

# JOURNAL OF TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

## *Preface*

Wireless networks, devices and technologies play huge – and still increasing role in communications nowadays, reflecting the need for mobility and ubiquitous access. This made mobile communications the fastest growing and most profitable sector of telecommunications. Cellular networks are supplemented with fixed and satellite systems.

Rapid growth also exposes limitations of existing wireless devices and networks, driving their technical development. Additionally, other technologies required for provision of services and construction of infrastructure must be developed, too. There is a need to tackle issues like speech quality or performance limitations imposed by existing antennae and electronic devices in broadband mobile networks.

Proliferation of wireless devices brings with it the vexing problem of user safety, due to unavoidable exposure to modulated microwave radiation. Despite long and extensive research in this field, results are often inconclusive, while technical characteristics of wireless networks (frequencies used, modulation schemes, power levels, etc.) constantly evolve. More work still needs to be done, and existing regulations updated.

The emergence and development of Internet of Things reminds us also of ubiquity of Future Internet, where all electronic devices, appliances and machinery will be connected, usually without human involvement. Because of huge numbers and wide variety of connected devices, with differing needs for services, bandwidth, security level, etc., reliable object and service identification is of paramount importance here.

This issue includes papers devoted to development of wireless mobile networks and related issues: microwave propagation, broadband antenna design, prevention of stray radiation from heterodyne receivers by use of photonic rather than electronic technology, and adverse effects of microwave radiation on humans. Additional subjects include: reduction of acoustic interference in voice communications by spectral techniques, identification layer in the Internet of Things, and the more distant issue of optimization of Sudoku advisory strategy.

To begin with, the paper *Mobile Telecommunication Systems Changed the Electronic Communications and ICT Market* by A. Zieliński and K. Zieliński gives a picture how important mobile communications is, in particular in countries lacking modern fixed infrastructure like Poland. While mobile voice users have outnumbered fixed ones for over a decade,

current deployment of LTE and proliferation of new terminals – smartphones and tablets is expected to make mobile operators key players in broadband access, too.

Proper operation of all radio systems depends very much on signal propagation and antennas used. J. Bogucki and E. Wielowieyska in the paper *Fading Duration in Line-of-sight Radio Links at 6 GHz* deal with issue of the first type: wave propagation which determines the performance of a radio-relay systems operating in the 6 GHz band. Such systems may be used for provision of broadband fixed access in areas lacking cable infrastructure. Signal fading is the principal factor limiting quality and availability of microwave links in this frequency band. The authors present propagation measurements performed in Poland.

In the next paper, *Dual-band Multi Slot Patch Antenna for Wireless Applications*, M. Samsuzzaman, M. T. Islam, and M. R. I. Faruque propose new design of broadband multi slot antenna for C/X bands, e.g. for use in satellite communication systems. While microstrip patch antennas are inexpensive, robust and relatively compact, the bandwidth of such devices tends to be narrow. According to simulations, the proposed multiple slot antennas can provide two separated bands, offering 970 MHz (11.96% centered at 8.11 GHz) and 890 MHz bandwidth (about 9.76% centered at 9.42 GHz), outperforming other known devices.

H. V. Baghdasaryan, T. M. Knyazyan, and M. Marciniak in their paper *High Q-factor Fabry-Perot Microresonator as an Alternative to Microdisk in Electro-Optical Modulator for Microwave-Photonic Receivers* describe a novel solution to the problem of spurious radio emissions produced by local oscillators in microwave superheterodyne receivers. The authors propose to eliminate this problem by converting microwave signals to optical frequencies (where a very effective shielding is possible), using high Q-factor Fabry-Perot microresonator as electro-optical modulator. This approach is compared with known microwave-photonic receivers employing electro-optical microdisk modulator, and claimed to be superior.

The dark side of mobile communications is reviewed by A. J. Bamisaye in a paper titled *Evaluation of Potential Dangers of Mobile Telecommunication Frequencies and Modulations*. Harmful effects of microwave radiation are particularly important because of huge numbers of persons affected, long (and rising) exposure times and systematic proliferation of new systems. Experimental studies examined effects on all levels of the human organism, ranging from single cells to reactions of entire body. The author presents recommendations for reduction of adverse health effects of electromagnetic fields encountered in mobile communication networks.

Despite growth in data services, voice services remain most popular among mobile users. For them, speech quality is important, and frequently degraded by noise coming from various sources, either a noisy environment they are surrounded by, or various devices and signal compression in the communications network they use. I. A. Alimi and M. O. Kolawole in their contribution *Enhancement of Speech Communication Technology Performance Using Adaptive-Control Factor Based Spectral Subtraction Method* look at speech enhancement by means of adaptive Multi-Band Spectral Subtraction, considered by them as the best way to deal with color (rather than white) noise encountered in real-world situations. Effectiveness of this technique was verified by simulations showing removal of colored noise without losing low amplitude speech signals and in subjective listening tests.

Internet, also mobile, is no longer for humans only. Machines and appliances use (or will use) it, too, according to the concept known as Internet of Things (IoT). In the paper *ID Layer for Internet of Things Based on Name-Oriented Networking*, J. Mongay Batalla, P. Krawiec, M. Gajewski, and K. Sienkiewicz look at the important issue of identification for this very diverse new class of users, critical for proper automatic selection of services needed. This functionality is provided by a so called ID (IDentifier) layer, exposing IoT objects and services offered by them to users. While common approach is to create the ID layer as an overlay to existing network, this paper presents a new architecture with ID layer functionality embedded into the network plane. An ID-aware network node was implemented and tested.

The last paper: *Agent-based Optimization of Advisory Strategy Parameters* written by M. Polnik, M. Kumięga, and A. Byrski is of more generalized and theoretical type, looking at application of Evolutionary Multi-agent Systems (EMAS) and its memetic version to optimization of Sudoku advisory strategy. The authors compare results obtained experimentally using EMAS and Parallel Evolutionary Algorithm (PEA) in decision support in Sudoku solving.

Hope readers will find this up-to-date content of current issue of the *Journal of Telecommunications and Information Technology* useful and interesting.

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