DEPARTMENT OF THE NAVY (DoN)
24.2 Small Business Innovation Research (SBIR)
Direct to Phase II (DP2) Announcement and Proposal Submission Instructions

IMPORTANT

- **The following instructions apply to Direct to Phase II (DP2) SBIR topic only:**
  - **N242-D05 through N242-D12**

- Submitting small business concerns are encouraged to thoroughly review the DoD Program BAA and register for the DSIP Listserv to remain apprised of important programmatic changes.
  - The DoD Program BAA is located at: https://www.defensesbirsttr.mil/SBIR-STTR/Opportunities/#announcements. Select the tab for the appropriate BAA cycle.
  - Review the Attachments of the DoD Program BAA and ensure the correct versions of the following MANDATORY items are uploaded to the Supporting Documents, Volume 5:
    - Contractor Certification Regarding Provision of Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment (Attachment 1)
    - Disclosures of Foreign Affiliations or Relationships to Foreign Countries (Attachment 2)
  - Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/submissions/login.

- The information provided in the DoN Proposal Submission Instruction document takes precedence over the DoD Instructions posted for this Broad Agency Announcement (BAA).

- A submitting small business concern **MUST** use the DP2 Phase I Feasibility proposal template for Volume 2. This template is specific to DoN DP2 topics and meets DP2 submission requirements. The DP2 Phase I Feasibility proposal template can be found at https://navysbir.com/links_forms.htm.

- Proposing small business concerns that are more than 50% owned by multiple venture capital operating companies (VCOC), hedge funds (HF), private equity firms (PEF) or any combination of these are eligible to submit proposals in response to DoN topics advertised in this BAA. Information on Majority Ownership in Part and certification requirements at time of submission for these proposing small business concerns are detailed in the section titled ADDITIONAL SUBMISSION CONSIDERATIONS.

- DoN provides notice that Basic Ordering Agreements (BOAs) or Other Transaction Agreements (OTAs) may be used for Phase II awards.

- This BAA is issued under regulations set forth in Federal Acquisition Regulation (FAR) 35.016 and awards will be made under "other competitive procedures". The policies and procedures of FAR Subpart 15.3 shall not apply to this BAA, except as specifically referenced in it. All procedures are at the sole discretion of the Government as set forth in this BAA. Submission of a proposal in response to this BAA constitutes the express acknowledgement to that effect by the proposing small business concern.

INTRODUCTION

The DoN SBIR/STTR Programs are mission-oriented programs that integrate the needs and requirements of the DoN's Fleet through research and development (R&D) topics that have dual-use potential, but primarily address the needs of the DoN. More information on the programs can be found on the DoN SBIR/STTR website at www.navysbir.com. Additional information on DoN's mission can be found on the DoN website at www.navy.mil.

The Department of Defense (DoD), including the Department of the Navy (DoN), may issue an SBIR award to a small business concern under Phase II , without regard to whether the small business concern received a Phase I award for such project. Prior to such an award, the head of the agency, or their designee, must issue a written determination that the small business concern has demonstrated the scientific and technical merit and feasibility of the technology solution that appears to have commercial potential (for use by the government or in the public sector). The determination must be submitted to the Small Business Administration (SBA) prior to issuing the Phase II award. As such, DoN issues this portion of the BAA in accordance with the requirements of the Direct to Phase II (DP2) authority. Only those proposing small business concerns that are capable of meeting the DP2 proposal requirements may participate in this DP2 BAA. No Phase I awards will be issued to the designated DP2 topic.

The Director of the DoN SBIR/STTR Programs is Mr. Robert Smith. For questions regarding this BAA, use the information in Table 1 to determine who to contact for what types of questions.

TABLE 1: POINTS OF CONTACT FOR QUESTIONS REGARDING THIS BAA

Type of Question	When	Contact Information
Program and administrative	Always	DoN SBIR/STTR Program Management Office usn.pentagon.cnr-arlington-va.mbx.navy-sbir-sttr@us.navy.mil or appropriate Program Manager listed in Table 2 (below)
Topic-specific technical questions	BAA Pre-release	Technical Point of Contact (TPOC) listed in each topic. Refer to the Proposal Fundamentals section of the DoD SBIR/STTR Program BAA for details.
	BAA Open	DoD SBIR/STTR Topic Q&A platform (https://www.dodsbirsttr.mil/submissions) Refer to the Proposal Fundamentals section of the DoD SBIR/STTR Program BAA for details.
Electronic submission to the DoD SBIR/STTR Innovation Portal (DSIP)	Always	DSIP Support via email at dodsbirsupport@reisystems.com
Navy-specific BAA instructions and forms	Always	DoN SBIR/STTR Program Management Office usn.pentagon.cnr-arlington-va.mbx.navy-sbir-sttr@us.navy.mil

TABLE 2: DoN SYSTEMS COMMAND (SYSCOM) SBIR PROGRAM MANAGERS

Topic Numbers	Point of Contact	SYSCOM	Email
N242-D05 to N242-D10	Ms. Kristi DePriest	Naval Air Systems Command (NAVAIR)	navair-sbir@us.navy.mil
N242-D11	Mr. Jason Schroepfer	Naval Sea Systems Command (NAVSEA)	NSSC_SBIR.fct@navy.mil
N242-D12	Mr. Jon M. Aspinwall III (Acting)	Strategic Systems Programs (SSP)	ssp.sbir@ssp.navy.mil

Each DoN SBIR DP2 topic requires documentation to determine that Phase I feasibility, described in the Phase I section of the topic, has been met.

The DoN SBIR DP2 is a two-step process:

STEP ONE: Prepare and Submit a Phase I Feasibility Proposal (instructions and link to template provided below). The purpose of the Phase I Feasibility Proposal is for the proposing small business concern to provide documentation to substantiate that both Phase I feasibility and the scientific and technical merit described in the topic have been met. The Phase I Feasibility Proposal must: demonstrate that the proposing small business concern performed Phase I-type research and development (R&D) and provide a concise summary of Phase II objectives, work plan, related research, key personnel, transition/commercialization plan, and estimated costs. Feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR/STTR work. The government will evaluate Phase I Feasibility Proposals and select small business concerns to submit a Full DP2 Proposal. Demonstrating proof of feasibility is a requirement for a DP2 award. The small business concern must submit a Phase I Feasibility Proposal to be considered for selection to submit a Full DP2 Proposal.

STEP TWO: If selected, the cognizant SYSCOM Program Office will contact the small business concern directly to provide instructions on how to submit a Full DP2 Proposal.

DoN SBIR reserves the right to make no awards under this DP2 BAA. All awards are subject to availability of funds and successful negotiations. Proposing small business concerns must read the topic requirements carefully. The Government is not responsible for expenditures by the proposing small business concern prior to award of a contract. For 24.2 topics designated as DP2, DoN will accept only Phase I Feasibility Proposals (described below).

DP2 PROPOSAL SUBMISSION REQUIREMENTS

The following section details requirements for submitting a compliant DoN SBIR DP2 Proposal to the DoD SBIR/STTR Programs.

(NOTE: Proposing small business concerns are advised that support contract personnel will be used to carry out administrative functions and may have access to proposals, contract award documents, contract deliverables, and reports. All support contract personnel are bound by appropriate non-disclosure agreements.)

DoD SBIR/STTR Innovation Portal (DSIP). Proposing small business concerns are required to submit proposals via the DoD SBIR/STTR Innovation Portal (DSIP); follow proposal submission instructions in the DoD SBIR/STTR Program BAA on the DSIP at https://www.dodsbirsttr.mil/submissions. Proposals submitted by any other means will be disregarded. Proposing small business concerns submitting through DSIP for the first time will be asked to register. It is recommended that proposing small business concerns register as soon as possible upon identification of a proposal opportunity to avoid delays in the proposal submission process. Proposals that are not successfully certified electronically in DSIP by the Corporate Official prior to BAA Close will NOT be considered submitted and will not be evaluated by DoN. Proposals that are encrypted, password protected, or otherwise locked in any portion of the submission will be REJECTED unless specifically directed within the text of the topic to which you are submitting. Please refer to the DoD SBIR/STTR Program BAA for further information.

Eligibility. Each proposing small business concern must:

- Have demonstrated feasibility of Phase I-type R&D work
- Have submitted a Phase I Feasibility Proposal for evaluation
- Meet Offeror Eligibility and Performance Requirements as defined in the Proposal Fundamentals section of the DoD SBIR/STTR Program BAA
- Comply with primary employment requirements of the principal investigator (PI) during the Phase II award including, employment with the small business concern at the time of award and during the conduct of the proposed project. Primary employment means that more than one-half of the PI's time is spent in the employ of the small business concern
- Register in the System for Award Management (SAM) as defined in the Proposal Fundamentals section of the DoD SBIR/STTR Program BAA. To register, visit https://sam.gov/

Proposal Volumes. The following six volumes are required.

- **Proposal Cover Sheet (Volume 1).** As specified in DoD SBIR/STTR Program BAA.

- **Technical Volume (Volume 2).**
  - Technical Proposal (Volume 2) must meet the following requirements or the proposal will be REJECTED:
    - A submitting small business concern MUST use the DP2 Phase I Feasibility proposal template for Volume 2. The DP2 Phase I Feasibility proposal template can be found at https://navysbir.com/links_forms.htm.
      This template is specific to DoN DP2 topics and meets DP2 submission requirements:
      - Not to exceed 30 pages, regardless of page content; Phase I Proof of Feasibility portion not to exceed 20 pages, Snapshot of Proposed Phase II Effort portion not to exceed 10 pages
      - Single column format, single-spaced typed lines
      - Standard 8 ½" x 11" paper
      - Page margins one inch on all sides. A header and footer may be included in the one-inch margin.
      - No font size smaller than 10-point

  - Additional information:
    - A font size smaller than 10-point is allowable for headers, footers, imbedded tables, figures, images, or graphics that include text. However, proposing small business concerns are cautioned that if the text is too small to be legible it will not be evaluated.

