

JOURNAL OF TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

Preface

This issue of the *Journal of Telecommunication and Information Technology* continues topics addressed in the previous issues related to multiple criteria decision making, data mining, knowledge acquisition, management and engineering, and other advanced information technologies with application to telecommunications and other network services, but starts with two more fundamental papers, one concerning philosophy of technology in time of informational revolution and the second, invited paper on methodology of multiple criteria decision making. This is continued with papers on applications of multicriteria analysis to telecommunications and on knowledge management in telecommunications research institute. This issue contains also papers on diverse technological and economic aspects of telecommunication technology, such as spectral division of the optical fiber passband, code cardinality for ultra wideband systems, high-frequency power amplitude modulators, cooperative and non-cooperative, integrative and distributive market games, problems of broadband in rural areas, etc.

The first paper, by Andrzej P. Wierzbicki from National Institute of Telecommunications in Warsaw, *Delays in Technology Development: Their Impact on the Issues of Determinism, Autonomy and Controllability of Technology*, provides a discussion of diverse delays occurring in technology development, and an explanation of reasons why, when seen holistically from outside, the process of technology development might appear as an autonomous, self-determining, uncontrollable process. When seen from inside, however, the process is far from being uncontrollable. This paradox is explained by the fact that technology development contains many processes with delays, in total amounting sometimes to fifty years; when seen from outside, such a process might appear uncontrollable, even if it is very much controllable when approached internally and in detail. Therefore, the definition and types of technology creation as well as stages of technological processes are discussed in some detail in this paper. Some aspects of the contemporary informational revolution and some recent results on micro-theories of knowledge and technology creation are also reviewed. It is suggested that one of possible ways of changing the paradigmatic attitude of philosophy of technology is to invite some such philosophers to participate in the development of modern tools of knowledge civilization era, such as software development and evaluation. The conclusions of the paper stress the need of essentially new approaches to many issues in the time of informational revolution.

The second, invited paper by Włodzimierz Ogryczak from Warsaw University of Technology, *Reference Point Method with Importance Weighted Partial Achievements*, stresses that the reference point method (RPM) is a convenient technique for interactive analysis of the multiple criteria optimization problems. It provides the decision maker (DM) with a tool for an open analysis of the efficient frontier. The interactive analysis is navigated with the commonly accepted control parameters expressing reference levels for the individual objective functions. The partial achievement functions quantify the DM satisfaction from the individual outcomes with respect to the given reference levels. The final scalarizing achievement function is built as the augmented max-min aggregation of partial achievements with respect to the given reference levels which means that the worst individual achievement is essentially maximized but the optimization process is additionally regularized with the term representing the average achievement. In order to avoid inconsistencies caused by the regularization, the max-min solution may be regularized by the ordered weighted averages (OWA) with monotonic weights which combines all the partial achievements allocating the largest weight to the worst achievement, the second largest weight to the second worst achievement, and so on. Further following the concept of the weighted OWA (WOWA) the importance weighting of several achievements may be incorporated into the RPM. Such a WOWA RPM approach uses importance weights to affect achievement importance by rescaling accordingly its measure within the distribution of achievements rather than by straightforward rescaling of achievement values. The recent progress in optimization methods for ordered averages allows one to implement the WOWA RPM quite effectively as extension of the original constraints and criteria with simple linear inequalities.

The third paper, by Michał Majdan from Warsaw University of Technology and National Institute of Telecommunications in Warsaw, *On Subjective Trust Management*, stresses that trust and reputation management is gaining nowadays more attention than ever as online commodity exchange and other open virtual societies became a widespread reality. Most widely used computational models use reputation metrics as global property assigned to each party. More sophisticated models try to use reputation as subjective property. While introducing subjective reputation there arise a need to model preferences of agents. The paper proposes to use weighted ordered weighted average operator to support the decision maker in assessing available evidence about other's party behavior.

The fourth paper, by Paweł Białoń from National Institute of Telecommunications in Warsaw, *An Eclectic Approach to Network Service Failure Detection Based on Multicriteria Analysis with an Example of Mixing Probabilistic Context Free Grammar Models*, presents a method of failure detection in telecommunication networks. This is a meta-method that correlates alarms raised by failure-detection modules based on various philosophies. The correlation takes into account two main characteristics of each module and the whole meta-method: the percentage of false alarms and the percentage of omitted failures. The trade-off between them is tackled with aspiration-based multicriteria analysis. The alarms are correlated using linear classification by support vector machines. An example of the profitability of correlating alarms in such way is shown.

The fifth paper, by Joana Fialho, Pedro Godinho, João Paulo Costa, Ricardo Afonso, and José Gonçalo Regalado from University of Coimbra and PT Inovação in Aveiro, Portugal, *A Level-Based Approach to Prioritize Telecommunications R&D*, presents an approach to evaluate R&D projects in telecommunications. These projects have particular features that cannot be properly incorporated by classical evaluation methods. This approach incorporates different criteria, both quantitative and qualitative, and also management flexibility and uncertainty. Thus, it is an approach that can be applied to real data of R&D projects in a telecommunications company.

