

Department of the Navy SBIR/STTR Transition Program

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NAVAIR

Topic # DOE16-030

Wireless Inter-Communications System

Dirac Solutions Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-275

Transition Target: PMA-209

TPOC:

Other transition opportunities: Army Air Warrior Integration, Navy nuclear submarines, DHS

Notes: Robust RF communications from V-22 Osprey cockpit to crew inside aircraft and from cabin to outside for at least 300 ft with no dead-zones.

High reliability in presence of metals and radar interference. Prototypes are being evaluated for full certification under MIL-STD 461G RS103, RE102, CE106.

Secure communications, currently with AES encryption, NSA Type 1 encryption (next step).

Integration of the Base station with V-22 Osprey intercom.

Handheld and helmet mounting units for crew and pilot.



google search, <https://nationalinterest.org/tag/v-22-osprey>

WHAT

Operational Need and Improvement: There is a need for Wireless Intercom System (WICS) to allow V-22 Osprey aircrew members to communicate with each other without being physically "tethered" via an intercom cord, both within the aircraft, and external to the aircraft when on the ground. The WICS needs to provide reliable connectivity between the base station inside the aircraft and mobile units inside and outside without experiencing any dead-zones while being resilient to electromagnetic interference (EMI), without interfering with the aircraft control signals. The new WICS improves the crew connectivity by eliminating physical cables and the operational and safety issues associated with them.

Specifications Required: (1) Wireless transmissions between cabin crew members (in the air) and cabin crew members and external crew members (on the ground). (2) Minimum communications range of 300 feet (T), as measured from a crew member inside the V-22 Osprey cabin to a crew member external to the V-22 aircraft on the ground. (3) Base station integration with V-22 ICS (4) E3 certified with MIL-STD-461G, Test CE106 and RE102 (Helicopter Limits).

Technology Developed: DSI's wireless technology is based on ultra-wideband/wideband pulse based RF signaling and is specifically designed for harsh propagation environments where conventional wireless technologies face significant challenges. It offers reliable, high fidelity, and clear wireless voice communications, is resilient to multipath signal degradation/fading caused by heavy metallic structure of the aircraft, and is resilient to electromagnetic interference (EMI) from high power radars. DSI prototypes are being evaluated for certification for MIL-STD 461G RS103, RE102, CE106 and demonstrated success in limited ground testing in various DoD aircrafts (V-22 aircraft, Blackhawk, and Chinook helicopters), as well as successful test and demonstration in harsh environment of nuclear facilities for through the thick concrete wall communications. DSI has also developed similar wireless communications systems for DOE applications with wireless sensor data and image/video communications capability in nuclear facilities.

Warfighter Value: Reliable wireless communications can significantly enhance the warfighter operations as it eliminated the need for physical cables in tethered communications. The wireless communication capability reduces the operational risks related to cable integrity, as well as safety issues related to cables in various operational scenarios. The system can provide data and image/video communications can also be added to the system if needed by the warfighter.

WHEN

Contract Number: N68335-19-C-0220 **Ending on:** April 30, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Reliable wireless communication for V-22 up to 300 ft.	Low	Audio testing in/around V-22	6	April 2021
Extended communications range	Low	Audio testing in/around V-22	6	March 2022
Certification testing (CE106, RE102)	Low	Certification by independent lab	6	March 2021

HOW

Projected Business Model: DSI's business model is to transition innovative research to high TRL through SBIR phase I, II, and III projects and target various applications based on the similar technologies. DSI's current strategy includes working with prime defense contractors for mainframe integration and welcomes the opportunity to test and sell directly to other government agencies if there are sufficient interests.

Company Objectives: DSI's objective is to innovate and develop next generation wireless systems with emphasis on reliability, security, low cost and low power. DSI targets DoD applications including aircraft and submarine communications as well as underground tunnel / and skyscraper communications for DHS allowing for sensor data, and image/video applications. DSI also targets vertical markets for communications in harsh propagation environments in DOE applications such as wireless sensor data/image/video communications through thick concrete walls (containment) of nuclear reactors (applicable to Navy nuclear reactors also), as well as first responder communications in nuclear emergency response teams (applicable to firefighters also).

Potential Commercial Applications: Communications in nuclear facilities, shipboard communications, commercial avionics communications, urban communications, integration with 5G/6G densification networks, and integration with SATCOM.

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