconnects, lidar systems, and additive manufacturing.

Demonstrating open-air FSO across the River Clyde

Until recently, PCSEL architectures remained largely confined to academic research. University of Glasgow spin-out Vector Photonics took the technology into real-world trial conditions to demonstrate its transition toward commercial viability.

Vector Photonics partnered with the Fraunhofer Centre for Applied Photonics, UK (Fraunhofer CAP), an applied laser research organisation specialising in the design, testing, and characterisation of optical modules. Funded by Innovate UK under the Contracts for Innovation: Future Telecommunications Challenge Phase 2, the eight-month project was named 'Hoplite'.

The open-air demonstration used a Fraunhofer-built communications platform powered by Vector Photonics' indium phosphide (InP) semiconductor PCSELS on an overcast afternoon in Glasgow, Scotland.

Signals were beamed across the River Clyde from the Glasgow Science Centre to the Clydeside Distillery, a fitting backdrop connecting the historical Clydeside Distillery Pumphouse (which once operated the swing bridge for Queen's Dock via signal lamp concepts pioneered by Vice-Admiral Philip Howard Colomb) to modern optical engineering.

Exceeding expectation: 500m data transmission in Glasgow

The system achieved a data transmission rate of 50Mb/s, sufficient to stream two 1080p high-definition video feeds simultaneously. While modest compared to fibre-bound networks, this exceeded the project's baseline target by 100%,

with data rates primarily constrained by driver electronics that were designed within the condensed eight-month development window.

Unlike competing research projects, Vector Photonics' PCSELS utilise a proprietary all-semiconductor structure within the photonic crystal region. Future trials aim to expand performance to 1 GHz data rates over 1km distances in real-world conditions.

Dr Gerald Bonner, Principal Researcher at Fraunhofer CAP, commented on the trial: "This project has been a great opportunity to deploy Fraunhofer CAP's capabilities in the engineering of optical systems to assist Vector Photonics in demonstrating the growing maturity of PCSELS and the potential of this important new diode laser technology in the field of optical communications."

Elena Kniazeva, who is the Senior Programme Manager at Technology Scotland, added: "Technology Scotland was delighted to witness firsthand the successful demonstration of Vector Photonics' technology. This project, delivered in collaboration with the Fraunhofer CAP team in Scotland, highlights the strength of partnership-driven innovation within our sector."

David Fulton, Chartered Patent Attorney and Director at Lincoln IP, noted: "I was really impressed by the demonstration of the potential for PCSELS as a source for free-space data transmission. It is amazing to see how far this technology has developed in such a short period of time."

The next steps: a scaling and foundry strategy

Vector Photonics is currently transitioning from start-up to scale-up phase. With the core design concept validated in open-air conditions, development efforts are now focused on scaling optical output power and establishing high-yield, reproducible manufacturing processes.

A central pillar of the commercial strategy includes the qualification of two commercial fabrication facilities across Europe and North America to establish a resilient supply chain.

In time, these foundries will supply initial device volumes for a period of rigorous quality and reliability testing, prior to customer sampling across data centre, terrestrial FSO, satellite, and defence markets. **FS**

“The system achieved a data transmission rate of 50Mb/s, sufficient to stream two 1080p high-definition video feeds simultaneously”

Dr Richard Taylor is CEO and founder of Vector Photonics

Intelligent network operations: a new playbook for telcos



Buddie Ceronie, Chief Commercial Officer at VertiGIS, outlines how telecoms operators can use unified network intelligence and GIS to optimise fibre rollout and cut costs

Telecoms operators worldwide face intense pressure to cut costs, modernise networks, and deliver reliable services while accelerating nationwide fibre rollout. This challenge is especially visible in the UK, where one of the world's fastest fibre deployment programs is underway.

Driven by Project Gigabit and major commercial investment, the UK is moving quickly toward universal gigabit coverage. Physical infrastructure

access (PIA) is central to this progress, enabling shared ducts and poles to reduce duplication, speed up rollout, and enhance asset visibility.

Across the Atlantic, operators in the United States and Canada face similar commercial and operational pressures, but within more decentralised frameworks. Both countries have access rules for poles and ducts, but neither mandates the deep physical-infrastructure sharing or asset-record

transparency that is currently seen in the UK. Yet the direction of travel is, of course, identical: fibre is becoming strategic national infrastructure.

