Editorial: Software-Defined Radio and Broadcasting

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Editorial

Software-Defined Radio and Broadcasting

Daniel Iancu,[1,2] John Glossner,[1] Mihai Sima,[3] Peter Farkas,[4] and Michael McGuire[3]

[1] *Sandbridge Technologies, Inc., Tarrytown, NY 10591, USA*
[2] *Tampere University of Technology, Korkeakoulunkatu 1, FIN-33720 Tampere, Finland*
[3] *Department of Electrical and Computer Engineering, University of Victoria, Victoria, BC, Canada V8W 3P6*
[4] *Department of Telecommunication FEI STU, University of Slovakia, 812 19 Bratislava, Slovakia*

Correspondence should be addressed to Daniel Iancu, diancu@sandbridgetech.com

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Software-Defined Radio is not a myth anymore. As process technologies transitioned to 65 nm and lower, power consumption, size, and cost are no longer impediments to SDR adaption. Many SDR products have been introduced in the consumer market in the past few years, in both wireless infrastructure and user equipment, ranging from 2G to 4G. As process technology evolves, processors become more computationally capable pushing the borderline between software and hardware closer to the antenna. One of the main advantages of SDR is software reconfigurability that leads to significant design simplification for multimode receivers. Therefore, processor reconfigurability must be accompanied by multimode antennas as well as reconfigurable radios.

This special issue highlights the most recent advances in the topics of Software-Defined Radio from both industry and research. After two-round peer-reviews, nine papers are selected to be included in this special issue.

The first paper entitled "3G Long Term Evolution Baseband Processing with Application-Specific Processors," by Salmela et al., addresses the challenges encountered by next-generation receivers. The most computationally intensive functions, list sphere decoding, QR decomposition, fast Fourier transform, and turbo decoding are implemented in application-specific processors.

The second paper entitled "The Sandblaster Software Defined Radio Platform for Mobile 4G Wireless Communications," by Surducan et al., presents an inexpensive PCI-e 4G SDR platform built around Sandblaster technology. With the multimode antenna system and flexible RF receiver, the platform is capable of executing in real-time multiple 3G and 4G communication protocols.

In the third paper entitled "Software Defined Radio Demonstrators: An Example and Future Trends," by Farrell et al., flexible Software-Defined Radio platform developed to investigate the use of Software-Defined Radio in the provision of infrastructure elements in telecommunication applications.

The fourth paper entitled "Exploiting redundancy in an OFDM SDR receiver," by Tomas Palenik and Peter Farkas, proposes an easy-to-implement modification to an existing SDR OFDM receiver resulting in improved error correction capabilities while preserving full compatibility with the existing standards.

The fifth paper entitled "Implementing a DVB-T/H Receiver on A Software Defined Radio Platform," by Jiang et al., presents the feasibility of a software implementation of Digital Video Broadcasting on the Software-Defined Radio platform, MuSIC from Infineon Technologies

The sixth paper entitled "Galois Field Instructions in the SANDBLASTER 2.0 Architecture," by Moudgill et al., describes the Galois Field instruction set implemented in the Sandblaster 2.0 Architecture from Sandbridge Technologies. The instruction set takes the advantage of the fact that for some applications, it is not necessary to execute both a polymultiply and polyremainder for each GF multiplication resulting in significant computational expense saving.

The seventh paper entitled "Low-Cost Transceiver Architectures for 60 GHz Ultra Wideband WLANs," by Tatu et al., proposes a multiport architecture that allows the complete integration of circuits including antennas, in planar technology on the same substrate improving cost and receiver performance.

The eighth paper entitled "Multi-band Antennae for SDR Applications," by Surducan et al., deals with the challenges and implementation of multiband antennas for multimode communication systems. It is shown that starting from a composite-folded dipole structure, a more complex antenna configuration capable of supporting multiple communication protocols is derived.

The last paper entitled "A Geometry-Inclusive Analysis for Single-Relay Systems," by Yu et al., investigates the impact of a relay's location on the system capacity and outage probability for amplify-forward and decode-forward schemes. It is shown that a candidate pool of 3 to 5 nodes is enough to obtain most of the cooperative gain provided by a selective single-relay system.

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Daniel Iancu
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