OFC

The future of optical networking and communications

2024 Post-Show Report

An Overview of the Market

IEEE ComSoc™
IEEE Communications Society

IEEE Photonics Society

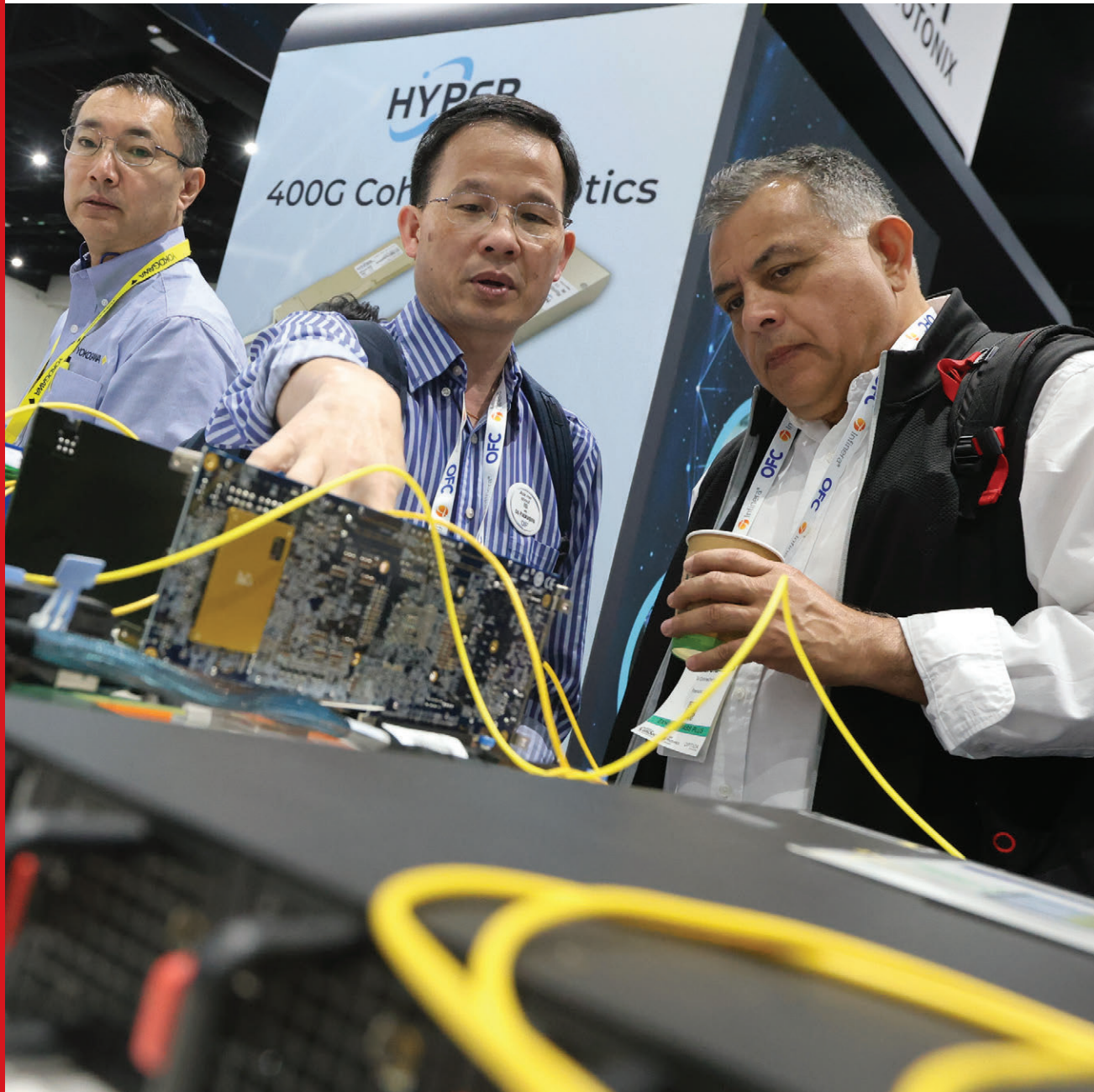OPTICA
Formerly OSA

Content

OMDIA

Omdia — Connecting the Dots

Omdia is a global analyst and advisory leader that helps you connect the dots across the technology ecosystem. Our deep knowledge of tech markets combined with our actionable insights empower organizations to make smart growth decisions.

