

**1. Research Title:** *Reconfigurable RF Systems*

**2. Individual Sponsor:**

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**3. Academic Area/Field and Education Level:** Electrical & Computer Engineering / VLSI , Digital Signal Processing and Formal Verification, and Digital 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 threat environments. Another objective is to enable dynamic performance optimization for a given mission by providing a reconfigurable RF front-end capability that has an analogy to digital field programmable gate arrays (FPGA's). Critical enabling technologies include:

- Adaptive component cells/devices;
- RF interconnect/switch matrix architectures;
- Reconfigurable ultra-wideband (UWB) apertures

**5. Description:**

For next generation radar, communications and electronic warfare (EW) systems there is a requirement for efficient spectrum utilization and lifecycle cost reduction. One promising capability which can help satisfy these requirements is Reconfigurable Multi-function RF systems. The realization of these capabilities necessitates research and development of smart systems that performs under adverse conditions, and in mobile environments. Understanding the current state-of-the-art, and developing technologies to advance efficient/opportunistic spectrum utilization under adverse Anti-Access/Area Denial conditions (A2/AA) are key goals of this effort. Critical to achieving these goals are small wideband apertures with ultra wideband beam forming capabilities and high isolation adaptive transceivers. To develop the ultimate reconfigurable RF system, a combination of many technologies and techniques need to be researched and developed, including UWB antennas, conformal antennas, reconfigurable antenna elements and phased arrays, reconfigurable RF transceivers. All of these technologies are of interest.

**6. Research Classification/Restrictions:** This work is unclassified; U.S. Citizens only.

**7. Eligible Research Institutions:**

Universities (DAGSI)

AFIT only

USAFA