DEPARTMENT OF THE NAVY
SBIR/STTR TRANSITION PROGRAM

SUCCESS STORY

TOPIC NUMBER: N02-043

SBIR INVESTMENT: $99,931

PHASE III FUNDING: $2,972,179



Photo credit: MC2 Justin Stack

EXPENDABLE DATA EXFILTRATION (EDEX) ADVANCEMENTS

Syntonics' Covert FLEXible transCEIVER helps keep Navy personnel and equipment safe by enabling secure data transmission in hostile environments.

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THE CHALLENGE

Naval forces often need to operate in close proximity to adversaries, where mission success can depend on transmitting critical data, including voice and video, without revealing the location of friendly forces, sensors or platforms. If those communications are intercepted, sensitive information can be exposed, jeopardizing the safety of personnel and high-value assets. The Navy sought a technology that would allow remote sensors and other systems operating in potentially hostile territory to communicate persistently while minimizing the risk of detection or interception.

THE TECHNOLOGY

Syntonics LLC developed the Covert FLEXible transCEIVER, a software-defined radio (SDR) that provides secure and low probability of detection/intercept (LPD/LPI) RF communications. The system utilizes a specialized Chirp-FSK (frequency-shift keying) waveform designed specifically for LPD and LPI. A key differentiator is the technology's ability to transmit video over a distance of 30 miles while evading detection from as close as one-half mile. The hardware prototype supports a 50-megahertz bandwidth, enabling high-data-rate communications. The technology builds on the successful foundation of the Expendable Data Exfiltration (EDEX) program, evolving the concept from an expendable, one-way link into a more flexible and capable two-way communication system.

THE TRANSITION

The technology's development traces back more than two decades. In 2002, Engenium Technologies Corp. received a Phase I contract to develop the Flexceiver, an ultra-wideband, spread-spectrum modem. Syntonics and Engenium subsequently collaborated on defense communications technologies before completing a merger in 2019, bringing the Flexceiver technology and technical expertise into Syntonics. The technology then evolved through the Navy's EDEX program.

In particular, the EDEX Waverider/High Speed variant demonstrated two-way high-speed data exfiltration and successfully transitioned to the MK18 Unmanned Underwater Vehicle program of record. The current project represents the next step in that progression. Syntonics is maturing the technology into the Covert FLEXible transCEIVER, with initial efforts focused on developing a hardware prototype and specialized Chirp-FSK waveform. Subsequent testing demonstrated transmit and receive capabilities, establishing the foundation for full implementation and integration.

THE NAVAL BENEFIT

The Covert FLEXible transCEIVER's ability to support covert operations with a significantly reduced risk of detection directly translates to enhanced mission effectiveness and improved safety for personnel and high-value assets. The technology can reduce mission timelines by enabling covert data exfiltration from platforms such as unmanned underwater vehicles without requiring the platform to surface. By allowing critical information to be transmitted without bringing the entire platform to the surface, the system can shorten the detect-to-engage sequence and potentially enable operators to act on information sooner. The related EDEX program also demonstrated a potential cost benefit for the MK18 program, estimated at $3 million per year, by enabling asset recovery.

THE FUTURE

The technology has potential for integration across a range of Naval platforms, including unmanned underwater vehicles, gliders, drifters and moored sensors. One potential application is a sub-mounted device that could enable covert data exfiltration while a submarine remains submerged, reducing the tactical timeline for acting on critical information. Another concept would use an airborne relay launched from a submerged platform. A balloon would raise the transceiver to high altitude, enabling line-of-sight data exfiltration within a radius of up to 50 miles. The technology also has commercial applications, including secure industrial monitoring, environmental sensing and asset tracking.

Published

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ONR Approval #2026-10-1-2954