Special Notice N00014-20-S-SN17
Special Program Announcement for 2020 Office of Naval Research
Research and Development Opportunity:
Next Generation Department of Defense (DoD) Atomic Clock

I. INTRODUCTION

This announcement describes a research and development thrust, entitled "Next Generation Department of Defense (DoD) Atomic Clock" to be launched under the N00014-20-S-B001 - Amendment 0001, Long Range Broad Agency Announcement for Navy and Marine Corps Science and Technology, which can be found at https://www.onr.navy.mil/en/work-with-us/funding-opportunities/announcements. The submission of proposals, their evaluation and the placement of contracts will be carried out as described in that Broad Agency Announcement.

The purpose of this announcement is to focus attention of the scientific community on (1) specifics of the area of interest, (2) the structure of the Special Program, and (3) the planned timetable for the submission of white papers and proposals.

II. DESCRIPTION

Background

Many DOD platforms require precise time. For some warfighting systems precision timing at the nanosecond level, synchronous with Coordinated Universal Time (United State Naval Observatory) (UTC(USNO)), is critical. While time transfer techniques via the Global Positioning System (GPS), two-way satellite time transfer and tactical data links can achieve high quality synchronization, platform-organic holdover can only be provided by atomic clocks.

Today's deployable, ruggedized, militarized atomic clocks are limited to Cs beam tube technology, Rb lamp technology, and the newer coherent population trapping (CPT)-based line of compact Rb and Cs cell clocks. These clock technologies have limitations in the performance and Size, Weight, Power and Cost (SWaP-C) trade-space that limit their applicability for military systems.

Trapped-ion microwave clocks, cold-atom microwave clocks, and cell-based optical clocks are becoming viable options due to improvements in trapping technology, light sources, integrated photonics, microwave electronics, frequency combs, etc. and overall advancement of the clock-making field due in large part to significant and steady investment from the DoD and other US government agencies. The current state of atomic clock technology is such that significant near term investment will result in a novel clock suitable for DoD usage in the near future.

Objective

The Office of Naval Research (ONR) is interested in receiving white papers describing approaches to significantly accelerate the development and deployment of clocks exhibiting a unique combination of performance and size, weight and power. The Next Generation DoD Atomic Clock program shall design, build and demonstrate timekeeping devices capable of performing in a challenging military environment; it is expected that at the end of the 5 year program the technologies will be at a Technology Readiness Level (TRL) of 7 (system prototype demonstrated in an operational environment).

This Special Notice covers export controlled technologies. Specific information on the program structure and clock characteristics of greatest near term interest will be made available as a Government Furnished Information (GFI) package to DoD and DoD contractors only (see Section III). It is anticipated that at the end of the program, a new clock product or products will be validated with performance, form-factor, and cost commensurate with the goals outlined in the GFI package.

III. SUBMISSION PROCESS

Offerors shall submit white papers and only those that satisfy the criteria set forth in N00014-20-S-B001 - Amendment 0001 (see pg. BAA-19), will be selected for a subsequent full proposal, and potential contract or other transaction agreement award. The submission process for N00014-20-S-SN17 is:

 White Papers: The white paper shall be no more than fifteen (15) pages and the due date for white papers is no later than 4:00 PM (EDT) on 30 September 2020. Specific instructions for submission can be found in N00014-20-S-B001 - Amendment 0001. White papers received after that date will be considered as time and availability of funding permit.

Copies of the GFI package describing the program structure and clock performance/SWaP of greatest near term interest to ONR will be made available to DoD and DoD contractors only (in accordance with Standard Distribution D and export controlled restrictions) on request to Stephen Hughes at Stephen.T.Hughes@navy.mil with a copy Roberto.Diener@navy.mil . Please include company name, company cage code for the facility where you would like the documents to be sent, a current DoD contract number along with the government POC for that contract and the contact information for your Joint Certification Program POC. ONR will use this information to verify eligibility to receive Distribution D, export controlled information. Requests for exceptions to the Distribution D DoD contractor requirement may also be submitted to Mr. Hughes.

The white paper should describe a clock development program aligned with the government's goals and should include the following sections:

- **Clock technology**: Describe the basic design, including all important components, with overall SWaP, form factor, and performance targets and driving component flow down requirements. Include an assessment of the current TRL of the technology (it is expected that this will be at least 3 at the beginning of the program).
- **Critical technology elements**: Identify Critical Technology Elements[1] for the proposed architecture, assess their current TRL and describe strategy for quickly increasing their maturity to a TRL 6.
- **Environmental susceptibility**: Describe the driving environmental susceptibility issues in the context of the goals outlined in the GFI package.
- **Aging and lifetime**: Describe the driving limiting factors on aging and lifetime and a strategy for their improvement.
- **Manufacturability**: Describe a path, timeline, and main challenges to Manufacturing Readiness Level 7.

[1] A critical technology element is a new or novel technology that a platform or system depends on to achieve successful development or production or to successfully meet a system operational threshold requirement.

- **Market research:** Provide a rough order of magnitude (ROM) on the expected number of units sold per year and clock cost per unit (after a full production line can be put in place), describing driving assumptions.
- **Schedule:** Provide a preliminary proposed development schedule that includes relevant quantitative milestones at the end of the first two years of the program.
- **Development Cost ROM:** Provide a ROM on program cost to achieve TRL 7 over the program.

 White Paper Evaluation/Notification: The Government will provide responses regarding white papers via email on or about 21 October 2020. Any Offeror whose white paper technology was not identified as satisfying the BAA criteria is ineligible to submit a full proposal under this Special Notice.

IV. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

Full proposals should be submitted under the FY 20 Long Range BAA, N00014-20-S-B001 - Amendment 0001, or current ONR Long Range BAA, by **24 November 2020**. Full Proposals received after that date will be considered as time and availability of funding permit. Full proposals shall be submitted in accordance with the requirements of the current ONR Long Range BAA.

ONR anticipates that contracts or OTAs will be issued for this effort. Full proposals for contracts shall be submitted in accordance with the instructions of the current ONR Long Range BAA. The period of performance for projects should follow the timeline outlined in the GFI package. 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 December 2020. Selected projects will have an estimated award date of 1 March 2021.

V. SIGNIFICANT DATES AND TIMES

Event	Date	Time
White Paper Submission	30 September 2020	1600 Eastern Local Time
Notification of White Paper Valuation*	21 October 2020	
Full Proposal Submission	24 November 2020	1600 Eastern Local Time
Full Proposal Selection *	15 December 2020	
Awards *	1 March 2021	

Note: * These are approximate dates**.**

VI. POINTS OF CONTACT

In addition to the points of contact listed in N00014-20-S-B001 - Amendment 0001, the specific points of contact for this announcement are listed below:

Technical Point of Contact:
Dr. Roberto Diener
Program Officer, ONR Code 312
roberto.diener@navy.mil

Business Point of Contact:
Stephen Hughes
Contracting Officer, ONR Code 251
stephen.t.hughes@navy.mil
703-696-1575

VII. SUBMISSION OF QUESTIONS

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

Answers to questions, if relevant to other offerors, will be addressed in the form of an Amendment and will be posted to the following web pages:

- Beta.Sam.gov - Contract Opportunities
  https://www.beta.sam.gov
- ONR Special Notice Webpage
  https://www.onr.navy.mil/en/Contracts-Grants/Funding-Opportunities/Special-Notices

Questions regarding **White Papers or Full Proposals** should be submitted at least two weeks before the dates recommended for receipt of White Papers and/or Full Proposals. Questions after this date may not be answered.