Department of the Navy SBIR/STTR Transition Program

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NAVSEA #17-488

Topic # N131-059
Novel, Very Wide-Bandwidth Characterization Technique
EOSPACE Inc

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS 2.0, Above Water Sensors

Transition Target: SEWIP

TPOC:
(812)854-4694

Other transition opportunities:
Department of Defense:
-Distributed coherent sensors/emitters
-Embedded Radar/EW system health monitoring
Commercial:
-Test and measurement systems
-Remote vector network analysis

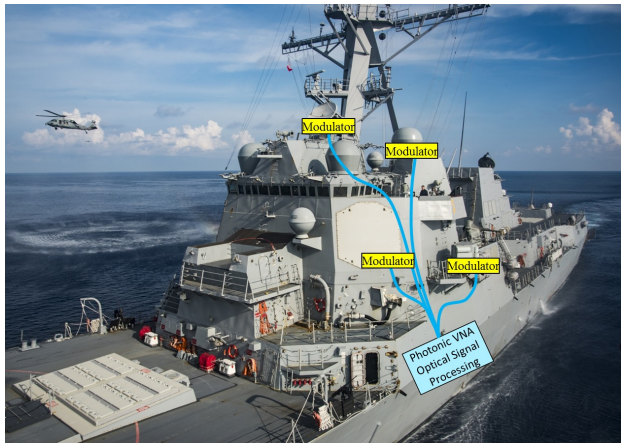

Photo courtesy of U.S. Navy 170409-N-GD109-015.JPG.
Modified to illustrate system concept.

WHAT

Operational Need and Improvement: Distributed remote sensing of a wide variety of Radar, Electronic Warfare, and Communication systems with complete phase information was previously not feasible due to the size, weight, and loss of coaxial cables. Fiber optic links and optical signal processing provide a dramatic reduction in weight compared to coaxial cable along with immunity to electromagnetic interference, and corrosion resistance. Optical fiber can carry extremely wideband signals >110 GHz long distances while preserving RF phase and amplitude information. This technology enables broadband distributed coherent sensing of Navy shipboard Radar, electronic warfare (EW), and communication (COMM) systems.

Specifications Required: Suitable for passive and active components and systems
Scalable to 110 GHz

Technology Developed: EOSPACE manufactures high performance wide bandwidth Lithium Niobate phase, intensity and polarization modulators. The technology developed under this SBIR utilizes our Lithium Niobate modulators to provide a new capability for remote sensing of high frequency RF systems without losing the critical phase and amplitude information that helps determine if the system is functioning correctly. This capability was previously impossible for conventional high frequency RF test and monitoring equipment. We call this technology a Photonic Vector Network Analyzer. It is broadband and extensible, supporting future Navy frequency bands well beyond 40 GHz and up to 110 GHz. It is also modular allowing sensor remoting via low-loss optical fiber.

Warfighter Value: This technology enables precise health monitoring and characterization of remote/distributed radar, electronic warfare (EW), or communication (COMM) systems. It leverages the low loss and immunity to electromagnetic interference (EMI) of optical fiber to transport system health and performance data from the remote sensor to a secure central control room. Optical fiber also dramatically reduces SWaP by >10x compared to conventional coaxial cables.

WHEN

Contract Number: N00024-15-C-4044 **Ending on:** October 30, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Basic research completed	N/A	Demonstrated proof of concept	3	November 2013
Components integrated into a functional system	N/A	Component validation	4	March 2015
Prototype developed	N/A	Prototype system in a relevant environment	5	December 2015
Prototype delivered to NSWC Crane	N/A	System demonstration with Navy	6	November 2016

HOW

Projected Business Model: EOSPACE plans to develop this technology to support Navy and Prime Contractor initiatives to integrate fiber optic technology into the Radar and electronic warfare systems of the fleet.

Company Objectives: EOSPACE is committed to supporting the Navy and Prime Contractors in cutting edge fiber optic link technology and optical signal processing techniques. We continually work to extend the state of the art for high performance Lithium Niobate modulators to support next generation DoD applications including future frequency bands up to and beyond 110 GHz. We are interested in partnering with Lockheed Martin, Raytheon, Northrop Grumman, General Dynamics, Harris Corporation, and other DoD Prime Contractors to identify application areas for which fiber optic links can provide a sustaining advantage to the warfighter.

Potential Commercial Applications: Remote RF vector network analysis test and measurement. High frequency analog fiber optic links.

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