

Guest Editorial

Cognitive Radio Communications and Software Defined Radio

Dear readers,

It is our pleasure to introduce this Radionegineering journal special issue on Cognitive radio communications and software defined radio, scheduled for December 2010.

Increasing demands for high speed wireless access gave rise to new approach to radio communications and spectrum management – Cognitive Radio (CR). One of the key components of cognitive radio – dynamic spectrum access – shows a way to overcome the scarcity of one of the natural resources – radio frequency spectrum. The research in the domain of CR spans the wide area from information and signal theory, physical and MAC layer architectures or network theory to economic, legal and policy issues. Moreover, the future of cognitive radio would not be possible without the advances in the software defined radio architectures, signal processing or intelligent learning and optimization algorithms. This special issue of Radioengineering journal thus aims to gather the innovative contributions in the broad domain of cognitive radio and reconfigurable software defined radio and present them to the reader interested in this recent exciting area.

From among 32 regular papers submitted, 13 papers have been selected for the publication during the review process. Moreover, two papers have been invited by the guest editors from renowned authors. As the result, the issue consists of 15 papers submitted by the authors with the primary affiliation in 8 different countries.

The first invited paper, written by *G. Baudoin et al.* (Université Paris-Est, France) is oriented to the area of transmitter architectures suitable for high efficiency multi-radio applications. The second invited paper, written by *Y. Cui et al.*, presents the research work performed by the members of the team lead by prof. Honggang Zhang (Zhejiang University, China) and is focused on the efficient use of filter banks in cognitive radio networks.

As apparent from the title of this special issue, the published papers could be categorized into two main categories – one with more accentuated Software defined radio and signal processing aspects, the second focused more specifically on CR technology in all its forms including both MAC and PHY layers. It has to be noted that the border between the two categories is rather fuzzy than crisp and some papers could well fit in both of them.

The published regular papers start with the analysis of secondary system interference for cognitive radio in slow fading environment, submitted by *K. Ruttik et al.* The following two papers – by *N. Milošević et al.* and by *R. Pust et al.* are connected with the interference and collision

avoidance problems, too. The former deals with the special receiver structure for DSSS signals with interference suppression capabilities, the latter presents a new technique of frequency hopping with collision avoidance functionality. Other three papers focus on the multicarrier principle in software defined and cognitive radios. The contribution written by *Z. Fedra et al.* analyzes the pilot based channel estimation method in two-dimensional spreading multicarrier systems, the paper by *Z. Kollár et al.* compares various multicarrier modulation schemes with respect to the potential use in CR networks. The research described by *Z. Jing et al.* makes use of the game theory to DMT power allocation. The first part – rather signal processing and software radio oriented – is concluded with two papers dealing with practical implementations. The paper by *B. Hu et al.* deals with RF part design, as it presents the hot results from low noise amplifier development, while the paper by *O. Jakubov et al.* describes the low cost GNSS software receiver.

One of the best known functionalities of CR subsystems is the spectrum sensing. It is very often confused with the CR itself. Three papers treating the spectrum sensing have been accepted for the publication. The method of sensing task allocation for cooperative spectrum sensing is presented in *Q. Wu et al.*, the cooperative spectrum sensing using the location principle is described by *Hongtao Zhang et al.* The wideband spectrum segmentation performance in noise power uncertainty condition is analyzed in the paper by *S. Tascioglu et al.* In order to cover broad range of current cognitive radio research activities, the MAC layer and networking issues have to be considered, too. The MAC protocol design with QoS is described in the paper by *S.M. Kamruzzaman et al.*, the optimal routing approach in Wireless Sensor Networks is discussed by *J. Trdlička et al.*

We hope that you – readers find the above mentioned papers interesting, inspiring and motivating for further research. Please enjoy the time spent during the reading. Finally, we would like to thank to all the authors for their valuable submissions, to the preprint team of the journal, and in particular to all the anonymous reviewers. Without their rigorous work, the publication of this special issue would not be possible at all. We really appreciate their fast response during the overall review process. Thanks.

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