

**WHO**

**SYSCOM:** ONR

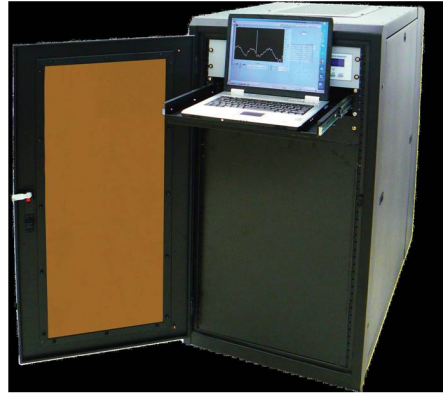
**Sponsoring Program:** SPAWAR  
PMW 120, PMW 150, PMW/A 170,  
PMW 770

**Transition Target:** Shipboard Signals  
Exploitation Equipment next  
generation, Navy Multi-band SATCOM  
Terminal

**TPOC:**

Dr. Deborah Van Vechten  
[deborah.vanvechten@navy.mil](mailto:deborah.vanvechten@navy.mil)

**Other transition opportunities:** Multi-  
functional Information Distribution  
System (MIDS) Link 16, Magnetic  
Resonance Imaging (MRI) systems for  
Traumatic Brain Injury



*Modular, Multi-Function Digital-RF Receiver*

Copyright 2018 HYPRES

**WHAT**

**Operational Need and Improvement:** Naval radio frequency (RF) systems have a requirement to improve spectrum utilization by implementing high speed broadband analog to digital converters. Although great strides were made with the third generation Modular, Multi-Function Digital-RF Receiver systems in the hands of government labs, attention is now focused on the fourth generation, first delivered in 2018. The ability to simultaneously capture a wide range of signals of interest is now primarily limited by the immaturity of integration of the data output into appropriate backend DSP.

**Specifications Required:** This phase II is part of the program plan to develop a wideband receiver for applications such as electronic warfare. The objective of this Phase II is to integrate ADCs together with an analog filter/multiplexer as an integrated Nb technology single chip. If more capability is required, the system can be scaled up by combining chips into a multi-chip module (MCM).

**Technology Developed:** Technology developed utilizing the HYPRES advanced digital RF receiver (ADR) will eliminate many components, enhance toleration of co-located high power transmitters and enable dominance of the RF spectrum for naval multi-function RF applications, such as communications, Electronic Warfare (EW), Intelligence, Surveillance, and Reconnaissance (ISR) and Radar.

**Warfighter Value:** These Modular, Multi-Function Digital-RF Receiver systems maximize signal reception for communication, ISR and EW systems, enabling full broadband spectrum monitoring and precise emitter identification (ID) in a smaller form factor. Direct digitization at RF eliminates traditional analog RF components such as mixers, LO and many filters. High sensitivity allows many LNA to be eliminated. Digital reception allows many signals having different bandwidths and potentially overlapping frequency content to be collected from a single data stream and a single antenna. All these benefits reduce the size, weight, and power of full spectrum access systems by as much as 50 percent while simultaneously allowing facile real time adaptation.

**WHEN**

**Contract Number:** N00014-17-C-2001 **Ending on:** March 16, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Design and develop a multi ADC chip and a digital RF receiver concept	N/A	Test and evaluate a set of ADC chips per test plan, Completed	3	1st QTR FY18
Develop Cryocooled Testbed for Receiver chip	N/A	Demonstrate an MCM based, working ADC. Demonstrate a digital receiver with multiple coherently clocked ADC.	3	2nd QTR FY18
Design and develop Nb analog filter	N/A	Test analog filter chips per test plan. First development cycle completed. Second cycled started.	3	2nd QTR FY18
Option 1-Develop receiver MCM	High	Test system on a single, integrated chip per test plan.	4	2nd QTR FY20
Option 2-Build Digital RF Receiver with Filter ADC SoC MCM	High	Test and demonstrate the concept of a channelizing Digital RF Receiver	6	1st QTR FY20

**HOW**

**Projected Business Model:** The output of this Phase II will result in a product that will be incorporated into the HYPRES digital RF receiver product family which in turn will be inserted into military systems directly and through other DoD prime contractors. HYPRES has worked with L-3 Communications, Argon ST, and ViaSat on digital-RF receiver projects in the past.

**Company Objectives:** HYPRES seeks program office support for completion of development, test and evaluation, and transition to Ship's Signals Exploitation Equipment (SSEE) and Navy Multiband Terminal (NMT) as examples of relevant programs of record. HYPRES also seeks relationships with prime contractors, DoD program offices and equity investors for transition to major communications, EW, ISR and radar acquisition programs, and to the commercial market.

**Potential Commercial Applications:** HYPRES has identified commercial applications in MRI systems (ONR/OSD SBIR phase I/phase II contracts), avionics equipment and commercial SATCOM.