- **Cost Volume (Volume 3).** The text fields related to costs for the proposed effort must be answered in the Cost Volume of the DoD Submission system (at

https://www.dodsbirsttr.mil/submissions/), however, proposing small business concerns DO NOT need to download and complete the separate cost volume template when submitting the DoN SBIR Phase I Feasibility Proposal. Proposing small business concerns are to include a cost estimate in the Order of Magnitude Cost Estimate Table (example below) within the Snapshot of Proposed Phase II Effort portion of the Technical Volume (Volume 2). Please refer to Table 3 below for guidance on cost and period of performance. Costs for the Base and Option are to be separate and identified on the Proposal Cover Sheet and in the Order of Magnitude Cost Estimate Table in the Technical Volume (Volume 2).

Order of Magnitude Cost Estimate Table			
Line Item – Details	**Estimated Base Amount**	**Estimated Option Amount**	**Total Estimated Amount Base + Option**
Direct Labor (fully burdened) – Prime			
Subcontractors/Consultants			
Material			
Travel & ODC			
G&A			
FCCM			
Fee/Profit			
TABA (NTE $25K, included in total amount)			
Total Estimated Costs			

TABLE 3: COST & PERIOD OF PERFORMANCE

Topic Number	**Base**		**Option**		**Total (NTE)**
	Cost (NTE)	**POP (NTE)**	**Cost (NTE)**	**POP (NTE)**	
N242-D05 to N242-D10	$1,000,000	30 mos.	$300,000	12 mos.	$1,300,000
N242-D11	$700,000	12 mos.	$1,300,000*	24 mos.*	$2,000,000*
N242-D12	$900,000	18 mos.	$300,000	6 mos.	$1,200,000

***** Step Two: for the Full Phase II submission, if selected, N242-D11 will require the Phase II Option 1 and Phase II Option 2 to be detailed separately:

- Phase II Option 1: Cost $700,000, Period of Performance 12 months
- Phase II Option 2: Cost $600,000, Period of Performance 12 months

- Additional information:

  For Phase II a minimum of 50% of the work is performed by the proposing small business concern. The percentage of work requirement must be met in the Base costs as well as in the Option costs. The percentage of work is measured by both direct and indirect costs. To calculate the minimum percentage of work for the proposing small business concern the sum of all direct and indirect costs attributable to the proposing small business concern represent the numerator and the total cost of the proposal (i.e., Total Cost before Profit Rate is applied) is the denominator. The subcontractor percentage is calculated by taking

the sum of all costs attributable to the subcontractor as the numerator and the total cost of the proposal (i.e., Total Cost before Profit Rate is applied) as the denominator. **NOTE:** G&A, if proposed, will only be attributed to the proposing small business concern.
  - Provide sufficient detail for subcontractor, material, and travel costs. Subcontractor costs must be detailed to the same level as the prime contractor. Material costs must include a listing of items and cost per item. Travel costs must include the purpose of the trip, number of trips, location, length of trip, and number of personnel.
  - Inclusion of cost estimates for travel to the sponsoring SYSCOM's facility for one day of meetings is recommended for all proposals.
  - The "Additional Cost Information" of Supporting Documents (Volume 5) may be used to provide supporting cost details for Volume 3.

- **Company Commercialization Report (Volume 4)**. DoD collects and uses Volume 4 and DSIP requires Volume 4 for proposal submission. Please refer to the Phase I Proposal section of the DoD SBIR/STTR Program BAA for details to ensure compliance with DSIP Volume 4 requirements.

- **Supporting Documents (Volume 5).** Volume 5 is for the submission of administrative material that DoN may or will require to process a proposal, if selected, for contract award.

  All proposing small business concerns must review and submit the following items, as applicable:
  - **Telecommunications Equipment Certification.** Required for all proposing small business concerns. The DoD must comply with Section 889(a)(1)(B) of the FY2019 National Defense Authorization Act (NDAA) and is working to reduce or eliminate contracts, or extending or renewing a contract with an entity that uses any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As such, all proposing small business concerns must include as a part of their submission a written certification in response to the clauses (DFAR clauses 252.204-7016, 252.204-7018, and subpart 204.21). The written certification can be found in Attachment 1 of the DoD SBIR/STTR Program BAA. This certification must be signed by the authorized company representative and is to be uploaded as a separate PDF file in Volume 5. Failure to submit the required certification as a part of the proposal submission process will be cause for rejection of the proposal submission without evaluation. Please refer to the instructions provided in the Phase I Proposal section of the DoD SBIR/STTR Program BAA.
  - **Disclosures of Foreign Affiliations or Relationships to Foreign Countries.** Each proposing small business concern is required to complete Attachment 2 of this BAA, "Disclosures of Foreign Affiliations or Relationships to Foreign Countries" and upload the form to Volume 5, Supporting Documents. Please refer to the following sections of the DoD SBIR/STTR Program BAA for details:
    - Program Description
    - Proposal Fundamentals
    - Phase I Proposal
    - Attachment 2
  - **Majority Ownership in Part.** Proposing small business concerns which are more than 50% owned by multiple venture capital operating companies (VCOC), hedge funds (HF), private equity firms (PEF), or any combination of these as set forth in 13 C.F.R. § 121.702, are eligible to submit proposals in response to DoN topics advertised within this BAA.

Complete certification as detailed under ADDITIONAL SUBMISSION CONSIDERATIONS.

- Additional information:
  - Proposing small business concerns may include the following administrative materials in Supporting Documents (Volume 5); a template is available at https://navysbir.com/links_forms.htm to provide guidance on optional material the proposing small business concern may want to include in Volume 5:
    - Additional Cost Information to support the Cost Volume (Volume 3)
    - SBIR/STTR Funding Agreement Certification
    - Data Rights Assertion
    - Allocation of Rights between Prime and Subcontractor
    - Disclosure of Information (DFARS 252.204-7000)
    - Prior, Current, or Pending Support of Similar Proposals or Awards
    - Foreign Citizens
  - Details of Request for Discretionary Technical and Business Assistance (TABA), if proposed, is to be included under the Additional Cost Information section if using the DoN Supporting Documents template.
  - Do not include documents or information to substantiate the Technical Volume (Volume 2) (e.g., resumes, test data, technical reports, or publications). Such documents or information will not be considered.
  - A font size smaller than 10-point is allowable for documents in Volume 5; however, proposing small business concerns are cautioned that the text may be unreadable.

- **Fraud, Waste and Abuse Training Certification (Volume 6)**. DoD requires Volume 6 for submission. Please refer to the Phase I Proposal section of the DoD SBIR/STTR Program BAA for details.

DP2 EVALUATION AND SELECTION

The following section details how the DoN SBIR/STTR Programs will evaluate Phase I Feasibility proposals.

Proposals meeting DSIP submission requirements will be forwarded to the DoN SBIR/STTR Programs. Prior to evaluation, all proposals will undergo a compliance review to verify compliance with DoD and DoN SBIR/STTR proposal eligibility requirements. Proposals not meeting submission requirements will be REJECTED and not evaluated.

- **Proposal Cover Sheet (Volume 1).** The Proposal Cover Sheet (Volume 1) will undergo a compliance review to verify the proposing small business concern has met eligibility requirements and followed the instructions for Proposal Cover Sheet as specified in the DoD SBIR/STTR Program BAA.

- **Technical Volume (Volume 2).** The DoN will evaluate and select Phase I Feasibility proposals using the evaluation criteria specified in the Phase I Proposal Evaluation Criteria section of the DoD SBIR/STTR Program BAA, with technical merit being most important, followed by qualifications of key personnel and commercialization potential of equal importance. The information considered for this decision will come from Volume 2. This is not a FAR Part 15 evaluation and proposals will not be compared to one another. Cost is not an evaluation criterion and will not be considered during the evaluation process; the DoN will only do a compliance review

of Volume 3. Due to limited funding, the DoN reserves the right to limit the number of awards under any topic.

The Technical Volume (Volume 2) will undergo a compliance review (prior to evaluation) to verify the proposing small business concern has met the following requirements or the proposal will be REJECTED:

- A submitting small business concern MUST use the DP2 Phase I Feasibility proposal template for Volume 2. The DP2 Phase I Feasibility proposal template can be found at https://navysbir.com/links_forms.htm.
  This template is specific to DoN DP2 topics and meets DP2 submission requirements:
  - Not to exceed 30 pages, regardless of page content; Phase I Proof of Feasibility portion not to exceed 20 pages, Snapshot of Proposed Phase II Effort portion not to exceed 10 pages
  - Single column format, single-spaced typed lines
  - Standard 8 ½" x 11" paper
  - Page margins one inch on all sides. A header and footer may be included in the one-inch margin.
  - No font size smaller than 10-point, except as permitted in the instructions above.

- **Cost Volume (Volume 3).** The Cost Volume (Volume 3) will not be considered in the selection process and will undergo a compliance review to verify the proposing small business concern has met the following requirements or the proposal will be REJECTED:
  - Must not exceed values for the Base and Option (refer to Table 3).
  - Must meet minimum percentage of work; a minimum of 50% of the work is performed by the proposing small business concern. The percentage of work requirement must be met in the Base costs as well as in the Option costs.

- **Company Commercialization Report (Volume 4).** The CCR (Volume 4) will not be evaluated by the Navy nor will it be considered in the Navy's award decision. However, all proposing small business concerns must refer to the DoD SBIR/STTR Program BAA to ensure compliance with DSIP Volume 4 requirements.

