

## Special Issue on Advances in Wireless and Optical Communications

## Guest Editorial

Significant research and development growth continues to propel the fields of wireless and optical communications. Information technology, Internet and multimedia communications are all based on either wireless or optical networks. Optical wireless communication is another growing field which combines optical principles and wireless techniques. This special issue brings together the state-of-the-art research contributions and developments that address the various critical issues in wireless and optical communication systems and networks.

Researchers from around the world were invited to contribute to this special issue which prompted a significant number of submissions. In addition, a selected number of authors were invited from the IEEE International Conference on Computer and Information Technology held on December 22-24, 2011 in Dhaka, Bangladesh, to enhance their papers significantly and submit to the special issue. We received a total of fourteen submissions which went through rigorous review process by the experts in the field. Nine papers were finally selected for inclusion in the special issue of the journal. The contributing authors represent academic and/or research institutions from Bangladesh, China, Sweden, Thailand, and United States of America.

The first paper by Alhasson and Matin analyzes the peak-to-average power ratio (PAPR) of an orthogonal frequency division multiplexed (OFDM) signals. The authors found that the discrete time signals follow a Gaussian distribution while the continuous time signals follow a Rayleigh distribution. They also used a suboptimal combination technique to reduce the searching complexity of finding the optimum set of vectors to minimize PAPR. Through an analytical study, the paper shows that a single-carrier frequency division multiple access (SC-FDMA) system with Interleaved-FDMA or Localized-FDMA performs better than an Orthogonal-FDMA in the uplink direction when the transmitter power efficiency is significant.

Sabuj and Islam developed analytical models to suppress the signal-to-noise-plus-interference ratio (SNIR) in a multiple-input multiple-output OFDM system. They utilized the inter-carrier interference and average probability of error along with space frequency block code and data conjugate over Nakagami- $m$  fading channel. Their simulation results show that the average probability of error decreases with an increase in the fading parameter  $m$ . The proposed technique can increase the SNIR by 1 dB when fixed signal-to-noise ratio is 6 dB.

The third paper by Kamruzzaman and Hao evaluates the performance of a turbo-coded OFDM wireless system with different schemes, including single-input single-output (SISO), single-input multiple-output (SIMO), multiple-input single-output (MISO), and multiple-input multiple-output (MIMO) under the influence of Rayleigh fading. The authors show that the turbo coding enhances the coding gain of SISO-OFDM by 21 dB at a bit error rate (BER) of  $10^{-4}$ , that of SIMO-OFDM by 20 dB at a BER of  $10^{-6}$ , that of MISO-OFDM by 17 dB at a BER of  $10^{-6}$ , and that of MIMO-OFDM by 11 dB at a BER of  $10^{-6}$ .

A different PAPR reduction scheme is proposed in the fourth paper by Mahmuda, Haque and Ahmed that employs an adaptive companding technique. The algorithm compares the PAPR of an OFDM system to a threshold value in order to determine if companding operation is required and if so, how many. However, the PAPR reduction scheme degrades the BER performance and as such the trade-off needs to be optimized based on specific applications.

Amin and Alam investigated the electro-optical characteristics of two types of photodetectors, namely, p-n nanowire structure, and p-i-n structure, at a temperature range of 77 K to 300 K. The authors show that the intrinsic layer of the p-i-n photodetector contributes significantly in improving the electro-optic behavior over that of the p-n structure. The only drawback of the p-i-n structure is that the noise increases with temperature.

The sixth paper by Khan and Saengudomlert proposes to utilize design based routing (DBR) in wavelength division multiplexed (WDM) system with waveband switching so as to minimize the total link cost subject to the constraints on traffic demands and network resources. The authors showed through simulation experiment that the proposed technique provides a low blocking probability and hence outperforms the shortest path first routing DBR scheme.

Khatun and Islam evaluated the propagation properties of square, hexagonal and octagonal lattice photonic crystal fibers (PCF) under both stressed and unstressed conditions. The external stress is found to cause PCF deformation and changes in propagation properties, which in turn is dependent on the PCF type. The hexagonal PCF was found to be more sensitive to birefringence properties and also the number of air hole rings in a PCF increases the sensitivity.

The eighth paper by Khan and Islam investigates the apodization functions in a linearly chirped apodized fiber Bragg grating. Among the six different apodization profiles considered, the *sinc* profile is found to perform the best for chromatic dispersion compensation. Simulation studies show that the reflectivity increases with elevation of grating length and exceeds 96% at a grating length of 10 cm.

The last paper of the special issue by Zhang, Yuan, and Zhang proposes a new spatial modulation scheme based on the Ungerboeck's set partitioning rule for correlation Rician fading scenario. The authors evaluated the unequal error protection performance which is found to be dependent on the correlation coefficient and Rician factor. The proposed scheme can enhance the error performance significantly and facilitate the joint design of channel coding and spatial modulation.

The guest editors would like to express their sincere gratitude to the reviewers, who have contributed significantly in ensuring the quality of the special issue through their valuable time and expert comments on the submitted papers. Special thanks are due to Dr. Adam Filios, Dr. Uma Balaji and Dr. Mathieu Kourouma for their review recommendations. Finally, the guest editors extend their sincere appreciation to the Associate Editor-in-Chief, Dr. Haohong Wang for providing them with this opportunity and facilitating preparation of an excellent journal special issue.

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