NDIA
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Radar System Technology Research Area

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Agenda

- Research Area Objectives
- Topics
- Topic Overview
- Questions

Research Area Scope and Objectives

- Provide subsystem improvements to enhance BMDS radar performance for emerging threats to support existing and future radar systems through sensitivity, bandwidth, discrimination, countermeasure mitigation, open systems architecture, scalability, and affordability.

Topics

- Device Level Thermal Management Solutions for Phased Array Radar
- Innovative Hardware Technologies for Anti-Jam and Electromagnetic Attack Rejection in Ballistic Missile Defense System (BMDS) Radars
- Electrical Interconnect Technologies for MDA Phased Array Radars
- Distributed Aperture Radar Signal Processing Algorithms, Waveforms and Signal Processing
- RF-Photonic Circuits and Interconnections for Radar Applications

Topic Overview

Device Level Thermal Management Solutions for Phased Array Radar

Objective: Develop and demonstrate low cost, manufacturable, chip-level thermal management solutions to reduce the operational junction temperature of high power RF power amplifiers.

- **Supplemental information:**
  - Wide bandgap semiconductors, namely Gallium Nitride (GaN), hold promise for revolutionary improvements in cost, size weight and performance.
  - Thermal management seems to be a key issue, ideally integrated directly into GaN device.
  - Phase I should develop and demonstrate innovative materials and/or techniques capable of reducing device junction temperature without degrading performance, reliability or processability.
  - Applicable to multiple BMDS radars.

Topic Overview

Innovative Hardware Technologies for Anti-Jam and Electromagnetic Attack Rejection in Ballistic Missile Defense System (BMDS) Radars

Objective: Identify, develop and demonstrate novel or innovative advances in anti-jamming and electromagnetic attack protection hardware technologies that will support existing BMDS X-band, S-band and other radar systems. The focus of this research is to develop and demonstrate hardware technologies that provide protection and/or mitigation of the radar from jamming, high power microwave, ultra wide band, and electromagnetic pulse attacks.

- **Supplemental information:**
  - Develop countermeasures for radar threats of types listed in the Objective.
  - Proposed approaches include details of assumptions that:
    - Impact overall radar system performance.
    - Required to facilitate incorporation of proposed technology.
  - Phase I should Develop and demonstrate the feasibility of the proposed technologies for threats listed in the objective. Demonstrations can be through hardware or models and simulations. Demonstrations of the technology with either a brassboard or pre-prototype is preferred.
  - Applicable to multiple BMDS radars.

Topic Overview

Electrical Interconnect Technologies for MDA Phased Array Radars

Objective: Develop, demonstrate and test Advanced Interconnect Technologies which significantly increase Phased Array Radar performance through higher packaging density, increased application robustness and improved power dissipation when compared to conventional phased array technologies. The proposed technologies shall also demonstrate a significantly reduced cost as compared to conventional phased array technologies.

- **Supplemental information:**
  - MDA and military radar systems require significantly increased electronic interconnection packing density and reliability, with reduced complexity and cost of manufacturing.
  - Phase I should demonstrate improved manufacturability of radar array module. Array module interconnect design demonstrates improved yield and lower cost while maintaining or improving system RF performance. Establish preliminary cost and reliability test plan for the proposed technology approach.
  - Applicable to multiple BMDS radars.

Topic Overview

Distributed Aperture Radar Signal Processing Algorithms, Waveforms and Signal Processing

Objective: Develop and demonstrate critical algorithms, waveforms and signal processing techniques enabling coherent operation of distributed radar antennas in the presence of strong interfering signals.

- **Supplemental information:**
  - Development of advanced distributed aperture (over extended distances, several kilometers between antennas) radar algorithms.
  - Phase I should develop and demonstrate the feasibility of distributed aperture concepts and technologies that address the broad needs identified. Demonstrations can be through hardware demonstrations or modeling and simulation.

Topic Overview

RF-Photonic Circuits and Interconnections for Radar Applications

Objective: Demonstrate robust photonic RF interconnections and components that improve radar performance while reducing system weight and are packaged to survive temperature and environmental/functional operating conditions of MDA/military radar systems.

- **Supplemental information:**
  - Development and novel utilization of RF/photonic interconnections in radar systems to increase performance, packaging density and internal bandwidths while reducing system size and weight.
  - Phase I should perform a feasibility study and an initial development effort that demonstrates a photonic circuit concept capable of providing increased radar performance.
  - Applicable to multiple BMDS radars.

Questions

- For reasons of competitive fairness, direct communication between offerors and topic authors is not allowed starting August 20, when DoD begins accepting proposals for this solicitation.

- However, offerors may still submit written questions about solicitation topics in which the questioner and respondent remain anonymous and all questions and answers are posted electronically for general viewing until the solicitation closes.

- All offerors are advised to monitor SITIS (07.3 Q&A) during the solicitation period for questions and answers, and other significant information, relevant to the SBIR 07.3 topic under which they are proposing.