

WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-263

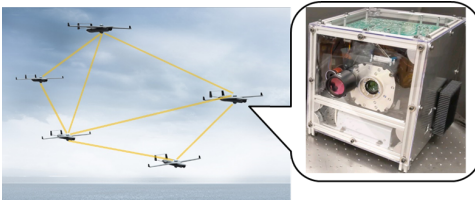
**Transition Target:** Aerial systems (V-BAT, MQ-25, MQ-4C, MQ-8C, and MQ-9), surface vessels, and land vehicles

**TPOC:** (301) 342-3728

**Other Transition Opportunities:**

Howling Coyote (under funding consideration by Navy)  
FSOC system for SkyRunner MK 3.2 Light Sport Aircraft being developed for the AFRL Force Design 2030

**Notes:** Intellisense Systems, Inc.'s Airborne, Long-Range, Multi-Beam Optical Network Device (ALMOND) is a free-space optical communication (FSOC) transceiver system with low size, weight, and power consumption that can be mounted to ships, land vehicles, and manned and unmanned aerial systems (UASs). It provides high-speed data transfer in environments where radio frequency communications cannot be used and enables mobile optical mesh networks.



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WHAT

**Operational Need and Improvement:** ALMOND addresses the Navy's need for a low probability of intercept/low probability of detection communication system that can operate in environments where radio frequency (RF) communications cannot be used.

**Specifications Required:**

- Be able to transmit 1+ Gbps over a 25 km range in clear air at a transmission wavelength of 1550 nm and/or 1064 nm, support voice chat at 35 km, and support text messaging at 45 km.
- Perform link acquisition and tracking without resorting to RF communications or GPS support.
- Fit within a 1 cubic foot volume and weigh no more than 20 lb.
- Enable each UAS to be mounted with two FSOC transceivers, with each transceiver covering a 360°x180° field of view (FOV), ideally without using a gimbal, with a pointing accuracy of <10 °rad.

**Technology Developed:** The Airborne, Long-Range, Multi-Beam Optical Network Device (ALMOND) is a full-duplex FSOC transceiver with the following capabilities:

- Autonomous target identification, locking, and tracking, including automatic reestablishment of dropped links without requiring gimbal, GPS, or RF link
- Data rates of 949 Mbps with negligible packet losses (speed limited only by selection of components in prototype)
- >47 km range in light turbulence conditions, >17 km in heavy turbulence (based on laboratory tests)
- Operational wavelength – open (modular architecture can support 1550 nm and 1064 nm)
- Specialized optics to support wide FOV without requiring gimbal or Risley prisms
- SWaP: 16.6 lb, 1.00 cubic foot volume, operational time >4.5 hr on a single 2 lb lithium-ion battery

**Warfighter Value:** ALMOND provides high-speed data transfer in environments where radio frequency communications cannot be used and enables mobile optical mesh networks.

WHEN

**Contract Number:** N68335-20-C-0901

**Ending on:** Aug 29, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Gen 1 prototype demonstration in lab	N/A	Demonstrated ~1 Gbps at simulated range of 47 km	5	4th QTR FY22
Gen 2 design to minimize SWaP complete	N/A	Reduced weight by 47% and power consumption by 24%	5	4th QTR FY23
Gen 2 prototype lab test	Low	Demonstrate improved FSOC in laboratory environment	5	2nd QTR FY24
Gen 2 prototype field test	Medium	Demonstrate long-range FSOC in relevant environment	6	2nd QTR FY24

HOW

**Projected Business Model:** We plan to develop ALMOND to TRL-7/8 and then transition to low-rate initial production, selling directly to the Navy/government for programs such as Force Design 2030. We also plan to partner with primes such as Boeing and Lockheed Martin to integrate ALMOND directly with their UASs prior to delivery to the DoD, thus reducing DoD costs. We anticipate that the first fully productized system will be available in either late 2027 or early 2028.

**Company Objectives:** Intellisense intends to leverage the ALMOND technology into a new family of products for use by all branches of the DoD and other government agencies for different operating environments.

**Potential Commercial Applications:** ALMOND may be used for any of the following FSOC links:

- Air-to-air links between manned and/or unmanned platforms
- Air-to-surface links between aerial platforms and a ground station, vehicle, or ship
- Satellite-to-satellite links for satellites in low or medium earth orbit
- Satellite-to-surface links for any satellite and an Earth-based node
- Surface-to-undersea links between ships and underwater vehicles
- Undersea links between submarines or unmanned undersea vehicles

Specific platforms that ALMOND can be integrated with include:

- V-BAT, MQ-25 Stingray, MQ-4C Triton, MQ-8C Fire Scout, MQ-9 Reaper, and similar UASs
- SkyRunner MK 3.2 Light Sport Aircraft
- Any quad copter, aerostat, or balloon with at least a 20-lb payload capacity
- Any surface vessel or land vehicle with the capacity to support a transceiver

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