- **Supporting Documents (Volume 5).** Supporting Documents (Volume 5) will not be considered in the selection process and will only undergo a compliance review to ensure the proposing small business concern has included items in accordance with the DP2 SUBMISSION INSTRUCTIONS section above.

- **Fraud, Waste, and Abuse Training Certificate (Volume 6).** Not evaluated.

ADDITIONAL SUBMISSION CONSIDERATIONS

This section details additional items for proposing small business concerns to consider during proposal preparation and submission process.

Due Diligence Program to Assess Security Risks. The SBIR and STTR Extension Act of 2022 (Pub. L. 117-183) requires the Department of Defense, in coordination with the Small Business Administration, to establish and implement a due diligence program to assess security risks presented by small business concerns seeking a Federally funded award. Please review the Program Description section of the DoD SBIR/STTR Program BAA for details on how DoD will assess security risks presented by small business concerns. The Due Diligence Program to Assess Security Risks will be implemented for all Phases.

Discretionary Technical and Business Assistance (TABA). The SBIR and STTR Policy Directive section 9(b) allows the DoN to provide TABA (formerly referred to as DTA) to its awardees. The purpose of TABA is to assist awardees in making better technical decisions on SBIR/STTR projects; solving technical problems that arise during SBIR/STTR projects; minimizing technical risks associated with SBIR/STTR projects; and commercializing the SBIR/STTR product or process, including intellectual property protections. Proposing small business concerns may request, in their Cost Volume (Volume 3), to contract these services themselves through one or more TABA providers in an amount not to exceed the values specified below. The Phase II TABA amount is up to $25,000 per award. The TABA amount, of up to $25,000, is to be included as part of the award amount and is limited by the established award values for Phase II by the SYSCOM (i.e. within the $2,000,000 or lower limit specified by the SYSCOM). The amount proposed for TABA cannot include any profit/fee by the proposing small business concern and must be inclusive of all applicable indirect costs. TABA cannot be used in the calculation of general and administrative expenses (G&A) for the SBIR proposing small business concern. A Phase II project may receive up to an additional $25,000 for TABA as part of one additional (sequential) Phase II award under the project for a total TABA award of up to $50,000 per project. A TABA Report, detailing the results and benefits of the service received, will be required annually by October 30.

Request for TABA funding will be reviewed by the DoN SBIR/STTR Program Office.

If the TABA request does not include the following items the TABA request will be denied.

- TABA provider(s) (firm name)
- TABA provider(s) point of contact, email address, and phone number
- An explanation of why the TABA provider(s) is uniquely qualified to provide the service
- Tasks the TABA provider(s) will perform (to include the purpose and objective of the assistance)
- Total TABA provider(s) cost, number of hours, and labor rates (average/blended rate is acceptable)

TABA must NOT:

- Be subject to any indirect costs, profit, or fee by the SBIR proposing small business concern
- Propose a TABA provider that is the SBIR proposing small business concern
- Propose a TABA provider that is an affiliate of the SBIR proposing small business concern
- Propose a TABA provider that is an investor of the SBIR proposing small business concern
- Propose a TABA provider that is a subcontractor or consultant of the requesting small business concern otherwise required as part of the paid portion of the research effort (e.g., research partner, consultant, tester, or administrative service provider)

TABA requests must be included in the proposal as follows:

- Phase II:
    - — DoN Phase II Cost Volume (provided by the DoN SYSCOM) - the value of the TABA request.
    - — Supporting Documents (Volume 5) – a detailed request for TABA (as specified above) specifically identified as “TABA” in the section titled Additional Cost Information when using the DoN Supporting Documents template.

Proposed values for TABA must NOT exceed:

- Phase II: A total of $25,000 per award, not to exceed $50,000 per Phase II project

If a proposing small business concern requests and is awarded TABA in a Phase II contract, the proposing small business concern will be eliminated from participating in the DoN SBIR/STTR Transition Program (STP), the DoN Forum for SBIR/STTR Transition (FST), and any other Phase II assistance the DoN provides directly to awardees.

All Phase II awardees not receiving funds for TABA in their awards must participate in the virtual Navy STP Kickoff during the first or second year of the Phase II contract. While there are no travel costs associated with this virtual event, Phase II awardees should budget time of up to a full day to participate. STP information can be obtained at: https://navystp.com. Phase II awardees will be contacted separately regarding this program.

Disclosure of Information (DFARS 252.204-7000). In order to eliminate the requirements for prior approval of public disclosure of information (in accordance with DFARS 252.204-7000) under this award, the proposing small business concern shall identify and describe all fundamental research to be performed under its proposal, including subcontracted work, with sufficient specificity to demonstrate that the work qualifies as fundamental research. Fundamental research means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons (defined by National Security Decision Directive 189). A small business concern whose proposed work will include fundamental research and requests to eliminate the requirement for prior approval of public disclosure of information must complete the DoN Fundamental Research Disclosure and upload as a separate PDF file to the Supporting Documents (Volume 5) in DSIP as part of their proposal submission. The DoN Fundamental Research Disclosure is available on https://navysbir.com/links_forms.htm and includes instructions on how to complete and upload the completed Disclosure. Simply identifying fundamental research in the Disclosure does **NOT** constitute acceptance of the exclusion. All exclusions will be reviewed and, if approved by the government Contracting Officer, noted in the contract.

Majority Ownership in Part. Proposing small business concerns that are more than 50% owned by multiple venture capital operating companies (VCOC), hedge funds (HF), private equity firms (PEF), or any combination of these as set forth in 13 C.F.R. § 121.702, **are eligible** to submit proposals in response to DoN topics advertised within this BAA.

For proposing small business concerns that are a member of this ownership class the following must be satisfied for proposals to be accepted and evaluated:

a. Prior to submitting a proposal, proposing small business concerns must register with the SBA Company Registry Database.
b. The proposing small business concern within its submission must submit the Majority-Owned VCOC, HF, and PEF Certification. A copy of the SBIR VC Certification can be found on https://navysbir.com/links_forms.htm. Include the SBIR VC Certification in the Supporting Documents (Volume 5).
c. Should a proposing small business concern become a member of this ownership class after submitting its proposal and prior to any receipt of a funding agreement, the proposing small business concern must immediately notify the Contracting Officer, register in the appropriate SBA database, and submit the required certification which can be found on https://navysbir.com/links_forms.htm.

System for Award Management (SAM). It is strongly encouraged that proposing small business concerns register in SAM, https:// sam.gov, by the Close date of this BAA, or verify their registrations are still active and will not expire within 60 days of BAA Close. Additionally, proposing small business concerns should confirm that they are registered to receive contracts (not just grants) and the address in SAM matches the address on the proposal. A small business concern selected for an award MUST have an active SAM registration at the time of award or they will be considered ineligible.

Notice of NIST SP 800-171 Assessment Database Requirement. The purpose of the National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171 is to protect Controlled Unclassified Information (CUI) in Nonfederal Systems and Organizations. As prescribed by DFARS 252.204-7019, in order to be considered for award, a small business concern is required to implement NIST SP 800-171 and shall have a current assessment uploaded to the Supplier Performance Risk System (SPRS) which provides storage and retrieval capabilities for this assessment. The platform Procurement Integrated Enterprise Environment (PIEE) will be used for secure login and verification to access SPRS. For brief instructions on NIST SP 800-171 assessment, SPRS, and PIEE please visit https://www.sprs.csd.disa.mil/nistsp.htm. For in-depth tutorials on these items please visit https://www.sprs.csd.disa.mil/webtrain.htm.

Human Subjects, Animal Testing, and Recombinant DNA. If the use of human, animal, and recombinant DNA is included under a DP2 proposal, please carefully review the requirements at: https://www.nre.navy.mil/work-with-us/how-to-apply/compliance-and-protections/research-protections. This webpage provides guidance and lists approvals that may be required before contract/work can begin.

International Traffic in Arms Regulation (ITAR). For topics indicating ITAR restrictions or the potential for classified work, limitations are generally placed on disclosure of information involving topics of a classified nature or those involving export control restrictions, which may curtail or preclude the involvement of universities and certain non-profit institutions beyond the basic research level. Small businesses must structure their proposals to clearly identify the work that will be performed that is of a basic research nature and how it can be segregated from work that falls under the classification and export control restrictions. As a result, information must also be provided on how efforts can be performed in later phases if the university/research institution is the source of critical knowledge, effort, or infrastructure (facilities and equipment).

SELECTION, AWARD, AND POST-AWARD INFORMATION

Notifications. Email notifications for proposal receipt (approximately one week after the Phase I BAA Close) and selection are sent based on the information received on the proposal Cover Sheet (Volume 1). Consequently, the e-mail address on the proposal Cover Sheet must be correct.

Debriefs. Requests for a debrief must be made within 15 calendar days of select/non-select notification via email as specified in the select/non-select notification. Please note debriefs are typically provided in writing via email to the Corporate Official identified in the proposal of the proposing small business concerns within 60 days of receipt of the request. Requests for oral debriefs may not be accommodated. If contact information for the Corporate Official has changed since proposal submission, a notice of the change on company letterhead signed by the Corporate Official must accompany the debrief request.

Protests. Interested parties have the right to protest in accordance with the procedures in FAR Subpart 33.1.

Pre-award agency protests related to the terms of the BAA must be served to: osd.ncr.ousd-r-e.mbx.SBIR-STTR-Protest@mail.mil. A copy of a pre-award Government Accountability Office (GAO) protest must also be filed with the aforementioned email address within one day of filing with the GAO.

Protests related to a selection or award decision should be filed with the appropriate Contracting Officer for an Agency Level Protest or with the GAO. Contracting Officer contact information for specific DoN Topics may be obtained from the DoN SYSCOM Program Managers listed in Table 2 above. For protests filed with the GAO, a copy of the protest must be submitted to the appropriate DoN SYSCOM Program Manager and the appropriate Contracting Officer within one day of filing with the GAO.

