



IEEE Transactions
on Radar Systems

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IEEE Transactions on Radar Systems (T-RS)

*Special Section on Innovations in Radar Spectrum:
Deconfliction, Containment, Sharing, and Multifunction*

Aims and Scope

The proliferation of wireless communication devices and associated demand for spectrum has progressively eroded the allocated bands available for sole radar use. Yet radar technology has likewise evolved toward wider bandwidths (finer range resolution) and an expanding set of functionalities. These conflicting visions for spectrum usage has given rise to a wide variety of new technical considerations involving deconfliction between different user requirements, imperatives for improved spectral containment (especially for high-power transmitters), operating models that support spectrum sharing between highly disparate systems, and even emerging methods to realize simultaneous dual/multi-function capabilities.

Different radars can have vastly different time scales, bandwidths, transmit powers, waveform structures, and operating assumptions because they span a tremendous breadth of defense, scientific, weather, and civil applications. Consequently, there is no “one-size-fits-all” solution to radar spectrum. Moreover, juxtaposing this breadth against the myriad ways in which other spectrum users/functions can manifest realizes an incredibly diverse tapestry to be explored.

For instance, a cognitive radar mode may employ dynamic autonomy to make real-time operating decisions that give due consideration to other users via some “good spectral neighbor” policy. Another example is the incorporation of knowledge regarding high-power transmitter distortion into waveform optimization as a means to improve containment of the ensuing physical emissions. Yet another involves exploiting standardization of commercial signal structures to enhance the cancellation of widespread interference from cellular communications. Alternatively, radar techniques represent a topic of great interest to facilitate situational awareness and enhanced services for communication networks (5G and beyond). Such dual/multifunction modes could support autonomous vehicles, smart environments, augmented reality, and more. The broader notion of radio frequency convergence is likewise pushing toward greater commonality across hardware platforms and the perpetual upgradability of software-driven capabilities. Of course, conflicting attributes/requirements regarding operating frequency(ies), bandwidth, dynamic range, and a host of distortion effects and trade-offs underline the many challenges that still remain.

In short, spectrum is a singularly unifying topic that spans all aspects of radar, thereby also serving as a connection point for all manner of radar researchers. Taken together, this special section will explore the breadth of current research across the many innovations taking place in the radar spectrum context.

Topics of Interest include:

All applications with radar as the primary focus involving:

- Multifunction system co-design
- Multidimensional waveform design / optimization for co-use
- Interference avoidance, mitigation, and theoretical analysis/bounds for spectral coexistence
- Statistical/electromagnetic environment modeling and validation
- MIMO radar and communication systems
- Cognitive systems (in the context of spectrum maneuverability)
- Parasitic/passive systems leveraging other RF modalities
- AI/ML based spectrum sharing techniques
- Enabling technologies for radar spectrum sharing
- Experimental demonstrations and prototypes for spectrum sharing

Important Dates:

Manuscript submission due: 15 June 2023
First review completed: 30 July 2023
Revised manuscript due: 29 August 2023
Second review completed: 28 September 2023
Final manuscript due: 12 October 2023
Publication date: Fall 2023

Submitted manuscripts will be reviewed according to standard T-RS procedures for regular papers. Prospective authors should visit <https://iee.atyponrex.com/journal/tradar-ieee> for additional information. When submitting, use the category **Spectrum Innovations**. Manuscripts deemed to be outside the scope of the special section but otherwise still appropriate for T-RS will be redirected internally.