

Guest Editorial—— Wireless and Optical Communication Systems

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Communication systems have been playing the major role in information technology, Internet, multimedia communications, forensics, security systems, and handheld applications. Wireless and optical communications have received tremendous interests from both academics and industries over recent years which led to a significant growth of research and development activities in the fields. There are still lots of challenges in the design of an effective communication system or network that can meet all the practical requirements and the growing user demands. This special issue invited research papers from around the world addressing the critical issues in wireless and optical communications along with future directions of the fields. It covers many important areas of communication systems, such as cognitive radio, vehicular ad hoc networks, cooperative cognitive ad hoc networks, quasi-orthogonal space-time block code, signal receive model based on wavelet operator, energy-efficient cellular technologies, and multi-beam mobile satellite system.

Cognitive radio (CR) enhances the wireless communication performance significantly by reducing data congestion and dynamically utilizing free channels. Spectrum sensing is one of the key factors in enabling functionality of a CR network. In the first paper, Gao, Fan and Wang presented a soft fusion scheme where information from CR users is sent to the base station and exhibit the cooperation. The authors also proposed a hybrid fusion scheme to incorporate both the soft and hard information in the base station. An optimal cooperative spectrum sensing technique was developed to maximize the global detection probability as per the Neyman-Pearson criterion.

Xu, Bao, Luo and Wang investigated in the second paper the maximum likelihood ratio detection scheme for enhancing the performance of an orthogonal frequency division multiplexing-based overlay CR vehicular ad hoc network (VANET). Logic OR fusion rule is applied with square-law selection diversity scheme at CR-VANET roadside. Global detection probability and the corresponding receiver operation characteristics are analyzed with different sensing signal-to-noise ratio and inter-user error rates.

The third paper considered a primary user and secondary users coexisting with an interference user in a cooperative cognitive ad hoc network. Li, Peng, Tong, Lin and Liu proposed a hybrid scheme where the secondary users forward data from the interference user

as well as the primary user. A Stackelberg game framework is used to maximize the primary users' rates and minimize the secondary users' energy consumption. A distributed iterative algorithm is developed to obtain the gain equilibrium. The authors demonstrated that the proposed hybrid relay forwarding and interference mitigation technique enhances the system performance significantly as compared to similar other mechanisms.

Multipath radio channels in wireless systems results in frequency-selective fading and hence intersymbol interference in high-speed communication. Gao and Bai proposed in the fourth paper an extended quasi-orthogonal space-time block code with Givens rotation to enhance the transmission performance of a single carrier frequency-domain equalization system. It is demonstrated that the correlation of channel equivalent matrix can be eliminated and the decoding can be done with linear combiner at the receiver. The scheme achieves full rate transmission and provides with high diversity gain.

The fifth paper discusses on the direction of arrival estimation technique in array signal processing. Mao and Pan developed a signal receive model based on wavelet operator to improve the estimation performance. The systems involves enhanced multiple user classification scheme and estimation of signal parameter via rotation invariance technique to achieve a high resolution and accuracy as compared to traditional techniques in low signal-to-noise ratio environment.

There has been tremendous increase in the demand for mobile data traffic which motivated significant research interests in developing energy-efficient cellular technologies. The newly developed femtocells are small, inexpensive and low-power base stations that can largely improve the coverage and capacity of indoor users. Saad, Ismail and Nordin investigated the power control techniques for femtocell networks and observed that proper selection of the transmit power level can mitigate the interference from femtocells to macro-users.

The last paper of the special issue investigates a multi-beam mobile satellite system involving interleaved division multiple access technique. Liu and Fang evaluated the uplink performance of the system in terms of power control error with given outage probabilities. It was found in the simulation studies that the system capacity may decrease significantly because of the effect of imperfect power control and interference from the users within the overlapped region.

A total of sixteen papers were received from around the world, including the United States of America, Canada, China, Malaysia, Taiwan and Bangladesh. These papers have been critically reviewed by a team of expert Reviewers from different academic institutions in the USA in several rounds and finally only seven papers got accepted resulting in an acceptance rate of 43.75 percent. The high quality of the special issue would not have been ensured without significant contributions from the Reviewers, who have spent considerable amount of time in checking the technical merits of the papers, putting expert comments, and responding the Editor's requests in timely manner. The Guest Editors would like to acknowledge the important role of the Reviewers, including Dr. Adam Filios, Dr. Qinghai Gao, Dr. Mathieu Kourouma, Dr. Yenumula Reddy, Dr. Amr Yousef and Dr. Prakash Duraisamy. The Guest Editors also extend their sincere appreciation to the Associate Editor-in-Chief,

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