Awards. Due to limited funding, the DoN reserves the right to limit the number of awards under any topic. Any notification received from the DoN that indicates the proposal has been selected does not ultimately guarantee an award will be made. This notification indicates that the proposal has been selected in accordance with the evaluation criteria and has been sent to the Contracting Officer to conduct cost analysis, confirm eligibility of the proposing small business concern, and to take other relevant steps necessary prior to making an award.

Contract Types. In addition to the negotiated contract award types listed in the section of the DoD SBIR/STTR Program BAA titled Proposal Fundamentals, for Phase II awards the DoN may (under appropriate circumstances) propose the use of an Other Transaction Agreement (OTA) as specified in 10 U.S.C. 2371/10 U.S.C. 2371b and related implementing policies and regulations. The DoN may choose to use a Basic Ordering Agreement (BOA) for Phase I and Phase II awards.

Contract Deliverables. Contract deliverables are typically progress reports and final reports. Required contract deliverables must be uploaded to https://www.navysbirprogram.com/navydeliverables/.

Transfer Between SBIR and STTR Programs. Section 4(b)(1)(i) of the SBIR and STTR Policy Directive provides that, at the agency's discretion, projects awarded a Phase I under a BAA for SBIR may transition in Phase II to STTR and vice versa.

PHASE III GUIDELINES

A Phase III SBIR/STTR award is any work that derives from, extends, or completes effort(s) performed under prior SBIR/STTR funding agreements, but is funded by sources other than the SBIR/STTR programs. This covers any contract, grant, or agreement issued as a follow-on Phase III award or any contract, grant, or agreement award issued as a result of a competitive process where the awardee was an SBIR/STTR firm that developed the technology as a result of a Phase I or Phase II award. The DoN will give Phase III status to any award that falls within the above-mentioned description. Consequently, DoN will assign SBIR/STTR Data Rights to any noncommercial technical data and noncommercial computer software delivered in Phase III that were developed under SBIR/STTR Phase I/II effort(s). Government prime contractors and their subcontractors must follow the same guidelines as above and ensure that companies operating on behalf of the DoN protect the rights of the SBIR/STTR firm.

Navy SBIR 24.2 Direct to Phase II Topic Index

N242-D05 TITLE: DIRECT TO PHASE II: F7-Wideband Acoustic Receiver and Source (F7-WARS) Sonobuoy

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Network Systems-of-Systems; Integrated Sensing and Cyber

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop and demonstrate an updated, evolved air-deployable receiver with a compatible source that can characterize the acoustic ocean environment in the F7 Low Frequency range and builds upon previous successful designs. The system will be deployed from Navy Maritime Patrol and Reconnaissance Aircraft, have capability across multiple operational environments, and utilize the necessarily varied hardware configurations, active and passive processing, and frequency characteristics to consistently attain key anti-submarine warfare (ASW) measurements.

DESCRIPTION: The capabilities of current Low Frequency F7 receiver/source sensors do not provide calibrated coherent receiver/source combination tailored for environmental characterization or advanced passive processing. Innovative sensor technologies are sought with enhanced electromechanical property ceramics that fill frequency, bandwidth, and responsiveness gaps for the transmitter and receiver elements that are capable of transmitting, collecting, and processing surveillance information. Enhanced signal processing techniques for both active and passive processing can enable improvements in capabilities within the entire Low Frequency acoustics band. There is a need within the Navy, and other DoD agencies, to characterize the ocean environment for pre-mission planning, environmental analysis, and marine mammal mitigation during training and operational trials, as well as achieve key ASW measurement capabilities at Low Frequency. Variations in acoustic frequencies necessitate changes in hardware configurations, acoustic propagation, and advanced signal processing capabilities. Advanced passive and active processing capabilities will need to be developed to achieve these measurements. Tactical needs and munition transport capabilities make it difficult to meet all intelligence and mission planning requirements with existing hardware. Additionally, scenario characteristics such as transmission loss, bottom loss, reverberation, geo-acoustic characterization, obscuration, clutter, multipath, signal detection, and signal type vary with changes in acoustic frequency and may limit the performance of current intelligence gathering systems without the capability to gather and exfiltrate the information. System solutions should include both single unit concepts, paired source and receivers, as well as analysis into the feasibility of combined units and mission planning considerations.

The unit should be capable of both shallow and deep-water operations deploying the active and passive sensing elements through 500 ft (152.4 m) with both mission operating life and extended duration capability. Enhancements in passive processing should provide for significantly improved minimal detection levels. Coherent signals of interest are in the Low Frequency range, to include but not be limited to continuous waveforms (CW) and frequency modulation (FM) waveforms, with associated active processing improvements. The unit will also take advantage of the communication between the aircraft and sensor unit. This should be compliant with the NATO digital uplink format, STANAG 4718.

This expendable sensor solution should be low power and sized to fit within an A-size sonobuoy. A-size sonobuoy standards are as follows: dimensions of 4.875 in. (12.38 cm) diameter x 36 in. (91.44 cm) length and weight of 40 lb (18.14 kg) or less.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have accomplished the following in a Phase I-type effort and developed a concept for a workable prototype or design to address, at a minimum, the basic requirements of the stated objective above. The below actions would be required to satisfy the requirements of Phase I:
1. Provide evidence of prior successful development, testing, or deployment in a relevant domain. The system should clearly demonstrate readiness for integration with Navy Maritime Patrol and Reconnaissance Aircraft. Furthermore, the proposal must emphasize the system's capability for uninterrupted operation across varied oceanic environments, underpinned by documented results or prototypes, which have effectively captured essential ASW measurements. Prior success in addressing similar challenges will be heavily weighted in evaluation.
2. Provide an intelligible forward plan that minimizes risk and redesign efforts by identifying and incorporating existing ASW technologies. While a combined source and receiver is ideal, solutions separating the source from the F7 receiver will be considered so long as the tradeoffs are clear.
3. Modeling and/or results of risk reduction experiments that validate the existing concept along with the expected application at a new frequency to be provided.

FEASIBILITY DOCUMENTATION: Offerors interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in the Phase I above.

PHASE II: Develop and fabricate an over-the-side prototype unit(s) operating in the F7 Low Frequency range and demonstrate in both acoustic facilities and the ocean environment. Prototype demonstrations will demonstrate successful completion of classified objectives (how the objectives are defined). Throughout this development phase, emphasize a comprehensive evaluation of the prototype’s performance under high-ambient and low-source level conditions, ensuring its adaptability and resilience in diverse acoustic settings. Collaborate with similarly focused domain experts and utilize feedback from preliminary tests to further refine and optimize the system at Low Frequency. Finalize the concept design and make recommendations for Phase III production-oriented designs, detailing potential challenges and solutions for scalable manufacturing. Explore integration pathways with existing Navy Maritime Patrol and Reconnaissance infrastructure to maximize system collaboration. Demonstrate the prototype’s ability to attain desirable ASW measurement capabilities at Low Frequency and provide a roadmap for iterative improvements and integration based on feedback.

PHASE III DUAL USE APPLICATIONS: Transition over-the-side prototype unit(s) into an air deployable sonobuoy system. Sensor must meet A-size packaging requirements specified in the PMA-264 Production Sonobuoy Specification. Testing will be required which verifies the sensor passes all required environmental, structural, and operational tests. These tests include but not limited to Environmental Exposure, Air Certification, Hazards of Electromagnetic Radiation to Ordnance (HERO), and Office of Naval Intelligence (ONI) certification.

Upon successful testing, Low Rate Initial Production (LRIP) will need to be successful for transition to the platform.

This technology/topic can benefit any entity that requires calibrated active target strength measurements within the underwater environment.

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KEYWORDS: Anti-Submarine Warfare; Sonobuoy; Low Frequency; Navy Underwater Active Multiple Ping; NUAMP; Acoustics; Intelligence

N242-D06 TITLE: DIRECT TO PHASE II: Low-Cost Ground Testing for Rotating Detonation Concepts

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Materials; Hypersonics; Space Technology

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Demonstrate a rapid, repeatable, low-cost ground testing solution for rotating detonation engines and combustors to mature candidate propellants and fuels from TRL 2–5.

DESCRIPTION: Hypersonic operating environments are particularly challenging environments to simulate. Often testing approaches are limited to a subset of the representative environment for short durations, and extrapolation is challenging [Ref 1]. Expense and access to current testing facilities limit capacity to capture relevant data and increase schedule timelines for development. This further exacerbates the challenge of predicting design behavior for materials, components, and system performance. The Navy requires a solution to meet the growing cadence of investment in hypersonic weapons technology by near-peers [Refs 2–4]. A low-cost ground testing solution will spark a leap forward by enabling engineers and scientists to quickly verify and validate assumptions.

The Rotating Detonation Engine (RDE), a specific implementation of the detonation process, appears as a promising candidate to replace current constant-pressure combustion systems, due to its high-thermal efficiency, wide-operating Mach range, short combustion time, and small volume. There has been a significant increase in laboratory demonstrators with different fuels, injection techniques, operating conditions, dimensions, and geometric configurations. Rocket RDEs have been reported and demonstrated in Japan and Poland [Ref 5]. Understanding the fundamentals of detonation dynamics and interrelated optimizations of device components are critical to demonstrating a promising system.

The Navy requires a rapid, repeatable setup/instrumentation, including standard interface architecture. The flowfield in the hypersonic regime is dominated by certain physical phenomena. Accurate modeling of hypersonic flow requires challenging test campaigns that may not capture the entire flight regime. The complex aerodynamic and aerothermal requirements make adequate test-section size and duration essential for reliable results and model validation [Ref 6]. There is a desire to allow for efficient combination of test data between other facilities, including large test and evaluation facilities currently being constructed [Ref 7]. This Direct to Phase II effort will consist of a 12 month design and prototype fabrication. The Phase II option, if exercised, will install and commission the ground test capability at Naval Air Warfare Center Weapons Division (NAWCWD).

