

Special Notice N00014-21-S-SN02
Special Program Announcement for 2021 Office of Naval Research
Research Opportunity:
Landing Autonomous Navigation Technology for Enhanced Recovery to Navy
Ships (LANTERNS)
Amendment 0002

I. INTRODUCTION

The research opportunity entitled “Landing Autonomous Navigation Technology for Enhanced Recovery to Navy Ships (LANTERNS)” as described in this announcement specifically falls under the areas of Aviation, Force Projection, and Integrated Defense (Code 35) Future Naval Capabilities (FNC) program (<https://www.onr.navy.mil/en/Science-Technology/Departments/Code-35/All-Programs/air-warfare-and-naval-applications-352/future-naval-capabilities>). This opportunity is under the Office of Naval Research (ONR) Broad Agency Announcement (BAA) N00014-21-S-B001, Long Range BAA for Navy and Marine Corps Science and Technology, which can be found at <https://www.onr.navy.mil/work-with-us/funding-opportunities/announcements>. 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) identifying and addressing the technical challenge as it applies to the topic, and (2) the planned timetable for the submission of full proposals.

II. TOPIC DESCRIPTION

The LANTERNS program is an ONR sponsored FNC effort. The proposed topic will develop and demonstrate an advanced landing system technology that can improve operations in contested environments for transition to Naval Air System Command (NAVAIR) programs of record. ONR plans to execute the FNC program during fiscal years (FY) 2021 – 2023. The focus of this Special Notice is on improving communications between the ship and aircraft.

Background:

The use of unmanned aerial vehicles is of interest to the United States Department of Navy. The 2016 – 2025 Naval Aviation Vision stated: “The Navy plans to field an unmanned carrier-based capability in the mid-2020’s that will deliver an organic refueling and high-endurance intelligence, surveillance, and reconnaissance (ISR) capability” (NAVAIR and Naval Aviation Enterprise, 2016). Successful integration of unmanned air vehicles into future naval operations demands safe landing of the air vehicles on existing aircraft carriers. Such landings must be possible in both permissive and contested environments.

Autonomous landings rely on accurate measurements of unmanned air vehicle and aircraft carrier positions, headings, and other information. There are multiple-different techniques to

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capture the relative position and heading (i.e. pitch, roll, yaw, heave, sway, and translation) of the two platforms. These include but are not limited to the following:

1. Collecting the absolute positions and headings of the two platforms in an external frame of reference (e.g. Global Navigation Satellite System (GNSS) and inertia sensor data measured on each platform).
2. Capturing the relative position and heading of the unmanned air vehicle measured with a high accuracy sensor onboard the aircraft carrier.

For either of these two techniques to work, a two-way communication is required to close the loop and successfully perform an autonomous landing. While today's landing system communication architectures adequately perform their function in many conditions, advanced technologies are required to further enhance the landing system communication capabilities in additional operational environments.

Objective:

ONR is soliciting proposals for the development of a robust and accurate ship-relative navigation solution for autonomous landing that meets datalink bandwidth and range goals defined in the LANTERNS Design Requirements Annex while operating in the prescribed environments. The effort will investigate software and hardware solutions that can meet performance goals. Hardware may include antennas and radios for both the Nuclear Aircraft Carrier (CVN) class and the unmanned air vehicle. The effort shall include tasking towards the development, testing, and demonstration of a ship-to-aircraft communication system in an operationally relevant environment that meets the performance goals outlined in the LANTERNS Design Requirements Annex.

Approach:

ONR Code 35, in partnership with NAVAIR Naval Air Traffic Management Program Office (PMA 213) and Unmanned Carrier Aviation Program Office (PMA 268), is seeking proposals for a robust datalink to integrate into the Joint Precision Approach and Landing System (JPALS) in order to communicate between the host CVN class aircraft carrier and an unmanned air vehicle. ONR will divide the effort into a contract Base and Option as described in the below paragraphs.

Base Contract:

During the Base period, each Offeror shall perform research, design, and laboratory test activities for the development of their proposed communication solution to support the recovery of unmanned aircraft to US Navy CVN class aircraft carrier. Base activity will have a period of performance of 8 months. ONR anticipates making multiple contract awards of approximately **\$1.0M** each in value. The Base effort will include a prototype system Preliminary Design

Review (PDR). The prototype design shall encompass installation of software/hardware on both the ship and the air platform.

