

Special Notice N00014-19-R-S003

Special Program Announcement for 2019 Office of Naval Research (ONR) Research Opportunity: Long Endurance Advance Off-board Electronic Warfare (AOEW) Platform (LEAP)

I. INTRODUCTION

This announcement describes a research thrust, titled “Long Endurance Advanced Off-board Electronic Warfare Platform,” or LEAP, to be launched under the ONR Broad Agency Announcement (BAA) N00014-19-S-B001, Long Range BAA for Navy and Marine Corps Science and Technology which can be found at <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements>. The research opportunity described in this announcement specifically falls under the areas of Aerodynamics, Autonomy, Flight Dynamics & Control (<https://www.onr.navy.mil/Science-Technology/Departments/Code-31>), and Electronic Warfare (<https://www.onr.navy.mil/Science-Technology/Departments/Code-35>). The submission of proposals, their evaluation and the placement of research contracts will be carried out as described in that BAA.

The purpose of this announcement is to focus attention of the scientific community on (1) the area to be studied, (2) the ONR LEAP industry day for dialogue amongst those interested in this arena, and (3) the planned timetable for the submission of proposals.

II. TOPIC DESCRIPTION

The proposed topic will explore and exploit the necessary technologies to design an advanced ship-based, LEAP, that consists of a flight vehicle with modular decoy mission compatible payloads and antenna solutions enabling off-board ship self-defense. The LEAP decoy will be part of a multi-layered approach, with the airborne decoy enhancing the existing and evolving soft-kill capabilities for current and developing anti-ship missile (ASM) threats.

ONR Code 35 and Code 31 will host a classified industry day to inform the industry of relevant threats, discuss detailed requirements, and to showcase recent technology investments in applicable areas.

Background:

U.S. Navy ships are subject to attack by high speed, maneuvering missiles with the potential to be delivered in salvos that overwhelm ship defenses. Existing defenses include hard-kill as well as onboard and off-board electronic warfare (EW) techniques; all three combined are needed to be effective against current and emerging threats. Currently, the AOEW program is developing

the Active Mission Payload (AMP) to integrate with H-60 platforms as part of this required capability. This call seeks to complement the AOEW AMP and other Program of Record capabilities.

Objective:

This Special Notice seeks to develop concept designs for an expendable, long endurance airborne platform decoy. The development strategy is to pursue a modular vehicle and payload concept to allow for rapid evolution of payload capabilities with a common flight vehicle to counter the progression of ASM threats. Thus, the decoy is anticipated to be realized as a combination of the LEAP vehicle and a LEAP payload. Further, it is anticipated that multiple payloads will be compatible with a single vehicle that is common among diverse payload configurations to address multiple threats.

Specifically, for this Special Notice, ONR is interested in pursuing design concepts that can meet the decoy requirements as well as understand how certain requirements within the trade space might drive design solutions. The targeted requirements for the LEAP decoy include:

- A launcher that fits within deck space allocated for EW topside equipment aboard the Arleigh Burke Class (DDG 51) and maximizes number of decoys available for use.
- Ability to deploy and transition to stable controlled flight while providing safe and stable separation from the ship.
- Autonomous flight control capability, to include collision avoidance, with an ability to accept mission tasking at launch with waypoint updates from a ship-board control station and the ability to reposition and realign to maintain focus on the ASM threats.
- Ship-relative navigation with air and sea platform awareness with the ability to operate in a Global Positioning System denied environment.
- Minimum flight endurance of one hour on station. Details on altitudes and ranges from launch site to station are classified and will be discussed during industry day.
- Capability to employ modular EW payloads in both the Radio Frequency (RF) (primary) and Electro Optic Infrared (EO/IR) domains.
- Operate in conditions up to sea state 5 (up to 25 mph steady winds) and air temperatures of 0 to 120 degrees F.
- Secure bi-directional communication between the decoy and the control station.
- Effective antenna isolation. Details are classified and will be discussed at Industry day.

ONR foresees the total integrated decoy cost to range between \$100k to \$500k for the full rate production unit. ONR sees significant benefits to a lower cost solution in enabling larger numbers of employment as well as more regular training and exercise. However, a more expensive solution may enable more rapid response, as well as more overall capability while reducing overall mission cost. To understand this trade space, ONR is specifically looking for proposals that will explore how the following requirements drive the decoy carrier vehicle design and consider the following tradable requirements for mission effectiveness:

- Decoy endurance versus cost. While the Navy seeks a minimum time on station of an hour, the understanding is that endurance will have an impact on vehicle cost. If total mission cost can be reduced with either reduced or increased endurance, the Navy desires to understand this trade space.

- Vehicle reaction time versus cost. The mission/vehicle cost of a rapidly deployable decoy design launched after ASM detection vs system pre-emptively deployed prior to engagement. ONR is receptive to designs that target vehicle solutions with either capability.
- Sophistication of decoy and communication capability versus cost. ONR seeks to understand how adding advanced autonomous capabilities, such as formation flight, cooperative peer-to-peer communications, and on-board decision making based on organic sensing, may be traded with greater bi-directional communication and shipboard control to drive overall cost.