Operators that can see, manage, and optimise their physical networks with precision will be the ones able to scale efficiently, control costs, and deliver the resilient digital foundations that modern economies now depend on.

When several networks depend on the same ducts, poles, and underground



Operators face growing pressure to modernise networks while accelerating nationwide fibre rollout

“Operators that can see, manage, and optimise their physical networks with precision will be the ones able to scale efficiently”

pathways, any gaps or inaccuracies in asset records can slow builds, inflate costs, and increase the risk of outages. This means fibre expansion is no longer just an engineering challenge; it is a data-integrity challenge, where the quality of asset information directly determines the speed and efficiency of national rollout.

The global fibre race is redefining telco expectations

The scale and complexity of today's networks demand intelligent planning, real-time visibility, data integrity, and seamless coordination across engineering, operations, and field teams. As fibre footprints expand and legacy networks continue to age, the ability to anticipate issues, model scenarios, and act decisively becomes a core competitive advantage.

A new generation of integrated design and management tools is reshaping how telcos approach these challenges. By embedding standardised planning capabilities directly into network design workflows, operators can significantly reduce manual engineering effort and ensure consistent, high-quality outputs across teams. This shift not only accelerates deployment but also reduces the risk of costly rework: a critical factor when you consider margins are tight and expectations are high.

One of the most important advancements is the ability to link physical infrastructure with logical data transmission services. This connection gives operators a clear view of how planned or unplanned network changes affect customer services, enabling faster decision-making and minimising disruption. Enhanced operational visibility also supports more effective change management, allowing teams to simulate outages, assess risks, and coordinate tasks before work begins. In an environment where even minor errors can cascade into major service impacts, this level of foresight is essential.

Scenario planning further strengthens strategic decision-making. By comparing multiple build or upgrade options, including cost, performance indicators, and expected benefits, operators can confidently select the most efficient and impactful approach. This capability is especially valuable when navigating the trade-offs between maintaining legacy assets and investing in new fibre infrastructure. Ultimately, network investments get optimised too.

Smarter operations demand integrated, real-time network intelligence

At the heart of these capabilities is a comprehensive telecommunications data model, stored within a central system

that precisely represents every aspect of the network. This model forms the single source of truth, capturing both the physical infrastructure and the logical service relationships that define modern telecom operations.

Surrounding this core, multiple interfaces enable users to interact with the same data in different ways: a geographic (GIS) view for spatial context and field-based workflows, and a schematic view for understanding network topology and service flow. Together, these perspectives give engineers, planners, and operations teams a complete and consistent understanding of the network, ensuring that every decision is based on accurate, connected, and up-to-date information. This in turn means the data the boardroom is viewing is consistent and can be relied upon for strategic choices.

Modern telecom network philosophy

This is precisely the philosophy behind modern telecom network inventory software, which exemplifies how unified network models can really bring field operations and engineering teams onto the same page.

When planners and field engineers work from a single source of truth, discrepancies between design, documentation, and execution are dramatically reduced. The result is improved accuracy, faster deployment timelines, and a more resilient network without compromising the vendor-neutral principles that operators increasingly expect from their technology ecosystems.

Unified network intelligence enables proactive, data-driven operations

Together, these capabilities form a powerful foundation for proactive, data-driven network maintenance. They help telcos evolve their networks efficiently while safeguarding service quality and customer experience. As fibre becomes the backbone of national digital infrastructure, operators that embrace smarter operations, powered by integrated data, unified models, and GIS-driven intelligence, will be the ones that are best positioned to meet rising expectations and build the resilient networks of the future.

This is what “from the field engineer to the boardroom” means in practice: a unified, accurate, and continuously updated view of the network that supports every role, every workflow, and every strategic decision. **FS**

Buddie Ceronie is Chief Commercial Officer and Global MD Telecommunications at VertiGIS

How network operators can monetise data to boost ARPU

Aleksandr Moskotin details a three-step playbook for telecom operators to transform from basic connectivity providers into high-yield intelligence platforms



For more than a decade, the phrase 'dumb pipe' has been the telecom industry's most uncomfortable truth. Operators built the highways of the digital economy, laying fibre, deploying spectrum, and engineering 5G networks, only to watch the value accrue to the platforms riding on top of them.