Omdia has been covering OFC for more than 20 years and this post-show report is just another example of the work we do. Analysts from our optical networking, optical components and broadband access intelligence services cover all aspects of the technologies covered at OFC. In addition, Omdia has analysts who cover areas that affect the optics industry like telecom, service providers, cloud and data centers and enterprise networks. With our combined expertise, Omdia helps its clients navigate complex ecosystems and make concise strategies for their businesses.

1 Summary

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OFC 2024 attendance was back to pre-COVID levels with more than 12,500 people from more than 83 countries attending. Everyone was talking about AI and how it will revolutionize the optical networking industry. Some of the latest optical technologies were showcased in the over 630 exhibitor booths. In addition, OFCnet, which saw it's humble beginnings just two years ago, demonstrated a multi-national network that connected networking products, solutions and architectures from both academia and industry.

# 2 Highlights

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Highlights

OFCnet

This network spanned the exhibition floor connecting 14 different booths and the outside world through the SmartCity network to universities, research facilities and cloud services in Europe and the US.

OFCnet expects to expand this network in 2025.

The OFCnet network diagram captures the 20 live demonstrations by:

Anritsu

AUREA Technology

CESNET

Ciena/FABRIC/SDSC

Ciena/ID Quantique

Ciena/Toshiba

ICAIR/Northwestern University

IOWN Networking Hub

NEC/Verizon/OFS

Nokia/ID Quantique

Nucrypt/Quantum Opus

Open ROADM MSA/IOWN Networking Hub

Qunett/University of Maryland

Qunnect

QTI/Telsy/TIM/SM-Optics

University of Amsterdam

University of Bristol
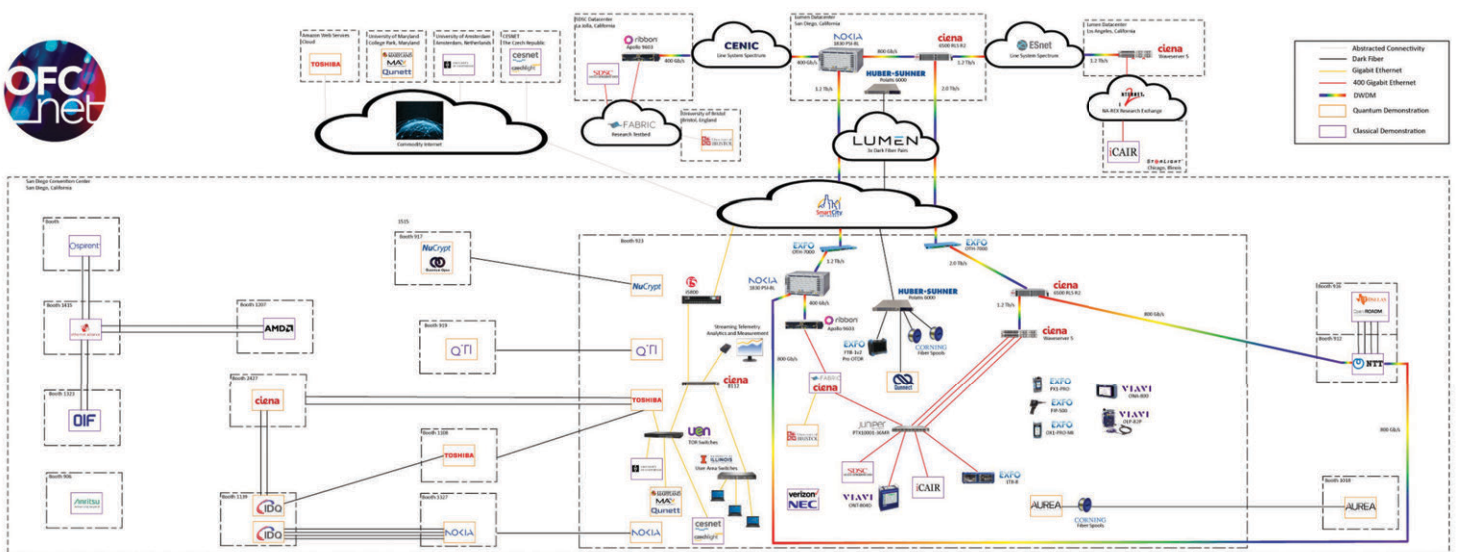
SOURCE: OPTICA

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Hottest Topic – AI

The hottest topic at OFC 2024 by far was AI. It was the underlying theme of nearly every presentation on the show floor and rightfully so. According to Omdia's recent research, AI backend networks alone have the potential to substantially increase the adoption of optical technologies in data centers large and small. Below is Omdia's current view of the AI backend network overall optical module volume forecast. The overall six-year CAGR is 34% with lower data rates like 100G and 200G declining and higher data rates like 400G, 800G and 1.6T increasing.

While this forecast is for transceivers to be deployed inside the data center, the growth inside will translate to growth between data centers and in the wide area network (WAN) as a whole as well. Evidence that this forecast is feasible was shown at OFC with the following companies highlighting their capabilities for 800G, 1.2T and 1.6T transceivers and technologies to support them.

