

Topic: N141-015

Pacific Antenna Systems

SBIR Phase II - Flightworthy Prototype (FWP) Low Profile Antenna for Multi-Band (Ka SATCOM, X Band option) including Ku band Tactical Common Data Link (TCDL)

Initially targeting the MQ-8C Fire Scout, Pacific Antenna Systems (PAS), with 70 years antenna and gimbal systems design experience developed a compact, lightweight, low-profile airborne Ka Band antenna for wideband SATCOM on all aircraft including helicopter Through the Rotor (TTR) for greater than 10 Megabit/second throughputs. PAS reduced Size, Weight and Power (SWaP) providing payload advantage including a monopulse RF tracking RF feed for higher reliability and accuracy. PAS prototyped the high bandwidth digital servo drives in collision sense and avoid mm wave radars and prototyped and, using their own range, field tested the compact reflector and RF feed assembly. PAS' antenna with integrated RFE baseband transceiver and modem enables rotorcraft to participate in network concentric operations such as Anti-Submarine Warfare (ASW) and other missions.

Technology Category Alignment:

RF Components for sensing, transmission and communication

Fixed Wing Vehicles (includes UAS)

Rotary Wing Vehicles

Broadband/Multispectral Components and Systems

Radio Frequency Weapons (RFW)

Contact:

Anthony Macari

anthony@pasantennas.com

(805) 383-0700

<http://pasantennas.com>

SYSCOM: NAVAIR

Contract: N68335-15-C-0341

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-15-C-0341

Department of the Navy SBIR/STTR Transition Program

Distribution Statement A: Approved for public release, distribution is unlimited.

NAVAIR 2016-922

Topic # N141-015

SBIR Phase II - Flightworthy Prototype (FWP) Low Profile Antenna for Multi-Band (Ka SATCOM, X Band option) including Ku band Tactical Common Data Link (TCDL)
Pacific Antenna Systems

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA 266

Transition Target: MQ-8B Fire Scout air vehicles

TPOC:

(301)757-1116

Other transition opportunities:

This compact, lightweight, low-profile airborne Ka Band antenna has applications on all aircraft including helicopter Through the Rotor (TTR), vertical take-off and landing tactical unmanned air vehicle (VTUAV) warfighters, in addition to planned and current UAV/UAS systems needing lower SWaP communications antennas can consider applying this antenna technology.

Notes: This technology creates potential DoD wide opportunity for Rotary Wing aircraft such as:

- 1) Ability to transmit and receive video (FMV, HD FMV, Radar) at BLOS ranges
- 2) Ability to command and control rotary wing VTUAV beyond LOS ranges
- 3) Remote Anti-Submarine Warfare (ASW) capability with high on-station availability



Courtesy of US Navy 141217-N-DC018-368 DEC 2014,
<http://www.navy.mil/management/photodb/photos/141217-N-DC018-368.JPG>

WHAT

Operational Need and Improvement: There is a need for a low profile antenna for Multi-Band (Ka SATCOM) including capabilities of operating at bandwidths up to 14 Megabits per second (MBS) Through the Rotor (TTR) while maintaining the same effective radiated power as standard size antenna apertures. Standard size satellite antennas have a greater height projection which creates greater aerodynamic drag. An antenna with a lower outward projection that does not sacrifice antenna gain, with full hemispherical coverage, does not currently exist. A prototype, low-profile, high data rate SATCOM antenna is being designed and fabricated during this project.

Specifications Required: The target weight of a Ka SATCOM Aircraft system (antenna, radome, modem and power amplifiers - excluding aircraft unique supporting structure) is 35 pounds or less for each antenna system. An antenna aperture diameter of 18 inches is the maximum allowable due to size constraints. Radome vertical height cannot exceed 15 inches. It is anticipated and planned that additional reduction of size, weight, and power of key components such as the monopulse tracking receiver, antenna control unit, pedestal positioner shall be necessary with the goal of attaining pre-production status.

Technology Developed: A compact, lightweight, low-profile airborne Ka Band antenna for wideband SATCOM on all aircraft including helicopter Through the Rotor (TTR) for greater than 10 Megabit/second throughputs. PAS reduced Size, Weight and Power (SWaP) providing payload advantage including a monopulse RF tracking RF feed for higher reliability and accuracy. The antenna system will include the pedestal positioner, monopulse tracking RF components, RF baseband equipment, and stabilization equipment including IMU and antenna controller.

Warfighter Value: This solution would enable a low-profile, lightweight, high bandwidth (Ka SATCOM) with hemispherical coverage. The antenna will utilize monopulse tracking for a reduced Size, Weight, Power (SWAP) form factor and high tracking accuracy. Additionally, State of the Art antenna/modem configurations is designed to support reliable Full motion Video (FMV) for high data rates for (TTR) application with the ability to command and control rotary wing VTUAV beyond LOS ranges.

WHEN

Contract Number: N68335-15-C-0341 **Ending on:** April 10, 2017

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---|------------|---|------------|--------------|
| Testing of Basic reflector geometry | Med | Test of reflector Antenna Gain in PAS Antenna Range | 5 | August 2015 |
| Testing of High Bandwidth Digital Servo Controllers | Med | Prototyped in PAS lab; implemented on W-Band radar | 5 | October 2015 |
| Testing of embedded antenna | Med | Successfully controlled PAS AD-100 TC DL | 5 | May 2016 |
| GPS Tracking and accelerometer data in moving vehicle | Med | Capture data and verify accuracy using Google maps | 5 | June 2016 |
| Antenna Gain testing of Gregorian antenna | High | Verify Antenna Gain and pattern geometry | 5 | August 2016 |

HOW

Projected Business Model: The overall technical objective of this program is to continue the development of a very affordable, low-profile high bandwidth through the rotor (TTR) SATCOM Antenna System that is at a very high TRL level (TRL level 6 or higher) and ready for preproduction. For the SBIR Phase II.5 Program, there are eight (8) NRE Spiral development cycles which include finalizing the performance criteria (to a high TRL level) for respective sub-systems, iterating and verifying performance requirements, interface requirements and re-procuring subsystem hardware.

Company Objectives: Pacific Antenna Systems design history includes over 70 years of Antenna Systems design experience in Communications, Radar and Electronics Warfare. To be an effective, high-bandwidth communications system from a rotary-wing platform a need exists for an Advanced Antenna with (BLOS) hemispherical coverage for ISR purposes. This PAS state of the art antenna and controller, with all RF components and modem will to allow a rotorcraft to participate in network concentric operations such as air to satellite, air to air and air to ground, using high data rate communications. Additionally, with the growing role of helicopters and VTUAV in anti-submarine warfare, high data rate communications a critical as raw sono-buoy data cannot be compressed as it is shared between platforms. The final program objective is a cost effective, complete, BLOS Antenna system including RF Transceiver and radio modem.

Potential Commercial Applications: As the OBSCAN technology Readiness Level increases, the advantages to both Rotary Wing for TTR mitigation and Fixed Wing & UAV communities needing "Dual Band, Dual Mode" communications capabilities shall solicited. OBSCAN shall have the advantage of affordability and can take the place of two antennas on certain platforms given the TC DL inherent capability and provides ISR data for incorporation into the Common Operational and Tactical Pictures (COTP) via Global Information Grid (GIG). Potential platforms for consideration include fire and police department helicopters.

Contact: Anthony Macari, Vice President / GM
anthony@pasantennas.com (805) 383 0700