REQUEST FOR INFORMATION (RFI)

ONR RFI Announcement # 12-RFI-0001

"Enabling Hardware (HW) and Software (SW) for Simultaneous Transmit and Receive (STAR) Communications"

I. DISCLAIMER:

This announcement does not constitute a Request for Proposals (RFP), a Request for Quote (RFQ) or an indication that the Government will definitely contract for any of the items and/or services discussed in this notice. Neither ONR nor any other part of the federal government will be responsible for any cost incurred by responders in furnishing this information. Information on the specific topics of interest and submission procedures is provided in the following sections of this announcement.

The Office of Naval Research (ONR) solicits its Science and Technology (S&T) research efforts through Broad Agency Announcements (BAA), sometimes by issuing a specific area of interest notice, called a Special Notice, in reference to ONR's Long Range BAA to produce more focused responses on a particular research area. This Request for Information (RFI) is intended to ensure than any such future notice properly reflects areas that are still in need of science and technology work from research areas long known to have hard problems and de-emphasize areas where solutions have already been proven. That is, RFI results will be used for internal planning purposes only. No specific feedback to respondents is planned and no submissions will be returned.

II. BACKGROUND:

ONR is seeking information related to the current technical state of the art of both hardware (HW) and software (SW) with respect to generic multi-waveform, software controlled communications systems fully capable of simultaneous transmit and receive (STAR) over extended frequency bands and suitable for a variety of platforms. The strong desire to reduce manning costs translates into a need for all future systems to operate with minimal human intervention and minimum need for specific user training.

III. SPECIFIC INFORMATION OF INTEREST:

Respondents are invited to describe their proven capabilities, already funded efforts that will deliver important enabling capabilities during FY12, and the potentially most relevant, revolutionary capabilities they have already invented but not yet developed fully. Where possible, quantify the performance/functionality expected. These responses should be marked on at least a paragraph by paragraph basis as to whether the government must respect the material as proprietary or if the ideas contained are available for unrestricted distribution, because, for example, they have already been published. If the respondents wish their materials to be read only by government employees, not by any support contractors employed by the government, the submissions should so state on the cover page.

Hardware described should operate via software definition of functionality and be fully capable of dynamic reallocation of resources (especially transmit power, receive dynamic range, and processor Flops) requiring <<1 ms after notice is received to implement. Radio Frequency (RF) HW that implements a fixed function or small set of waveforms is insufficiently generic to be of interest. HW systems should be modular in construction and will be expected to cope with a few signals at a time in a less than 1 lb., few U (a measurement of size of electronics subsystems that fit into standard 19 inch wide racks, one rack unit is 1.75 inches tall) package or up to all the RF traffic in a dense signal environment, in a package that weighs ~100 lb. and is a half rack tall. Methods of optimizing individual functional modules for cost as well as functionality should be discussed in any HW oriented submission. Simultaneous transmit (Tx) and receive (Rx) (STAR) is essential, implying the existence of system status software that provides the Rx side with full information about Tx activities, facilitating both digitally driven analog cancellation before and digital signal excision after the Analog to Digital Converter (ADC). Additional examples of technical interests include:

- Methods to enhance Tx/Rx isolation
- Extreme performance ADC and Digital to Analog Converter (DAC)
- Energy efficient spur suppression and simultaneous Tx signal preparation methodologies
- Transmit predistortion techniques for signature and noise floor control
- Methods of achieving coherent reception among spatially distributed users when low jitter clocking is required
- Network synchronization and timing protocol management for mobile, spatially separated users
- Non-volatile memories and unusual approaches to Size Weight and Power- Cost (SWaP-C) minimization.
- Digital Signal Processing (DSP) platforms with improved latency and energy efficiency which can be scaled from ~1 Commercial Off-the-Shelf (COTS) computer to the Ultra High Performance Computing (UHPC) class
- Analog signal processing concepts already at technology readiness level (TRL) 3
- Methods to achieve reprogramming of field programmable gate array (FPGA) in <<1 ms

All software described should be consistent with easy portability between platforms and among systems. SW should focus on automation of signal sorting and separation, reduction of processing latency, processing efficiency, spur recognition and excision/avoidance, and complete awareness of the current RF environment.

IV. SUBMISSION INSTRUCTIONS and FORMATTING REQUIREMENTS

a. Responses are requested by **Tuesday, November 8, 2011.** Any response received after this date will also be considered but may not be included in initial reporting or assessments.

b. All responses should be in PDF format and emailed to the technical point of contact: **Dr. Deborah Van Vechten, ONR Code 312 Program Officer, at Deborah.vanvechten@navy.mil.** The subject line of the email should read as

follows "RFI submission by xxx (your company name): **Enabling HW and SW for Simultaneous Transmit and Receive Communications.**

All responses should be unclassified. If desired, a classified supplement may be submitted separately. Please contact the Technical Point of Contact for directions on submission of any sensitive or classified information.

All information received in response to this RFI that is marked proprietary (as defined on the cover page) will be handled accordingly. Responses to this notice will not be returned, nor will detailed feedback be made available.

c. Responses should not exceed a maximum of sixteen (16) pages with a maximum of four (4) pages per technical capability and should be typed in 12-point Times New Roman font, single spaced, with 1-inch margins. See suggested submission organization below for content and section page limitations.

d. A suggested submission organization:

1. Cover Sheet – RFI number and name, address, company, technical point of contact, with printed name, title, email address and date. Also definition of proprietary marking scheme if any
2. Table of Contents with page
3. Technical capabilities – Limited to 4 pages per capability, with a 14-page maximum limit regardless of the number of capabilities described.

   Include the following information for each capability:

   - Category of functionality provided, range of architectures enabled
   - Performance proven/anticipated at component & system levels
   - Why capability is unique/desirable
   - Rough estimates of the cost in time and financial resources to three levels of technical maturity/risk reduction for each capability discussed: a) proof of concept completed; b) system functionality ready to demonstrate in relevant environment; and c) items required for system functionality in the field ready to be produced in quantities of tens. No cost or pricing information should be provided. Any received will be deleted and destroyed
   - Critical facilities and equipment required for realization of capability
   - Inclusion of notional figures may be useful to clarify architectural innovations and system consequences of component performance enhancements
   - Funding Source, whether the current capability has been developed with government or private funding or both.

V. QUESTIONS AND POINT OF CONTACT

Questions of a technical nature regarding this RFI may be sent to the following Technical Point of Contact:

Name: Dr. Deborah Van Vechten
Title: Program Officer
Division Title: C4ISR
Division Code: 312
Address: room 910, 875 N Randolph St, Arlington VA 22203
Email Address: Deborah.vanvechten@navy.mil