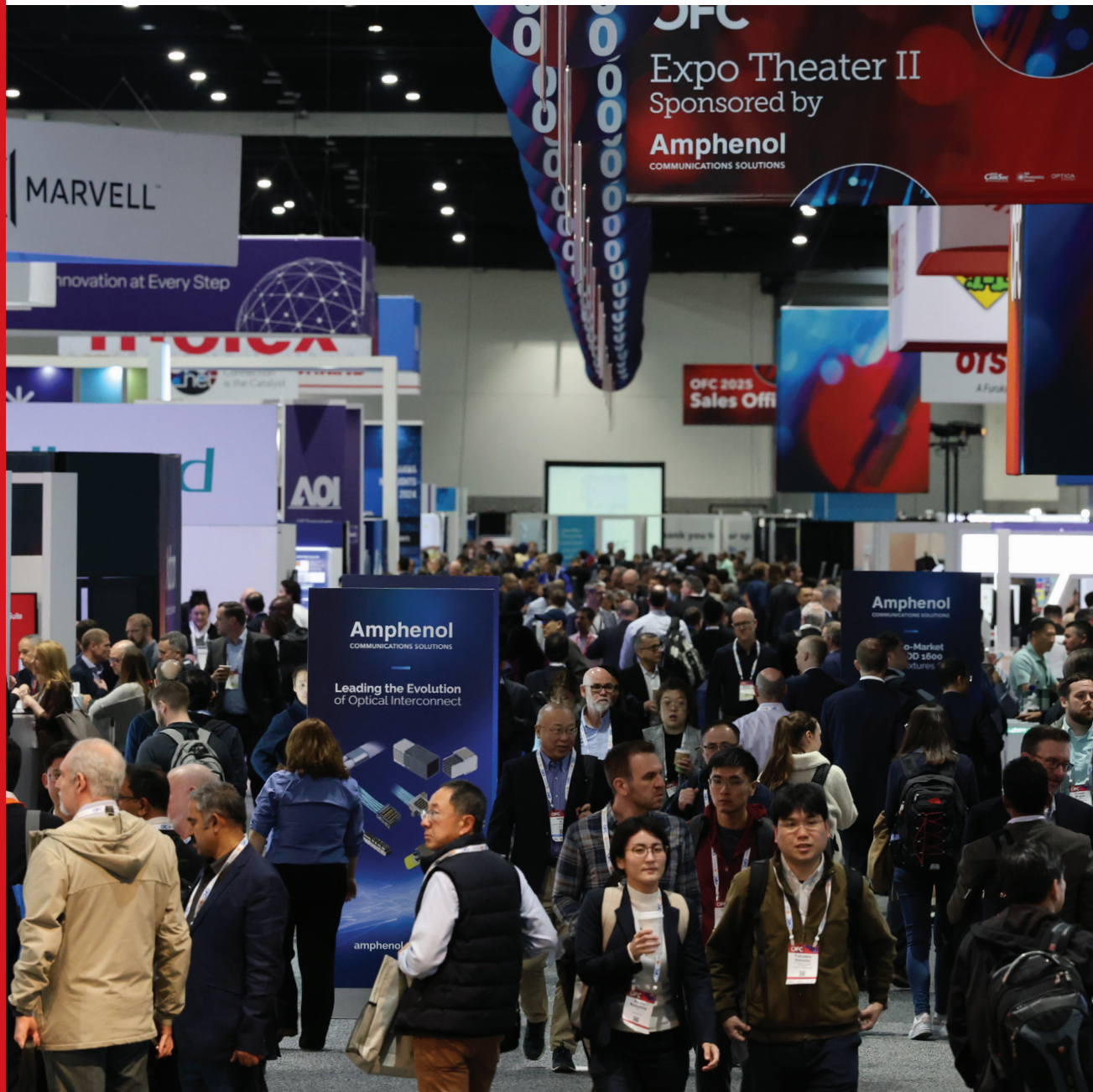**Total Optical Modules in AI Networks – Demand-side Analysis 2024**
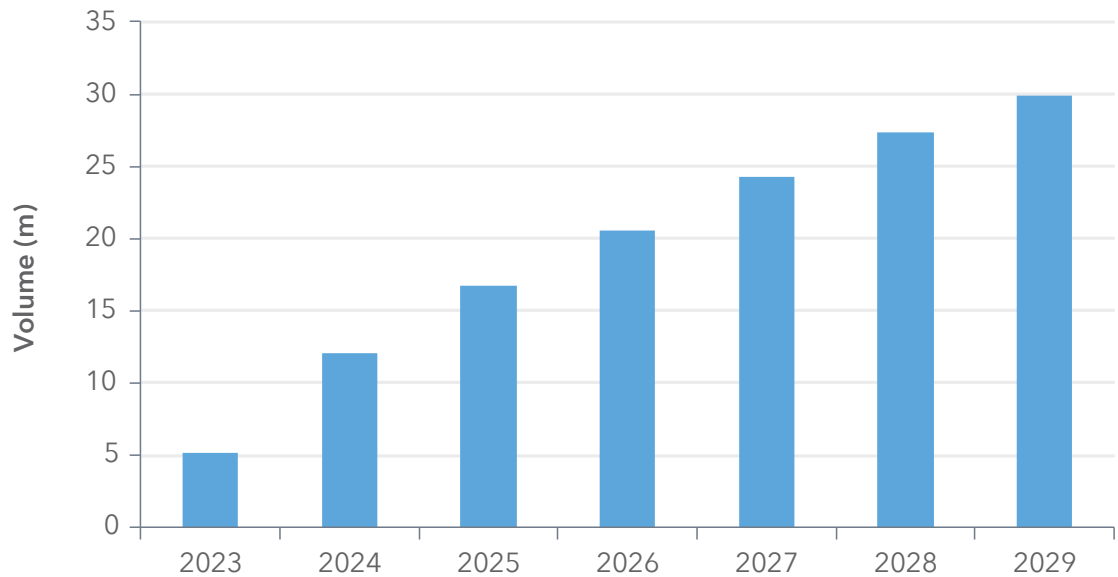
SOURCE: OMDIA

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3 Telecom Technologies and Companies to Watch

3

Telecom Technologies and Companies to Watch

800G- and 1600G-ZR

Now that 400G-ZR is in full production and deployment, 800G-ZR will be the next step for cloud SPs for their data center interconnect (DCI). These devices are expected to be commercially available starting in 2H24 with many optical component suppliers and network equipment manufacturers demonstrating it at OFC. Cisco/Acacia, Marvell, Ciena, Nokia, Infinera, Juniper and Ribbon all showed compliance to the OIF specification for 800G-ZR. The twist for this new technology is that it may need liquid cooling to actually meet the power efficiency goals. The OIF had several demonstrations of the technology in its booth at OFC and many vendors also had announcements of small deployments and demonstrations of it. These included Cisco/Acacia, Ciena, Juniper, Marvell, Nokia, Infinera and Ribbon.

