

Multifunctional Information Distribution System (MIDS) Navy Integrated Fire Control (NIFC) Low Power Amplifier Mode (LPAM)



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

Program Sponsor: PMA/PMW-101

Other Potential Programs: Multi-
Functional External Power Amplifier
(MEPA)

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Projected TRL: 6 / Q4 2024

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THE CHALLENGE

The Tactical Targeting Network Technology (TTNT) External Power Amplifier (TEPA) and TTNT Higher Power Amplifier (THPA) are pieces of equipment that are integral to the TTNT network. The TTNT waveform requires the TEPA and THPA to operate at various power modes to avoid overpowering the network. The challenge is to improve the capability of the TTNT network by adding significantly different power modes without creating unwanted noise and requiring a lengthy calibration process. These improvements will increase network robustness as it scales with different platforms.

Furthermore, an investigation was performed using Digital Pre-Distortion (DPD) to linearize the RF amplifier to operate advanced waveforms while operating the amplifier in a compressed state utilizing GAN technology.

THE INNOVATION

North Star Scientific developed an algorithm programmed into the internal FPGA that allows the external power amplifiers to have more than five times the number of power modes than they were originally designed for. The goal was to obtain this increase in power modes without requiring recalibration of existing units or the addition of a complex calibration process during manufacturing. The algorithm can be implemented through a simple software update and an adjustment to the calibration values in memory. Lab based testing has proven that recalibration is not required.

THE NAVY BENEFIT

The updated algorithm allows the Navy to have a more robust TTNT network with the TEPA and THPA. With the benefits of DPD, future amplifiers being developed for higher bandwidth waveforms will have reduced SWaP.

THE FUTURE

The algorithm has been successfully tested in the lab so the next steps are to roll the algorithm into a software update for the power amplifiers and to perform field testing. North Star Scientific is looking for future funding to improve the DPD technology to allow the warfighter to obtain advanced waveforms for higher bandwidth communication.