

**WHO**

**SYSCOM:** NAVWAR

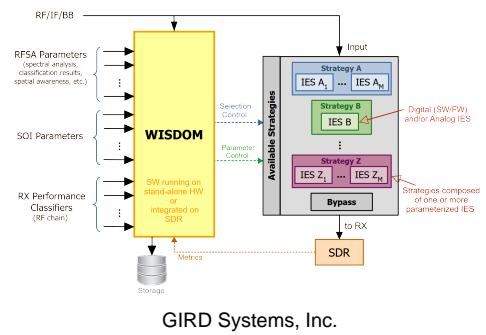
**Sponsoring Program:** PMW/A-170

**Transition Target:** Wideband Anti-Jam Modem System (WAMS)

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**Other Transition Opportunities:** All Department of Defense (DoD) systems that operate in contested environments and need intelligent orchestration of the application of available interference excision systems (IESs) that are deployed to the communications platform. The technology applies as an integrated software solution or can be applied as a stand-alone solution that integrates on the communications platform.

**Notes:** GIRD Systems is a small business defense contractor that is innovative and agile in satisfying the DoD's signal processing and communication needs. The smart controller WISDOM technology developed under N211-080 has application that extends well beyond the interference excision application, for instance, selecting the optimal data routing through contested/congested satellite links, optimal configuration of radio systems, generating and managing training with representative RF environments, or applying WISDOM in the reverse problem of developing enhanced jamming scenarios to strengthen EW missions (red teaming applications).



GIRD Systems, Inc.

**WHAT**

**Operational Need and Improvement:** A wide variety of interference excision systems (IESs) have been developed by industry to mitigate interference and allow communication systems to operate through the interference. However, there is no one-size-fits-all IES solution that addresses every interference mitigation need, especially as threats continue to evolve. Consequently, the issue of selecting the optimal interference mitigation strategy using the IES available on a platform or mission is paramount to establishing and maintaining communication links and successful mission completion.

**Specifications Required:** A dynamic interference environment demands dynamic IES application. A changing RF environment requires automatic detection and adaptation of the deployed IES solution as well as the ability to identify, log and record novel interference (anomalies) to support capability upgrades. The WISDOM application must improve interference mitigation figures of merit (FoMs), such as headroom, signal-to-noise ratio (SNR) and dynamic range, above that produced by any single IES application. This is accomplished by monitoring the radio frequency (RF) interference environment and selecting a strategy from one or more available IES to maximally mitigate the interference for the given conditions.

**Technology Developed:** WISDOM is not a new IES solution, but rather serves as a "smart controller" or orchestration engine for available third-party vendor-supplied IES. As such, WISDOM applies machine learning (ML) to select an optimal interference mitigation strategy based on a number of inputs including information from RF scene analysis (RFSA), signal of interest (SOI) parameters, RF chain performance metrics (as available), and radio performance metrics. Implemented as a collection of microservices within a Service Oriented Architecture (SOA), WISDOM's software architecture flexibly supports a variety of different platforms, readily extends to manage novel IES, federates across networks when available, and disaggregates and customizes so that WISDOM can be deployed in part or in whole and scaled according to platform resources. WISDOM evolves to be not just a "smart controller" of IES for SATCOM radios, but a key enabling technology for future Naval Operations at any frequency band. Further, GIRD has developed an IES Characterization Testbed to generate RF scenarios for training the ML algorithm and provide testing / verification of WISDOM operation.

**Warfighter Value:** Communications while operating in congested and contested environments is vital for the modern warfighter where the spectrum of operation is often limited and where hostile forces actively interfere with communications.

**WHEN**

**Contract Number:** N68335-23-C-0162

**Ending on:** Jun 12, 2024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Incremental Capability Demonstration #1	Low	Successful demonstration of software development progress	3	4th QTR FY23
Incremental Capability Demonstration #2	Low	Successful demonstration of microservices architecture, networked platforms, federated learning	4	2nd QTR FY24
Stand-alone WISDOM Demonstration	Low	Successful demonstration of full WISDOM capability set	5	3rd QTR FY24

**HOW**

**Projected Business Model:** GIRD will engage industry partners to assess the contribution of the technology and identify a strategy for the potential market and potential customers. GIRD plans to license the technology as software/firmware IP to be integrated into customer's communication platforms or as a hardware applique with interfaces to the available IES and modem systems. GIRD is identifying other potential applications within the DoD and is engaging industry partners for integration of the technology into their products.

**Company Objectives:** Development of the WISDOM intelligent orchestration technology ties in with GIRD's long-term goal of becoming a leading provider of IES technology to the DoD and other government and commercial sectors. GIRD's past and current interference excision technology developments for the DoD comprise major thrusts in this direction as is the application of machine learning to optimal decision making in complex, dynamic scenarios.

**Potential Commercial Applications:** As spectrum becomes scarce and demands for video and data continue to rise, operating through interference or congestion becomes paramount. The machine learning decision engine forming the core of the WISDOM technology has application to commercial systems, not just in terms of applying optimal IES strategies, but also in optimally configuring radio/communication systems and optimally routing data through alternate systems (e.g., satellites) to avoid congestion and manage network loading. Further, the WISDOM training framework can serve to generate scenarios and network conditions to intelligently test and identify corner case conditions which impact system performance.

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