

Topic: AF141-253

## Technology Service Corporation

### Disruptive Military Navigation Architectures

Technology Service Corporation's (TSC) Location, Identification and Flight Tracking System (LIFTS) is a radio frequency (RF) sensor and pseudo-lite system for position, navigation and guidance (PNT) in Global Positioning System (GPS) denied, anti-access area denial (A2AD) and adverse environmental conditions. LIFTS provides a RF sensor solution for the Sea-Based Automated Landing and Recovery System (SALRS), unmanned aerial refueling, and vertical replenishment (VERTREP). TSC's RF solution provides all-weather, extended range operation with minimal size, weight, power, and cost (SWAP-C). TSC specializes in RF sensor and datalink research, detection solutions, navigation and guidance, communications, command guidance, intelligence, surveillance and reconnaissance (ISR), radar, fire control, and electronic warfare. Under internal research and development (IRAD), TSC developed the prototype hardware, matured and demonstrated in this NAVAIR Phase II SBIR.

### Technology Category Alignment:

RF Components for sensing, transmission and communication

Air Platforms

Autonomy

Ground and Sea Platforms

Radio Frequency (RF) (non-EW)

### Contact:

Brandon Wolfson

[brandon.wolfson@tsc.com](mailto:brandon.wolfson@tsc.com)

(256) 535-2181

<http://www.tsc.com/>

**SYSCOM:** NAVAIR

**Contract:** N68335-16-C-0166

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-16-C-0166](https://navystp.com/vtm/open_file?type=brochure&id=N68335-16-C-0166)

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2017-760

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## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** Sea-Based Automated Landing and Recovery System (SALRS)

**Transition Target:** MQ-8 Fire Scout air vehicles (MQ-8B or MQ-8C) and X-47B Unmanned Combat Air System (UCAS)

**TPOC:**  
(301)342-8548

**Other transition opportunities:**

Manned aircraft, both fixed-wing and rotary wing, navigation and guidance (MH-60S Seahawk, MH-60R Romeo, MV-22B Osprey, K-Max)

- Capability to support Search and Rescue missions
- Capability to support Vertical Replacement (VERTREP)
- Capability to assist pilots in landing aircraft in restricted visibility conditions
- Capability to fully automate manned aircraft launches and recoveries
- Capability to enable automation of aircraft carrier air traffic control (ATC)
- Capability to support aerial refueling to extend flight operational envelopes



Courtesy U.S. Navy,

## WHAT

**Operational Need and Improvement:** The US Navy has a significant fleet of nuclear carrier (CVN) based aircraft, both manned and unmanned, deployed in critical current and future sea-based aviation operational missions. A system is needed to increase safety and efficiency of those missions and to provide Precision Approach and Landing (PAL) guidance during at sea shipboard operations. The Navy Air Warfare Center - Aircraft Division (NAWCAD) 4.3.2 is exploring a variety of sensor technologies to support aircraft approach and landing activities through the Sea-Based Automated Landing and Recovery System (SALRS) Program.

**Specifications Required:** SALRS targets technologies that support unmanned aircraft operations or pilot augmenting capabilities. The basic SALRS requirement is stated as a sensor and processor system integrated with the air platform that detect, track and precisely navigate and land to a naval surface platform, from up to 10 nmi in range, at day or night, through thick cloud or fog cover, during heavy snow, or through heavy rain, in order to support an effective approach and recovery operation to the target ship.

**Technology Developed:** Technology Service Corporation's (TSC) Location, Identification & Flight Tracking System (LIFTS) is a multi-function system mounted on the aircraft with an intelligent Tag or set of Tags placed at designated landing locations. LIFTS provides precision guidance to the Tag(s) for a variety of mission scenarios. Employed to aid in landing or automatic extraction and deployment of cargo, LIFTS not only makes precision range and bearing measurements to the Tags for guidance but also establishes a datalink enables relay of data between Sensor and Tags.

**Warfighter Value:** Enables optimization of non-GPS precision ship-relative navigation system performance during tactical operations characterized by: degraded weather; high deck motion; and GPS denied, A2AD and jamming. Provides requisite capabilities to support execution of alternate missions (e.g., landings ashore, landings on non-surveyed ships, etc.), enable the creation of ship reference and aircraft cockpit displays for manned aircraft; facilitate automated aircraft carrier air traffic control.

## WHEN

**Contract Number:** N68335-16-C-0166 **Ending on:** December 17, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Non-Form Factor Test	Low	Demonstrate potential to achieve measurement accuracy	4	July 2017
Prototype Hardware for Sensor	Low	Complete integrated test and calibration	4	September 2017
Prototype Hardware for Tags	Low	Complete integrated lab test with sensor	5	October 2017
Final Form Factor Prototype Demonstration	Med	Demonstrate potential to achieve measurement accuracy	5	November 2017
Final Form Factor Prototype Flight Test	Med	Demonstrate potential to achieve measurement accuracy	6	December 2017

## HOW

**Projected Business Model:** TSC is an employee owned, small business engaged in providing systems engineering and electronics to the U.S. Government and Industry. TSC provides radar and sensor subject matter expertise, hardware and software development services to advanced technology clients. From its inception, TSC's goal has been to hold a unique place among high technology firms for quality, on-time and within budget products, research and development, system engineering and analysis. TSC provides the analysis, development and support of RF systems, assemblies and subassemblies such as radars, missile electronics, communication systems and antenna assemblies. We perform the analysis, design, development, simulation, fabrication, integration and test of these electronic assemblies.

**Company Objectives:** TSC's LIFTS technology is a promising cooperative pseudolite system design currently in prototype development, test and evaluation toward a Sea-Based Automated Landing and Recovery System (SALRS) type application. The Tags have the ability to store data and relay it to the LIFTS Sensor when requested. Data can be stored on the Tag prior to or in real time during the mission from the ship or from the aircraft-based LIFTS Sensor. This allows LIFTS to provide area information as defined for the specific application in addition to providing guidance to the landing area or payload. Information can include any alpha-numeric data required, such as description, ship information, ship motion data, priority, etc.

**Potential Commercial Applications:** TSC's LIFTS technology is easy adapted to support a diverse set of commercial applications e.g. automated cargo management (ACM)- to include automated management of electronic manifests; and commercial aircraft landing optimization - the potential to support multiple simultaneous approach landing, reduced airspace congestion, and lower airport noise and emissions.

**Contact:** Brandon Wolfson, VP and General Manager  
[brandon.wolfson@tsc.com](mailto:brandon.wolfson@tsc.com) 256-535-2181