

Optical Advances Help Enable 800 Gigabit Ethernet

Lasers capable of transmitting signals at 224 gigabits per second, enough to achieve 800 gigabit ethernet.

With the massive proliferation of data-heavy services, including high-resolution video streaming and conferencing, cloud services infrastructure growth in 2021 is expected to reach a 27% CAGR. Consequently, while 400 gigabit ethernet (GbE) is currently enjoying widespread deployment, 800 GbE is poised to rapidly follow to address these bandwidth demands.

One approach to 800 GbE is to install eight 100 gigabit per second (Gbps) optical interfaces or lanes. As an alternative to reduce the hardware count, increase reliability, and lower cost, a team of researchers at Lumentum developed an optical solution that uses four 200 Gbps wavelength lanes to reach 800 GbE.

Syunya Yamauchi, a principal optical engineer at Lumentum, will present the optimized design during a session at the [Optical Fiber Communication Conference and Exhibition](#) (OFC), being held virtually from 6-11 June, 2021.

“Active optical devices are the most important components of optical communications systems,” said Mike Staskus, vice president of Datacom Product Line Management at Lumentum.

To achieve high speed, high bandwidth operations, Yamauchi’s team developed a lumped-element (LE) electroabsorption modulator-integrated distributed feedback (EA-DFB) laser capable of 2-kilometer transmission – a transmission length requirement for many modern large data centers – of 224 Gbps signals operating over a wide temperature range.

“There are tradeoffs between high bandwidth and modulation characteristics, such as extinction ratio,” Staskus said. “We overcame the tradeoff by optimizing the design of EA-DFB using a simplified packaging method.”

Compared to a conventional EA-DFB, the LE EA-DFB’s reduced capacitance and inductance resulting from design and assembly optimizations in the EA modulator improves its power and bandwidth.

“It can enable the development of optical transceivers with twice the data rate of current 400 GbE modules, without dramatic increases in the cost and power consumption, by using higher-speed laser transmitter chips that do not require power-hungry thermoelectric coolers,” said Staskus.

These results suggest that the LE EA-DFB could enable 800 GbE applications, making this device a promising light source for future data center applications.

“Next-generation lasers using this same ‘toolbox’ of advanced semiconductor and packaging processes may enable higher speeds, longer reaches and lower costs with the competitive levels of performance, reliability and power consumption,” said Staskus. “With the increase of various data streaming and other internet services, intra-data-center links will require higher speeds, including 1.6 terabits per second and beyond.”

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Hear from the Research Team

“224-Gb/s PAM4 Uncooled Operation of Lumped-electrode EA-DFB Lasers with 2-km Transmission for 800GbE Application,” Syunya Yamauchi, Koichiro Adachi, Hideaki Asakura, Hayato Takita, Yoshihiro Nakai, Yoriyoshi Yamaguchi, Masatoshi Mitaki, Ryosuke Nakajima, Shigehisa Tanaka, and Kazuhiko Naoe, Tuesday, 8 June 2021, 3:00 a.m. PDT (UTC – 10:00).

Registration Information

Credentialed media and analysts who wish to cover OFC 2021 can find registration and other essential information in the [OFC media room](#). View the OFC website for upcoming announcements on registration, schedule updates and more.

About OFC

The [2021 Optical Fiber Communication Conference and Exhibition \(OFC\)](#) is the premier conference and exhibition for optical communications and networking professionals. For more than 40 years, OFC has drawn attendees from all corners of the globe to meet and greet, teach, and learn, make connections and move business forward. OFC includes dynamic business programming, an exhibition of global companies and high impact peer-reviewed research that, combined, showcase the trends and pulse of the entire optical networking and communications industry. OFC is co-sponsored by IEEE Communications Society (IEEE/ComSoc), IEEE Photonics Society, The Optical Society (OSA) and managed by OSA. OFC 2021, an all-virtual event, will take place 06 – 11 June 2021. Follow @OFCConference, learn more at OFC Community [LinkedIn](#), and watch highlights on [OFC YouTube](#).

About The Optical Society

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