

The

# DATA CENTER

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Journal

## Industry Outlook: Widening Data Center Interconnect Bandwidth

by Industry Outlook

*Industry Outlook is a regular Data Center Journal Q&A series that presents expert views on market trends, technologies and other issues relevant to data centers and IT.*



**T**his week, Industry Outlook asks Abraham Jou and Paul Wu from Adolite, a provider of optical communications products, about the changes that data center operators are facing with regard to accelerating data growth.

Abraham is Adolite's chairman and CEO and was previously cofounder and chair of PayEase as well as founding CEO for Silicon Valley Communications. He also worked in R&D at Apple. Paul is Adolite's executive vice president and brings optical and electrical integration experience in optical interconnects, silicon photonics, storage and nano/micro optical systems. He previously chaired the Department of Optics and Photonics at National University.

### Industry Outlook: What are some of the biggest challenges facing data center operators?

**Abraham Jou:** The advancement of new technologies—such as 5G, the Internet of Things, virtual reality and driverless cars—is placing an exponential strain on data infrastructures. We are seeing optical-connectivity requirements double every 8–10 months. And by 2025, IDC predicts the global data sphere will grow to 163 zettabytes! That's equivalent to 10 times the data generated in 2016.

This data explosion is driven in part by consumer demand for bandwidth-hungry applications. People want to stream video on the Internet, especially on their

mobile devices. They want fast access to data stored in the cloud with lifelike images for 3D gaming, full-length movies and, increasingly, more real-time content. A year ago, The Wall Street Journal reported that 400 hours of video were being uploaded to YouTube each minute.

As data providers try to keep pace with demand, they face challenges with design and expansion. Existing transceiver designs are complex, requiring time-consuming and error-prone production processes owing to rigid multilayer circuit boards, multiple lenses, fiber-alignment challenges and complicated assembly.

Providers rely on their supply chains for solutions, but they often encounter bottlenecks. Capacity and growth are being held back because manufacturers are simply unable to produce enough state-of-the-art optical-interconnect products.

### IO: How are data providers innovating to meet customer demands?

**AJ:** One trend is growth of hyperscale cloud operators, which are expanding their facilities. And more enterprises

are outsourcing their storage to cloud providers in search of cost savings, so we see more server traffic moving from one data center to another rather than from data center servers directly to users.

As they seek more optical bandwidth, cloud data centers are driving next-generation data center technologies. At the design level, it means they must combine many optical functions into integrated solutions. They're looking for breakthroughs in products including 100G Ethernet for data center interconnects (DCIs).

According to LightCounting reports, Ethernet transceivers accounted for 75 percent of all optics purchased by cloud companies in 2016, and these companies will remain the major buyers through 2022. As they map out their evolutionary paths, some of the larger ones are going from 100G Ethernet straight to 400G—skipping 200G.

## IO: How are optical interconnects evolving to meet the greater demand?

**Paul Wu:** Optical-interconnect products are critical to cost-effectively adding bandwidth, and IHS Infonetics expects the datacom optical-transceiver market to reach over \$2.1 billion by 2019. Accomplishing this feat necessitates innovation that speeds products in volume to data centers. Increased production capabilities are essential to unblocking the supply-chain problem so providers can expand their capacity as rapidly as everyone desires.

New developments are underway for optical design, structure and process. For example, we're using a new manufacturing technology that employs flexible printed circuits (FPCs) with optical reflectors and polymer waveguides built in a single layer right on flexible printed-circuit boards (PCBs). This simplified physical structure is more flexible and routable at the board level, and it can help streamline the production process compared with traditional methods.

It also lets us accelerate production and product delivery to data providers. Ultimately, manufacturing developments can help the industry move data center expansion roadmaps from 100G to 400G Ethernet to match customers' innovation requirements and keep pace with demand.

## IO: What's required to move the industry to 400G?

**PW:** As we work to reach 400G Ethernet and beyond, the industry is examining on-board optics as a promising solution. This technology requires reliance on high-speed, high-density platforms, such as on-board optics, manufactured in high volumes.

The Consortium for On-Board Optics (COBO), a standards organization, is developing specifications for interchangeable optical modules that can be mounted on PCBs. Changing the physical infrastructure by enabling optical modules to sit above the current framework can help overcome today's limitations and grow beyond 400G.

Of course, manufacturing with quality at a fast-enough pace is critical. Otherwise, providers will keep experiencing the same supply-chain bottlenecks they're seeing today. Therefore, manufacturers must couple innovation with precision execution and, ideally, Industry 4.0 automation.

## IO: What steps do you recommend data center providers take to stay competitive?

**AJ:** From talking with large data center providers who share their challenges, we know a race is in progress. Providers are mapping their routes with aggressive plans for cost-effective data center capacity growth. Adopting forthcoming industry standards, such as those developed by COBO, to standardize around interoperable modules also will be crucial.

Scaling quickly will require providers to shore up supply chains with new technology that simplifies design and delivers performance. Manufacturing innovation is catching up, so we think data providers that are embracing new form factors and are ready to move ahead will see a competitive advantage and be able to seize market opportunities first.

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