

# Orthogonal-Frequency-Division Multiplexed Communications Systems and Networks: introduction to the focus issue

Elaine Wong

*The University of Melbourne, Australia*

Published July 1, 2008 (Doc. ID 98154)

Orthogonal-frequency-division multiplexing (OFDM) is receiving enormous interest from the fiber-optic community. Already widespread in mobile communications, OFDM is now being proposed for long-haul single-mode optical communications, multimode fiber links, and plastic optical fiber links. OFDM, a digitized multicarrier modulation scheme that uses a large number of closely spaced orthogonal lower-rate subcarriers, has several advantages over single-carrier modulation schemes. Most significant is its much improved spectral efficiency and tolerance against chromatic dispersion and polarization-mode dispersion. This focus issue comprises five invited articles that provide a comprehensive overview of OFDM, from theoretical concept through to the most recent advances in modulation, equalization, detection, and signal processing techniques in OFDM research.

The first invited article, "[Long-haul transmission of  \$16 \times 52.5\$  Gbits/s polarization-division-multiplexed OFDM enabled by MIMO processing](#)," by S. L. Jansen, I. Morita, T. C. Schenk, and H. Tanaka, discusses the implementation of multiple-input multiple-output detectors and performance issues in polarization-division-multiplexed orthogonal-frequency-division multiplexing in long-haul transmission systems. The second invited article, "[High-speed transmission over multimode fiber using discrete multitone modulation](#)," by S. C. J. Lee, F. Breyer, S. Randel, H. P. A. van den Boom, and A. M. J. Koonen, discusses implementation issues, such as synchronization and required peak-to-average power, in discrete multitone modulation intensity-modulated direct-detection multimode fiber links. The third invited article, entitled "[Optimization of adaptively modulated optical OFDM modems for multimode fiber-based local area networks](#)," by X. Q. Jin, J. M. Tang, P. S. Spencer, and K. A. Shore, focuses on the use of adaptively modulated optical orthogonal-frequency-division multiplexing (AMOOOFDM) in intensity-modulated direct-detection multimode fiber links. The effect of different component parameters on the transmission performance of AMOOOFDM signals are also studied, identified, and optimized. The fourth invited article, "[LDPC-coded OFDM in fiber-optics communication systems](#)," by I. B. Djordjevic and B. Vasic, highlights the benefits and potential of low-density parity-check-coded OFDM as an efficient coded modulation technique for long-haul optical fiber communications and 100 Gbits/s Ethernet and discusses its ability to increase spectral efficiency and to facilitate chromatic dispersion compensation as well as polarization-mode dispersion compensation. Finally, "[Coherent optical OFDM: has its time come?](#)" by W. Shieh, X. Yi, Y. Ma, and Q. Yang, presents an overview of the progress and latest results in coherent optical OFDM, including the use of incoherent or coherent optical single-carrier frequency-domain equalization techniques in coherent optical OFDM.