Related S&T efforts in this area are measurement techniques to characterize detonation structure, injection dynamics, mixing characterization, flowfield velocity, and so forth. Additionally, research into surrogate models making use of sparse experimental data sets to predict performance over the system operational map explore the gap this solution is expected to fill by providing additional data to these sparse models. Some of these efforts include [Refs 8–11].

This rapid low-cost ground test solution will:
1. demonstrate test durations of 0.5–3 s (threshold) after achieving steady-state:
    (a) at this time, it is believed that a realistic time to reach operating conditions will take 5–20 s with a vitiated heater (using a hot-gas divert valve) prior to combustion initiation. An electric heater may be used. The vitiated heater time to reach operating conditions is included as an example of current understanding and,
    (b) a threshold of 30 min between each change in system configuration is expected. It is desired to reach an objective of 15 min from test stop, system change (including air-supply or oxidizer changes, a different injector installation, etc.), and ready to conduct the next test.
        i. If the fuel lot or fuel composition has changed, a larger duration than 30 min is expected.
2. constrain the test section geometrically to fit within a 10 ft (3.05 m) length by 10 ft (3.05 m) width by 10 ft (3.05 m) height volume. Supporting hardware, including torches, electric heaters, air compressors and surge tanks, are not included within the volume constraint,
    (a) an existing facility has been identified for installation and the volume constraint is intended to protect facility, operators, and transients, and
    (b) plume length is not included in the volume constraint, and
3. additional ability to modify test section geometry during testing would be seen positively.

The test solution will be designed with the experimenter in mind. NAWCWD scientists and engineers should be able to instrument the prototype with sufficient measurement capability to inform validation efforts and future effort expenditures on air-breathing rotating detonation engines. Some of the objective measurement capability desires include:
1. providing high-speed pressure (including dynamic) axially and radially over the combustor at a threshold sampling frequency of 1-MHz,
2. providing temperature profiles axially and radially over the combustor
3. load sensor(s) allowing for uninstalled thrust performance measurements, and
4. high-speed video of an optically accessible chamber. The final frame rate will be dependent upon the optical parameters selected to observe the combustion phenomena,
    (a) Velocimetry measurements of the flowfield are desired. Ref 11 presents an ideal setup allowing validation of CFD predictions of the flowfield measurements.
5. high-speed chemiluminescence, particularly of OH* for hydrogen, is widely used because it allows for flowfield investigation, detonation height, wave number, and their associated effects on detonation, including entrainment of hot gasses or saturation,
6. shadowgraph/schlieren capability, and
7. laser absorption spectroscopy and/or FTIR at the injection sites and adjustable to capture a representative area in the combustor.
    (a) Time-resolved measurements of at least H2O, CO2, and CO concentrations.

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Cost-savings (i.e., low cost) is expected from the rapid cadence this system will provide, including its long duration.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have accomplished the following in a Phase I-type effort and developed a concept for a workable prototype or design to address, at a minimum, the basic requirements of the stated objective above. The below actions would be required to satisfy the requirements of Phase I:
Design, development, and demonstration of a Preliminary Design of the ground-testing solution will provide solutions for different injection methods, different states (solid, liquid, or gaseous) propellants and fuels, along with associated calculations for safe operation, thrust measurement, and instrumentation.

The solution must be designed for interoperability and low life-cycle costs. Subcomponent testing is encouraged. Prototype design and manufacturing plans with estimated cost, including options, should be presented.

FEASIBILITY DOCUMENTATION: Offerors interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above.

PHASE II: Development, fabrication, and verification of a prototype is anticipated to be demonstrated during the first 12 month period of the Direct to Phase II period of performance. Instrument integration of government-furnished equipment (GFE) will occur prior to testing. Verification testing and prototype acceptance will occur at NAWCWD. Verification will occur via demonstrating retrofit/modification not to exceed one working day to test a solid and liquid fuel and two different injectors (i.e., four tests, two per fuel, in one working day). This verification is not to include data analysis from the test. The system must be fabricated with diagnostic data capture and performance data in mind. The system will be validated by demonstrating sufficient measurement capability to prove and/or disprove computational models of the performed tests.

PHASE III DUAL USE APPLICATIONS: If the Phase II option was not exercised, install and commission the ground test capability at NAWCWD. Additional instrumentation integration of GFE will be a consideration.

The commercial potential of this device lies in the component fabrication and potential secondary applications. The awardee selected contractor will be able to manufacture rotating detonation combustor hardware, and use lessons learned in combustion diagnostic system integration for future advanced propulsion efforts. This system could be used across a broad range of aerospace applications. The low-cost ground-testing system is a product that will be desirable not only for propulsion, but energy production research and development efforts ongoing in RDEs by industry and government agencies, including NASA and Department of Energy.

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KEYWORDS: rotating detonation; detonation cells; injector design; propulsion; fuel; ground testing

N242-D07 TITLE: DIRECT TO PHASE II: Development of Full Polarimetric Radar for Sea Surface Effects and Phenomenology

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Sensing and Cyber; Microelectronics; Space Technology

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop design concepts for full polarimetric (Horizontal, HH; Vertical, VV; Cross-Poles, HV/VH) Active Electronically Scanned Array (AESA) Software Defined Radio (SDR) Radar to span P-Band thru Ku-Band Spectrum (200 MHz-18 GHz).

DESCRIPTION: A specific Anti-Submarine Warfare (ASW) capability deficiency, plus parts obsolescence is recognized for the existing P-8A X-Band Radar as documented within the POM-25 Naval Aviation Requirements Group (NARG) report that lists the need to replace this system. Other mission and safety impacts have also been cited for this radar by the fleet. An element of the capability deficiency is because the existing radar has a single polarization that is not optimal for a specific type of target detection. The fleet needs full polarimetric radar (HH, VV, HV, VH) that will be optimal for a greater variety of target types and features. The fleet requires the development of an AESA SDR Radar made from state-of-the-art components that will be available for parts replacement long into the 21st Century. Beyond X-Band, the fleet needs an improved understanding of fundamental sea surface effects and phenomenology for all Radar Bands for Ku (~16 GHz), X (~9 GHz), L (~1.1 GHz), and P-Bands (~400 MHz). The plan will begin with the design, development, test, and evaluation of Ku and X-Band Radars as these are smaller, lighter, and lower cost than longer wavelength systems; followed by L-Band, and P-Band systems. This Direct to Phase II SBIR topic will develop a long-range development plan that will serve as a roadmap for naval aircraft radar systems for the next few decades.

Work produced in Phase II may become classified. Note: The prospective contractor(s) must be U.S. owned and operated with no foreign influence as defined by 32 U.S.C. § 2004.20 et seq., National Industrial Security Program Executive Agent and Operating Manual, unless acceptable mitigating procedures can and have been implemented and approved by the Defense Counterintelligence and Security Agency (DCSA) formerly Defense Security Service (DSS). The selected contractor must be able to acquire and maintain a secret level facility and Personnel Security Clearances. This will allow contractor personnel to perform on advanced phases of this project as set forth by DCSA and NAVAIR in order to gain access to classified information pertaining to the national defense of the United States and its allies; this will be an inherent requirement. The selected company will be required to safeguard classified material during the advanced phases of this contract IAW the National Industrial Security Program Operating Manual (NISPOM), which can be found at Title 32, Part 2004.20 of the Code of Federal Regulations.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would be able to demonstrate experience in the development, test, processing, and/or analysis of full polarimetric Radar. Offerors should respond with documentation that verifies they have experience with understanding the

science of full polarimetric effects and phenomenology plus engineering analysis to understand form factor impacts as system designs move through the radar spectrum.

FEASIBILITY DOCUMENTATION: Offerors interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above.

PHASE II: Phase II design elements shall include Size, Weight, and Power, Cost factors (SWaPC) for airborne systems integrated to aircraft radomes, or pods. The large frequency range is likely to require separate amplifiers and antennas for the frequency ranges: Ku (~16 GHz), X (~9 GHz), L (~1.1 GHz), and P (~400 MHz). The X-Band Radar shall have weather, Plot Position Indicators (PPI) search, and Synthetic Aperture Radar (SAR) modes as this system may serve as a replacement for the existing P-8A Radar. Essential design elements shall include agile waveforms, and bi-static and interferometric collection and processing capabilities. A modular, plug-and-play hardware and software approach is favored. AESA technology will remove the need for waveguides and transmitters as 20th Century Radar technology components are getting very difficult to replace due to obsolescence issues. SDR technology will allow for agile waveforms from a range of center frequencies that will reduce ESM threat detection. Open-source hardware and SDR concepts will allow future vendors to modify or augment system capabilities without hardware changes. Provide practical concepts for flying a radar built to the concepts described above with a development and test plan to be utilized for the platforms. AESA SDR Radars may not exist for initial test flight operations. If this is the case, the developer shall perform test flights using full polarimetric radar systems as they exist at the time of initial test flight operations. Test flights shall include sea surface effects characterization, surface target object detection, Automated Target Detection (ATD), Moving Target Focus (MOTAR), and interferometric collection and processing for surface and undersea targets. Work in Phase II may become classified. Please see note in Description paragraph.

PHASE III DUAL USE APPLICATIONS: Deliver prototype radar systems to be integrated to naval surveillance air platforms with test and evaluation flights over relevant maritime environments. Full polarimetric radar has potential as an airborne, land use, and crop analysis sensor tool to support commercial industry to include agriculture, forestry, and urban planning.

