

# Optical transceivers: co-packaged optics and Chinese players are supporting the growth<sup>1</sup>

## OUTLINE:

- **Market forecasts:**  
Revenue generated by optical transceiver market is expected to reach US\$20.9 billion in 2026, at a CAGR<sup>2</sup> for 2021-2026 of 14%.  
This growth is driven by high data rate modules adoption, big cloud service and national telecom operators...
- **Technology trends:**  
Three material platforms are used in today's optical transceivers: GaAs<sup>3</sup>, InP<sup>4</sup> and SiPh<sup>5</sup>.  
Technology is linked with other optical communication solutions, together forming an eco-system.  
Today's challenges are to reduce size, and decrease power consumption while increasing data throughput.
- **Supply chain:**  
The ecosystem might be changed completely.  
COVID-19 affected optics manufacturing globally: China and other Asian countries, European and North American fabs...  
US vs. China: the optical transceivers industry has grown by 24% in China the last three years, while only by 1% in the US.

*“For the past 50 years, mobile technology innovations have been rolled out each decade”.* asserts **Martin Vallo, PhD, Technology & Market Analyst, Solid-state Lighting at Yole Développement (Yole)**. He adds: *“Mobile bandwidth requirements have evolved from voice calls and texting to UHD<sup>6</sup> video and a variety of AR/VR<sup>7</sup> applications. In spite of deep implications of the COVID-19 outbreak for the telecom infrastructure supply chain, consumers and business users*

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<sup>1</sup> Extracted from:

[Optical Transceivers for Datacom & Telecom Market 2021 report](#), Yole Développement, 2021  
[InnoLight's 400G QSFP-DD Optical Transceiver report](#), System Plus Consulting, 2021

<sup>2</sup> CAGR: Compound Annual Growth Rate

<sup>3</sup> GaAs: Gallium Arsenide

<sup>4</sup> InP: Indium Phosphide

<sup>5</sup> SiPh: Silicon Photonics

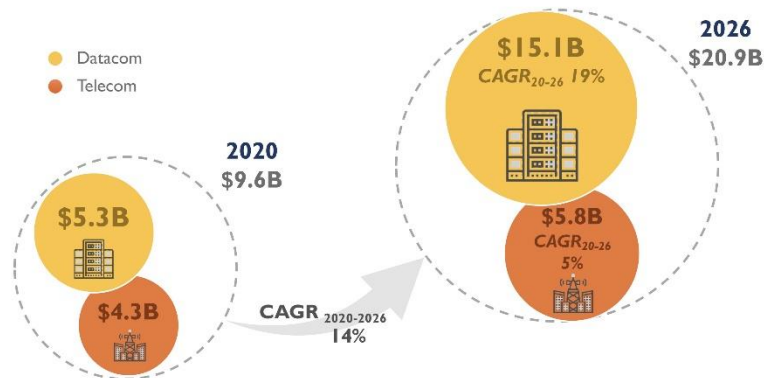
<sup>6</sup> UHD: Ultra-High-Definition

<sup>7</sup> AR/VR: Augmented Reality/Virtual Reality

worldwide continue to create new demand for networking and cloud services. Social networking, business meetings, video streaming in UHD, e-commerce and gaming will drive the continued application growth”.

### 2020-2026 optical transceiver revenue growth forecast by market segment

(Source: Optical Transceivers for Datacom & Telecom Market 2021 report, Yole Développement, 2021)



In this context, Yole investigates disruptive technologies and related markets in depth, to point out the latest innovations and underline the business opportunities. Released today, the Optical Transceivers for Datacom & Telecom Market 2021 report helps to understand the global landscape of fiber-optic communication and classify its technologies for newcomers to this field. The report provides straightforward and easy to understand explanations of the technology of optical transceivers. This study also examines the application landscape, and associated technologies, and provides detailed market forecasts from 2017 to 2026 for optical transceivers in datacom and telecom.

