INTRODUCTION

The US Army Combat Capabilities Development Command (CCDC) is responsible for execution of the Army SBIR Program. Information on the Army SBIR Program can be found at the following Website: https://www.armysbir.army.mil/.

Broad Agency Announcement (BAA), topic, and general questions regarding the SBIR Program should be addressed according to the DOD Program BAA. For technical questions about the topic during the pre-release period, contact the Topic Authors listed for each topic in the BAA. To obtain answers to technical questions during the formal BAA period, visit https://www.dodsbirsttr.mil/submissions/. Specific questions pertaining to the Army SBIR Program should be submitted to:

Monroe Harden
Acting Program Manager, Army SBIR
usarmy.apg.ccdc.mbx.sbir-program-managers-helpdesk@mail.mil
US Army Combat Capabilities Development Command
6662 Gunner Circle
Aberdeen Proving Ground, MD 21005-1322
TEL: 866-570-7247

The Army participates in three DoD SBIR BAAs each year. Proposals not conforming to the terms of this BAA will not be considered. Only Government personnel will evaluate proposals.

DIRECT TO PHASE II

15 U.S.C. §638 (cc), as amended by NDAA FY2012, Sec. 5106, and further amended by NDAA FY2019, Sec. 854, PILOT TO ALLOW PHASE FLEXIBILITY, allows the Department of Defense to make an award to a small business concern under Phase II of the SBIR program with respect to a project, without regard to whether the small business concern was provided an award under Phase I of an SBIR program with respect to such project. Army is conducting a "Direct to Phase II" implementation of this authority for this 20.2 SBIR Announcement and does not guarantee Direct to Phase II opportunities will be offered in future Announcements. Each eligible topic requires documentation to determine that Phase I feasibility described in the Phase I section of the topic has been met.

INTRODUCTION

Direct to Phase II proposals must follow the steps outlined below:

1. Offerors must create a Cover Sheet using the DOD Proposal submission system (follow the DOD Instructions for the Cover Sheet located in section 5.4.a.). Offerors must provide documentation that satisfies the Phase I feasibility requirement* that will be included at the beginning of the Direct to Phase II proposal. Offerors must demonstrate that they have completed research and development through means other than the SBIR/STTR program to establish the feasibility of the proposed Phase II effort based on the criteria outlined in the topic description.

2. Offerors must submit a Phase II proposal using the Army Phase II proposal instructions below.
* NOTE: Offerors are required to provide information demonstrating that the scientific and technical merit and feasibility has been established. The Army will not evaluate the offeror's related Direct to Phase II proposal if it determines that the offeror has failed to demonstrate that technical merit and feasibility has been established or the offeror has failed to demonstrate that work submitted in the feasibility documentation was substantially performed by the offeror and/or the principal investigator (PI). Refer to the Phase I description (within the topic) to review the minimum requirements that need to be demonstrated in the feasibility documentation. Feasibility documentation MUST NOT be solely based on work performed under prior or ongoing federally funded SBIR or STTR work.

**DIRECT to PHASE II PROPOSAL SUBMISSION**

SBIR Direct to Phase II (DPII) proposals have three Volumes: Proposal Cover Sheet, Technical Volume, and Cost Volume. **Please note that the Army will not be accepting a Volume Five (Supporting Documents), nor a Volume Six (Fraud, Waste and Abuse) as noted at the DOD SBIR website.** The Technical Volume .pdf document has a 38-page limit including: table of contents, pages intentionally left blank, references, letters of support, appendices, technical portions of subcontract documents (e.g., statements of work and resumes) and any other attachments. Small businesses submitting a DPII Proposal must use the DOD SBIR electronic proposal submission system (https://www.dodsbirsttr.mil/submissions/). This site contains step-by-step instructions for the preparation and submission of the Proposal Cover Sheet, the Cost Volume, and how to upload the Technical Volume. For general inquiries or problems with proposal electronic submission, contact the DOD SBIR Help Desk at 703-214-1333.