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KEYWORDS: Synthetic; Aperture; Radar; Active Electronically Scanned Array; AESA; Software Defined Radio; SDR; surveillance

N242-D08 TITLE: DIRECT TO PHASE II: Fiber-Optic Filter Integration

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Computing and Software; Microelectronics; Sustainment

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Design, fabricate, test, and integrate dichroic filters for use in digital avionics fiber-optic communication-link hardware and software in order to reduce the time and complexity for a properly trained maintainer to detect and isolate a failure and affect repair.

DESCRIPTION: The use of optical fiber on air, surface ship, and undersea platforms is pervasive, and is an enabling technology. Current military electronics, electro-optic, communications, radar, and electronic warfare systems require ever-increasing bandwidths, while simultaneously demanding reductions in space, weight, and power (SWAP). The effectiveness of these systems hinges on optical communication components that realize sufficient link budget, dynamic range, and compatibility with military surface ship, undersea platform, and aircraft maintenance environments. Future digital and analog/radio frequency (RF) signal transmission rates and frequencies have increased to the point where fiber optics is the only medium with the capacity and low loss for maintaining communication signal integrity. Key fiber-optic systems engineering design considerations include architecture (i.e., openness, modularity, scalability, and upgradeability), reliability, maintainability, and supportability. Maintainability and supportability are well-known operational availability drivers for fiber-optics technology deployment on military platforms.

Fiber-optics supportability cuts across reliability, maintainability, and the supply chain to facilitate detection, isolation, and timely repair/replacement of system anomalies. Typical supportability features include prognostics, diagnostics, skill levels, support equipment footprint, training, maintenance data collection, compatibility, packaging and handling, and other factors that contribute to an optimum environment for sustaining a fiber-optic system. The ability to sustain the operation of a fiber-optic system on aircraft is established by the inherent supportability of the system and the processes used to sustain the functions and capabilities of the system in the context of the end user. Supportability infrastructure is difficult to add on after the design is established, and therefore should be included in the systems engineering design process. The focus of sustainment planning is to influence the inherent supportability of the system, and to plan the sustainment capabilities and processes used to sustain system operations.

Fiber-optics maintainability considerations encompass modularity, interoperability, physical accessibility, training, testing, and human systems integration. Maintainability generally requires balancing the maintenance requirement over the life cycle with minimal user workload. The emphasis on maintainability is to reduce the maintenance burden and supply chain by reducing time, personnel, tools, test equipment, training, facilities, and cost to maintain the system. Maintainability engineering includes the activities, methods, and practice to design minimal system maintenance requirements and associated costs for preventative and corrective maintenance, as well as servicing and calibration activities. Maintainability should be a designed-in capability and not an add-on option, because good maintenance

procedures cannot overcome poor system and equipment maintainability design. The primary objective is to reduce the time and complexity for a properly trained maintainer to detect and isolate a failure and affect repair.

Integrating the disparate interfaces associated with digital and analog/RF fiber-optic systems require innovation. Although the Navy has complete knowledge of the required connections and interfaces for digital and analog/RF fiber optics, there is no approach to selecting and qualifying dichroic filter-based components, and implementing new support equipment (maintenance sets), training, and the required supportability and maintainability modernization concepts to enable single ended optical loss measurement based on dichroic filter technology. Dichroic filters transmit light in one wavelength band in one direction while reflecting light at other wavelengths. Inserting dichroic filters in aircraft fiber-optic links enables the fleet maintainer to measure optical loss from one end of the fiber-optic cable. The application of dichroic filter technology will modernize single-ended fiber-optic link loss measurement and fiber-optic built-in test (BIT) concept of operations on aircraft platforms. This SBIR topic seeks a component research effort that develops dichroic filters compatible with avionics fiber optics. This research effort should also develop models that include all of the platform considerations for multimode fiber-optic links operating at 1, 10, 25 and 50 Gbps, link components, support equipment, associated fleet maintainer training, and digital fiber-optic system design engineering principles.

Research is needed to design and assemble dichroic fiber prototypes for use for the following: (a) inside avionics weapon replaceable assemblies, (b) in fiber-optic test equipment, (c) in fiber-optic adapters, and (d) other optical interface circuitry. Research is also needed to design and demonstrate light source and optical power meter prototypes that enable single ended optical loss measurement in single and multi-wavelength multimode fiber-optic links on airborne platforms.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have accomplished the following in a Phase I-type effort and developed a concept for a workable prototype or design to address, at a minimum, the basic requirements of the stated objective above. The below actions would be required to satisfy the requirements of Phase I:
Demonstrate feasibility of a dichroic filter transmission in digital vertical cavity surface emitting laser-based fiber-optic links operating in-band at no less than 25 Gbps. Demonstrate single-ended fiber-optic link loss measurement at out-of-band optical wavelengths that do not interfere with the in-band fiber-optic communications link wavelengths. Design a portable maintenance support equipment prototype for performing single-ended optical loss measurement on airborne platforms.

FEASIBILITY DOCUMENTATION: Offerors interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above.

PHASE II: Design, build, and test dichroic filters for in-band signal transmission and out-of-band, single-ended loss measurement. Integrate dichroic filters in weapon replaceable assembly fiber-optics systems. Integrate dichroic filters in fiber-optic support equipment to facilitate single-ended, optical-loss measurement of legacy fiber-optic links where integration within the weapons replaceable assembly is not practical. Perform environmental testing of the dichroic filter devices to verify the qualifiability of dichroic filters for avionics and avionics support equipment.

PHASE III DUAL USE APPLICATIONS: Finalize the prototype portable support equipment design for single-ended fiber-optic loss measurement on airborne platforms. Implement integration hardware and software in avionics representative use cases. Verify and validate the portable support equipment performance. Perform environmental testing to increase technology readiness. Develop manufacturing tooling and supply chain infrastructure to increase manufacturing readiness of portable support equipment. Transition to applicable naval avionics use cases and platforms.

Dual-use applications include telecommunication systems, data centers, and campus networks.

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KEYWORDS: Dichroic filter; fiber optics; light source; power meter; avionics integration; support equipment

N242-D09 TITLE: DIRECT TO PHASE II: F2-Wideband Acoustic Receiver and Source (F2-WARS) Sonobuoy

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Network Systems-of-Systems; Integrated Sensing and Cyber

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop and demonstrate an updated, evolved air-deployable source and receiver combination (F2 WARS) that can characterize the acoustic ocean environment in the F2 Mid-Frequency range and builds upon previous successful designs. The system will be deployed from Navy Maritime Patrol and Reconnaissance Aircraft, have capability across multiple operational environments, and will utilize the necessarily varied hardware configurations, active and passive processing, and frequency characteristics to consistently attain key Anti-Submarine Warfare (ASW) measurements.

DESCRIPTION: The capabilities of current Mid-Frequency transmitter/receiver sensors do not provide calibrated coherent source/receiver combinations tailored for environmental characterization or advanced passive processing. The Navy requires innovative sensor technologies with enhanced electromechanical property ceramics that fill frequency, bandwidth, and responsiveness gaps for the transmitter and receiver elements that are capable of transmitting, collecting, and processing surveillance information. Enhanced signal processing techniques for both active and passive processing can enable improvements in capabilities at the F2 Mid Frequency. The Navy, and other DoD Agencies, require the ability to characterize the ocean environment for pre-mission planning, environmental analysis, and marine mammal mitigation during training and operational trials, as well as achieve key ASW measurement capabilities at Mid Frequency. Variations in acoustic frequencies necessitate changes in hardware configurations, acoustic propagation, and advanced signal processing capabilities. Advanced passive and active processing capabilities need to be developed to achieve these measurements.

Tactical needs and munition transport capabilities make it difficult to meet all intelligence and mission planning requirements with existing hardware. Additionally, scenario characteristics such as transmission loss, bottom loss, reverberation, geo-acoustic characterization, obscuration, clutter, multipath, signal detection, and signal type vary with changes in acoustic frequency, and may limit the performance of current intelligence gathering systems without the capability to gather and exfiltrate the information. System solutions should include both single-unit concepts, as well as analysis into the feasibility of combined units with varying frequency bands.

The unit should be capable of both shallow and deep-water operations deploying the active and passive sensing elements through 500 ft (152.4 m) with both mission operating life and extended duration capability. Enhancements in passive processing should provide for improved minimal detection levels. Coherent signals of interest are in the Mid-Frequency range to include, but not limited to, continuous waveforms (CW) and frequency modulation (FM) waveforms, with associated active processing improvements. The unit will also take advantage of the communication between the aircraft and sensor unit. This should be compliant with the NATO digital uplink format, STANAG 4718.

This expendable sensor solution should be low power and sized to fit within an A-size sonobuoy. A-size sonobuoy standards are as follows: dimensions of 4.875 in. (12.38 cm) diameter x 36 in. (91.44 cm) length and weight of 40 lb. (18.14 kg) or less.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have accomplished the following in a Phase I-type effort and developed a concept for a workable prototype or design to address, at a minimum, the basic requirements of the stated objective above. The below actions would be required to satisfy the requirements of Phase I:
1. Provide evidence of prior successful development, testing, or deployment in a relevant domain. The system should clearly demonstrate readiness for integration with Navy Maritime Patrol and Reconnaissance Aircraft. Furthermore, the proposal must emphasize the system's capability for uninterrupted operation across varied oceanic environments, underpinned by documented results or prototypes which have effectively captured essential ASW measurements. Prior success in addressing similar challenges will be heavily weighted in evaluation.
2. Provide evidence of advanced signal processing techniques applied on similar sensors and frequencies. Develop and document the expected processing improvements available in ideal hardware configurations based on existing real-sensor data.
3. Modeling and/or results of risk reduction experiments that validate the existing concept along with the expected application at a new frequency to be provided.

