

**REQUEST FOR INFORMATION (RFI)
ONR RFI Announcement # 13-RFI-0003**

Title: High Power Radio Frequency (HPRF) Technologies for Naval Applications

I. DISCLAIMER:

This announcement constitutes a Request for Information (RFI) for the purpose of determining market capability of High Power Radio Frequency (HPRF) systems and related S&T research. It does not constitute a Request for Proposals (RFP), a Request for Quote (RFQ) or an indication that the Government will contract for any of the items and/or services discussed in this notice. Any formal solicitation that may subsequently be issued will be announced separately through Federal Business Opportunities (FedBizOpps). Information on the specific topics of interest is provided in the following sections of this announcement. Neither ONR nor any other part of the federal government will be responsible for any cost incurred by responders in furnishing this information.

II. BACKGROUND:

Proliferating worldwide asymmetric threats are driving research into innovative solutions in Directed Energy Weapons (DEW). DEWs take advantage of low cost per shot and allow naval commanders flexible response to various small surface craft and UAV threats. In some threat scenarios, Rules of Engagement (ROE) may not allow kinetic engagements. High Power Radio Frequency (HPRF) weapon systems, which deliver pulses of electromagnetic (EM) energy, can be used to disrupt, disable or potentially destroy critical electronic circuitry. HPRF delivers electromagnetic energy through coupling of the EM wave to target circuits through aperture or cable points of entry, inducing currents in the circuitry capable of causing a variety of effects. Non-kinetic counter-electronics (low collateral damage) applications of HPRF are characterized by: high intensity radio / micro-waves (can induce currents within electronic components causing a variety of effects); very short, intense high power and/or energy pulse producing a transient surge of current in electronics. Potential effects include: erroneous signals, system lock-up, shutdown, loss of communications between systems and physical damage.

To realize the benefits of HPRF technology the Office of Naval Research is embarking on an effort to develop an investment strategy, through the creation of a series of S&T roadmaps defining options for basic and applied research. Responses to this RFI will be reviewed for subsequent presentation to a Senior Advisory Panel with a goal toward development of an S&T roadmap for future Naval investment. HPRF systems for Naval applications may be employed on a ship, a single small boat, a USV, a UAV, a missile system, or some other platform that may be deployed from a Naval asset.

III. SPECIFIC INFORMATION OF INTEREST:

In order to best develop these S&T roadmaps the Office of Naval Research requests information from government, industry, academia, and small business on current and recent HPRF S&T efforts and the development of HPRF related technologies. This information will be used to support a Senior Advisory Panel led HPRF Strategy and Investment Planning Review in the spring of 2014. Selected RFI responses may be invited to provide additional information or

briefings in support of the Panel roadmap assessment and development. Desired areas of interest include Prime Power, Pulsed Power Systems, Advanced HPRF Sources, Antennas, Lethality, and Modeling and Simulation.

a. Prime Power

Prime Power considerations could include but are not limited to advanced batteries and power electronics. For the purposes of this RFI prime power source descriptions should include: voltage and current capabilities; size, weight and energy densities; current and future state of development (to include TRL); and compatibility with common HPRF sources or pulsed power systems.

b. Pulsed Power Systems

Pulsed Power System considerations could include but are not limited to energy storage, voltage multiplication, switching, and power conditioning. For the purposes of this RFI pulsed power system descriptions should include: voltage and current capabilities, charging and discharging times, size and weights; current and future state of development (to include TRL); and compatibility with common HPRF sources.

c. Advanced HPRF Sources

Advanced HPRF sources could include but are not limited to advanced development or high power solutions for common HPRF sources and novel HPRF sources. For the purposes of this RFI advanced HPRF source descriptions should include: source power output (independent of antenna when applicable); duty cycle capabilities including pulse repetition rate, pulse width; frequency content including center frequency and bandwidth; prime power requirements; the time required to take the HPRF source from standby to firing; size and weights; current and future state of development (to include TRL); and compatibility with common HPRF Antennas.

d. Antennas

Antenna considerations could include but are not limited to conformal and non-conformal antennas. For the purposes of this RFI Antennas descriptions should include: antenna gain; center frequency and bandwidth capabilities; peak power capabilities; size and weights; current and future state of development (to include TRL); and compatibility with common HPRF sources.

