

# NAVY Transition Assistance Program

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N08-208 - Morton Photonics Incorporated

Low-Cost Ultra-Low-Noise Hybrid-Integrated Laser

## NEED & CUSTOMER REQUIREMENT

**Need:** An ultra-low noise laser for use in Navy submarine fiber-optic sensing systems, including the TB-33 Towed Array and LWAA Lightweight Large Aperture Array sensing systems. A lower cost laser is required to replace the current (expensive) laser device, and to provide a second source for that laser.

**Value to the Warfighter:** Fiber optic sensing systems offer increased sensitivity over acoustic sensors, although at an increased cost. A significantly lower cost ultra-low-noise laser will reduce the cost of these sensing systems, and allow them to be more widely fielded by the Navy.

**Operational Gap:** The current laser is very expensive, and limits the applicability of fiber optic sensing systems. The current laser is sole sourced, posing availability issues to the Navy. Morton Photonics' solution will reduce the laser cost by 10x.

**Customer Specifications:** The key performance specification for this device is the low frequency phase noise, which determines the sensitivity of the fiber-optic sensing system. The 'Chesapeake noise specification' has been provided to Morton Photonics by the Navy as the main requirement for the device.

**Technology Description:** A novel approach using the hybrid integration of a semiconductor gain chip and a Fiber Bragg Grating (FBG) to form an external cavity laser. The FBG and laser cavity designs provide the required ultra-low-noise performance. The device is packaged with a Thermo-Electric Cooler to control the temperature of the sub-components, inside an extended 'butterfly' style package. All sub-components and the extended package are based on existing technologies developed for the fiber-optic telecom market, leveraging the large investment made previously in that marketplace. The Phase II development will provide a laser for use in the TB-33 Towed Array sensing system; further development of a high power version will provide a laser for use in the LWAA sensing system.

## SPONSORSHIP of original SBIR/STTR Topic

**SYSCOM:** NAVSEA

**Transition Target:** Fiber-Optic Sensing Systems: TB-33 Towed Array, LWAA Lightweight Wide Aperture Array (with additional funding)

**Original Sponsoring Program:** PMS450

**TPOC Phone Number:** 202-781-1396



## TECHNOLOGY DEVELOPMENT MILESTONES (SBIR/STTR)

Milestone	TRL	Risk	Measure of Success	TRL Date
Phase II - 1st year	4	Moderate	Prototype device meeting Chesapeake Laser power and Noise Spec for TB33 towed array, and LWAA laser noise spec	March 2011
Phase II - Option (2nd year)	6	Moderate	Production ready full specification device	March 2012
Phase II - Option II	7	Moderate	Qualified device	October 2012

**Open contract:** N00024-10-C-4123 ending 03/19/2011

## TECHNOLOGY TRANSITION OPPORTUNITIES (PHASE III)

**Other Potential Applications:** TB-33 Towed Array Sensing System (initial target)  
LWAA - Lightweight Wide Aperture Array (application for higher power device; requires additional funding).

**Business Model:** Custom sub-components will be fabricated by outside sources to Morton Photonics specifications. Packaging and assembly will be carried out at Alphion Corporation. Final testing will be performed in-house at Morton Photonics.

**Objective:** To showcase Morton Photonics' broad expertise from device physics up to system level applications of novel photonic technologies, in-house capabilities and products, including;

- Ultra-low-noise lasers for sensing systems.
- 'Silicon Photonics' devices; optical time-delay devices for phased array systems, linearized modulators.

To identify primes interested in incorporating our technologies in their systems.  
To find additional applications and systems uses for our technologies across the DoD.  
To obtain additional funding to develop a higher power version of the laser device to expand its potential market.

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