To reinforce the desired modularity and to facilitate involvement by researchers that may specialize in only one of the following technical areas, ONR is splitting the decoy design into two related Technical Areas (TA): 1) LEAP autonomous airborne carrier, 2) LEAP Radio Frequency payload. Additionally, Electro Optic Infrared payloads are being developed which will be coordinated with the LEAP. Researchers may propose to one or both TA1 and TA2 however, efforts that target both TA1 and TA2 should provide for severability between the two aspects of the proposal to enable the government to pursue just one of the proposed areas if desired.

Significant co-design is anticipated between the carrier and payload to provide design solutions that meet mission requirements. For instance, to address issues such as RF isolation as well as power and cooling needs, aspects of each Technical Area can influence overall system design. To facilitate this co-design, ONR anticipates holding regular Technical Interchange Meetings (TIM) to include the government.

At the conclusion of the period of performance, ONR is expecting researchers to deliver preliminary point designs including documentation of:

- Functional diagrams addressing systems necessary to meet mission requirements
- Interface capability document (ICD) that supports carrier/payload integration
- Trade study analysis around the targeted point design
- Analysis supporting the targeted performance metrics

TA1: Autonomous Airborne Carrier

Technical Area 1 seeks to explore solutions providing an autonomous carrier system for integrating EW payloads to counter ASM threats. In addition to the carrier decoy air vehicle, the system will include a launcher and ship-board control station. The launcher design will enable the LEAP decoy to effectively deploy within relevant timelines suitable for the threat, as well as fit within the space identified for DDG ship integration (to be discussed on Industry day). The control station will be integrated onto the ship, enabling two-way communication and updates to the LEAP decoy(s). Prior to launch, the decoy will be updated with relevant mission information to effectively counter the threat. To ensure mission effectiveness, the decoy will combine quick deployment and activation with sustained duration controlled flight capability. Upon launch from the ship, the LEAP autonomous decoy will orient itself to maintain steady stable flight as well as engage the integrated EW payload to counter the threat. During flight, the carrier is expected to provide payload power delivery of 600W minimum and cooling ability to the

payload. Carrier should be capable of handling payloads of up to 20 pounds and 1000 cubic inches in a manner consistent with the payload mission. Additionally, the carrier should be able to orient itself azimuthally within an accuracy of at least +/- 10 degrees during flight operation. Further refinement in pointing accuracy is desirable to reduce payload complexity.

Technical Area 2 (TA2): RF payload (primary)

The LEAP RF payload is intended to provide a completely encapsulated, modular RF system capable of maintaining situational awareness in the electromagnetic spectrum, communicate with the host platform, operate autonomously and under direction from the host to transmit Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance signals (C4ISR). The payload is anticipated to encompass the compute engine, digital signal processing, RF front end and RF apertures. Prime power of nominally 600W should be assumed to be provided from the LEAP carrier in a single rail. The entire payload should be constrained to 20 lbs. and 1000 cubic inches to be compatible with a small form factor module for the LEAP carrier. The payload design will need to address issues including aperture isolation requirements for transmit and receive as well as cooling in conjunction with the TA1 LEAP carrier design team. Further, performance parameters are identified at the classified level to be discussed during industry day.

Other Modular Payloads: EO/IR

Under concurrent and parallel efforts to this Special Notice, concept designs and component technologies are being developed for low size, weight and power (SWaP) modular EO/IR payloads. It is envisioned that the compact payloads will have components including visible and infrared receivers, internal fine pointing control, control electronics, processor and a local inertial navigation system (INS). It is also desired that the air platform can receive cues over its communication link and provide this information to the payload. It is also envisioned that the payload will be able to request the carrier platform to point within the +/- 10-degree window mentioned above at any given time during flight maneuvers. The EO/IR payload is expected to be constrained to 20 lbs. and 1000 cubic inches compatible with the LEAP carrier. It is expected that the designers for the EO/IR payload will, under the concurrent efforts, interact with successful bidders under TA1 and TA2 to collaborate and provide information on interface, platform and payload trades.

Cost

For any designs put forth, ONR needs to understand the usage cost in deploying that design to defeat intended threats. Number of units to deploy, sets of asset cycling, and use factors all drive total mission cost which is critical to understand for system cost. Each design shall include a cost section detailing the above items to understand total mission cost for a scenario that will be provided in the classified Industry day.

III. LEAP industry day

ONR will conduct a classified industry day on Monday, May 13, 2019 at the Office of Naval Research. This meeting will provide insight into current threats and present previous work investments in applicable areas. This event is intended to provide for any necessary question and

answers to add further clarification toward the desired outcome of the LEAP program. There is no registration fee for participation, however advance registration is required.

ADVANCED REGISTRATION IS REQUIRED.

Registration will close on May 6, 2019 at 1500 EST.

Walk in registration will not be accepted.

Please use the URL below to register.

<https://www.onlineregistrationcenter.com/leap>

IV. WHITE PAPER SUBMISSION

White papers are not desired under this Special Notice. Researchers are highly encouraged to ask questions during industry day.

V. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

Full proposals should be submitted under N00014-19-S-B001 by **7/01/2019**. The proposals can be for the full integrated decoy system or either the airborne carrier or RF payload concept. Full Proposals received after that date will be considered as time and availability of funding permit.

ONR anticipates that contracts will be issued for this effort.

Full proposals for contracts should be submitted in accordance with the instructions in BAA N00014-19-S-B001 at Appendix 2, "Requirements Applicable to Contracts and Other Transaction Agreements." The Technical Proposal/Content shall be single spaced and not exceed 15 pages. The cover page, resumes, bibliographies, and table of contents are excluded in the page count. For contract proposal submission, all submissions should be submitted electronically to the Point of Contact identified in Section VII of this Special Notice, unless submitting a classified proposal. Classified submissions can be sent electronically or mailed in accordance with the instructions at BAA N00014-19-S-B001, Section D.2.b.

Those selected for contracts will receive incremental funding with a period of performance of one year. At the conclusion of the period of performance, researchers are expected to deliver a final report and Interface Control Document. The final report will include the design description, system functional diagrams, design justifications to meet system performance requirements, and trade space investigation. ONR plans to award contracts of approximately \$750k-\$1M per technical area. It is anticipated that multiple awards will be made in each Technical Area based on the quality of the proposed efforts. Interested researchers may bid on one or both Technical Areas, however there should be delineation between bidding on both Technical Areas allowing researchers to receive funding for one Technical Area if desired by the Government. During the one-year period of performance, researchers will be expected to attend a kick-off meeting at ONR, followed by three TIM's (3, 6, and 9 months), and a final report/brief at ONR. The three and nine month TIM's will be by teleconference, with the six month TIM at the contractor's facility. The long term vision, past this design study, is to transition technology by building and

demonstrating an integrated decoy, having the carrier designer serve as a Lead System Integrator (LSI) to the payload supplier. Having an LSI in future efforts, will identify and reduce the risks associated with combining a payload and carrier vehicle to provide an integrated solution.

Although ONR expects the above described program plan to be executed, ONR reserves the right to make changes.

Funding decisions should be made by 7/14/2019. Selected projects will have an estimated award date of 9/30/2019

VI. SIGNIFICANT DATES AND TIMES

| Event | Date | Time |
|---|-------------|-------------|
| Industry day | 5/13/2019 | 9am Eastern |
| Recommended Full Proposal Submission | 7/01/2019 | 4pm Eastern |
| Notification of Selection: Full Proposals * | 7/14/2019 | |
| Contracts Awarded * | 11/14/2019 | |
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Note: * These are approximate dates.

VII. POINTS OF CONTACT

In addition to the points of contact listed in ONR BAA N00014-19-S-B001, the specific points of contact for this announcement are listed below:

Technical Points of Contact:
 David Findlay, PhD
 Program Officer
david.findlay@navy.mil

Business Point of Contact:
 Philip Eisenhour, Code 251
 Contracting Officer
philip.eisenhour@navy.mil

VIII. ADDRESS FOR THE SUBMISSION OF FULL PROPOSALS FOR CONTRACTS

Unclassified full proposals should be submitted electronically to onrcode35research.fct@navy.mil by 4:00 PM Eastern Daylight Time on 01 July 2019. Files exceeding 10MB in size should not be emailed, but instead transmitted via a file transfer service, for example AMRDEC SAFE <https://safe.amrdec.army.mil>.

Classified proposals 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 Full Proposal should be addressed to the attention of the cognizant Technical POC, ONR Code 35 and marked in the following manner:

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

“Program Name: LEAP
Office of Naval Research
ATTN: ONR Program Officer David Findlay
ONR Code: ONR Program Officer Code 35
875 North Randolph Street
Arlington, VA 22203-1995”

If a classified proposal is submitted and selected for award, the resultant contract will be unclassified. An ‘unclassified’ Statement of Work (SOW) must accompany any classified proposal.

IX. SUBMISSION OF QUESTIONS

Any questions regarding this announcement must be provided to the Technical Points of Contact and/or the Business Point of Contact listed above. All questions shall be submitted in writing by electronic mail.

Answers to questions submitted in response to this Special Notice will be addressed in the form of an Amendment and will be posted to the following web pages:

- Federal Business Opportunities (FEDBIZOPPS) Webpage – <https://www.fbo.gov/>
- Grants.gov Webpage – <http://www.grants.gov/>
- ONR Special Notice Webpage - <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Special-Notices>

Questions regarding **Full Proposals** should be submitted NLT two weeks before the dates recommended for receipt of Full Proposals. Questions after this date may not be answered.

Acronym list

AMP – Active Mission Payload
AOEW – Advanced Off-Board Electronic Warfare
ASM – Anti Ship Missile
BAA – Broad Agency Announcement

C4ISR – Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
DDG – Destroyer Designated Guided
EO/IR – Electro Optic Infrared
EW - Electronic Warfare
GPS – Global Positioning System
ICD – Interface Control Document
LEAP – Long Endurance AOEW Platform
LSI – Lead System Inertial Navigation System Integrator
ONR – Office of Naval Research
RF – Radio Frequency
SWaP – Size, Weight, and Power
TA – Technical Area
TIM – Technical Interchange Meeting