The small business will also need to register at the Army SBIR Small Business website: https://sbir.army.mil/SmallBusiness/ in order to receive information regarding proposal status/debriefings, summary reports, impact/transition stories, and Phase III plans. **PLEASE NOTE:** If this is your first time submitting an Army SBIR proposal, you will not be able to register your firm at the Army SBIR Small Business website until after all of the proposals have been downloaded and we have transferred your company information to the Army Small Business website. This can take up to one week after the end of the proposal submission period.

Do not include blank pages, duplicate the electronically generated cover pages or put information normally associated with the Technical Volume such as descriptions of capability or intent in other sections of the proposal as these will count toward the 38-page limit.

Only the electronically generated Cover Sheets and Cost Volume are excluded from the 38-page limit. **Army Phase II proposals submitted containing a Technical Volume .pdf document containing over 38 pages will be deemed NON-COMPLIANT and will not be evaluated. It is the responsibility of the Small Business to ensure that once the proposal is submitted and uploaded into the system that the technical volume .pdf document complies with the 38 page limit.**

Phase II proposals must describe the "vision" or "end-state" of the research and the most likely strategy or path for transition of the SBIR project from research to an operational capability that satisfies one or more Army operational or technical requirements in a new or existing system, larger research program, or as a stand-alone product or service.

Phase II proposals will be reviewed for overall merit based upon the criteria in Section 6.0 of the DOD Program BAA. 

20.2 DP II Key Dates

BAA closes, proposals due 2 Jul 2020, 12:00 pm ET

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**DP II IS A TWO YEAR PROJECT**

The DP II is a two year project and the proposal must include activities and budget for both years. The second year must be included within the 38-page limit for the Phase II proposal. Do not include blank pages, duplicate the electronically generated cover pages or put information normally associated with the Technical Volume such as descriptions of capability or intent, in other sections of the proposal as these will count toward the 38 page limit.

**PHASE II COST VOLUME**

A firm fixed price or cost plus fixed fee Direct to Phase II Cost Volume of $1,100,000 maximum must be submitted in detail online. Proposers that participate in this BAA must complete a Direct to Phase II Cost Volume not to exceed a maximum dollar amount of $1,100,000 and 24 months. The Direct to Phase II year one and Phase II Year two costs must be shown separately but may be presented side-by-side in a single Cost Volume. The system generated Cost Volume DOES NOT count toward the 38-page Phase II proposal limitation when submitted via the submission site’s on-line form. When submitting the Cost Volume, complete the Cost Volume form on the DOD Submission site, versus submitting it within the body of the uploaded proposal.

Army SBIR Direct to Phase II Proposals have three Volumes: Proposal Cover Sheet, Technical Volume, and Cost Volume. The Technical Volume .pdf document has a 38-page limit including: table of contents, pages intentionally left blank, references, letters of support, appendices, technical portions of subcontract documents (e.g., statements of work and resumes), data assertions and any attachments. Do not include blank pages, duplicate the electronically generated cover pages or put information normally associated with the Technical Volume in other sections of the proposal as these will count toward the 38-page limit. As with Phase I proposals, it is the proposing firm’s responsibility to verify that the Technical Volume .pdf document does not exceed the page limit.

Only the electronically generated Cover Sheet and Cost Volume are excluded from the 38-page Technical Volume.

**Army Direct to Phase II Proposals submitted containing a Technical Volume .pdf document over 38 pages will be deemed NON-COMPLIANT and will not be evaluated.**

DOD is not obligated to make any awards under Phase I, II, or III. For specifics regarding the evaluation and award of Phase I or II contracts, please read the DOD Program BAA very carefully. Direct to Phase II proposals will be reviewed for overall merit based upon the criteria in Section 8.0 of the BAA.

**BIO HAZARD MATERIAL AND RESEARCH INVOLVING ANIMAL OR HUMAN SUBJECTS**

Any proposal involving the use of Bio Hazard Materials must identify in the Technical Volume whether the contractor has been certified by the Government to perform Bio Level - I, II or III work.

Companies should plan carefully for research involving animal or human subjects, or requiring access to government resources of any kind. Animal or human research must be based on formal protocols that are reviewed and approved both locally and through the Army’s committee process. Resources such as
equipment, reagents, samples, data, facilities, troops or recruits, and so forth, must all be arranged carefully. The few months available for a Phase I effort may preclude plans including these elements, unless coordinated before a contract is awarded.

