



Photonics Research Centre

Seminar

Recent advances in space-division multiplexed transmissions

by

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Date: Tuesday, 25 Jun 2013

Time: 5:00 pm

Venue: Room CF617, Department of Electrical Engineering
The Hong Kong Polytechnic University

ABSTRACT

Recent advances in coherent optical systems have led to tremendous growth in system capacity, and 100-Tb/s transmission using C+L band has been reported. Previously, it was possible to increase transmission capacity by using a larger number of channels or using higher spectral efficiency (SE). Both techniques are rapidly approaching their limits. Fiber nonlinearity precludes using ever higher power to increase SE. Even in a linear medium, capacity only grows logarithmically with signal-to-noise ratio (SNR), thus ultra-high SE is power inefficient. Parallel transmission appears to be only solution to enable further capacity growth. In particular, much recent research have focused on new transmission fibers, including multicore fibers (MCF), multimode fibers (MMF) and photonic bandgaps fibers (PBG).

Ultimately, reduction in cost-per-bit requires component integration. The use of new fibers will require new amplifiers and switches that can simultaneously process the parallel channels. For few-mode fiber, it is necessary to ensure that devices have low mode-dependent loss/gain. NEC Labs America has been at the forefront in the development of space-division multiplexing systems, including demonstration of the first few-mode erbium-doped fiber amplifier, demonstration of the first loop experiment using all few-mode components in the loop, and setting a world record capacity of 1.048 Pb/s in a 14-core MCF last year.

In this talk, I will focus on few-mode fiber transmission, including the design of gain-equalized few-mode amplifiers, and present experimental results from NEC's recent few-mode loop experiments.

ABOUT THE SPEAKER

Ezra Ip received his B.E. (hons) degree in electrical and electronics engineering in 2002 from the University of Canterbury, Christchurch, New Zealand; and his M.S. and Ph.D. degrees in electrical engineering in 2004 and 2008 from Stanford University, CA, USA. He joined NEC Laboratories America in 2009 and is a current member of the research staff. His research interests include coherent optical systems, space-division multiplexing transmission, optical fiber amplifiers, digital signal processing, nonlinear optics and submarine systems. He is a co-author of more than 60 journal and conference papers.

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