e. Lethality

HPRF systems are only as effective as their level of lethality which can be described in terms of both soft (mission) kill and hard (system) kill. It is desired to develop a concept of the level of lethality testing completed. Lethality descriptions should include: targeted devices; sources or types of waveforms used throughout testing; and level of lethality testing completed. Lethality descriptions should include the level of lethality determined, when available, as well as the related test procedures. This section will likely require responses via a classified addendum

f. Modeling and Simulation

Modeling and simulation considerations could include but are not limited to electromagnetic propagation for HPRF sources (multipath, material penetration), signal coupling into devices, antenna development, and engagement or PK modeling.

g. Real-Time Measure of Effectiveness

HPRF effects on an adversary system may not always be easy to measure quickly, and in real-time. Concepts for quick, real-time measure of the effects of HPRF devices are of interest.

h. Innovative HPRF Systems

Novel and/or innovative new concepts for HPRF application are sought. Offensive and defensive applications may be addressed as well as counters to both asymmetric and conventional threats.

IV. SUBMISSION INSTRUCTIONS and FORMATTING REQUIREMENTS

- a. Responses are requested no later than **6 December 2013 at 1600**. Any response received after this date will also be considered but may not be included in initial reporting or assessments.
- b. The responses should not exceed 15 pages in length and shall be in an electronic format on CD-ROM and mailed to the technical point of contact, Ryan Hoffman, at the address listed below. **NO E-MAIL RESPONSES WILL BE ACCEPTED**. The attention line should read as follows”

“RFI: High Power RF”
Office of Naval Research
Ryan Hoffman
Title: Program Officer
Division Title: Naval Air Warfare and Weapons Division Code: 352
Address: 875 N. Randolph St, Arlington, VA, 22203-1995

- c. All responses will be unclassified but may, as necessary, contain a classified addendum.
- d. Classified Data: All information submittals containing classified data shall be appropriately marked and shall be delivered to the following location:

Classified Response Instructions:

Classified information shall be submitted directly to the attention of ONR’s Document Control Unit at the following address and marked in the following manner:

OUTSIDE ENVELOPE (no classification marking):

“Office of Naval Research
Attn: Document Control Unit
ONR Code 43
875 North Randolph Street
Arlington, VA 22203-1995”

The inner wrapper of the classified document should be addressed to the attention of the TPOC, ONR Code 352 and marked in the following manner:

INNER ENVELOPE (stamped with the overall classification of the material)

“RFI: High Power RF”
Office of Naval Research
ATTN: Ryan Hoffman
ONR Code: 352
875 North Randolph Street
Arlington, VA 22203-1995”

- e. All information received in response to this RFI that is marked proprietary will be handled accordingly. Responses to this notice will not be returned.
- f. Recommended content and submission organization as follows:
 - i. Cover Sheet – RFI number and name, address, company, technical point of contact, with printed name, title, email address and date.
 - ii. Table of Contents with page numbers.
 - iii. Technical data to include an assessment paper (marked proprietary in nature) discussing the technical challenges inherent in the HPRF technology approach and the available solutions to each of those challenges. Evidence to validate each solution should be provided. If possible, this paper should not exceed 15 pages including charts/graphs/illustrations.
- g. No cost or pricing information should be provided. Any received will be deleted and destroyed.

ADDITIONAL INSTRUCTIONS TO RESPONDERS: Responses to every area and all questions are not required. Address only to those areas and questions, which are appropriate based on your capabilities and knowledge.

1. Responders are requested to provide a high-level description of their research, development and integration capabilities in High Power RF or damage assessment technology. Capabilities provided should be as specific as possible, and should identify unique technical development experience and qualifications in specific areas that relate to the objective of this RFI.
2. Responders are requested to provide an overview of the concept and capabilities of an HPRF weapon or a damage assessment system that can perform the mission described above and the current maturity of that concept. Include technology development efforts and system/sub-system demonstrations that provide ONR the pertinent information relative to the capabilities and system maturity of the concept.
3. General information is requested in response to the following specific questions:
 - a. What is your concept/approach?
 - b. What's new in your approach and why do you think it will be successful?
 - c. What are the risks and the payoffs?
 - d. How long will it take?
 - e. What are the midterm and final "exams" to check for success? How will progress be measured?

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: Ryan Hoffman

Title: Program Officer

Division Title: Naval Air Warfare and Weapons Division Code: 352

Address: 875 N Randolph St, Arlington, VA, 22203-1995

Email Address: ryan.hoffman@navy.mil