While some network equipment manufacturers are focused on 1.2T, like Nokia and Fujitsu, others look towards 1.6T. 1600G-ZR or 1.6T-ZR was introduced by Microsoft for the OIF to begin work on late in 2023. This OIF project will define a power optimized solution for a multi-vendor interoperable 1600 Gbps coherent optical interface, with a focus on Data Center Interconnect (DCI) scenarios. Vendors supporting this include most of those listed above. In fact, at OFC 2024, Ribbon and Cisco showed their 1.2T systems were interoperable.

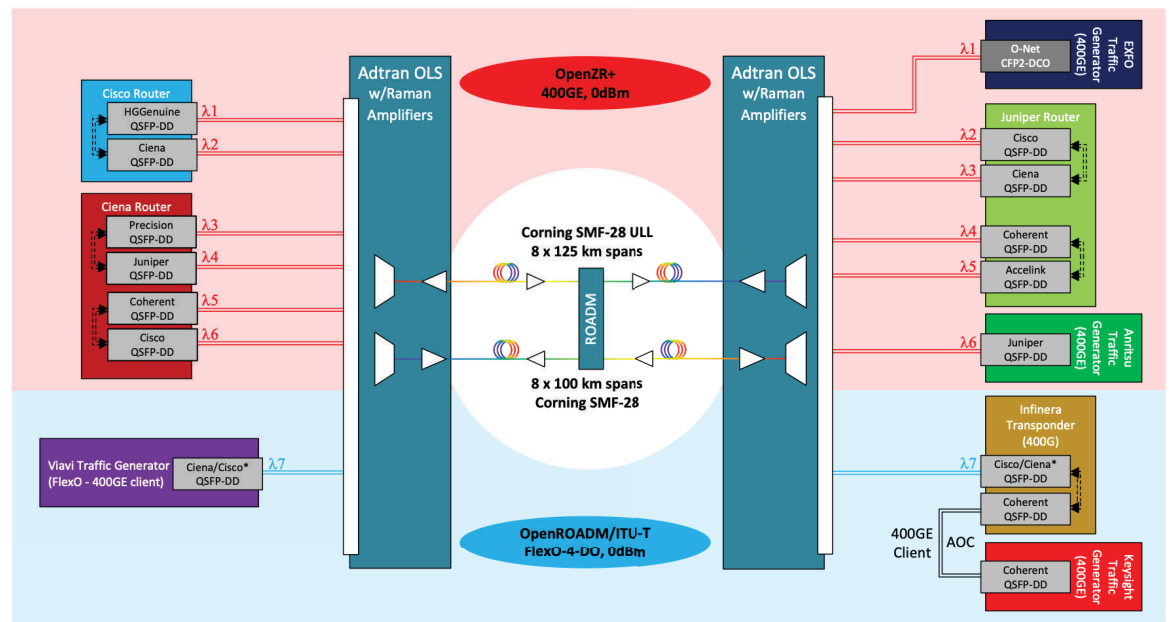# 3 Optical Internetworking Forum (OIF) Demonstrations

The OIF has been instrumental in showing interoperability of coherent technologies. At OFC 2024, they showed two demonstrations with multiple vendors. The multi-span interoperability demo included 400G-ZR, 0dBM solutions with the following characteristics:

• Two optical configurations
  – 1000km, 8 x125km, Corning Ultra Low Loss
  – 800km, 8 x 100km, Corning SMF-28

• Adtran Open Line System with Raman amplifiers

• Eight module vendors

• Hosted in three routers and four test equipment traffic generators

The setup is shown in the following diagram.

OFC 2024 Multi-Span Interoperability Demo

SOURCE: OIF

3

Optical Internetworking Forum (OIF) Demonstrations

The OIF 800G demonstration consisted of the following features:

- Single span interop with both 400G-ZR and 800G-ZR transmission
- 800G modules were hosted in three system test traffic generators and Juniper's PTX router
- Six module vendors participated utilizing both OSFP and QSFP-DD form factors

The test bed is shown in the diagram below.