FOREIGN NATIONALS

If the offeror proposes to use a foreign national(s) [any person who is NOT a citizen or national of the United States, a lawful permanent resident, or a protected individual as defined by 8 U.S.C. 1324b (a) (3) – refer to Section 3.5 of this BAA for definitions of “lawful permanent resident” and “protected individual”] as key personnel, they must be clearly identified. For foreign nationals, you must provide country of origin, the type of visa or work permit under which they are performing and an explanation of their anticipated level of involvement on this project. Please ensure no Privacy Act information is included in this submittal.

OZONE CHEMICALS

Class 1 Ozone Depleting Chemicals/Ozone Depleting Substances are prohibited and will not be allowed for use in this procurement without prior Government approval.

CONTRACTOR MANPOWER REPORTING APPLICATION (CMRA)

The Contractor Manpower Reporting Application (CMRA) is a Department of Defense Business Initiative Council (BIC) sponsored program to obtain better visibility of the contractor service workforce. This reporting requirement applies to all Army SBIR contracts.

Offerors are instructed to include an estimate for the cost of complying with CMRA as part of the Cost Volume for Phase II ($1,100,000 maximum), under “CMRA Compliance” in Other Direct Costs. This is an estimated total cost (if any) that would be incurred to comply with the CMRA requirement. Only proposals that receive an award will be required to deliver CMRA reporting, i.e. if the proposal is selected and an award is made, the contract will include a deliverable for CMRA.

To date, there has been a wide range of estimated costs for CMRA. While most final negotiated costs have been minimal, there appears to be some higher cost estimates that can often be attributed to misunderstanding the requirement. The SBIR Program desires for the Government to pay a fair and reasonable price. This technical analysis is intended to help determine this fair and reasonable price for CMRA as it applies to SBIR contracts.

The Office of the Assistant Secretary of the Army (Manpower & Reserve Affairs) operates and maintains the secure CMRA System. The CMRA Web site is located here: https://www.ecmra.mil/.

The CMRA requirement consists of the following items, which are located within the contract document, the contractor’s existing cost accounting system (i.e. estimated direct labor hours, estimated direct labor dollars), or obtained from the contracting officer representative:

1. Contract number, including task and delivery order number;
2. Contractor name, address, phone number, e-mail address, identity of contractor employee entering data;
3. Estimated direct labor hours (including sub-contractors);
4. Estimated direct labor dollars paid this reporting period (including sub-contractors);
5. Predominant Federal Service Code (FSC) reflecting services provided by contractor (and separate predominant FSC for each sub-contractor if different);
The reporting period will be the period of performance not to exceed 12 months ending September 30 of each government fiscal year and must be reported by 31 October of each calendar year.

According to the required CMRA contract language, the contractor may use a direct XML data transfer to the Contractor Manpower Reporting System database server or fill in the fields on the Government Web site. The CMRA Web site also has a no-cost CMRA XML Converter Tool.

Given the small size of our SBIR contracts and companies, it is our opinion that the modification of contractor payroll systems for automatic XML data transfer is not in the best interest of the Government. CMRA is an annual reporting requirement that can be achieved through multiple means to include manual entry, MS Excel spreadsheet development, or use of the free Government XML converter tool. The annual reporting should take less than a few hours annually by an administrative level employee.

Depending on labor rates, we would expect the total annual cost for SBIR companies to not exceed $500.00 annually, or to be included in overhead rates.

**DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA) (FORMERLY KNOWN AS DISCRETIONARY TECHNICAL ASSISTANCE)**

In accordance with section 9(q) of the Small Business Act (15 U.S.C. 638(q)), the Army will provide technical assistance services to small businesses engaged in SBIR projects through a network of scientists and engineers engaged in a wide range of technologies. The objective of this effort is to increase Army SBIR technology transition and commercialization success thereby accelerating the fielding of capabilities to Soldiers and to benefit the nation through stimulated technological innovation, improved manufacturing capability, and increased competition, productivity, and economic growth.