As analyzed by Yole’s team in the new Optical Transceivers for Datacom & Telecom Market 2021 report, the average number of devices connected to the internet per household and per capita is increasing. With the advent of new digital devices with increased capabilities and intelligence, the analysts observe higher adoption rates each year. Expanding machine-to-machine applications, such as smart meters, video surveillance, healthcare monitoring, connected drives, and automated logistics, contribute in a major way to device and connection growth and push the expansion of data center infrastructure.

Revenue generated by the optical transceiver market reached around US\$9.6 billion in 2020 and is expected to reach US\$20.9 billion in 2026 at a 14% CAGR for 2020-2026. This growth is driven by high volume adoption of high data rate modules above 100G by big cloud service operators and national telecom operators to increase in fiber-optic network capacity.

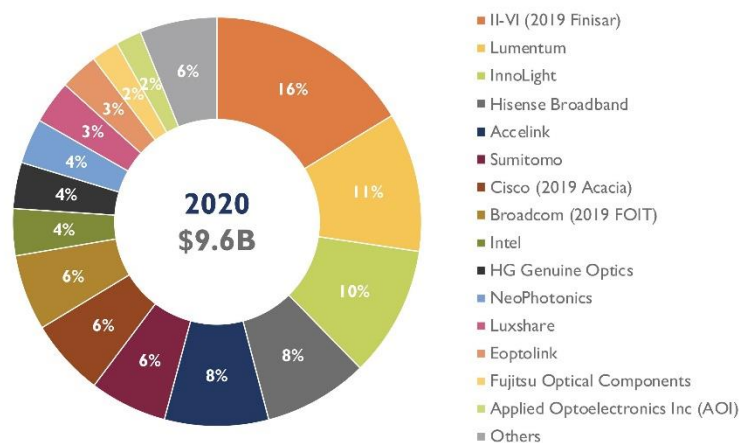
The evolution of multiple technologies has enabled data rates of 400G, 600G, 800G and beyond across data center infrastructure as well as in long-haul and metro networks.

400GbE deployments are ramping across data center networks. Many cloud providers and telecom operators are now looking to 800Gbps optical ecosystem to increase bandwidth capacity and keep pace with the growing demand for data. 800G optical modules can support more configurations, for example 2x 400GbE, 4x 200GbE or 8x 100GbE.

Today's Ethernet switch ASICs<sup>8</sup> are running at a 50Gbps lane rate driven by 50G PAM-4 modulation technology. In line cards, a retimer is typically needed to synchronize PAM-4 data from the switch to the optical interface. In 400G optical modules, an additional silicon gearbox chip can be used to convert 50G PAM-4 electrical I/Os<sup>9</sup> to 100G per wavelength optical I/Os in order to connect to 100G optics. Depending on the application and transmission reach 400G offer various optical interfaces, including 400G SR4, 400G DR4, 400G FR4 and 400G LR4.

## 2020 optical transceiver market shares

(Source: Optical Transceivers for Datacom & Telecom Market 2021 report, Yole Développement, 2021)



According to **Pars Mukish, Business Unit Manager, Solid-State Lighting & Display at Yole**: “We anticipate high popularity of 800G modules as they take advantage of 100G single-wavelength optics already proven in 400GbE systems and thus can be technically and cost-effectively implemented in QSFP-DD<sup>10</sup> and OSFP<sup>11</sup> form factors”.

Current form factors will be limited in their ability to support more than 800G capacity in terms of required electrical and optical densities and thermal aspects. Power consumption is another challenge. The largest contributor is the electrical interface between the switch ASIC and optical module, particularly for QSFP-DD and OSFP. As a result of discrete electrical device implementation power dissipation and thermal management are becoming limiting factors for future pluggable optics.

