

# Department of the Navy SBIR/STTR Transition Program

Distribution Statement A: Approved for public release, distribution is unlimited NAVAIR 2015-1090

Topic # N103-204

Ultra Wideband Low Profile Antennas for Software Defined Radios (1000-304)  
SI2 Technologies

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** Navy and Marine Corps Small Tactical Unmanned Aircraft Systems Program Office (PMA 263)

**Transition Target:** RQ-21 Blackjack

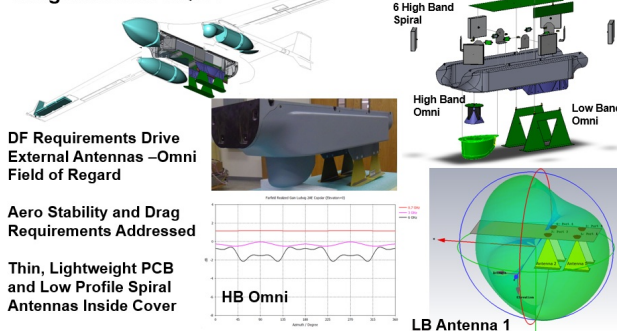
**TPOC:**

**Other transition opportunities:** V-22 Osprey, RQ-7B Shadow, MQ-8 Fire Scout, MQ-1C Grey Eagle, Army Future Vertical Lift (FVL)

**Notes:** Current platform antennas are confined to narrow bandwidths, and wide bandwidth capable software defined radios (SDRs) are becoming the choice for weapons data terminals. SI2's integrated antenna suite is customizable to platform, mission, and payload constraints. Novel antenna reference designs enable instantaneous wideband coverage expandable from 100 MHz to 6 GHz over a suite of apertures that require minimal switching power and minimal weight to small unmanned aerial systems.

## SI2's Integrated Antenna Suite

**12 Antennas Plus SRP Spiral 1 Integrated Into RQ-21**



Copyright 2015, SI2 Technologies, Inc. (SI2)

## WHAT

**Operational Need and Improvement:** Current platform antennas are confined to narrow bandwidths, and wide bandwidth capable software defined radios (SDRs) are becoming the choice for weapons data terminals. To allow for SDR required upgrades, comparable antennas are needed to allow new spectrum utilization. Also, network enabled platforms and weapons need to operate with an omnidirectional pattern to allow simultaneous link completion with as many network nodes as is possible. Wideband, lightweight antennas would provide an increased capability for platforms, such as RQ-21, and for integration with SDR radio communications and other Intelligence, Surveillance, and Reconnaissance (ISR) missions.

**Specifications Required:** The low profile antenna design is be capable of operating at frequencies ranging from 100 MHz - 6 GHz and designed to accommodate existing direction finding (DF) and airframe limitations. The antenna is designed for integration into a strongback payload design and meet the size, weight and power (SWaP) constraints of a small UAS.

**Technology Developed:** SI2 is developing a wideband low profile antenna system to incorporate into and employ on small tactical unmanned aerial systems (STUAS) in support of various SDRs. SI2's development of SWaP-optimized low profile antennas will result in increased capability, reliability, and maintainability of the STUAS vehicles for DF and communications relay. SI2's low profile wideband antennas can be fitted onto various STUAS components to offer maximum versatility in new vehicle production design or to retrofit the antenna on vehicles already in service.

**Warfighter Value:** SI2's antenna solution functions at wide instantaneous DF bandwidths on signals of interest and performs at high efficiency. The low cost, low profile antenna will enhance the versatility and success of future STUAS missions while lowering overall costs due to an increase in capability, reliability and maintainability versus current antennas. Success of SI2's antenna system on air vehicles would lead to additional use on ground based vehicles which would also benefit from low profile SWaP-optimized antennas. Developed reference designs can be customized for specific vehicle, payload, and mission requirements.

## WHEN

**Contract Number:** N68335-15-C-0071 **Ending on:** September 21, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Manned flight test	Low	Successful DF and communications relay operations	6	December 2015
RQ-21 flight test	Med	Successful DF and communications relay operations	7	February 2016
Reduced profile iteration of integrated antenna suite	Med	Further SWaP reduction	7	September 2016
Limited rate initial production (LRIP) of integrated antenna suite	Med	Initial production order	8	February 2017
Full scale production of integrated antenna suite	Med	Full rate production order	9	February 2019

## HOW

**Projected Business Model:** SI2 is a defense contractor specializing in development and production of radio frequency (RF) products. We develop innovative RF antenna and array reference designs and supporting specialty materials that permit high velocity customization for unique Vehicle, Payload, and Mission requirements and constraints. Our products leverage our specialty materials and state-of-the-art commercial printed circuit board (PCB) fabrication to reduce cost and minimize fabrication risk. SI2 intends to begin LRIP of the integrated antenna suite in FY17 with a plan for full rate productions in FY19.

**Company Objectives:** SI2 specializes in the development of wideband low profile structurally integrated and outer mold line conformal antenna solutions as well as RF systems and sensors for defense and commercial applications. SI2 will continue contract research and development for customers with unique challenges, and looks to lock in the production of structurally integrated antennas for commercial and Department of Defense (DoD) customers.

**Potential Commercial Applications:** This technology has potential applications in commercial aircraft, private aircraft and ground vehicle industry for communications, commercial surveying, in-flight autonomous flight path deconfliction, route optimization, and fuel consumption optimization for networked airliners. Lightweight wide bandwidth antennas would also be of interest for networked unmanned aerial vehicle (UAV) swarm missions. The low profile deployment for this program could be fully conformal given a different mission and SDR.

**Contact:** Jonathan Lathrop, VP, Programs and Business Development  
jlathrop@si2technologies.com 9784955325