

# Department of the Navy SBIR/STTR Transition Program

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NAVWAR

Topic # N122-146

SkyLight Free-Space Optical Terminal for Cubesats  
SA Photonics, Inc.

## WHO

**SYSCOM:** NAVWAR

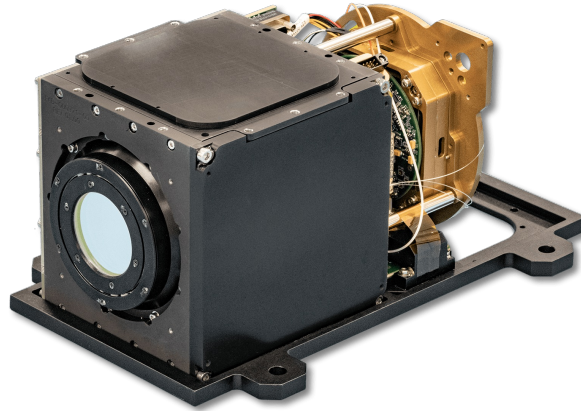
**Sponsoring Program:** Program Executive Office for Space Systems (PEO Space Systems)

**Transition Target:**

**TPOC:**

**Other transition opportunities:** This free space optical (FSO) technology is not limited to Navy space applications. In addition to space programs with other departments, SA Photonics is also pursuing uses with unmanned aerial vehicles (UAVs), littoral naval applications, and various ground communication systems.

**Notes:** The image at right shows SkyLight™, SA Photonics' 1.5U-sized cubesat FSO terminal.



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## WHAT

**Operational Need and Improvement:** Small satellites, including cubesats, require a high data rate communication capability that is resilient to RF interference and jamming, is LPI/LPD and has extremely low SWaP. SA Photonics' SkyLight™ free-space optical communications system provides these capabilities and is suitable for both crosslink and space-to-ground applications.

**Specifications Required:** SkyLight is design to support a crosslink experiment between two 6U cubesats with a threshold requirement of providing 25 Mbps at 100 km link distance, with an objective to support 100 Mbps at distances up to 1,000 km.

**Technology Developed:** SkyLight is a fully integrated FSO communication system that includes modem, all optical sources and receivers, optical amplifiers, closed loop beam tracking control system, autonomous acquisition, and built-in beam steering system. The integrated beam steering provides +/- 50 degree two-axis beam steering allowing for communications without requiring satellite body pointing.

**Warfighter Value:** SA Photonics' SkyLight FSO system provides high data rate secure and resilient communications between small satellites as well as space-to-ground and space-to-air applications. The low SWaP of skylight will enable use on small platforms such as small UAVs and man-portable ground terminals. This new capability provides communications without RF emissions, allowing use during EMCON conditions. Additionally, the optical communications is immune to RF interference and jamming, and highly tolerant to optical jamming.

## WHEN

**Contract Number:** N68335-20-C-0092 **Ending on:** November 12, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Qual Unit Delivery	Med	Unit(s) delivered	8	January 2021
Flight Unit Delivery	Med	Unit(s) delivered	8	April 2021
Satellite Integration	Med	Successful integration tests	8	June 2021
Launch	Low			September 2021
On-orbit testing	Low	Exceed threshold requirements	9	November 2021

## HOW

**Projected Business Model:** SA Photonics intends to undergo production of the SkyLight engineering model, qual units, and flight terminals using our in-house manufacturing capability. The company has a history of successful small-scale production for commercialized SBIR products. For larger quantity manufacturing, we would work with our contract-manufacturing partner currently used for our commercial terrestrial FSO system manufacturing.

**Company Objectives:** The SkyLight system is positioned to be a cost-saving and performance-improving communication system not just for U.S. Navy satellite communications, but military communications 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 satellite communications.

**Potential Commercial Applications:** Applications include the military space and UAV sectors, as well as commercial satellites. With commercial satellites, there is a market for free space optical links for crosslink and ground links. Additional commercial applications include high altitude platforms (drones, aerostats), as well as small aircraft and UAVs. The SWaP benefits are equally beneficial to the commercial market as the military.

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