<sup>8</sup> ASIC: Application Specific Integrated Circuits

<sup>9</sup> I/O: Inputs and Outputs

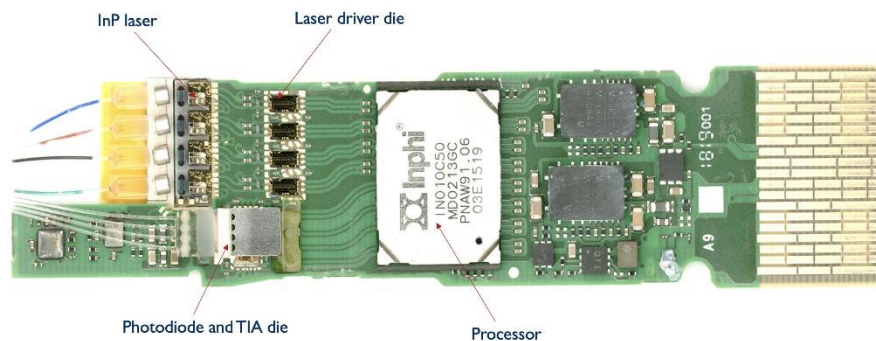
<sup>10</sup> QSFP-DD: Quad Small Form-factor Double-density

<sup>11</sup> OSFP: Octal Small Form-factor Pluggable

In this regard, Yole’s partner, the reverse engineering and costing company, System Plus Consulting, provides insight into technology data, manufacturing cost and selling price of InnoLight’s TDP4CNT-N00 400Gb QSFP-DD Optical Transceiver in its InnoLight’s 400G QSFP-DD Optical Transceiver analysis.

### Innolight 400G optical transceiver electronic board

(Source: InnoLight’s 400G QSFP-DD Optical Transceiver report, System Plus Consulting, 2021)



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For **Sylvain Hallereau, Principal Technology & Cost Analyst at System Plus Consulting**: “InnoLight’s 400G QSFP-DD is one of the first 400G optical transceivers on the market, allowing communication up to 2km using PSM4 modulation. The InnoLight solution is based on the INO10C50 PAM4 DSP<sup>12</sup> chipset, four GaAs laser driver dies, and a TIA<sup>13</sup> die, all designed by Inphi”. CPO<sup>14</sup> is a new approach that brings the optics and the switch ASIC close together and aims to overcome challenges mentioned above. Furthermore, CPO technology is considered as a new deployment model of the whole ecosystem and alternative to the pluggable optics.

All year long, Yole Développement and System Plus Consulting publish numerous reports and monitors. In addition, experts realize various key presentations and organize key conferences.



In this regard, do not miss the 4th Yole Développement and CIOE forum on Optical Transceivers & Silicon Photonics on September 2nd, 2021, in Shenzhen China and online.

Will present:

- Martin Vallo, Technology & Market Analyst, Solid-State Lighting at Yole Développement
- Alexis Debray, Technology & Market Analyst, Solid-State Lighting at Yole Développement
- Sylvain Hallereau, Principal Technology & Cost Analyst at System Plus Consulting
- Sven Otte, CEO of SICOYA

<sup>12</sup> DSP: Digital Signal Processor  
<sup>13</sup> TIA: Transimpedance Amplifier  
<sup>14</sup> CPO: Co-Packaged Optics

- Edison Huang, Technical Director at Shenzhen Gigalight Technology
  - Liangbo Wang, Senior Technical Marketing Director at Yuanjie Semiconductor Technology
- Register [HERE](#) to discuss with key players about the optical transceivers' technologies.  
Make sure to be aware of the latest news coming from the industry and get an overview of our activities, including interviews with leading companies and more on [i-Micronews](#). Stay tuned!

### Press contacts

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### About our analysts

**Martin Vallo, PhD** serves as a Technology & Market Analyst specialized in solid-state lighting technologies, within the Photonics, Sensing & Display division at Yole Développement (Yole). With 9 years' experience within semiconductor technology, Martin is involved today in the development of technology & market reports as well as the production of custom consulting projects at Yole. Prior his mission at Yole, he worked at CEA (Grenoble, France), with a mission focused on the epitaxial growth of InGaN/GaN core-shell nanowire LEDs by MOCVD and their characterization for highly flexible photonic devices. Martin graduated from Academy of Sciences, Institute of Electrical Engineering (Slovakia) with an engineering degree in III-nitride semiconductors.

