

High Dynamic Range Multi-Carrier Amplifier (HDR MCA)



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Topic Number: N181-088

SYSCOM: Naval Information Warfare
Systems Command (NAVWAR)
www.navwar.navy.mil

Program Sponsor: PMW/A 170 Air
Navigation Warfare Tactical Communication 2

Other Potential Programs:

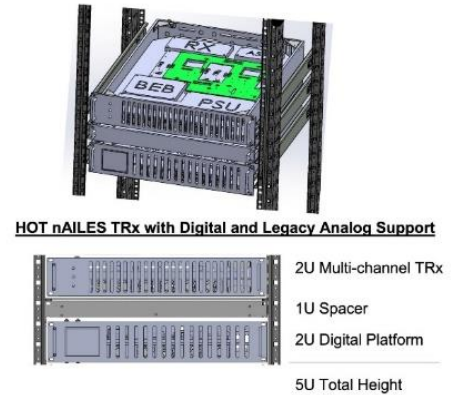
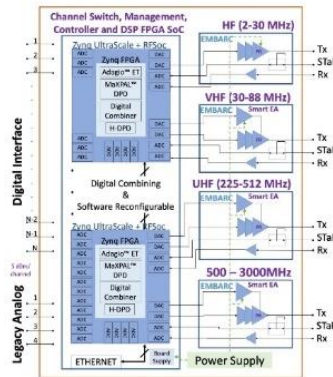
SATCOM tactical networked communications
(applicable for all DoD services, Coast Guard,
all COCOMs, and Coalition Forces)

Current TRL: 5

Projected TRL: 6 / Q3 2023

Keywords:

Advanced Shipboard Communication System



THE CHALLENGE

Navy shipboard communication systems operate a wide range of RF frequencies that require as many amplifiers as there are channels in use. This design limits the number of simultaneous radio channels in operation for SATCOM, ship-to-ship, and ship-to-air communications as well as their agility to move across the RF spectrum. The current solution uses expensive, inefficient, obsolete multi-couplers that are end of life, requiring increased amplifier output power to overcome losses, resulting in reduced reliability and high cost to maintain.

THE INNOVATION

Development and testing of the multi-channel (also known as multi-carrier), amplifiers, and receiver systems will greatly reduce the number of electronic components and systems needed; improve the channel capacity; and support modern waveforms not currently supported by the multi-couplers. The SBIR project is developing a unique multi-carrier high performance RF amplifier to address the capability to support advanced waveforms, which is impossible today.

THE NAVY BENEFIT

HOT nAILES is designed to support multiple legacy digital modular radio (DMR) analog channels as well as next generation DMR digital interface, providing improved performance, a lower size, weight, and power (SWaP) form factor, and extendable frequency coverage from 1.5 MHz to 3 GHz. It also maintains high performance for different dynamic power levels as well as during changes due to long-term reliability/supportability/maintainability, aging, and temperature, while supporting frequency hopping. The low thermal footprint and heat density offered with HOT nAILES will result in significantly higher reliability due to lower junction temperatures. The line replaceable, unit-based architecture of HOT nAILES allows for scalability, replicability, and low maintenance cost

THE FUTURE

Phase III investment will enable further development of the HOTnAILES of the Multi-Carrier Amplifier (MCA) system and allow PMW/A 170 to perform the advanced development work necessary to transition the amplifier system to a Program of Record. This critically needed funding will support environmental, electromagnetic interface (EMI)/electromagnetic compatibility (EMC), and Joint Interoperability Test Command (JITC) testing, which is required before fielding the system on a ship. This funding will also be used to support demonstrations of these technologies in Navy Operational exercises where “many” ships and aerial assets will provide operational feedback and test results to refine the MCA system.

Innovation Center at 2022 Navy Gold Coast



September 6 – 8, 2022