The Army has stationed nine Technical Assistance Advocates (TAAs) across the Army to provide technical assistance to small businesses that have Phase I and Phase II projects with the participating organizations within their regions.

**For more information go to:** [https://www.armysbir.army.mil](https://www.armysbir.army.mil), then click the “SBIR” tab, and then click on Transition Assistance/Technical Assistance.

As noted in Section 4.21 of this BAA, firms may request technical assistance from sources other than those provided by the Army. All such requests must be made in accordance with the instructions in Section 4.21. It should also be noted that if approved for discretionary technical, and business assistance from an outside source, the firm will not be eligible for the Army’s Technical Assistance Advocate support. All details of the TABA agency and what services they will provide must be listed in the technical proposal under “consultants”. The request for TABA must include details on what qualifies the TABA firm to provide the services that you are requesting, the firm name, a point of contact for the firm, and a web site for the firm. List all services that the firm will provide and why they are uniquely qualified to provide these services. The award of TABA funds is not automatic and must be approved by the Army SBIR Program Manager. The maximum TABA dollar amount that can be requested in a Phase I Army...
SBIR proposal is $5,000. The maximum TABA dollar amount that can be requested in a Phase II Army SBIR proposal is $5,000 per year (for a total of $10,000 for two years).

COMMERCIALIZATION READINESS PROGRAM (CRP)

The objective of the CRP effort is to increase Army SBIR technology transition and commercialization success and accelerate the fielding of capabilities to Soldiers. The CRP: 1) assesses and identifies SBIR projects and companies with high transition potential that meet high priority requirements; 2) matches SBIR companies to customers and facilitates collaboration; 3) facilitates detailed technology transition plans and agreements; 4) makes recommendations for additional funding for select SBIR projects that meet the criteria identified above; and 5) tracks metrics and measures results for the SBIR projects within the CRP.

Based on its assessment of the SBIR project’s potential for transition as described above, the Army utilizes a CRP investment fund of SBIR dollars targeted to enhance ongoing Phase II activities with expanded research, development, test and evaluation to accelerate transition and commercialization. The CRP investment fund must be expended according to all applicable SBIR policy on existing Phase II availability of matching funds, proposed transition strategies, and individual contracting arrangements.

NON-PROPRIETARY SUMMARY REPORTS

All award winners must submit a non-proprietary summary report at the end of their Direct to Phase II project. The summary report is unclassified, non-sensitive and non-proprietary and should include:
- A summation of Direct to Phase II results
- A description of the technology developed
- The anticipated DOD and/or non-DOD customer
- The plan to transition the SBIR developed technology to the customer
- The anticipated applications/benefits for government and/or private sector use
- An image depicting the developed technology

The non-proprietary summary report should not exceed 700 words, and is intended for public viewing on the Army SBIR/STTR Small Business area. This summary report is in addition to the required final technical report and should require minimal work because most of this information is required in the final technical report. The summary report shall be submitted in accordance with the format and instructions posted within the Army SBIR Small Business Portal at: https://sbir.army.mil/SmallBusiness/ and is due within 30 days of the contract end date.

ARMY SBIR PROGRAM COORDINATOR (PC) for Army SBIR 19.3 for Direct to Phase II

<table>
<thead>
<tr>
<th>Participating Organizations</th>
<th>PC</th>
<th>Phone</th>
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<tbody>
<tr>
<td>AFC (Army Futures Command)</td>
<td>Casey Perley</td>
<td>715-574-6311</td>
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ARMY SUBMISSION OF FINAL TECHNICAL REPORTS

A final technical report is required for each project. Per DFARS clause 252.235-7011 (http://www.acq.osd.mil/dpap/dars/dfars/html/current/252235.htm#252.235-7011), each contractor shall (a) Submit two copies of the approved scientific or technical report delivered under the contract to the Defense Technical Information Center, Attn: DTIC-O, 8725 John J. Kingman Road, Fort Belvoir, VA 22060-6218; (b) Include a completed Standard Form 298, Report Documentation Page, with each copy of
the report; and (c) For submission of reports in other than paper copy, contact the Defense Technical Information Center or follow the instructions at http://discover.dtic.mil/.