Netflix, Google, Meta, and Amazon generate billions in revenue from content and advertising delivered over networks that operators built and maintain, whilst those operators compete on price for a commodity service.

The data tells the story starkly, of course. Global telecom service revenue is projected to grow at a modest 2.8% CAGR to \$1.32trn by 2029, whilst mobile ARPU is expected to tick down marginally to \$6.20 in 2029 from \$6.32 in 2024. The structural challenge is real: usage is soaring, but willingness to pay is flat. Something has to change.

The good news to share is that something is now changing. A growing number of operators are successfully executing the transformation from connectivity utility to intelligence platform. The playbook is becoming clearer, and the results are measurable.

Step 1: Recognise the asset

The first step is recognising that the network itself is a data asset of extraordinary value. Every day, mobile networks generate petabytes of high-frequency, real-time data, including location signals, device behaviour, usage patterns, application preferences, and movement data. This data is consented (subscribers agree to terms of service) and it is network-verified, meaning it cannot be spoofed or fabricated.

Vodafone Analytics, which packages



SOMCHAI DAENGNGAM / Shutterstock

A growing number of operators are successfully executing the transformation from connectivity utility to intelligence platform

anonymised location data for retailers, event organisers, and city planners, is a prime example of an operator recognising and monetising this asset. Orange Business has gone further, building a suite of big-data and AI-based solutions for enterprise clients across finance, healthcare, and logistics.

Step 2: Build the architecture

Recognising the asset is not enough. The technical challenge of turning raw network data into monetisable intelligence is substantial. Modern telecom networks generate data from

Call Detail Records (CDRs), OSS/BSS systems, Deep Packet Inspection (DPI) solutions, location systems, and subscriber-management systems. These streams are complex and often siloed. Building the data ingestion, transformation, and storage pipeline required for effective analytics is a multi-year, capital-intensive undertaking.

We have spent years building the foundation for this shift. Our AI-based data-monetisation platform doesn't just 'process' data; it enriches it, categorises it, and monetises it with precision. We are already seeing a 5% ARPU increase



Every day, mobile networks around the globe generate petabytes of high-frequency, real-time data

“A growing number of operators are successfully executing the transformation from connectivity utility to intelligence platform”

for our partners by moving away from indiscriminate billing toward intelligent, AI-driven engagement. The future of telco revenue isn't in charging more for less; it's in understanding the intent behind every byte of data.

For operators who have decided they want to move faster, the alternative is to partner with specialised platforms that bring pre-built ML infrastructure. The key architectural principle here is that raw personal data must never leave the operator's secure perimeter.

In-network ID approaches, where machine-learning engines operate within the operator's environment and generate pseudonymous tokens representing audience attributes, allow operators to participate in the programmatic advertising ecosystem without exposing subscriber PII. This approach satisfies both regulatory requirements and advertiser demand for high-quality, fraud-free audience data.

Step 3: Operationalise the revenue

The final step is the hardest: turning data intelligence into recurring, scalable revenue. The most successful models are performance-based. Rather than selling raw data, which creates regulatory and reputational

risk, operators are delivering targeted campaigns (via SMS, RCS, IVR, or in-app) on a cost-per-acquisition (CPA) or revenue-share basis. This, of course, aligns the operator's incentives with the advertiser's outcomes and eliminates the risk of data misuse.

Operators using this approach have demonstrated ARPU increases of up to 5%, which is a significant achievement in a market where ARPU is otherwise declining. The key is the combination of machine-learning precision (identifying the right audience at the right time), channel optimisation (delivering via the most effective medium), and continuous feedback loops (using campaign results to improve future targeting).

The transformation from dumb pipe to intelligence platform is not a destination; it is a continuous journey. But the operators who are furthest along that journey are already demonstrating that the data flowing through their networks is worth far more than the connectivity fees they charge to carry it. **FS**

Aleksandr Moskotin is co-founder and CEO of afina, an AI/ML data-monetisation platform

Connected Britain 2026: infrastructure investment, AI scaling and the digital divide

Keely Portway previews the key trends, debates, and talking points set to dominate the UK's digital economy event

Connecting Britain returns to ExCeL London on 9-10 September 2026 as UK broadband infrastructure confronts defining challenges. With 8,000 industry professionals, 450 speakers and 300 exhibitors gathering across 14 content themes, the conference will examine how operators, local authorities and infrastructure investors are translating policy ambition into practical deployment at unprecedented scale.

