New distance record for 400 Gb/s data transmission

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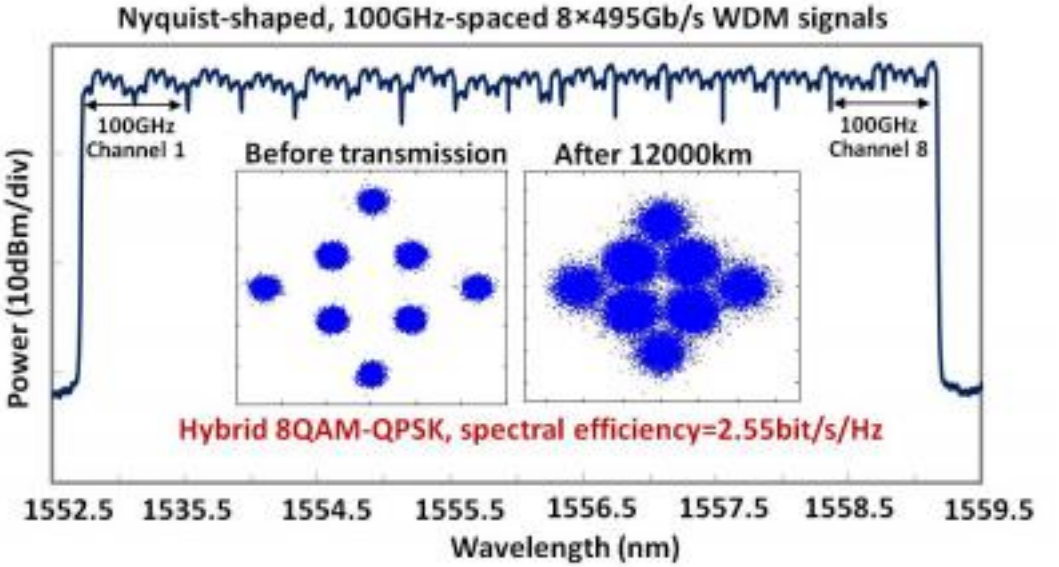

AT&T Labs to report milestone at OFC/NFOEC 2013

As network carriers debate the next Ethernet standard—and whether transmission speeds of 400 gigabit per second or 1 terabit per second should be the norm—engineers are working on new measures to squeeze next-generation performance out of current-generation systems.

To that end, a team from AT&T has devised a new patent pending technique enabling tuning of the modulation spectral efficiency, which allows, for the first time, 400 Gb/s signals to be sent over today's 100 gigahertz-grid optical networks over ultra-long distances. Spectral efficiency is the information rate that can be transmitted over a given bandwidth, and measures how efficiently the available frequency spectrum is utilized.

The researchers, led by optical transmission system expert Xiang Zhou of AT&T Labs-Research in Middletown, N.J., will describe their work at the Optical Fiber Communication Conference and Exposition/National Fiber Optic Engineers Conference (OFC/NFOEC) in Anaheim, Calif. March 17-21.

In the system, Nyquist-shaped 400Gb/s signals with tunable spectral efficiency were generated using modulated subcarriers. Eight 100 GHz-spaced, 400 Gb/s wavelength-division-multiplexed signals were combined and then transmitted over a re-circulating transmission test platform consisting of 100-km fiber spans.

Using the new modulation technique and a new low-loss, large-effective area fiber

from OFS Labs, the team transmitted the signals over a record-breaking 12,000 kilometers (roughly 7500 miles)—surpassing their own previous distance record (using the 50 gigahertz-grid) by more than 9000 km.

"This result not only represents a reach increase by a factor of 2.5 for 100 GHz-spaced 400 G-class WDM systems, it also sets a new record for the product of spectral efficiency and distance," says Zhou. Compared to modulation techniques currently used, he says, "our method has the unique capability to allow tuning of the modulation spectral efficiency to match the available channel bandwidth and maximize the transmission reach, while maintaining tolerance to fiber nonlinearities and laser phase noise, both of which are major factors limiting performance for high-speed optical systems."

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