

Topic: N181-088

MaXentric Technologies LLC

High Dynamic Range Multi-Carrier Amplifier (HDR MCA)

MaXentric is an advanced technologies company specializing in radio frequency (RF) systems. Products include high efficiency wideband amplifiers, custom integrated circuits (IC's), and software defined radio (SDR) platforms for communications and radar systems. Under contract N68335-19-C-0293; topic number N181-088, a multi-carrier wideband amplifier system will be demonstrated that is scalable in the number of channels and waveforms that can be supported for shipboard LOS and SATCOM communications. This capability will allow the Navy to transfer and receive mission-critical information between fleet assets with increased capacity. Moreover, the technology improves the Navy's capacity and flexibility to utilize the full RF spectrum without the limitations of fixed frequency filter/combiner systems thus improving A/J, LPI, LPD performance. Upon completion of the amplifier system testing, a multi-carrier, multiple waveform shipboard radio communication system will have demonstrated a modular, scalable, low-cost, light weight, high efficiency amplifier and combining system capable of maintaining simultaneous ship-to-ship, air-to-ship and ship-to- satellite data links which will provide greater access to ISR and improves overall situational awareness to the fleet.

Technology Category Alignment:

Command, Control, Communications, Computers, & Intelligence (C4I)

Advanced Electronics

Electronic Warfare (EW)

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SYSCOM: NAVWAR

Contract: N68335-19-C-0293

Department of the Navy SBIR/STTR Transition Program

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NAVWAR SR-2020-213

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WHO

SYSCOM: NAVWAR

Sponsoring Program: Digital Modular Radio (DMR)

Transition Target: FFG(X) Radio Room

TPOC:
(619)524-7910

Other transition opportunities: Multiple opportunities exist within the Navy, Marine Corps, Army and Air Force and commercial communication systems for wideband multi-carrier amplifiers. MaXentric has targeted several programs within the services and commercial 5G industry primes to offer high efficiency amplifier products.



: Cropped version of photograph accompanying PEO USC Public Affairs, "US Navy Awards Guided Missile Frigate (FFG(X)) Contract," Navy News Service, April 30, 2020.

WHAT

Operational Need and Improvement: High Dynamic Range Multi-Carrier Amplifier (HDR MCA) supports the National Defense Strategy's focus on command, control, communications, computers, intelligence, surveillance and reconnaissance (ISR) and fully networked command, control and communications modernization. In FY 2020, HDR MCA demonstrated multi-carrier, multiple waveform amplifier technology that is a scalable architecture for shipboard and airborne platforms operating in contested environments where topside space for antenna systems is limited.

Specifications Required: Output Power: > 250W
Supports digital interface: DMR / VITA 49.2 / ANSI-5041
Supports concurrent MULTI-CARRIER channels
Frequency Range: 2 MHz – 3 GHz
High Efficiency – >20% improvement over Class AB
Supports AM/FM/PM/modulated waveforms (e.g. HF, VHF, UHF, SATCOM, MUOS)

Technology Developed: Hybrid Open Transceiver new Advanced Integrated Line-of-sight Equipment System (HOT nAILES) is designed to scale up to 36 concurrent channels with frequency coverage from 1.5MHz to 3GHz and maintains high performance for different dynamic power levels, as well as changes in supply bias, temperature, and long-term aging of the system while supporting frequency hopping. 2-way communication to the DMR allows for spectrum management, channel selectivity, power management, and other interference mitigation schemes.

Warfighter Value: The Navy's DMR's have been upgraded to support a wide range of waveforms (e.g. SRW, HAVE QUICK, SINGGARS, SATCOM, and MUOS). To further increase the fleets warfighting capability, the U.S. Navy is interested in reducing the number of single function RF systems required on Navy ships and submarines. (HOT nAILES) addresses this need for an efficient wideband multi-carrier amplifier (MCA). HOT nAILES combines unique technologies developed at MaXentric to provide high efficiency with simultaneous high linearity under multi-carrier operation.

WHEN

Contract Number: N68335-19-C-0293

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|--|------------|--|------------|--------------|
| HDR MCA-Lab Testing | Low | Multi-carrier, Multiple Waveform Lab Testing | TRL-4 | June 2020 |
| HDR MCA Rack Mount-Lab Testing | Low | Mechanical form, fit, RF testing | TRL-5 | October 2020 |
| HDR MCA-DMR Digital and Analog Interface Tests | Low | DMR SIL Integration-Digital and RF interfaces verified | TRL-6 | June 2021 |
| EDM Prototype Testing | Med | DMR SIL Integration-Software and Hardware RF and Digital Testing | TRL-7 | June 2022 |
| EDM Environmental and E3 Testing | Med | DMR SIL Integration-Software and Hardware RF and Digital Testing over temperature and environmental conditions | TRL-8 | June 2023 |

HOW

Projected Business Model: MaXentric is a high technology and product-oriented company developing advanced RF technologies for antennas and radio frequency (RF) systems including communications, radar, amplifier, digital phased arrays, RF interference mitigation systems, FPGA and GPP modems, transceivers, and digital beamforming systems. MaXentric will produce a modular, scalable wideband multi-carrier amplifier for shipboard radio room upgrades.

Company Objectives: MaXentric intends to quickly productize the wideband amplifier system for commercial and military applications. Wideband amplifier technology and product sales at MaXentric have continued to grow and represent approximately 33% of our overall business.

Potential Commercial Applications: Commercial applications of this technology have been identified and include wideband high efficiency multi-carrier amplifiers for 5G base stations, air-to-ground communications and internet for commercial aviation aircraft.

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