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THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

Multi-Carrier Optical Communication Systems

by

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The Chinese University of Hong Kong

Abstract

Rapid growth in broadband services is increasing the demand for smart, low-cost, and high-performance optical communication systems. However, the impairments resulting in signal degradation increase significantly as the data rate increases, and the symbol rate per optical carrier is limited by the bandwidth of available optoelectronic devices. The move to 100 Gbit/s and beyond requires more sophisticated modulation and detection schemes. Multi-carrier optical systems are one of the promising solutions and have drawn much interest recently for metro and access networks as well as ultra high speed optical communication systems. In this talk, research activities on electrically and optically multiplexed multicarrier schemes performed at Tyndall National Institute are reviewed. In electrical multiplexing, emphasis will be placed on Tyndall-pioneered optical fast orthogonal frequency division multiplexing (F-OFDM). The basic principles as well as implementation concerns such as synchronization, guard interval design, channel and frequency offset estimation, are discussed. In optical multiplexing with parallel transceivers, orthogonal conditions in optical super-channel with the required signal pre-/post- shaping are discussed. In particular, offset quadrature amplitude modulation coherent wavelength division multiplexing (WDM), which can greatly relax the requirements for device specifications when compared to the all-optical OFDM and Nyquist WDM, is investigated.

Biography

Jian Zhao received the M.Phil. and Ph.D. degrees from the Chinese University of Hong Kong in 2004 and 2007, respectively. He joined the Photonic Systems Group at the Tyndall National Institute, Ireland in 2007, and is currently a Staff Researcher and Research Fellow. Since 2009, he has captured more than €1 million funding (direct investment) as a PI or a partner from Enterprise Ireland, Science Foundation Ireland, and EU FP7. He proposed and experimentally demonstrated the world-first optical fast OFDM at both the 1550-nm and 2000-nm optical wavelengths. The team he led developed a 10-G real-time electronic-dispersion-compensation integrated receiver prototype supporting >900 km transmission and was the runner-up of Alcatel-Lucent (UK & Ireland) Innovation Competition. He has published more than 70 papers (10+ invited) in peer-reviewed journals and conferences, and 2 book chapters. His current research interests include optical OFDM, advanced modulation and detection schemes, and digital signal processing for optical communications. He is a member of IEEE.

**** ALL ARE WELCOME ****

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