Other Technologies

- The Telecom high-speed transmission evolution will start to include liquid cooling in both communications equipment and in pluggables.
- L-band has moved from a niche market to mainstream and S-band is being eyed for future expansion.
- Packet/Optical integration continues with multi-vendor/multi-domain control maturing. Programs in full swing include TIP MUST, OIF CMIS, Open ROADM.
- The Access market will see a proliferation of DSP suppliers. In addition, many proven technologies from the metro and long-haul networks will be to upgrade the old 1G/10G access network including 25G/50G/100G direct detect and 100G-ZR. These technologies, as always in the access market, will be optimized for operations and capex.

OFC 2024 Single-Span Interoperability Demo
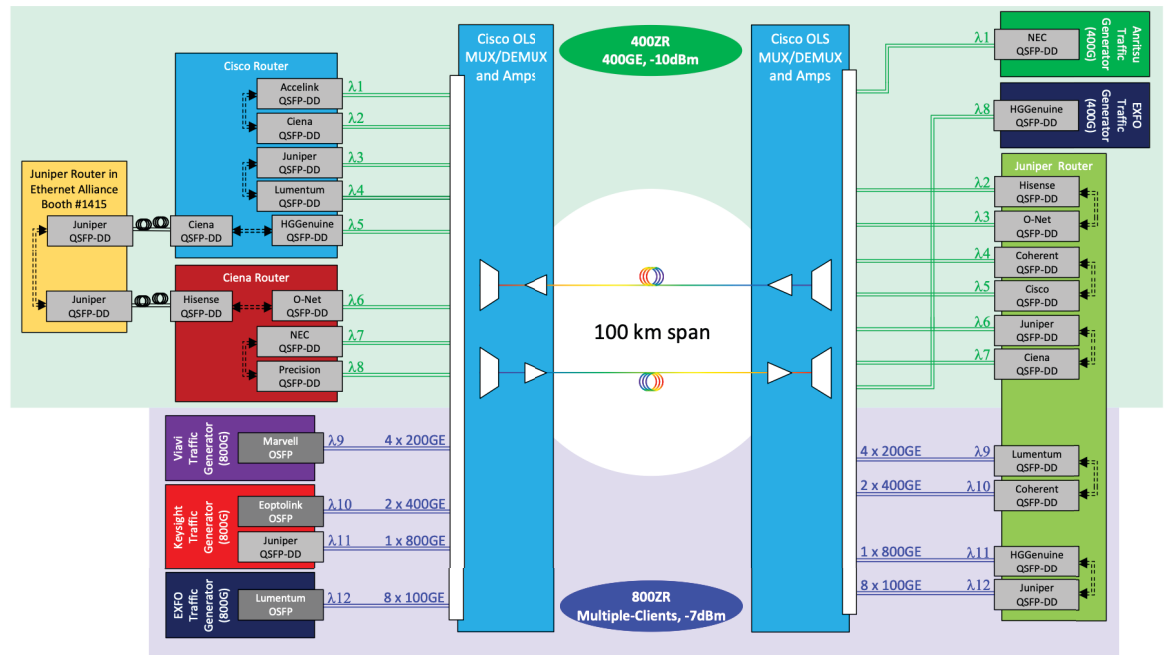
SOURCE: OIF

# 4 Datacom Technologies and Companies to Watch

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Datacom Technologies and Companies to Watch

