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Infinera's Optical Innovation Team Awarded OSA's 2021 Paul F. Forman Team Engineering Excellence Award

The Optical Society is pleased to announce that Infinera's Optical Innovation Team, USA, has received the 2021 [Paul F. Forman Team Engineering Excellence Award](#). The team is recognized “for the design, development and commercial deployment of a vertically optimized 1.6Tb/s (2x800G) digital coherent optics module, comprised of a large scale photonic integrated circuit, advanced high-speed RF packaging and pioneering real-time DSP ASIC”.

The 2021 award will be presented during [OSA Frontiers in Optics \(FiO\) + Laser Science \(LS\)](#). A list of all team members is available [here](#).

“This team’s work has resulted in the highest-performing 800 Gb/s class transponder, raising the bar for coherent optical engine design and delivering superior performance to the market,” said 2021 OSA President Connie Chang-Hasnain, Whinnery Chair Professor Emerita of EECS at University of California, Berkeley, USA. “We applaud their dedication, focus, and ambition.”

Coherent optical engines were previously designed for theoretical enhancements of spectral efficiency and capacity per wavelength. However, their limited optical reach impaired the promise of driving cost-effective fiber performance - crucial in addressing ever-increasing demand from long-haul and submarine applications.

Infinera's development team was determined to drive the optical performance of the new transponder to much greater reach in order to serve the maximum addressable market at the highest data rate. To achieve this, the team exploited multiple enabling technologies and capabilities – monolithic PICs, advanced DSP algorithms implemented in high baud rate-capable CMOS ASICs, and tightly integrated packaging including high-performance RF ASICs.

PIC performance is exceptional, integrating all the optical components for two wavelengths that can be independently tuned across the C-band or L-band, and narrow-linewidth lasers help to minimize phase noise in the receiver. An advanced analog ASIC has been engineered with exceptionally high linearity and low noise. This feeds a state-of-the-art 7-nm DSP with the equivalent of over 5 billion transistors and a comprehensive toolkit of signal conditioning and compensation capabilities.

This combination of best-of-breed subcomponent technology in a holistic design, development, and manufacturing process enabled the team to achieve the lowest implementation penalty, leading to superior capacity-reach performance over other similar designs. The result is that Infinera's ICE6 has extremely low modem noise, especially at ultra-high baud rates of 100 GBd. All this was achieved by leveraging globally distributed centers of excellence for various aspects of the design, with close and intense collaboration.

While the ICE6 advanced coherent toolkit contains multiple features that boost performance, three key capabilities and innovations differentiate ICE6 from its competitors. These are the use of ultra-high and variable baud rates, innovations such as Nyquist subcarriers, and long-codeword probabilistic constellation shaping (LC-PCS).

The vertically integrated approach, with key elements such as the PIC and module packaging designed and manufactured in the U.S., enables the team to achieve an unparalleled level of performance and dramatically exceed conventional expectations, with almost a fivefold increase in useable optical reach at just under 1,000 km. ICE6 has established new ultra-long-distance performance records in submarine cables by, for example, showing that a single trans-Atlantic (>6,600 km) fiber pair could operate with data rates of up to 700 Gb/s per wavelength and transport up to 30 Tb/s.

The [Paul F. Forman Team Engineering Excellence Award](#) was established by OSA in 1989 and named in remembrance of Paul F. Forman, who helped raise visibility for the field of optical engineering, in 2007. The team award recognizes technical achievements such as product engineering, process, software and patent development, as well as contributions to society such as engineering education, publication and management, and public appreciation of optical engineering.

Team Members

Stan Blakey

Parmijit Samra

Vincent Dominic

Steve Sanders

Matthew Fisher

Han Sun

Paul Freeman

Sandy Thomson

Parthiban Kandappan

Mehdi Torbatian

Mehdi Karimi

Corey Tsai

Vikrant Lal

Kuang-Tsan Wu

Robert Maher

Yuejian Wu

Pierre Mertz

Jiaming Zhang

Mark Missey

Mehrdad Ziari

John Osenbach

About The Optical Society

[The Optical Society \(OSA\)](#) is dedicated to promoting the generation, application, archiving, and dissemination of knowledge in optics and photonics worldwide. Founded in 1916, it is the leading organization for scientists, engineers, business professionals, students, and others interested in the science of light. OSA's renowned publications, meetings, online resources, and in-person activities fuel discoveries, shape real-life applications and accelerate scientific, technical, and educational achievement.

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