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Preface

It can be observed that the Internet traffic generated by multiplayer computer games, radio broadcasts, music files, videos, etc., is rapidly increasing. No doubt, the future Internet will carry more and more traffic related to different multimedia applications. It is also envisaged that future “in home” networks will be also mostly used for such purposes. Even the 3G mobile telephony is being marketed as a vehicle for watching television programs while on the move. The similar trend can be observed in most of the current research in the area of communication systems and networks, i.e., the envisaged application are high volumes of data generated by multimedia applications delivered with the certain level of the quality of service (QoS) to mobile customers.

This special issue on the multimedia communications contains selected papers from the 3rd Workshop on the Internet, Telecommunications and Signal Processing, WITSP'2005, which was held in December 2004 in Adelaide, South Australia. The Workshop built on the successes of two previous events, WITSP'2002 – held in Wollongong in 2002, and WITSP'2003 – held in Coolangatta on the Gold Coast in 2003. The response to the original call for papers has exceeded our expectations, with 165 submissions, which have been 12 more than for the previous workshop combined with the 7th International Symposium on DSP and Communication Systems and almost three times that of the 1st WITSP held in Wollongong. All submitted papers have been peer reviewed, and each paper received two independent reviews. Based on those reviews, 82 papers have been accepted and finally 76 papers included in the workshop program. After the Workshop, the authors of 11 papers were asked to revise and extend their contributions to form this special issue.

The papers invited to this issue cover a range of topics spanning from the image coding, unequal error protection coding and data encryption, through the problems of mobile ad hoc networks, traffic management in the high speed Internet, to techniques enabling better bandwidth utilization and accuracy of hardware involved in signal estimation at the receiver in the presence of high level of noise. The papers are presented in the order resembling the IP protocol stack.

The first group of four papers deals with the issues related directly to multimedia applications. The paper *Gaze-J2K: gaze-influenced image coding using eye trackers and JPEG 2000* by A. Nguyen, V. Chandran, and S. Sridharan presents a system incorporating the use of eye tracking and JPEG 2000 to allow a customized encoding of an image by using the user's gaze pattern. It is followed by the paper *Benchmarking image codecs by assessment of coded test images: the development of test images and new objective quality metrics* by A. Punchihewa, D. G. Bailey, and R. M. Hodgson describing a simple but accurate method for fast assessment of the degree of blockiness, edge-blur and ringing due to image compression. The efficiency of the method is demonstrated for a JPEG codec at different compression levels. The third paper *Application of convolutional interleavers in turbo codes with unequal error protection* by S. Vafi, and T. A. Wysocki demonstrates usefulness of convolutional interleavers to design unequal error protection turbo codes. By using such codes, different parts of multimedia data blocks can be differently protected significantly decreasing the total code redundancy compared to the case where the whole data block were protected at the level required for the most important part of the block. The last paper in the group *An identity-based broadcast encryption scheme for mobile ad hoc networks* by C. Y. Ng, Y. Mu, and W. Susilo proposes a secure protocol for mobile devices to construct a group key for a set up of a secure dynamic communication network.

The fifth paper of the issue *An adaptive LQG TCP congestion controller for the Internet* by L. B. White and B. A. Chiera addresses the problem of congestion control for transmission control protocol (TCP) traffic in the Internet. The proposed method is based on an adaptive linear quadratic gaussian (LQG) formulation that uses an extended least squares system identification algorithm combined with optimal LQG control.

The next two papers: *Load-balanced route discovery for mobile ad hoc networks* by M. Abolhasan, J. Lipman, and T. A. Wysocki, and *Effect of unequal power allocation in turbo coded multi-route multi-hop networks* by T. Wada, A. Jamalipour, K. Ohuchi, H. Okada, and M. Saito, deal with the important type of the networks which will be also carrying a significant proportion of multimedia traffic in the future. Such networks are promising candidates for next generation mobile communications and will facilitate extending the coverage area without the significant infrastructure costs.

The following three papers: *An adaptive iterative receiver for space-time coding MIMO systems* by C. Teekapakvisit, V. D. Pham, and B. Vucetic, *Exact pairwise error probability analysis of space-time codes in spatially correlated fading channels* by T. A. Lamahewa, M. K. Simon, T. D. Abhayapala, and R. A. Kennedy, and *CDMA wireless system with blind multiuser detector* by W. Y. Leong and J. Homer report on research into techniques for better bandwidth utilization and interference mitigation in wireless systems. Such techniques will be necessary for the future wireless networks to accommodate ever growing number of users with increased bandwidth demands caused by the multimedia applications.

The final paper of the issue *A highly accurate DFT-based parameter estimator for complex exponentials* by J. Tsui and S. Reisenfeld describes a low complexity algorithm for the phase and amplitude estimation suitable for real time digital signal processing applications which are necessary for an accurate reconstruction of data from the received signal.

The guest editor would like to thank here all the authors for their contributions and the reviewers for their hard work in preparing their submissions, reviewing, and revising the papers on time.

Tadeusz Antoni Wysocki
Guest Editor