
Editorial

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Biographical notes: Ernestina Cianca is an Assistant Professor in Telecommunications at the University of Rome Tor Vergata, Department of Electronics Engineering. She has worked on several European and national projects. Her research interests are mainly on the wireless access technologies and signal processing for biomedical applications. She is the author of about 80 papers in international journals/transactions and proceedings of conferences.

Mauro De Sanctis is an Assistant Professor at the Department of Electronics Engineering, University of Roma 'Tor Vergata', Italy, teaching information and coding theory. He is involved in the coordination of the Alphasat TDP5 scientific experiments for broadband satellite communications in Q/V band. He is serving as an Associate Editor for the Space Electronics and Communications area of the *IEEE Aerospace and Electronic Systems Magazine*. He has co-authored more than 70 papers published on journals and conference proceedings.

Simone Frattasi has worked as a Patent Attorney at Patrade since September 2011. From June 2010 to August 2011, he worked as a postdoc in the Center for TeleInfrastruktur at AAU. From 2002 to 2011, he was at AAU working on several European and national projects. In 2009, he worked as a Patent Attorney at Plougmann and Vingtoft. He has been co-Founder of Kyranova Ltd., and co-Founder and President of the International Symposium on 'Applied Sciences in Biomedical and Communication Technologies' (ISABEL), the International Conference on 'Cognitive Radio and Advanced Spectrum Management' (CogART) and One2One (Business and ScienceMatch).

Nicola Marchetti is an Assistant Professor at Trinity College Dublin, Ireland, and is affiliated to the National Telecommunications Research Centre (CTVR). He received his PhD from Aalborg University, Denmark in 2007, and holds two MSc in Electronic Engineering and Mathematics. His past and present collaborations include research projects in cooperation with Samsung, Nokia, Siemens Networks, Huawei, Intel Mobile Communications and among others. His research interests include: 5G, cognitive radio, complexity science, integrated optical-wireless networks, MIMO, RRM, small cells, and waveforms. He has authored in excess of 60 journals and conference papers, hold two patents, and wrote two books and four book chapters.

Conventional fixed spectrum allocation cannot successfully cope with the scarcity of radio frequency spectrum. Cognitive radio is a novel technology, which improves the spectrum utilisation by seeking and opportunistically utilising radio resources in time, frequency and space domains on a real time basis. The cognitive radio technology poses many new technical challenges, and overcoming these issues becomes even more challenging due to non-uniform spectrum and other radio resource allocation policies, economic considerations, the inherent transmission impairments of wireless links and user mobility. In particular, the spectrum sensing process, which is fundamental in CR networks, is still a time consuming and power intensive process. Cooperation is increasingly regarded as a key technology for tackling the challenges of a practical implementation of cognitive radio.

This special issue includes four papers reporting advances in this fast moving field.

In the article 'Optimisation of cooperative spectrum sensing with ultra-wideband signalling' an optimisation strategy for cooperative spectrum sensing is proposed. It consists of two parts: the first part is a Kullback-Leibler distance-based optimisation approach for the local decision thresholds, in the second part, an application-specific power control strategy is presented for the transmission of the local decisions, which can be realised by ultra-wideband underlay communications. The feasibility and effectiveness of the concepts are validated by real spectrum sensing results.

The article 'Directional and cooperative spectrum occupancy measurements in the 2.4 GHz ISM band' presents measurements of the spectrum occupancy, obtained from two devices with several directional antennas. The spectrum occupancy information obtained from the different antennas and measurement devices is combined using techniques known from the cooperative spectrum sensing research for future cognitive radio systems. A new metric is introduced, the cooperative spectrum occupancy, to characterise the resulting spectrum occupancy that is obtained by combining the occupancy measurements from the antennas with different combining techniques. The

new metric can give more insights into the actual spectrum occupancy in a given area taking into account the spatial dimension.

Authors of ‘Performance of resource sharing and borrowing in opportunistic access systems’ investigate a simple opportunistic resource sharing scheme enhanced with a borrowing concept from a traffic viewpoint. Resources are shared between primary and secondary users through a centralised scheme deployed at a base station. The primary users have the preemptive channel access, whereas the secondary ones opportunistically use the available channels. The borrowing concept is introduced to increase the resource availability at the base station level.

Authors of ‘Bluetooth automatic network recognition – the AIR-AWARE approach’ implement an energy detector using the USRP SDR platform. The energy detector output allows the formation of a packet presence/absence diagram. Experimental results indicate that the observation of Bluetooth packet exchange patterns reveals technology-specific MAC layer procedures, leading to the conclusion that technology recognition can be obtained on the basis of time domain technology-specific features.

Editors would like to thank reviewers and authors, who, in different ways, have contributed to this special issue. We would like to acknowledge all the other authors who have submitted their contributions for this issue.