FEASIBILITY DOCUMENTATION: Offerors interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above.

PHASE II: Develop and fabricate an over-the-side prototype unit(s) required to span the F2 Mid-Frequency range and demonstrate in both acoustic facilities and the ocean environment. Prototype demonstrations will demonstrate successful completion of classified objectives . Throughout this development phase, emphasize a comprehensive evaluation of the prototype's performance under high-ambient and low-source level conditions, ensuring its adaptability and resilience in diverse acoustic settings. Collaborate with similarly focused domain experts and utilize feedback from preliminary tests to further refine and optimize the system at Mid Frequency. Finalize the concept design and make recommendations for Phase III production-oriented designs, detailing potential challenges and solutions for scalable manufacturing. Explore integration pathways with existing Navy Maritime Patrol and Reconnaissance infrastructure to maximize system collaboration. Demonstrate the prototype's ability to attain desirable ASW measurement capabilities at Mid Frequency and provide a roadmap for iterative improvements and integration based on and feedback.

PHASE III DUAL USE APPLICATIONS: Transition over-the-side prototype unit(s) into an air deployable sonobuoy system. Sensor must meet A-size packaging requirements specified in the PMA-264 Production Sonobuoy Specification. Testing will be required which verifies the sensor passes all required environmental, structural, and operational tests. These tests include, but are not limited to, Environmental Exposure, Air Certification, Hazards of Electromagnetic Radiation to Ordnance (HERO), and Office of Naval Intelligence (ONI) certification.

Upon successful testing, Low Rate Initial Production (LRIP) will need to be successful for transition to the platform.

This technology/topic can benefit any entity that requires calibrated active target strength measurements within the underwater environment.

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3. “Standardization agreement: STANAG 4718: Sonobuoy digital telemetry (Ed. 1).” North Atlantic Treaty Organization, The NATO Standardization Office (NSO), 4 November 2020. https://nso.nato.int/nso/nsdd/main/standards?search=4718

KEYWORDS: Anti-Submarine Warfare; Sonobuoy; Mid Frequency; NUAMP; Acoustics; Intelligence

N242-D10 TITLE: DIRECT TO PHASE II: Radio Frequency Real-Time Modeling and Simulation

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Advanced Computing and Software

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Design, develop, and incorporate realistic environmental responses to radar signals from VHF to X-Band, including free-space propagation, terrain and ocean scattering, multipath signals, and ship targets (physical optics with multibounce dihedral and trihedral reflections) into at least one (threshold) of these threat surrogate testbeds. This will include high-fidelity propagation effects in testing advanced Electronic Warfare (EW) blue weapon systems via the Electronic Support (ES) receiver portion or tactical Electronic Attack (EA) receiver.

DESCRIPTION: The ASIE EW Labs of Naval Air Warfare Center Weapons Division (NAWCWD) at Point Mugu, CA have several Radio Frequency (RF) Hardware-in-the-Loop (HWIL) surrogate threat (red) capabilities for test and evaluation (T & E) of (primarily) airborne EW systems. The surrogate threat (red) capability at NAWCWD is a virtual test suite capable of emulating engagements at RF with incorporating blue and red force radar systems. The current hardware architecture and RF environment generator currently do not produce realistic threat representations and will not meet future requirements of testing advanced radar/EW capabilities. Updated capabilities need to include a wide range of advanced radar and EW threats, densely congested environments, realistic terrain and ocean scattering, multipath, and targets. HWIL testing will greatly reduce the need for open-air or sea range testing. This is especially important in the case of advanced Synthetic Aperture Radar (SAR) imaging platforms, EW platforms performing spatially coherent processing [Ref 1], and cognitive EW systems [Ref 2]. The goal is to incorporate realistic environmental responses to radar signals from Very High Frequency (VHF) to X-Band, including free-space propagation, terrain and ocean scattering, multipath signals, and ship targets (i.e., physical optics with multibounce dihedral and trihedral reflections) into at least one (Threshold) of these threat surrogate testbeds. An additional goal is to include these high-fidelity propagation effects in testing advanced EW blue weapon systems via the Electronic Support (ES) receiver portion or tactical Electronic Attack (EA) receiver. The modeling and simulation (M & S) system should be capable of predicting the wideband (1 GHz) electromagnetic channel for radar pulses from multiple (5) platforms in real time for the HWIL system over a 100 GbE connection.

Computational adjuncts should be proposed. Real-time responses for radar and EW systems will enable dynamic, competitive, and/or adversarial HWIL simulations.

Work produced in Phase II may become classified. Note: The prospective contractor(s) must be U.S. owned and operated with no foreign influence as defined by 32 U.S.C. § 2004.20 et seq., National Industrial Security Program Executive Agent and Operating Manual, unless acceptable mitigating procedures can and have been implemented and approved by the Defense Counterintelligence and Security Agency (DCSA) formerly Defense Security Service (DSS). The selected contractor must be able to acquire and maintain a secret level facility and Personnel Security Clearances. This will allow contractor personnel to perform on advanced phases of this project as set forth by DCSA and NAVAIR in

order to gain access to classified information pertaining to the national defense of the United States and its allies; this will be an inherent requirement. The selected company will be required to safeguard classified material during the advanced phases of this contract IAW the National Industrial Security Program Operating Manual (NISPOM), which can be found at Title 32, Part 2004.20 of the Code of Federal Regulations.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have accomplished the following in a Phase I-type effort and developed a concept for a workable prototype or design to address, at a minimum, the basic requirements of the stated objective above. The below actions would be required to satisfy the requirements of Phase I:
Both the scientific and technical merit, described in the topic have been met. Developed a physics-based, M & S software that can predict the wideband (1 GHz) (site-specific) RF channels for radars and EW systems in ocean or littoral environments. The M & S software exhibits realistic radar scattering versus aspect angle including ocean-ship dihedrals and trihedrals; and that the M & S environment accommodates an unlimited number of targets with unlimited range delay [Refs 3-4] for EW effects, which will allow for demonstration of real-time HWIL tests in the laboratory with dynamic pulse-to-pulse channel adjustments (not using a pre-calculated script), including realistic targets, ocean and terrain clutter, and EW signals.

FEASIBILITY DOCUMENTATION: Proposers interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above.

PHASE II: Modify the M & S software so that it can operate in real time. The system should be capable of predicting the wideband (1 GHz) electromagnetic channel for radar pulses from multiple (5) platforms in real time for the HWIL system over a 100 GbE connection.

Computational adjuncts should be proposed. Real-time responses for radar and EW systems will enable dynamic, competitive, and/or adversarial HWIL simulations.

Work in Phase II may become classified. Please see note in the Description paragraph.

PHASE III DUAL USE APPLICATIONS: The final deployment of the HWIL system scales with the T & E requirement dictated by the program of record under which the HWIL system is adapted. This indicates that the real-time signal processing system does not degrade under scaling to meet the appropriate many-v-many requirements of future EW systems.

Many commercial applications employing wireless devices in congested environments benefit directly from the ability to model the setting in which the technology deploys. This includes large-scale cellular infrastructure to support pico-cell networking for access points in 5G and Internet of Things (IoT) applications.

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1. Guerci, J. R. “Cognitive radar: A knowledge-aided fully adaptive approach.” Artech House, 2020. https://www.worldcat.org/title/1199585736
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5. “National Industrial Security Program Executive Agent and Operating Manual (NISP), 32 U.S.C. § 2004.20 et seq.” Code of Federal Regulations, 1993. https://www.ecfr.gov/current/title-32/subtitle-B/chapter-XX/part-2004

KEYWORDS: Real-Time Signal Processing; Hardware-in-the-Loop; HIWL; Electronic Warfare; EW; Radio Frequency; RF; Clutter; Space-Time Processing

N242-D11 TITLE: DIRECT TO PHASE II: Modernized Sonar Transmit Electronics

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Integrated Sensing and Cyber; Microelectronics

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Develop an architecture for modernized digital transmit electronics to power future hull-mounted acoustic arrays within the AN/SQQ-89A(V)15 sonar system.

DESCRIPTION: Sonar systems that include active sonar transmissions rely on transmit electronics to provide power to the transducers that produce sound in the ocean. Put simply, a transducer performs the transformation between an electrical signal in volts (V) and a physical quantity such as displacement of the head at the end of a stack of piezo-electric ceramics. Transmitters transform volts into amps (A) and vice versa.

The AN/SQS-53 hull mounted sonar array is a large bulb-like structure built into the bows of ships below the water line. Ships fitted with AN/SQS-53 include U.S. Navy Arleigh Burke-class destroyers, Ticonderoga-class cruisers, and select Japanese Maritime Self-Defense Force destroyers. The AN/SQS-53 hull-mounted sonar has a nominal source level of 235 decibels (dB) re 1 µPa and transmits at a center frequency of approximately 3 kHz. The AN/SQS-53 includes 576 TR-343 transducer tube assemblies arranged in staves of 8 transducers every 5 degrees azimuthally. Each TR-343 transducer assembly is capable of a) active acoustic transmit or creating noise (or sound pressure level) in response to voltage from the transmit electronics and b) passive acoustic detection or detecting incoming pressure changes and transforming that pressure into voltage to be sent to the transmit electronics.

The current transmit electronics for the AN/SQS-53C which perform the transformation between voltage and amps for both active acoustic transmit and passive acoustic detection consists of three racks of analog electronic components to support the 576 transducers in the AN/SQS-53C. These analog electronic components have reached end of life and must be modernized to support ongoing maintenance and future acquisition of new systems.