The sixth paper, by Cezary Chudzian from National Institute of Telecommunications in Warsaw, *Ontology Creation Process in Knowledge Management Support System for a Research Institute*, documents a part of the research activities performed at National Institute of Telecommunications, related to development of research institute knowledge management support system. The ideas lying in the background of the system come from the recent theories of knowledge creation and creativity support and from experience with everyday practice of knowledge management in market companies.

The seventh paper, by Jarosław Sobieszek from National Institute of Telecommunications in Warsaw, *Towards a Unified Architecture of Knowledge Management System for a Research Institute*, presents some elements of architecture of planned knowledge management system

dedicated to research institutions. Main contributions include social extension of the idea of adaptive hermeneutic agent and preliminary implementation of domain specific language for development of knowledge management systems.

The eighth paper, by Kamil Kołtyś, Piotr Pałka, Eugeniusz Toczyłowski, and Izabela Żółtowska from Warsaw University of Technology, *Multicommodity Auction Model for Indivisible Network Resource Allocation*, presents a multicommodity auction model that allocates indivisible network resources among bidders. The approach can be considered as a generalization of the basic multicommodity model for balancing communication bandwidth trade (BCBT). The BCBT model assumes that offers concerning inter-node links and point-to-point bandwidth demands can be realized partially. However, in the real-world trade there might be a need to include capacity modularity in the market balancing process. Thus the paper presents a model for balancing communication bandwidth trade that takes into account the indivisibility of traded bandwidth modules. This requires to solve a mixed integer problem and increases computational complexity. Furthermore, the pricing issue appears nontrivial, as the dual prices cannot be longer used to set fair, competitive market prices. For clearing the market, we examine the multicommodity pricing mechanism based on differentiation of buy and sell market prices.

The ninth paper, by Igor Goncharenko, Alexander Esman, Grigory Zykov, Vladimir Kuleshov, Marian Marciniak, and Vladimir Pilipovich, from Institute for Command Engineers, Belarus, Institute of Physics, National Academy of Sciences, Belarus, and National Institute of Telecommunications in Warsaw, *Spectral Division of the Optical Fiber Passband Using Narrowband Controllable Filter on the Base of Semiconductor Waveguide Microresonator*, analyzes a new principle of multichannel spectral division of optical fiber passband using controllable narrowband integrated optical filters composed of two-coupled ring microresonators made of different semiconductor materials.

The tenth paper, by Mohammad Upal Mahfuz, Kazi M. Ahmed, and Nandana Rajatheva from University of Calgary, Canada, and Asian Institute of Technology, Thailand, *On the Effects of Code Cardinality for TH-PPM Ultra Wideband Systems*, demonstrates the effects of code cardinality at transmitter section on bit error rate (BER) performance of time hopping pulse position modulation (TH-PPM) based ultra wideband (UWB) indoor radio communication. In the transmitter, different code cardinality values have been chosen and correspondingly the effects on BER of the system have been investigated.

The eleventh paper, by Juliusz Modzelewski and Mirosław Mikołajewski from Warsaw University of Technology, *High-Frequency Power Amplitude Modulators with Class-E Tuned Amplifiers*, stresses that a high-frequency (HF) power amplifier used in a drain amplitude modulator should have linear dependence of output HF voltage V_o versus its supply voltage V_{DD} . This condition, essential for obtaining low-level envelope distortions, is met by a theoretical class-E amplifier with a linear shunt capacitance of the switch. The paper analyzes the influence of non-linear output capacitance of the transistor in the class-E amplifier on its $V_o(V_{DD})$ characteristic using simulations of the amplifiers operating at frequencies 0.5 MHz, 5 MHz, and 7 MHz.

The twelfth paper, by Sylwester Laskowski from National Institute of Telecommunications in Warsaw, *Cooperative and Non-cooperative, Integrative and Distributive Market Games with Antagonistic and Altruistic, Malicious and Kind Ways of Playing*, illustrates distinctions between important concepts of game theory, which support understanding the relation between subjects on competitive and regulated telecommunications services market. Especially it shows that often used distinction between retail and wholesale market that treat them respectively as competitive and cooperative can be misleading or even wrong.

The thirteenth paper, by Paweł Białoń from National Institute of Telecommunications in Warsaw, *Problems of Broadband in Rural Areas in Light of the BReATH Project Experiences*, presents some lessons learned from the EU project “Broadband e-Services and Access to the Home” (2005–2007) concerning the broadband development in rural areas. In particular, the paper discusses the common problems of broadband deployment in the rural environment, various aspects of stimulating demand for broadband, the limitations of public aid and, most importantly, the problems of techno-economic analysis.

Andrzej P. Wierzbicki
Guest Editor