

WHO

SYSCOM: NAVSEA

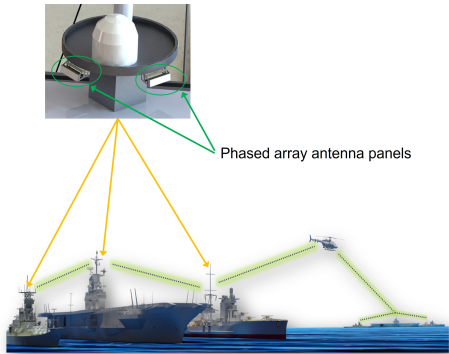
Sponsoring Program: PEO IWS 6.0

Transition Target: The target platforms are those surface platforms with currently installed legacy systems and those surface platforms slated to receive new installations.

TPOC: (202) 781-3014

Other Transition Opportunities: While this work is targeted towards surface vessels, the technology could be used to enhance some aspects of airborne data link terminals.

Notes:



FIRST RF Corporation

WHAT

Operational Need and Improvement: The Navy is seeking to develop greater connectivity from ships to air platforms and other ships. The connectivity is enhanced with the use of multiple-beam antennas, and these antennas give greater data routing flexibility between platforms in the surface fleet with high data rates. A critical component necessary for this capability is high dynamic range for the receive antenna. The modularity and scalability is enhanced with the use of a common subarray, and the digital beamforming provides increase in the configurability of the operation. This approach will greatly increase data throughput, system availability, and the ability to dynamically implement alternative routing, thereby improving the fleet’s ability to successfully execute complex multi-ship missions.

Specifications Required: The requirements are for up to four beams per face with very high dynamic range and element-level digital beamforming. One of the effective specifications to make the system modular and scalable is self-synchronization of subarrays used to assemble the full aperture.

Technology Developed: FIRST RF Corporation has leveraged proven internal phased array technology to create a modular and scalable element-level digital beamforming phased array antenna. The antenna provides 1-4 beams in both transmit and receive for each aperture face. The half-duplex phased array provides very high dynamic range to simultaneously connect with near and far platforms.

Warfighter Value: The multiple directional beams provide communications with the desired nodes, while minimizing energy in undesired directions. The quick beamsteering allows fast and dynamic network optimization at very high data rates.

WHEN

Contract Number: N68335-22-C-0005

Ending on: Oct 30, 2023

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Digitized Array Card	Medium	Basic electrical operation	5	3rd QTR FY23
Phase II completion	N/A	Final briefing and report	5	1st QTR FY24
Lab demo of Subarray	Medium	Demonstrated functionality	6	3rd QTR FY24
Phase I Option completion	N/A	Final briefing and report	6	3rd QTR FY24

HOW

Projected Business Model: FIRST RF is working to enhance the performance and flexibility of phased array antennas, while managing the Size, Weight, Power, and Cost (SWaP-C). Element-level digital beamforming, as used in this project, is the fully digital side of the design space, and analog beamforming is at the other end of the design space. FIRST RF will use operating arrays at both ends of the design space to develop hybrid arrays that use analog beamforming at the subarray level and digital beamforming to combine the subarrays. These hybrid analog/digital phased array antennas may offer the best optimization of spatial nulling and high dynamic range.

Company Objectives: FIRST RF seeks to enhance the design of phased array antenna systems with digital beamforming, high dynamic range operation, multiple beams, and self-synchronization. With multiple phased array designs from full digital to full analog beamforming, the company will be able to understand the design trades for all beamforming options in phased array antenna systems.

Potential Commercial Applications: Each of the technical enhancements are beneficial to phased array antennas in nearly every application, platform, and customer. Analog arrays may offer lower power consumption, and digital arrays may offer better performance an flexibility. Each commercial application has different needs for these performance trades, and FIRST RF will be able to offer the best approach for each commercial opportunity.