AI and NVIDIA

The buzz around AI had a lot to do with NVIDIA's announcement about its Grace-Blackwell node board the week before OFC at its GTC 2024 event. In presentations on several OFC panels, Ashkan Seyedi, Principal, Silicon Photonics Products at NVIDIA stressed that its backend connections for its NVLink switch (scale up connections) will remain copper, while the AI network connection (scale out) is optical – currently 400G and quickly moving to 800G. Below is a snapshot of NVIDIA's Grace-Blackwell node board.
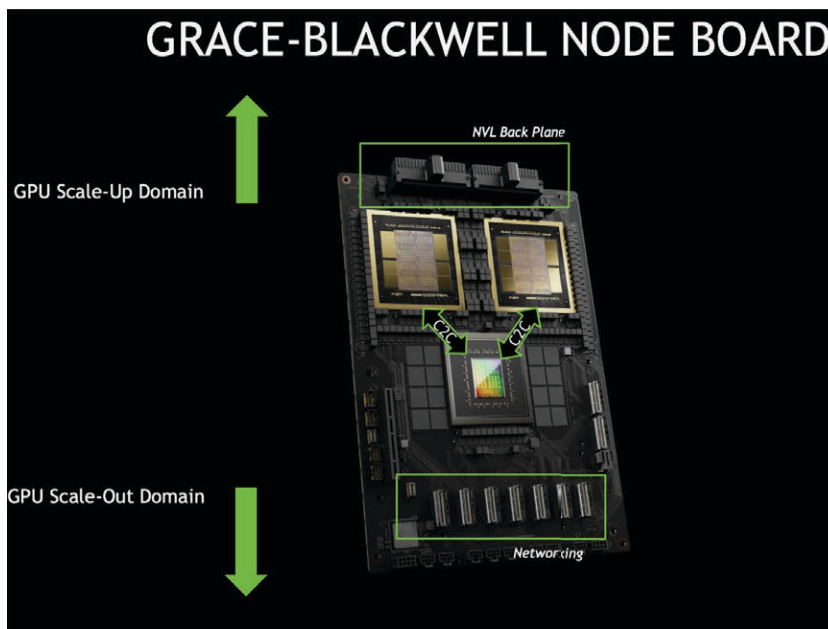
800G

With 400G variants in full operation inside the top cloud service provider (SP) data centers for almost three years now, 800G datacom variants are starting to see installations – mainly of the 2x400G type. This will accelerate in 2024 and beyond in order to support AI backend networks as well as the general Ethernet network that supports all data center workloads. All the top transceiver manufacturers are in full commercial deployment-ready status so now it's just a matter of increasing capacity in order to supply the demand that will be seen. These companies include Accelink, Applied Optoelectronics, Coherent, Eoptolink, Hisense Broadband, HG Genuine, Innolight, Lumentum (via Cloudlight acquisition) and Source Photonics.

1.6T

While there were a couple of demonstrations of 1.6T transceivers at OFC 2023, this year those demonstrations turned into 200G per lane and multi-vendor interoperability ones. Usually, this means that the data rate is ready for early deployment. This might be the case, but cloud SPs will not install a new data rate until they are assured that the capacity can keep up with the demand and that still needs to be proven. Omdia sees some early deployment starting in 2026 with a sharp uptick in the years to follow.

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Optical Circuit Switching in Data Center Networks

Ever since Google announced its OCS technology a couple of years ago, other cloud SPs have been toying with the idea inside their data centers. Rumor has it that Google itself may be shopping for an OCS supplier to take over its custom solution. Enter the AI boom and now the other cloud SPs are getting more serious about it as well – at least for its backend networks. Optical component suppliers are starting to respond. A prime example is the 300x300 OCS that Coherent demonstrated in its booth at OFC 2024.

Energy-efficient Interfaces

There has been excitement at OFC for several years now surrounding co-packaged optics (CPO). Last year this enthusiasm was tempered by the announcements surrounding linear-drive pluggable optics (LPO). However, there were still demonstrations showing its feasibility and several vendors continuing to develop it and at least one (Broadcom) that seems almost ready to release its product (albeit as a custom solution). The OIF showed four demonstrations of energy efficient interfaces that included both CPO and LPO. Below shows an overview of the demonstrations.

Interoperability Demonstrations:
Conceptual EEI (Energy Efficient Interfaces)
Showing examples of both Near-term and Long-term architectures

SOURCE: OIF

4

Ethernet Alliance (EA)

Every year at OFC the EA has demonstrations to show interoperability between vendors and backward compatibility between data rates. In 2024, the following suppliers participated: Anritsu, Alphawave Semi, AMD, Amphenol, Arista, Cisco, EXFO, Hyper Photonix, Juniper Networks, Keysite, Marvell, Multilane,

Panduit, Spectra7, Spirent, Synopsis, TE Connectivity,Teledyne Lecroy, Wilder Technologies and VeEX. Below is a diagram of the speeds and feeds demonstration.

