

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2020-0424

Topic # N181-064

Scalable Directional Antenna for Unmanned Aerial Vehicles (UAVs)

FIRST RF CORPORATION

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS 6.0, Command and Control Directorate

Transition Target: Navy Group-IV UAV systems with an initial integration onto the MQ-8C Fire Scout

TPOC:

(812)381-5741

Other transition opportunities:
Manned aircraft



<https://www.dote.osd.mil/Portals/97/pub/reports/FY2013/navy/2013vtuaa-ver=2019-08-22-111217-143>

WHAT

Operational Need and Improvement: The Navy is seeking to develop alternative routing of data through low-cost airborne Unmanned Aerial Vehicle (UAV) nodes to enable high data bandwidth, robust connectivity, and data routing flexibility between platforms in the surface fleet. A critical component necessary for this capability is a directional antenna architecture that has the flexibility to scale in size, weight, and power (SWaP), and is suitable for airborne applications.

Specifications Required: The Navy is seeking an airborne, low SWaP, half-duplex, active antenna subsystem that achieves high directional effective isotropic radiated power (EIRP) while minimizing sidelobes in transmit, and maximizing gain minus noise figure (G-F) and dynamic range in receive. This high EIRP is required in order to close links to the horizon in a variety of weather and EMI conditions while the high dynamic range is required to discern distant signals in the presence of nearby signals and noise. Rapid beam steering is necessary to support large network sizes with a highly directional array. The primary components of the design could be scaled down to 50% of the SWaP or up to 200% based on a future design point. The driving requirements are for a scalable, light-weight, high-efficiency, air-cooled antenna subsystem with high directivity and rapid beam steering in a small antenna with an overall transmit efficiency of no less than 25 percent.

Technology Developed: FIRST RF has developed a scalable Active Electronically Scanned Array (AESA) antenna. The hardware is modular to allow smaller form factors for UAV's using fewer subarrays and larger form factors for manned aircraft with many subarrays.

Warfighter Value: Achieving an innovative UAV solution provides two specific benefits to the warfighter. First, it enables a greater proliferation of geographically diverse network nodes enabling data routing around EMI sources. Secondly, it can provide a relay functionality that supports sustained network connectivity between geographically diverse nodes. In both cases the system performance can be improved while avoiding deployment of high-cost tactical assets or deploying manned systems for these functions.

WHEN

Contract Number: N68335-19-C-0661 **Ending on:** September 20, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I	N/A	Component measurements	2	December 2018
Phase I Option	N/A	Component measurements	2	August 2019
Phase II Baseline Program	N/A	Successful conceptual design review		September 2021

HOW

Projected Business Model: FIRST RF is a product oriented company developing advanced technologies for antennas and Radio Frequency (RF) systems including communications, radar, phased arrays, Point Navigation and Timing (PNT), RF compatibility, low observable antennas, Electronic Warfare (EW), and Direction Finding (DF) systems. FIRST RF will produce antennas and integrate them onto a variety of aircraft types and sizes. Radio integration will be through a prime or directly with the government.

Company Objectives: FIRST RF Corporation is a developer and manufacturer of Active Electronically Scanned Array (AESA) antennas. The company objective on this project is to produce, test, and deliver scalable AESA antennas for use on unmanned and manned aircraft to primes and government customers.

Potential Commercial Applications: None envisioned

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