PROTEST PROCEDURES

Refer to the DOD Program Announcement for procedures to protest the Broad Agency Announcement.

As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests After Award should be submitted to:

Monroe Harden
Acting Program Manager
Army Small Business Innovation Research (SBIR)
Phone: 866-570-7247
Email: usarmy.apg.cadc.mbx.sbir-program-managers-helpdesk@mail.mil

These protests will then be forwarded to the appropriate contracting officer based on the sponsoring organization for the topic.

DEPARTMENT OF THE ARMY PROPOSAL CHECKLIST

This is a Checklist of Army Requirements for your proposal. Please review the checklist to ensure that your proposal meets the Army SBIR requirements. You must also meet the general DOD requirements specified in the BAA. **Failure to meet these requirements will result in your proposal not being evaluated or considered for award.** Do not include this checklist with your proposal.

1. The proposal addresses a Phase II effort (up to $1,100,000 with up to a 24-month duration).

2. The proposal is limited to only **ONE** Army BAA topic.

3. The technical content of the proposal includes the items identified in Section 5.4 of the BAA.

4. SBIR Direct to Phase II Proposals have three (3) sections: Proposal Cover Sheet, Technical Volume, and Cost Volume. The Technical Volume .pdf document has a 38-page limit including, but not limited to: table of contents, pages intentionally left blank, references, letters of support, appendices, technical portions of subcontract documents [e.g., statements of work and resumes] and all attachments). However, offerors are instructed to NOT leave blank pages, duplicate the electronically generated cover pages or put information normally associated with the Technical Volume in other sections of the proposal submission as THESE WILL COUNT AGAINST THE 38-PAGE LIMIT. Any information that details work involved that should be in the technical volume but is inserted into other sections of the proposal will count against the page count. **ONLY** the electronically generated Cover Sheet, and Cost Volume are excluded from the Technical Volume .pdf 38-page limit.

5. The Cost Volume has been completed and submitted for the Direct to Phase II for the first and second year or the contract and the costs are shown separately. The Army requires that small businesses complete the Cost Volume form on the DOD Submission site, versus submitting

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within the body of the uploaded proposal. The total cost should match the amount on the cover pages.

6. Requirement for Army Accounting for Contract Services, otherwise known as CMRA reporting is included in the Cost Volume (offerors are instructed to include an estimate for the cost of complying with CMRA).

7. If applicable, the Bio Hazard Material level has been identified in the Technical Volume.

8. If applicable, plan for research involving animal or human subjects, or requiring access to government resources of any kind.

9. If applicable, Foreign Nationals are to be identified in the proposal.
ARMY

ARMY SBIR Direct to Phase II Topic Index

A20-D01 Portable Atomic Clock
TITLE: Portable Atomic Clock

RT&L FOCUS AREA(S): General Warfighting
TECHNOLOGY AREA(S): Electronics

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 section 3.5 of 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, demonstrate, and deliver a portable (rackmount) optical atomic clock with volume < 20 L, weight < 30 kg, power < 100 W, and stability (< 3 x 10^-13 at 1 second) that can be utilized in Army systems requiring precise timing in global positioning system (GPS)-denied environments.

DESCRIPTION: Precise timing is critical for numerous Army applications such as navigation, communications, surveillance, and synchronization of sensors and systems. Assured positioning, navigation, and timing (PNT) solutions currently rely on acquiring GPS signals, which may not be readily available in increasingly contested environments and therefore may need to hold precise time for minutes to hours. To ease reliance on GPS, long-holdover clocks with cost, size, weight, and power (CSWaP) appropriate for various DoD platforms are necessary to enable mission-critical functions even in contested environments.

Focused research over the past 10-15 years has led to portable timing technology advances including miniaturized vapor cell microwave atomic clocks [1] that are now commercially available. The chip-scale atomic clock (CSAC) has impressive stability performance at its size, weight, and power (SWaP), but it suffers limitations in long-term performance due to various drift mechanisms that are currently being addressed through exploration of new physics approaches. Optical atomic clocks have shown superior stability performance [2] but face challenges to being deployed outside of the laboratory, such as technical complexity and reliability in dynamic environments. