

2016 DAGSI TOPIC

1. Research Title: *Adaptive Multi-Mode RF Systems*

2. Individual Sponsor:

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3. Academic Area/Field and Education Level: Electrical & Computer Engineering, Cognitive Radar, Electromagnetics, Antennas, Communication, Ultra-Wide Band signals, Waveform Diversity, Signal Processing (Ph.D. Level)

4. Objectives:

The primary objective of this research is to develop technology for the next generation RF systems to enable the ability to quickly and efficiently adapt to dynamic environments. This requires multi-mode capabilities of radar scene imaging, target detection/identification, and communications.

5. Description:

For next generation radar, communications and electronic warfare (EW) systems there is a requirement for efficient spectrum utilization and lifecycle cost reduction. Spectrum congestion is a growing problem that seriously limits operational capabilities due to the increasing bandwidth of wireless communication networks, the use of net-centric unmanned systems, the need for flexibility in radar and communications spectrum to improve performance, and to overcome sophisticated countermeasures. Thus there is an urgent need to develop sharing technology that enables spectrum access for radar and communication systems to accomplish their evolving missions. One promising capability that can help satisfy these requirements is Adaptive Multi-Mode RF systems. The realization of such capabilities necessitates research and development of smart systems that performs in adverse conditions and mobile environments. To develop an efficient and robust multi-mode RF system, a combination of several technologies and techniques need to be researched and developed, including, waveform diversity, spread spectrum signals, software defined apertures, knowledge-based adaptive sensing, and cognitive radar. In addition to theory and simulations, experimental demonstration of concepts will be valuable.

6. Research Classification/Restrictions: This work is unclassified.

7. Eligible Research Institutions:

Universities (DAGSI)

AFIT only

USAFA