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Preface

Intelligent and data intensive computing remain the key paradigms in today's large-, medium- and ultra-scale communication networks. This volume of *Journal of Telecommunications and Information Technology* encompass twelve research papers reporting the recent developments and implementations in the modern networking.

The papers are divided into three groups. The first group contains three papers presenting the interesting examples of the usage of new methods (metaheuristics, monitoring systems) in the optimization of the network performances for specific applications.

Zidane *et al*. in *Compensation of Fading Channels Using Partial Combining Equalizer in MC-CDMA Systems* developed a new equalizer for Multi-Carrier Code Division Multiple Access (MC-CDMA) systems. They used the Broadband Radio Access Networks (BRAN A) channel model for channel identification and propagation in an indoor environment. The authors present the detailed theoretical analysis and numerical simulations in the noisy environment and for different Signal to Noise Ratio (SNR) for illustration of the high efficiency of the developed partial combining equalizer and its significant on the performance of MC-CDMA systems.

In the second paper, *Unsupervised phoneme segmentation based main energy change for Arabic speech*, Lachachi present a new method for segmenting the Arabic languages speech at the phoneme level. In this case, the novel hardware-based methods for the implementation of the Fast Fourier Transformation were investigated. The real aim of the research was the identification of the big energy changes in frequency over time, which can be described as phoneme boundaries. The author applied a frequency range analysis and search for detecting such energy modulation. The segmentation of the acoustic signals provided with such frequency range analysis show that over 80% of the boundaries were successfully identified.

Incumbent user spectrum band can be used in cognitive radio for communication purposes without can perform a communication using the without the interference caused by the users. Such incumbent user spectrum band uses the spectrum sensing technology. Chatterjee *et al*. in *Optimization of Spectrum Sensing Parameters in Cognitive Radio Using Adaptive Genetic Algorithm*, developed evolutionary-based AI metaheuristic for optimization of the Quality of Services spectrum sensing parameters, such as bit error rate, throughput, power consumption, interference, spectral efficiency, etc.

The second group of the papers addresses the problems of energy consumption and security aspects in new generation networks.

In the first paper in this part, Conti and Vitabile in *Design Exploration of AES Accelerators on FPGAs and GPUs* present the comparative analysis of different implementations of Rijndael AES cryptographic algorithm. Two implementations were presented: a novel FPGA using Celoxica RC1000 board, equipped with Agility's Handel-C compiler and a parallel OpenCL library based program running on GPU. Such implementation is a challenging task, and the compared FPGA and GPU used as accelerators for the AES cipher are very popular devices for parallel computation.

The analysis and optimization of the network traffic are among the most important methods of conservation of the energy in large and small areas networks. Rowshanrad *et al*. in *A Queue Monitoring System in OpenFlow Software Defined Networks*, used the Software Defined Networks for monitoring the performance of telecommunication networks. The proposed technology allows to achieve the 99% accuracy in monitoring of delay and available bandwidth of a queue on a link or path of the network, and in consequence, reduce the energy consumption in such networks.

A popular method of saving the energy in sensor networks is the improvement of the efficiency of the routing protocols. It can be very difficult in the specific real-world scenarios. Kohli and Bhattacharya in *Sensor Hop-based Energy Efficient Networking Approach for Routing in Underwater Acoustic Communication* used the Sensor Hop-based Energy Efficient Network Approach (SHEENA) for the construction of the energy-efficient, scalable and fault-tolerant Underwater Sensor Network (USN). They verified the QoS features of the network in shallow and deep-water environments and compared it with the USN with traditional multi-hop LEACH protocol. They achieved the 25–30% reduction rate of the energy consumption.

The optimal routing in mobile ad hoc networks remains a challenging problem. The greedy protocol uses the distance or direction metrics for detecting the relay node as a data transfer point from source to destination. Mishra *et al*. in *An Improved Greedy Forwarding Scheme in MANETs* propose the new position-based routing protocol in MANETs. They combine the distance-based and deviation-based node selection schemes into a joint weighted forwarding method. They show in the experimental section that their protocol is significantly better in the minimization of the average hop-count, end-to-end delay and routing overhead than distance and direction based routings considered separately.

Jakóbik *et al*. in *Energy Efficient Scheduling Methods for Computational Grids and Clouds* survey the recent models and technologies for measurement of the energy consumption in computational clouds. They provide an overview of resource allocation methods, tasks scheduling and load balancing methods. The ECT matrix is the basic scheduling model. The experiments defined for the Amazon Cloud instances presented at the very end of the paper show the impact of the optimal task scheduling on the energy consumed in the cloud environment.

Significant reduction of the consuming energy in large-scale HPC systems may be related to the implementation of the light-weighted authorization and users' authentication protocols, and cryptographic methods. Rayin in *Introduction to Big Data Management Based on Agent Oriented Cyber Security*, developed a new model of Big Data management based on the agent oriented cyber security model in public spaces. The use of the multi-agent system for such management process is very promising research area, especially in the context of the cyber security.

The game theory can be another methodology supporting the task and data management in large-scale networks. Jakóbik and Wilczyński in *Using Polymatrix Extensive Stackelberg Games in Security-Aware Resource Allocation and Task Scheduling in Computational Clouds* defined the Stackelberg game model for supporting the administrative decisions on tasks processing in Computational Clouds. Such game-based allows to optimize the computing capacities of the Virtual Machines for the processing of the generated schedules. The security aspects in that approach were addressed in mapping the security requirements specified for the tasks to virtual machine. The declared trust levels of the machines were interpreted as the mapping criterion. The number of virtual resources and their characteristics may be changed during the game. The optimal strategies for the game, and thus the proper security levels, were calculated automatically.

The last two papers show interesting examples of real-world applications of intelligent networking algorithms and models.

Earth observations are important area in modeling and simulations of such realistic scenarios. Sensing and radiosonde monitoring of the Earth atmosphere generate the large volume of data for the analysis. However, some data can be damaged during this monitoring process. Szuster in *Data fixing algorithm in radiosonde monitoring process* developed a new algorithm, which allows to repair such damaged data. The achieved efficiency improvement rate is significant and reaches up to 70%.

In the last paper of this issue, *My City Dashboard: Real-time Data Processing Platform for Smart Cities*, Usurelu and Pop address the problem of real-time processing of sensing data collected by sensors within a smart city. They visualized that data by using the dashboard model for citizen empowerment. This method is extremely important for the effective usage of the smart city application by average educated citizens without a strong background in computer science and ICT technologies.

I truly believe that this *JTIT* volume will serve as a reference for students, researchers, and industry practitioners currently working or interested in joining interdisciplinary works in the areas of intelligent modern networking using emergent large-scale distributed computing paradigms. It will also allow newcomers to grasp key concepts and potential solutions in advanced topics of theory, models, technologies, system architectures and implementation of applications in various types of sensor, wide and small area networks.

I am grateful to all the authors for their interesting papers, their time, efforts and their research results, which makes this volume a valuable source of the latest research advances and technology development on the next generation intelligent networks. I also would like to express my sincere thanks to the reviewers, who have helped me to ensure the quality of this volume. I gratefully acknowledge their time and valuable remarks and comments. My special thanks go to the journal editors for their patience, valuable editorial assistance and excellent cooperation in the preparation of this volume.

Joanna Kołodziej
Guest Editor