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IEEE Transactions on Aerospace & Electronic Systems (T-AES)

Special Section on Spectrum Sharing Systems

Aims and Scope

The radio frequency (RF) spectrum is finite, yet the demand for its use is growing, largely driven by the needs of commercial cellular, albeit with equally important requirements for enhanced performance by other spectral users, most notably radar and navigation. In total, this "RF triad" of radar, communications, and navigation represents a myriad of different ways in which the RF spectrum is accessed and utilized. As such, sharing of spectrum between these fundamentally different modes realizes a vast systems engineering problem space that is currently being investigated. At a high level, examples of topics being explored include coexistence between radar/aeronautical/satellite links and terrestrial systems such as cellular and WiFi, cognitive systems for spectral avoidance and adaptive interference mitigation, and the co-design of simultaneous multi-function systems.

There are numerous technical challenges as we move away from more traditional "stove-piped" approaches to begin to address the notion of sharing spectrum across disparate RF users. These diverse systems may operate on orders-of-magnitude different scales in terms of bandwidth, timing precision, dynamic range, and the like. Further, the figures of merit may, on their face, be seemingly incompatible, such as exemplified by communication capacity and radar sensitivity.

The spectrum sharing concept tends to fall into two separate categories: coexistence and co-design. The former directly addresses the rapid growth in cellular/WiFi demands for spectrum, largely driven by data-intensive links such as wireless video access by mobile users and the anticipated requirements for the 5G paradigm of machine-to-machine communications, otherwise known as the Internet of Things (IoT). Within this category, which may also be viewed as public/private sharing, are many facets of research involving the management of interference, strategies for sharing knowledge across unrelated systems, and determining performance bounds in complex electromagnetic environments. In contrast, the co-design category addresses the need for improved integration within many defense or future commercial systems in which finite spectral resources and antenna aperture space must meet the demands of increasing functionality by many different sensing, communication, and navigation modes that comprise the same system or collection of distributed systems. This multi-function approach seeks to develop system concepts that involve signaling strategies and architectures to support the simultaneous operation of two or more different modes, often through means of enhanced diversity across the dimensions of time, frequency, polarization, modulation, and space. This special section will serve as a venue to highlight a cross-section of the many different research endeavors currently underway under the auspices of spectrum sharing.

Topics of Interest include:

All applications of communications, navigation, and radar involving

- Multifunction system co-design
- Multidimensional waveform design / optimization for co-use
- Interference avoidance, mitigation, and theoretical analysis/bounds for spectral coexistence
- Cognitive systems (in the context of spectrum maneuverability)
- Parasitic/passive systems leveraging other RF modalities
- Distributed adaptive multifunction scheduling

Important Dates:

Manuscript submission due:	31 January 2018
First review completed:	15 April 2018
Revised manuscript due:	15 June 2018
Second review completed:	15 August 2018
Final manuscript due:	30 September 2018
Publication date:	Spring 2019

Submitted manuscripts will be reviewed according to standard T-AES procedures for regular papers. Prospective authors should visit http:/taes.msubmit.net for submission information. Use the category **spectrum sharing**. Manuscripts deemed to be outside the scope of the special section but otherwise appropriate for T-AES will be redirected to the appropriate area editor.

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