The event arrives at a critical juncture. UK government connectivity targets have driven substantial infrastructure investment across regional operators, alternative network providers and municipal initiatives. Coverage has expanded dramatically. Yet fundamental challenges persist. For example, how do operators manage capital efficiency during aggressive expansion? How are skills shortages constraining deployment? And critically, how does UK infrastructure evolve to support emerging AI and data centre interconnect requirements?

These questions will dominate discussion across two days of terrific programming reflecting genuine complexity facing infrastructure professionals.

Data centre infrastructure becomes a mainstream topic

For the first time, Connected Britain will feature dedicated data centre programming reflecting how AI infrastructure has moved from being a hyperscaler-specific concern, toward broader industry imperative. The Data Centre Forum track directly addresses the emerging bottlenecks and investment patterns that are driving hyperscaler infrastructure expansion.

Sessions examine immediate practical challenges. One key discussion explores whether current fibre networks can support AI's relentless demands, asking whether the industry is innovating fast enough and what core infrastructure constraints exist. Another addresses the 2030 vision for data centre operations, examining how AI is reshaping optical transmission, design and day-to-day management. Additional sessions interrogate power consumption, energy efficiency and the extreme density increases hyperscalers are demanding.

This programming reflects recognition that data centre infrastructure is no longer a peripheral concern for connectivity professionals. As hyperscalers expand AI infrastructure across UK regions, data centre connectivity requirements influence how operators approach network architecture, optical technology choices and capital allocation.

The Data Centre Driven Economy track extends this discussion toward investment and business strategy. Sessions examine what's driving data centre growth zone investment, why particular regions attract capital, and how public-private partnerships



Approximately 300 exhibitors will again showcase their technology during the two-day event, which remains the critical show for the UK digital economy market

influence infrastructure funding. Discussion at the show explores whether current data centre expansion reflects genuine long-term demand or short-term hype, and how investors and operators should assess overcapacity risk.

Operators and major vendors define infrastructure strategy

Headline speakers at the show span the UK infrastructure ecosystem. Neil Smith, TalkTalk Chief Operating Officer, will participate in customer strategy discussion examining just how operators are shifting focus from acquisition toward retention amid competitive intensity. His involvement at the event reflects TalkTalk's continued infrastructure investment across residential and business markets.

Chris Williams, Community Fibre Chief Information Officer, will contribute to sessions examining network consolidation challenges. Community Fibre's aggressive expansion as alternative network operator provides a relevant perspective on integrating legacy infrastructure, unifying networks and avoiding service disruption during transformation.

Conal Henry, Fibrus Chair, will participate in regional development discussion, offering viewpoints from successful alternative providers serving rural markets. Fibrus's experience deploying infrastructure across challenging terrain and managing complex funding structures provides practical insight into rural deployment economics.

These operator perspectives will be complemented by a range of vendor voices from established infrastructure companies. CityFibre Chief Technology Officer Neil McRae will address network consolidation discussion, examining the technical hurdles when integrating diverse network

infrastructure and how standardisation post-merger impacts operational efficiency. His experience managing large-scale network integration directly addresses practical challenges operators face.

Rural connectivity and digital inclusion remain central

Despite progress over the past two years, rural digital divide persists. Connected Britain programming extensively addresses ongoing challenges and emerging solutions. One substantial discussion examines connecting hard-to-reach communities, exploring why shared infrastructure and small cell models work in some contexts but not others, what planning barriers still exist, and whether government initiatives have effectively narrowed rural-urban connectivity gap.

Related sessions address digital exclusion more broadly. Discussion of digital dignity and connectivity for temporary accommodation reflects recognition that infrastructure deployment must address social dimensions. With more than 130,000 UK households in temporary accommodation lacking reliable connectivity, sessions examine how providers can partner with housing associations to bundle connectivity with housing and how to provide refurbished devices supporting digital participation.