During the performance period of the Base effort, the Offeror shall provide the following deliverables:

- Monthly progress reports (technical and financial)
- Quarterly program reviews
- Link budget analysis
- Lab test results using representative prototype hardware
- Communication models and code samples
- Preliminary Design Review artifacts
- Detailed execution plan for the contract Option
- Verification and validation plan
- Final report

Contract Option:

During the Option period, the Offeror shall perform a prototype critical design review and support developmental test and evaluation activities of a system solution capable of supporting the recovery of unmanned aircraft to US Navy CVN class aircraft carrier in relevant operational environments. The Offeror shall provide prototypes to government for laboratory, shore-based, and ship-based testing. The Offeror shall provide engineering and analysis support to the government during integration, developmental testing and demonstration. The Option period will have a period of performance of approximately 24 months. ONR anticipates that the cost of the option to be approximately **\$8M**.

The Option consists of the following three tasks as identified below:

Task 1 – Offerors shall have five months from the effective date of the Option to modify and re-evaluate their Base results to achieve required performance characteristics and to provide the first benchtop prototype for delivery to the government for hardware-in-the-loop developmental testing at Naval Research Laboratory (NRL) facilities. The prototype delivery shall include both the ground station and the air platform software/hardware. Offerors shall provide engineering and test support to NRL for testing. The Task 1 effort will include a prototype system Critical Design Review (CDR) at the conclusion of the task. The total period of performance for Task 1 is seven months.

Task 2 – Upon completion of Task 1, Offerors shall have four months to continue to modify the first prototype based on Task 1 results, and to produce a second prototype system for government testing at Naval Air Warfare Center Aircraft Division (NAWCAD), shore-based JPALS installation. The Task 2 prototypes shall include communication terminals, antennas, and all associated hardware necessary to accomplish over-the-air testing. The prototypes delivered shall include both the ground station and the air platform software/hardware. NAVAIR shall use the prototypes for testing and demonstration of the system solution for communication from a

ground based station to a surrogate air platform. Offerors shall provide engineering support for ground system integration, air-side integration with a surrogate aircraft, test execution, and post-demonstration analysis and reporting. The total period of performance for Task 2 is nine months.

Task 3 –Offerors shall have four months to correct any deficiencies in the Task 2 prototypes and modify the two prototype systems for use in testing and demonstration aboard a CVN class aircraft carrier. The prototypes delivered shall include both the CVN and the air platform software/hardware. During the final four months of the Option period of performance, Offerors shall provide engineering support for ship system integration, air-side integration with a surrogate aircraft, demonstration execution, and post-demonstration analysis and reporting. Task 3 shall also include Offeror-provided qualification data that leads to readiness for transition to Programs of Record supporting JPALS (PMA213) and MQ-25 (PMA268). The total period of performance of Task 3 is eight months.

During the Option performance period, each Offeror will be required to provide the following deliverables:

- Monthly progress reports (technical and financial)
- Quarterly and annual program reviews
- Updated artifacts from Base period
- Critical Design Review artifacts
- Qualification data artifacts
- Final report
- Initial prototype terminal set for delivery during Task 1.
- Second prototype system for delivery during Task 2.
- Two prototype systems for delivery during Task 3.

III. DISTRIBUTION OF GOVERNMENT FURNISHED INFORMATION – WORKSHOP - INDUSTRY DAY

ONR does not plan to hold any workshops, industry days, webinars, etc. in support of this announcement.

IV. LANTERNS DESIGN REQUIREMENTS ANNEX

Prior to submitting a proposal, potential Offerors should review the LANTERNS Design Requirements Annex, which is available upon request to companies with the proper security and handling classifications.

The request shall be on company letterhead and shall include the company name, company Cage Code, company mailing address, and current Department of Defense contract number along with the government point of contact (POC) for that contract and the contract information for the Joint

Certification Program POC. ONR will use this information to verify eligibility to receive information associated with Security Classification Guidance.

The request shall be sent to Mr. James Farnsworth (contracting officer) at James.Farnsworth@navy.mil with a copy sent to David Findlay at david.findlay@navy.mil.

The deadline to request the Government Furnished Information (GFI) is **05 February 2021 at 5:00 PM Eastern Standard Time (EST)**.

IV. WHITE PAPER SUBMISSION

There is no white paper submission requirement for this opportunity. Offerors are encouraged to submit full proposals.

V. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

Full proposals should be submitted under ONR BAA N00014-21-S-B001 by **22 February 2021 5:00PM Eastern Standard Time (EST)**. Full Proposals received after that date will be considered as time and availability of funding permit.

ONR anticipates issuing contracts for this effort.

Full proposals for contracts should be submitted in accordance with the Appendix 2 of the N00014-21-S-B001.

The period of performance for projects may be from June 2021 through June 2024 (3 years after contract award).

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

Funding decisions should be made by 15 March 2021. Selected projects will have an estimated award date of 10 June 2021

VI. SIGNIFICANT DATES AND TIMES

Event	Date	Time
Due Date to Request GFI	05 February 2021	5PM EST
Recommended Full Proposal Submission	22 February 2021	5PM EST
Notification of Selection: Full Proposals *	15 March 2021	
Awards *	10 June 2021	

Note: * These are approximate dates.

VII. POINTS OF CONTACT

In addition to the points of contact listed in N0014-21-S-B0001 the specific points of contact for this announcement are listed below:

Technical Points of Contact:

David Findlay, PhD
Program Officer
david.findlay@navy.mil

Zachary Sechrist, PhD
Program Officer
zachary.sechrist@navy.mil

Business Point of Contact/Contracting Officer:
Mr. James Farnsworth
Office of Naval Research
James.Farnsworth@navy.mil

VIII. 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:

- Beta.same.gov Webpage –Contract Opportunities – <https://beta.sam.gov/>
- Grants.gov Webpage – <http://www.grants.gov/>
- ONR Special Notice Webpage - <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Special-Notices.aspx>

Questions regarding **Full Proposals** should be submitted no later than two weeks before the dates recommended for receipt of Full Proposals. Questions after this date may not be answered.

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Q-01: What is the format for the proposal?

A-01: See Section II entitled, "Detailed Information about the Funding Opportunity" Paragraph D entitled, "Applications and Submission Information" and Appendix 2 entitled, "Requirements Applicable to Contracts and Other Transaction Agreements" Paragraph D entitled, "Application and Submission Information" of The Office of Naval Research Fiscal Year 21 Long Range Broad Agency Announcement (BAA) for Navy and Marine Corps Science and Technology N00014-21-S-B001" for formation information.

Q-02: Does the laboratory test activity in the Base phase include development and validation of the proposed apertures requiring open air testing?

A-02: Yes, or at least provide sufficient proof that it will meet/exceed the requirements.

Q-03: What are the requirements for the Base phase lab demonstration with regards to initial capability versus actual deliverable hardware?

A-03: Testing in the Base phase should be sufficient to prove to the evaluation team that the technology/proposal will be expected to meet/exceed the requirements upon completion of the Future Naval Capability.

Q-04: Does the LANTERNS datalink developed under this contract need to be used along with the Joint Precision Landing Aircraft Landing System (JPALS) datalink?

A-04: The government envisions LANTERNS to be an added capability, not to replace any part of JPALS.

Q-05: Will the government testing in Task 1 include the Air and Ground apertures for over-the-air testing?

A-05: No, government evaluations in Task 1 will consist of cabled benchtop testing - no free space transmission. However, any design unique apertures will be required for the subsequent tasks.

Q-06: What are the hardware deliverables to the government? How many prototypes will need to be developed per Task?

A-06: All hardware required to operate the prototypes are to be delivered to the government throughout the various tasks. This includes any and all physical apertures or antennas unique to the designed proposal. Task 1 – One full prototype. A cabled benchtop prototype including both air and ground segments; Task 2 – Two full prototypes. The one from Task 1, plus one for the shore based JPALS installation (this includes a segment for the shore-based system and a segment for the surrogate aircraft); Task 3 – Two full prototypes. The same ones as in Task 2, with the shore-based system modified to operate on a Nuclear Aircraft Carrier (CVN).

Q-07: Will the Government perform integration/verification of the JPALS message processors on both the ground and air surrogate platforms within the scope of Task 2 and on both the CVN and air surrogate platform within the scope of Task 3?

A-07: The government will execute the test and evaluation of the integration/verification working alongside with the developer who will be providing engineering support. The government expects the LANTERNS developer to understand how to address/meet/demonstrate all Interface Control Document (ICD) requirements in order to successfully integrate the proposed design.

Q-08: Is it still possible to request the requirements Annex?

A-08: Yes. This amendment extends the deadline for requests for the Annex to 05 February 2021 at 5:00PM Eastern Standard Time.