

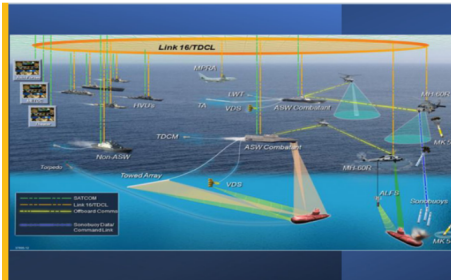
TOPIC NUMBER: N151-055

SBIR INVESTMENT: \$1,635,452

PHASE III FUNDING: \$2,971,686

DEPARTMENT OF THE NAVY

NAVY SBIR/STTR SUCCESS STORY



MULTI-SHIP SONAR BISTATIC AUTOMATIC ACTIVE LOCALIZATION

Technology leverages existing Navy Surface Sonar and ASW Planning architecture for cooperative bistatic Sonar fleet coordination.

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THE CHALLENGE

The Navy has an interest in applying state-of-the-art cutting-edge digital technologies to improve shipboard wide-band receiver systems performances in high electromagnetic interference (EMI) environments aiming to build a single unit multi-channel phase-coherent all-digital receiver system. To achieve bi-static reception benefits, each receiver needs some information about the remote source. Providing source information through the Navy's communications implementation framework will allow combatants to coordinate strike group active multi-ship operations to both avoid mutual interference and exploit echoes from other combatants' active emissions.

THE TECHNOLOGY

A Cooperative Sonar Engagement capability for Theater ASW (C-SET) was developed to deliver networked mission planning and communication capability to optimize cooperative use of Anti-Submarine Warfare (ASW) assets, optimizing placement of receive sensors and platforms capable of active emissions for bi-static active sonar. This capability leverages both existing Advanced Processing and Capability sonar builds and Undersea Warfare Decision Support System (USW-DSS) architecture, and an at-sea demo utilizing Program Executive Office Integrated Warfare Systems (PEO-IWS) to enhance ASW capability in strike group or coordinated ASW operations.

THE TRANSITION

Technology transition occurred via the Rapid Innovation Fund (RIF). As of June 2020, the Phase II SBIR technology was transitioned into Common AxB sonar systems (e.g., AN/SQQ-89, AN/BQQ-10), as well expanded to include a path toward transition with both AN/SQQ-89A(V)15 Advanced Capability Build (ACB) and AN/UYY-100 USW-DSS Programs of Record under Program Executive Office Integrated Warfare Systems (PEO-IWS).

THE NAVAL BENEFIT

C-SET provides an increased ASW capability against quiet submarine targets and provides the advantage of enhancing submarine detection performance in coordinated operations. It provides a step towards a potential bi-static active capability exploiting unmanned or uncooperative active sources and aids tactical decisions and mission planning capability for this uniquely complex sensor employment. Integration of C-SET into Common AxB sonar systems and theater-level planning tools (AN/UHQ-100, NAUTICA) will allow the Theater ASW Commander the capability to use ASW assets synergistically enabling a team of sensors to experience as much as a 50% increase in sonar coverage over single-ship (monostatic) sonar capability. Additionally, this includes opening active operations, traditionally an overt ASW prosecution mode, to the possibility of not only covert reception by multiple sensors but also mitigation of interference by unnecessary sources.

THE FUTURE

The capability this technology enables leverages existing Programs of Record architectures. The technology and future updates will field within incremental updates to these Programs of Record. The matured capability is directly transferable to High Velocity USW Outcomes for new surface platforms (Future Frigate, Large Surface Combatant, Large Unmanned Surface Vehicle) and undersea platforms (Orca, Snakehead, Razorback, Knifefish) identified in the Chief of Naval Operations' Design 2.0 strategy, under a common AxB framework.

"COMBATANTS BENEFIT WHEN THEY CAN TACTICALLY EXPLOIT ALL ACTIVE SOURCES AND RETURNS HEARD BY THEIR RECEIVERS. EFFECTIVE MULTI-STATICS HAS THE POTENTIAL TO TRANSFORM THE DISCUSSION FROM MERE AVOIDANCE OF MUTUAL INTERFERENCE TO THEATER-WIDE COOPERATION FOR ACTIVE SONAR OPERATIONS."