The analogue switch-off represents a critical policy milestone, of course. With copper network closure approaching, a series of sessions address how providers and local councils can bridge possible awareness gaps for vulnerable populations that are still using legacy technology. Discussion examines risks for elderly and isolated people still on copper networks and how mandatory upgrades can be

“Data centre infrastructure is no longer simply a peripheral concern for connectivity professionals”

- repositioned as an opportunity to deploy proactive health sensing technologies.

AI and emerging technologies define future infrastructure

Beyond data centres, AI discussion spans infrastructure strategy broadly. One keynote examines the UK 2030 vision for AI, innovation and productivity, asking what real-world use cases demonstrate automation delivering tangible efficiency gains and how the UK can convert frontier AI into measurable business growth.

The 6G discussion addresses the UK's research strategy and spectrum policy requirements for next-generation networks. Sessions at the show examine how the UK can bridge the gap between academic innovation and commercial deployment of the world-beating 6G ecosystem, what spectrum policies are needed for network-as-sensor capabilities, and the UK's role shaping future services.

Satellite integration represents another emerging theme. Discussion examines technical and commercial considerations for deploying satellite connectivity complementing terrestrial networks. Questions address direct-to-device satellite services timeline and potential for eliminating mobile black spots through non-terrestrial network deployment.

Skills crisis and workforce development

Persistent workforce challenge underpins much conference discussion this year. The telecom sector struggles attracting talent despite its critical infrastructure needs. One major session examines whether the sector can modernise culture, attract talent from outside telecommunications and create workplaces where the next generation of staff can really thrive.

Engineering apprenticeships discussion explores just how training models are adapting to the rapidly changing industrial landscape. Sessions at the show examine the bridge between education and industry, the shift toward digital skills, and what future work actually looks like for new recruits entering infrastructure roles.

The People, Skills and Recruitment Zone hosts employability clinics and development sessions, acknowledging that infrastructure deployment ultimately depends on human capability. Discussions at Excel address recruitment, retention, diversity and inclusion within the telecommunications sector.

Sustainability and the goal of net-zero infrastructure

Environmental considerations increasingly influence infrastructure investment. Sessions examine practical steps operators are taking to reduce emissions and transition toward circular supply chains. Discussion addresses how AI optimises

Total Telecom



8,000 industry professionals are expected to attend Connected Britain at Excel

“Environmental considerations increasingly influence infrastructure investment”

power consumption while balancing the challenging energy demands of increased AI workloads themselves.

Emerging reporting standards and UK green taxonomies are shaping investment decisions. Sessions explore how sustainable finance mechanisms can support infrastructure investment aligned with net-zero objectives.

How to balance regional development and local investment

Regional development programming at Excel reflects the devolved nature of the UK infrastructure strategy. Scottish Government Digital Connectivity director Sarah Eynon will contribute to discussions examining how authorities align local objectives with national goals. Greater Manchester programming explores how public-private partnerships scale regions into AI and fintech hubs.

Local authority sessions will address current capacity constraints and what skills, governance and cultural shifts remain within local councils. Discussion examines the place leadership plays in a digitally enabled future and just what local government should prioritise next.

The regulatory environment and evolving policy direction

Ofcom representation and policy discussion will address the evolving regulatory framework. Sessions examine how regulation should evolve to support deployment acceleration, what universal service obligations mean for infrastructure investment, and whether residential broadband should receive different regulatory treatment as essential service.

The show's significance for infrastructure professionals

Connected Britain 2026 reflects the infrastructure sector at an inflection point. Policy ambition is substantial, capital is available and technology is capable, but execution remains a challenge. The conference will provide clarity on where the industry stands, highlight remaining obstacles and explore approaches enabling faster, more efficient deployment.

For infrastructure professionals, the London event again offers essential insight into operator strategy, the emerging technology requirements, current investment patterns and policy direction. We expect discussion will be pragmatic, grounded in practical execution challenges rather than theoretical possibilities. Operators will share deployment experiences and lessons learned. Vendors will showcase technologies addressing real infrastructure obstacles.

As UK broadband infrastructure transitions from planning toward execution at scale, Connected Britain once again serves as an essential forum for understanding how ambitious targets become practical reality. **FS**

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