The Navy desires prototype transmit electronics that can transform the digital waveforms into voltage signals at individual TR-343 transducers to accommodate the requisite displacement of the ceramic assembly associated with active and passive acoustic functionality at the nominal source level and center frequency. There is nothing available commercially that can accomplish the required transformation. The prototype transmit electronics must be scalable to support the entire set of 576 transducers while fitting within the space, weight, and power (SWaP) envelope associated with the existing analog power transmit capability. The SWaP and notional full rate production cost targets are:
• Space: 3 transmit cabinets, each with height of 76”, width of 21” and depth of 22”
• Weight: 2000 lbs. for all three cabinets, not to include cable runs extending beyond the transmit cabinets
• Power: TBD
• Full Rate Product Cost (FY24 dollars): Not To Exceed $2.5M per transmit electronics assembly
Innovation is anticipated to handle the current AN/SQS-53C source levels using digital transmit electronics as well as make the design extensible to future hull arrays with transducers that may utilize

either textured ceramics or single crystal ceramics. Innovation is also anticipated to meet the Grade A shock requirements, which equates to the system remaining functional for any shock conditions where crew would remain alive to continue use of the AN/SQS-53C hull array.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have accomplished the following in a Phase I-type effort and developed a concept for a workable prototype or design to address, at a minimum, the basic requirements of the stated objective above. The below actions would be required in order to satisfy the requirements of Phase I:
• A concept for modern digital transmit electronics that is clearly extensible to a TR-343 transducer.
• A notional architecture to support the conclusion that the proposed digital transmit electronics could fit within the SWaP of the current analog transmit electronics associated with the AN/SQS-53C.
• Documentation describing completion of an experimental proof of concept (a manufacturing readiness level (MRL) of 3).
• Explanation of how the company could ramp up production to support acquisition of full transmit electronic units within a year of completion of the Phase II effort (4 years after award of the Phase II base).

FEASIBILITY DOCUMENTATION: Offerors interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the offeror and/or the principal investigator (PI). Read and follow all of the DON SBIR 24.2 Direct to Phase II Broad Agency Announcement (BAA) Instructions. Phase I proposals will NOT be accepted for this topic.

Work produced in Phase II may become classified. Note: The prospective contractor(s) must be U.S. owned and operated with no foreign influence as defined by 32 U.S.C. § 2004.20 et seq., National Industrial Security Program Executive Agent and Operating Manual, unless acceptable mitigating procedures can and have been implemented and approved by the Defense Counterintelligence and Security Agency (DCSA) formerly Defense Security Service (DSS). The selected contractor must be able to acquire and maintain a secret level facility and Personnel Security Clearances. This will allow contractor personnel to perform on advanced phases of this project as set forth by DCSA and NAVSEA in order to gain access to classified information pertaining to the national defense of the United States and its allies; this will be an inherent requirement. The selected company will be required to safeguard classified material during the advanced phases of this contract IAW the National Industrial Security Program Operating Manual (NISPOM), which can be found at Title 32, Part 2004.20 of the Code of Federal Regulations. Reference: National Industrial Security Program Executive Agent and Operating Manual (NISP), 32 U.S.C. § 2004.20 et seq. (1993). https://www.ecfr.gov/current/title-32/subtitle-B/chapter-XX/part-2004

PHASE II: Develop and deliver prototype transmit electronics that can support a representative segment of an AN/SQS-53C hull array, nominally 7 staves of 6-8 transducers. The government will review the design before the awardee acquires design-specific components. The government will also work with the awardee to conduct tests of appropriate collections of prototype transmit electronics (e.g., examples to demonstrate reliable performance with a single transducer, assemblies that can manage a representative

stave of 6-8 transducers, and finally that the full prototype that can handle at least 5-7 staves of transducers (20-30 degrees of azimuthal coverage)).

The final Phase II report shall contain a design for how the prototype can be scaled to accommodate a full AN/SQS-53C transducer set and the associated SWaP plus the full rate production cost estimated for the full transducer set.

Work under Phase II is anticipated to include at least discussion of classified information. A DD254 will be issued approximately 2 months after Phase II award to enable classified discussion between the government and the awardee.

PHASE III DUAL USE APPLICATIONS: Assist the Navy in transitioning the transmit electronics by a) a full engineering demonstration model (EDM) of the modernized transmit electronics for a full AN/SQS-53C array and b) low rate initial production of the company's modernized transmit electronics. Provide services associated with test and evaluation of the EDM and LRIP transmit electronics to include environmental qualification testing (EQT) appropriate for Grade A Shock.

The Navy anticipates that the technology developed under this Phase II effort can also be used to provide acoustic transmit electronics for active sonar systems used for exploration by commercial sectors such as the oil and gas industry.

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KEYWORDS: Transmit Electronics; Active Acoustic Transmit; Passive Acoustic Detection; Hull-Mounted Sonar Array; transform volts into amps; Grade A Shock

N242-D12 TITLE: DIRECT TO PHASE II: Flexible Integrated Optical Circuit (IOC) Packaging Options for Improved Size Weight and Power (SWaP) in Interferometric Fiber-Optic Gyroscopes (IFOG)

OUSD (R&E) CRITICAL TECHNOLOGY AREA(S): Microelectronics; Space Technology

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), 22 CFR Parts 120-130, which controls the export and import of defense-related material and services, including export of sensitive technical data, or the Export Administration Regulation (EAR), 15 CFR Parts 730-774, which controls dual use items. Offerors must disclose any proposed use of foreign nationals (FNs), their country(ies) of origin, the type of visa or work permit possessed, and the statement of work (SOW) tasks intended for accomplishment by the FN(s) in accordance with the Announcement. Offerors are advised foreign nationals proposed to perform on this topic may be restricted due to the technical data under US Export Control Laws.

OBJECTIVE: Address multiple aspects in the design and packaging of current state-of-the-art Y-branch phase modulator integrated optical circuits (IOCs), making them more flexible for integration into reduced form factor sensors.

DESCRIPTION: Sensor technology will always have high performance requirements as a standard, metrics like long-term bias stability, angle random walk, scale factor error and linearity, temperature sensitivity, etc. must remain consistent with or outperform prior generations of sensors. At the same time, reducing sensor Size, Weight, and Power (SWaP) requirements continues to be important to enable technology development for multiple applications. As a critical component of Interferometric Fiber-Optic Gyroscopes (IFOG) technology, the IOC phase modulator package presents a limitation for size reduction of the next higher assembly [Ref 1]. The IOC is typically a Y-branch crystal waveguide (in Lithium Niobate or other materials) with two pairs of electrodes creating dual modulators, which is then attached to optical fiber pigtails at the input and both output ports [Ref 2]. There are multiple possible ways to reduce the overall package volume, but this SBIR topic does not seek to prescribe a single solution. Instead, the goal will be to reduce SWaP (or impact of SWaP on the next higher assembly) of a state-of-the-art IOC with equivalent performance to current devices in the most efficient way possible using one or more techniques.

PHASE I: For a Direct to Phase II topic, the Government expects that the small business would have already demonstrated IOC design capability to address one or more of the packaging improvement options (Phase I-type work).

Possible techniques to reduce SWaP or the impact of SWaP include:
1. Chip design or material choices, including novel waveguide or electrode design, novel composite or combined materials, or Thin-Film Lithium Niobate (TFLN) devices
2. Reducing the space required for either high-precision fiber attachment to the waveguide or protection when exiting the package
3. Reducing connector size, either directly or by closer integration inside the package
4. Providing a means to re-direct fiber input and output ports in a different manner than possible with current straight waveguides
5. Equivalent phase modulator technology integrated into a photonic integrated circuit (PIC) based device (Note: this must still be integrated into a prototype as described in Phase II)
The above actions would be required in order to satisfy the requirements of Phase I.

FEASIBILITY DOCUMENTATION: Offerors interested in participating in Direct to Phase II must include in their response to this topic Phase I feasibility documentation that substantiates the scientific

and technical merit and Phase I feasibility described in Phase I above has been met (i.e., the small business must have performed Phase I-type research and development related to the topic NOT solely based on work performed under prior or ongoing federally funded SBIR/STTR work) and describe the potential commercialization applications. The documentation provided must validate that the proposer has completed development of technology as stated in Phase I above. Documentation should include all relevant information including, but not limited to technical reports, test data, prototype designs/models, and performance goals/results. Work submitted within the feasibility documentation must have been substantially performed by the offeror and/or the principal investigator (PI). Read and follow all of the DON SBIR 24.2 Direct to Phase II Broad Agency Announcement (BAA) Instructions. Phase I proposals will NOT be accepted for this topic.

PHASE II: Design, fabricate, and characterize six (6) prototype IOCs. These must be fully packaged devices with pigtailed fiber, connectors, and screwed on or sealed lids, which are suitable for individual testing, next higher assembly integration, or sensor prototype testing. Characterization data provided must cover optical measurements for insertion loss, split ratio, chip polarization extinction ratio (PER), fiber lead PER, optical return loss or coherent backscatter, and wavelength dependent loss. It must also cover electrical measurements for frequency response measurement and half-wave voltage (Vpi), as well as residual intensity modulation. An accelerated aging study, equivalent to 5-years real-time, involving these prototype IOCs being heated under vacuum must be performed. A predictive model of long-term (~30 years) environmental stability must be provided as a result of this accelerated aging study. The prototypes should be delivered at the end of Phase II.

PHASE III DUAL USE APPLICATIONS: Based on the prototypes developed in Phase II, continuing development must lead to productization of low SWaP phase modulators.

In addition to military/strategic applications, these improvements will be applicable to multiple commercial technologies. These areas include Light Detection and Ranging (LIDAR), satellite optical communications, and telecommunications.

REFERENCES:

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2. Wooten, Ed L. et al. "A review of lithium niobate modulators for fiber-optic communications systems." IEEE Journal of selected topics in Quantum Electronics 6, January 2000, pp. 69-82. https://ieeexplore.ieee.org/document/826874

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