

Topic: N161-029

SA Photonics, Inc.

Shipboard Cabling using Rugged Wavelength Division Multiplexing

SA Photonics is pleased to propose LightCables, a ruggedized terminal addressing the needs of both legacy (copper) and modern (copper/fiber) shipboard cabling systems. LightCables is built on the core technology of Dense Wave Division Multiplexing (WDM). Multiple analog or digital electrical signals are modulated onto different optical carriers and combined onto a single lightweight fiber-optic cable pair. LightCables can hence provide dramatic communication capacity on a single fiber-optic cable pair, dramatically reducing the amount of shipboard copper cabling. This system can be integrated into existing platforms, allowing the incorporation of more sensors, tactical displays and consoles. SA Photonics, which specializes in the development of advanced photonics systems to solve demanding problems for military and commercial customers, envisions teaming with well-known primes, as it has on past product developments.

Technology Category Alignment:

EO/IR Components for sensing, transmission and communication

RF Components for sensing, transmission and communication

Networks and Communications

Ground and Sea Platforms

Maintainability/Sustainability

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SYSCOM: NAVSEA

Contract: N00178-17-C-7011

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00178-17-C-7011

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2018-0559

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WHO

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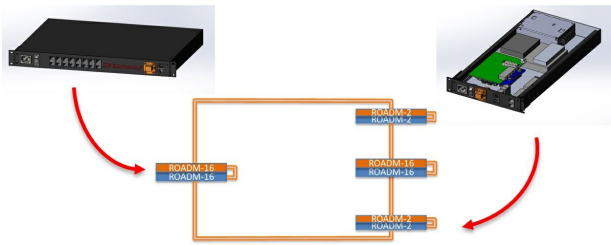
Sponsoring Program: PEO IWS 1.0

Transition Target: AEGIS Integrated Combat System

TPOC:
(540)653-0858

Other transition opportunities: This technology is not limited to Naval ships. SA Photonics is also pursuing uses with Navy and other DoD aircraft, bases and ground vehicles.

Notes: The image at right exemplifies SA Photonics' flexible, robust and scalable Wave Division Multiplexing (WDM) LightCables system that supports a wide range of shipboard signal types.



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WHAT

Operational Need and Improvement: Current shipboard communications cabling is comprised mostly of large, heavy copper cable which is costly to procure and expensive to run throughout ships. Additionally, the complexity of installing connectors between systems significantly drives production costs higher. Operationally speaking, legacy communications systems have difficulty handling digital data signals associated with newer technologies. This requires a larger number of cables to support capability improvements. Systems maintenance then requires additional materials and components, which exacerbates the issues. By utilizing WDM, SA Photonics' LightCables is able to convert digital/analog data signals to optical signals of varying wavelengths, which are then combined and transmitted through a single optical fiber, exponentially increasing the data transmission capacity of the networked system.

Specifications Required: The solution is to ruggedize wavelength division multiplexing to distribute platform communications over optical fiber cables. The system needs to integrate with existing hardware without creating additional or complex installation requirements or procedures, and current copper cabling will be reduced by the addition of new fiber optic cables. The solution needs to provide for establishing secure links through data encryption at entry and exit points.

Technology Developed: SA Photonics' LightCables terminal can couple a wide variety of interfaces and protocols and is completely transparent to the connected terminals, addressing the needs of both legacy (copper) and modern (copper/fiber) cabling systems. The terminals operate as if individually connected by conventional copper cables, thus there is no risk that a LightCables terminal will introduce new interoperability issues to legacy systems. LightCables can accept any mixture of digital (synchronous and asynchronous), analog, and RF signals without changing existing components in the integrated systems.

Warfighter Value: LightCables aims to improve reliability, reduce maintenance and installation costs, and provide a more robust communication infrastructure that is lightweight and immune to EMI interference. The solution is easy to use, protocol agnostic, scalable, offers cable size and weight reduction, has robust signal transmission, eliminates EMI susceptibility and emissions, and is ruggedized to withstand harsh maritime environments. The standards-based design also enables new systems to be added without requiring completely new cabling infrastructure.

WHEN

Contract Number: N00178-17-C-7011 Ending on: September 6, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Brassboard Testing	Low	Validation of reconfigurable optical add/drop multiplexing	4	October 2018
Prototype Testing	Low	Full system validation	5	May 2019
Preliminary interoperability testing	Med	Interoperability with Navy equipment	6	September 2019
Qualification Testing	Med	Qualified for shipboard use	7	September 2020

HOW

Projected Business Model: SA Photonics intends to undergo initial production of the LightCables system onsite. The company has a history of successful small-scale production for commercialized SBIR products. We envision teaming with a prime contractor for LightCables product sales. We would look for the prime contractor to supply sales support, installation support, and maintenance support.

Company Objectives: The LightCables system is positioned to be a cost-saving and performance-improving tool not just for Naval ships, but military vehicles and bases across the DoD. As a result, we are excited to present the product to a range of program offices at the FST, as well as a number of prime contractors, specifically those who work with ship, aircraft and electronics.

Potential Commercial Applications: Applications include military ships, vehicles, missiles and bases. With commercial sectors, LightCables is expected to have a market in the freight shipping industry which also relies on legacy systems and an aging cable infrastructure, as well as other industrial applications where legacy systems will remain in use for the foreseeable future. Greatly reduced maintenance costs and extended use of legacy interfaces, without requiring a complete system upgrade, will allow for high potential commercialization.

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