Providing further evidence that there are multiple vendors that can supply 800G transceivers to the market.
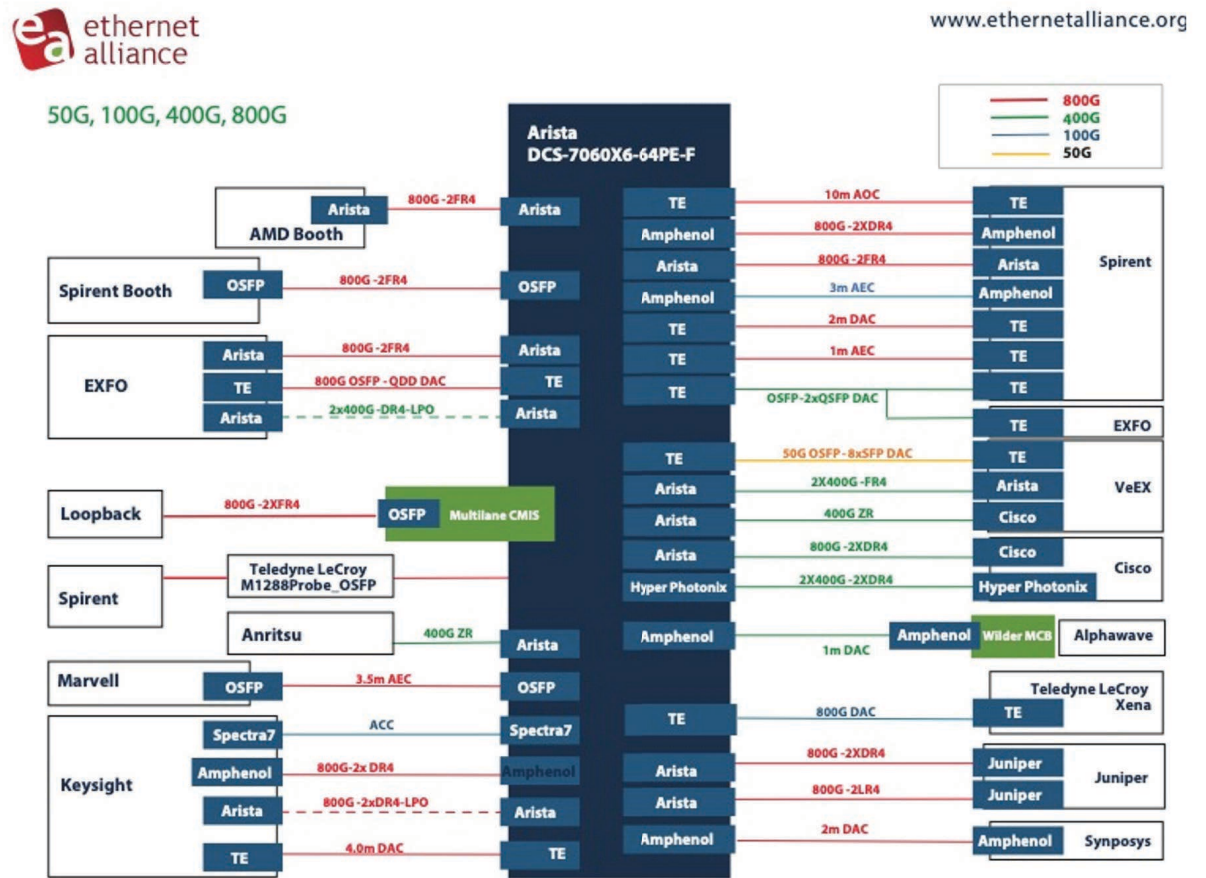
SOURCE: ETHERNET ALLIANCE

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Save the Date

OFC is moving to San Francisco in 2025.

Technical Conference: 30 March – 03 April 2025
Exhibition: 01 – 03 April 2025

Moscone Center
San Francisco, California, USA

OFCConference.org

IEEE ComSoc
IEEE Communications Society

IEEE Photonics Society

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