

# Department of the Navy SBIR/STTR Transition Program

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ONR Approval # 43-2203-16

Topic # N121-097

Improved High Frequency Communications

GIRD Systems, Inc.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** C4/Cyber Program

**Transition Target:** Marines, Navy

**TPOC:**

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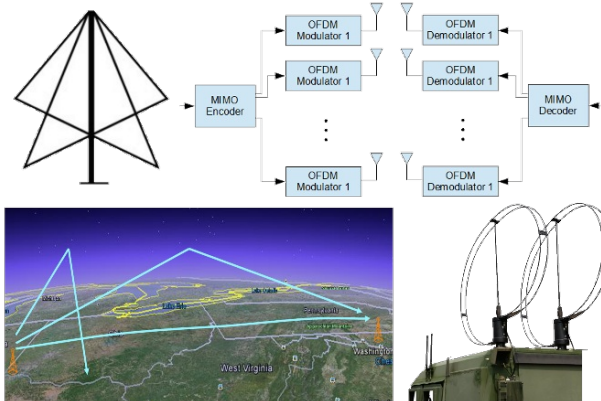
**Other transition opportunities:**

Coast Guard  
 Army  
 SOCOM  
 Air Force Battle Management C2 (BMC2)  
 Search and Rescue/Disaster Response Comms  
 Commercial Maritime

**Notes:** GIRD Systems is developing a novel HF communications waveform enabling considerably higher throughput than current state-of-the-art HF radios

GIRD Systems is a small business defense contractor that is innovative, competent, and agile in satisfying DoD's signal processing and communications needs.

[www.girdsystems.com](http://www.girdsystems.com)



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## WHAT

**Operational Need and Improvement:** HF radios are currently used in military deployments to provide Line-Of-Sight (LOS) and Beyond-Line-Of-Sight (BLOS) voice and data communications to mobile and dismounted troops from ships and command posts. Increasing focus on satellite-denied environments in Anti-Access/Area-Denial (A2AD) scenarios reveals that HF data rates are currently too low to support video and imagery currently supplied by SATCOM links. While recent updates to the MIL-STD-188-110C specification has provided higher data rates for HF data transfer, these higher rates are still too low to replace the current SATCOM links, especially when realistic propagation and interference scenarios are considered. Additionally, higher HF bandwidths require additional HF spectrum which is already highly fragmented with many existing military and commercial users, making these higher data rates especially hard to realize with limited spectrum.

**Specifications Required:** The ultimate goal of this SBIR is to develop a set of waveform and system enhancements which exceeds current capabilities and can be transitioned to both new and existing HF communication terminals. This includes exceeding the throughput rates of existing wide-channel HF radios by at least 25% (150 kbps). Additionally, MIMO over the NVIS channel should provide enhanced performance as compared to traditional single channel operation.

**Technology Developed:** By utilizing the latest advances in robust modulations (OFDM), error correction (LDPC), and multiple antenna configurations with advanced signal processing (MIMO), this system provides maximum spectral efficiency and robust communication links. The maximized data throughputs support future A2AD scenarios for Naval HF BLOS communications.

**Warfighter Value:** Increased HF communication throughput and robustness to channel effects provides SATCOM-alternative links for video/imagery and enhances situation awareness of the warfighter.

## WHEN

**Contract Number:** N00014-15-C-0010 **Ending on:** April 20, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Prototype Waveform Development and Hardware Port	Low	Verified waveform performance in a lab environment	4	January 2017
SISO Testing and Demonstration	Low	Successful OTA link using single channel	5	January 2017
MIMO Testing and Demonstration	Med	Successful OTA link using multiple channels	5	October 2017
Commercial Platform Development and Porting	Med	Modified commercial HW and waveform porting	5	April 2019
Final Demonstration on Commercial Platform	Med	Verified waveform performance in a lab environment	5	April 2019

## HOW

**Projected Business Model:** GIRD intends to license the advanced waveform to DoD primes. The portable, hardware agnostic waveform and software design ensures the waveform is easily able to transition to wideband HF capable platforms. GIRD will engage Thales and other industry partners to assess the contribution of the technology to the HF communication equipment market and identify a strategy for the potential market and potential customers.

**Company Objectives:** Development of the HF communication system ties in with GIRD's long-term goal of becoming the preferred provider of advanced waveform and communication capabilities to the DoD and other government and commercial sectors. GIRD's past and current communication system architectures and designs for Navy SPAWAR, Army and AFRL, and this program comprise major thrusts in this direction.

**Potential Commercial Applications:** Commercial applications may also be developed including systems to support search and rescue missions and disaster response where local infrastructure is nonexistent and/or affected by unexpected events. Additionally, beyond-line-of-sight maritime communications provides further commercial consideration.

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