

PROVIDES THE ABILITY TO SWITCH COMMUNICATION NODES DURING FLIGHT

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Planar Wideband
Phased-Array
Element for VHF
RADAR

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**SBIR
COMPANY
NAME:**

FIRST RF Corp.
Boulder, CO

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In partnership with the Air Force and Navy, Colorado-based FIRST RF Corp. developed an antenna that offers greater directivity and four active bands with the ability to switch modes during flight. (U.S. Navy photo)

NEW ANTENNA

EXPANDS WARFIGHTER SITUATIONAL AWARENESS

Helicopters play a vital support role for ship, air and ground forces, however their effectiveness has traditionally been hampered with single-band passive antennas that provide limited communication range and coverage.

With assistance from the Air Force Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Program, Colorado-based FIRST RF Corp. expanded the potential surveillance capabilities of helicopters by developing a multi-band active antenna that requires no special configuration planning prior to launch.

The new antenna – which can receive and transmit to all assets on the battlefield – is being touted as the first full-motion video antenna suite. It offers greater directivity and four active bands with the ability to switch communications between ground, ship or air nodes during flight.

Officials say this will offer the unprecedented capability for helicopters to be a source of intelligence, surveillance and reconnaissance data and function as an airborne relay to support beyond-line-of-sight communication, even under conditions where satellite signals are being jammed. That includes improving the situational awareness for gunships as ground units provide more accurate target recognition for engagement.

COOPERATION WAS KEY

“The initial technology, started by FIRST RF under an Air Force SBIR contract, has continuously evolved to meet rapidly changing warfighter needs because of teamwork between the Air Force and Navy as well as other federal agencies,” said technical lead Dan McCarthy from the Air Force Research Laboratory’s Information Directorate.

The company was originally charged with creating an airborne antenna for foliage penetration, but expanded its use to remotely piloted aircraft. Over the years, the technology developed by FIRST RF attracted millions of dollars in funding from outside the SBIR program. Later-stage investors include the Army as well as the Navy, which is supporting a Marine Corps need for real-time full-motion video capability for legacy helicopters. Officials say the technology has garnered congressional support to retrofit in-service Navy aircraft with the antenna system.

BEHIND THE TECHNOLOGY

Integrated transmit and receive amplification across four bands improves range performance and requires no additional radio frequency equipment compared to traditional off-the-shelf designs. The Ku-Band antennas are electronically steerable, capable of maintaining communication links throughout vehicle maneuvers while giving maximum range performance. The Ku-Band antennas are also capable of configuration that allows for full duplex air-to-air or air-to-ground Tactical Common Data Link-compliant communications.

The ability to electronically switch from a ground or air node will eliminate the need to ‘hard-wire’ the aircraft’s communications prior to launch, thereby improving its operational availability for missions.

SBIR support allowed amplification to be added to the L/S/C-band antennas, which were previously passive units, eliminating the cable loss for previous installations, according to Dean Paschen of FIRST RF. The Ku-band Active Electronically Scanned Array antenna was also upgraded to allow the antenna to operate as an air or ground node, which is a new critical function for air-to-air relay operation.

“The SBIR program provided the support for full qualification, and this enabled us to reach the highest level of technical maturity,” Paschen said.

A MAGNET FOR INVESTMENT

Prototype antennas developed by FIRST RF, a woman-owned small business, were first demonstrated by the Marine Corps Light/Attack Helicopter program in 2014. Company officials say the antenna system was able to communicate to a handheld Rover, relaying video imaging from about 10 miles away.

FIRST RF has delivered more antenna sets for developmental and operational flight test evaluation aboard several Navy aircraft. Operational flight testing is scheduled to begin in the third quarter of 2016. The delivery of more sets, as well as qualification testing, should be complete by the end of 2016.



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AIR FORCE SBIR/STTR PROGRAM

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