

# Department of the Navy SBIR/STTR Transition Program

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Approval # 43-1256-16

Topic # N131-074

Multi-spectral, short-pulse, high-pulse-energy laser transmitter

Q Peak, Inc.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** Mine Warfare Program Office (PMS 495)

**Transition Target:** Coastal Battlefield Reconnaissance and Analysis (COBRA)

**TPOC:**

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**Other transition opportunities:**

MH-60S Airborne Laser Mine

Detection System (ALMDS)

Office of Naval Research (ONR)

Laser Weapon System

Demonstrator (LWSD) Track

Illumination Laser (TIIL)

Air Force Research Lab (AFRL)

Self Protect High Energy Laser

Demonstrator (SHIELD) Beacon

Illuminator Beacon Illuminator Laser

(BIIL)



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## WHAT

**Operational Need and Improvement:** The detection of mines on the beach and floating/submerged mines in the ocean is currently accomplished with electro-optic (EO) sensors deployed on a Tactical Unmanned Airborne Vehicle (TUAV). The TUAV sometimes encounters complex issues such as the target contrast with the background and false detections of a threat. The Q-Peak multi-spectral laser will enhance discrimination between submerged and floating mines and vegetation, utilizing a high per-pulse energy in a laser transmitter.

**Specifications Required:** The multi-spectral laser will utilize the following four pulse strengths and colors (wavelengths)

- 500 mJ per pulse at a wavelength of 532 nm
- 150 mJ per pulse at a wavelength of 1064 nm
- 150 mJ per pulse at a wavelength of 675 nm
- 150 mJ per pulse at a wavelength of 810 nm

**Technology Developed:** The main innovations being developed under this topic are as follows

- High power Nd:YAG laser oscillator
- Multi-stage modular system with large power handling capabilities for wavelength shifting
- Novel multi-pass gain module configuration
- Fiber coupled wavelength optimized high efficiency diode pumping of Nd:YAG

**Warfighter Value:** This system will enhance the accuracy of intelligence on beach and littoral environments by greatly reducing false positive target acquisition, all from an unmanned vehicles. This keeps warfighters out of harm's way while gathering intelligence and pinpoints enemy locations; allowing the Navy and Marine Corps to concentrate their attack forces on the correct targets.

## WHEN

**Contract Number:** N00014-14-C-0180

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Nd:YAG Oscillator Assembly and Test	N/A	36 mJ per-pulse energy at 1064 nm (COMPLETE)	4	July 2015
Nd:YAG Amplifiers (2) Assembly and Test	Med	280 mJ per-pulse energy at 1064 nm	4	November 2015
Second Harmonic Generator (SHG) Integration and Test	Low	90 mJ per-pulse energy at 532 nm	4	November 2015
Optical Parametric Oscillator (OPO) Integration and Test	Low	42 mJ per-pulse energy at 675 nm	4	December 2015

## HOW

**Projected Business Model:** Q-Peak, Inc. can begin Low Rate Initial Production (LRIP) after prototype assembly and completion of flight test; construction of a test-rack and appropriate lead times are expected to take up to 6 months, at which time Q-Peak can begin full-rate manufacturing.

**Company Objectives:** Q-Peak is currently focused on the ALMDS and COBRA Programs of Record (POR) and integration with BAE Systems Spectral Solutions (Hawaii). The company is focused on expanding the novel Nd:YAG oscillator-amplifier configuration with modular OPO shifting into the commercial UAV bathymetric light detection and ranging (LIDAR) markets for coastal monitoring and oil and gas applications.

**Potential Commercial Applications:** Reduced SWAP-C bathymetric LIDAR systems to discriminate between vegetation and ocean floor  
Novel Nd:YAG oscillator-amplifier configuration leading to reduced SWAP-C BIIL / TIIL

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