**Pars Mukish** serves as a Business Unit Manager, Solid-State Lighting (SSL) & Display at Yole Développement (Yole). Pars' mission is dedicated to the development of SSL and Display activities (ie laser diode, LED and OLED). Pars actively assists and supports the development of strategic projects, working with leading customers of the company. He manages the on-going expansion of technical and market expertise of the SSL & Display team. Prior to Yole, Pars has worked as Marketing Analyst and Techno-Economic Analyst for several years at the CEA (French Research Center). Pars holds a master's in Materials Science & Polymers (ITECH - France) and a master's in Innovation & Technology Management (EM Lyon - France).

With more than 25+ years' experience within the semiconductor industry, **Eric Mounier PhD**, is Director of Market Research at Yole Développement (Yole). Eric provides daily in-depth insights into current and future semiconductor trends, markets and innovative technologies (such as Quantum computing, Si photonics, new sensing technologies, new type of sensors ...). Based on relevant methodological expertise and a strong technological background, he works closely with all the teams at Yole to point out disruptive technologies and analyze and present business opportunities through technology & market reports and custom consulting projects. Previously, Eric held R&D and Marketing positions at CEA Leti (France). Eric Mounier has a PhD. in Semiconductor Engineering and a degree in Optoelectronics from the National Polytechnic Institute of Grenoble (France).

**Sylvain Hallereau** is Principal Technology & Cost Analyst at System Plus Consulting, part of Yole Développement (Yole). Working in close collaboration with the laboratory teams, Sylvain produces reverse engineering & costing reports while also contributing to custom projects, especially focused on solid-state lighting components, sensors, biotechnology devices, and ICs. In parallel, based on his significant technical and industrial knowledge, Sylvain supports the development of the semiconductor device activities and the related team at System Plus Consulting. He also contributes to the strategies of this department. He holds a master's degree in Microelectronics from the University of Nantes (France).

### About the reports

#### **Optical Transceivers for Datacom & Telecom Market 2021**

*Growth in optics is driven by expanding datacom infrastructure and accelerating deployment by Chinese suppliers. – Performed by Yole Développement*

#### **Companies cited:**

Acacia Communication, Accelink, Adtran, ADVA, Alibaba, Amazon Web services, Apple, Applied optoelectronics Inc (AOI), Arista, ATOP, Baidu, Broadcom, Broadex, ChampionONE, Ciena (Cyan), CIGtech, Cisco, ColorChip, Crealights, E.C.I. Networks, , Emcore, Eoptolink, Facebook, Fiberhome, Finisar (now II-VI), Foxconn Interconnect Technology (FOIT), Fujitsu Networks, Fujitsu Optical components, Gigalight, Google, HG Genuine Optics, Hisense Broadband, Huawei, Huawei, HUBER+SUHNER Cube Optics AG, IBM+Softlayer cloud services , II-VI, Infinera (Coriant, Transmode), InnoLight, Inphi, Intel, IPG Photonics (Menara Network), J.P. Morgan, Juniper Networks, Lumentum, Luxshare, Macom, Mellanox, Microsoft, and more...

#### **InnoLight's 400G QSFP-DD Optical Transceiver**

*Deep analysis of the 400Gb optical transceiver from a leading Chinese company. – Performed by System Plus Consulting*

### Related reports:

- [Silicon Photonics 2021](#)
- [Edge Emitting Lasers – Technology and Market Trends 2021](#)
- [VCSELs – Market and Technology Trends 2020](#)
- [Intel Silicon Photonic 100G PSM4 QFSP28 Transceiver](#)
- [Intel Silicon Photonic 100G CWDM4 QFSP28 Transceiver](#)

### About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide... [More](#)

### About System Plus Consulting

System Plus Consulting specializes in the cost analysis of electronics, from semiconductor devices to electronic systems. Created more than 20 years ago, System Plus Consulting has developed a complete range of services, costing tools and reports to deliver in-depth production cost studies and estimate the objective selling price of a product... [More](#)

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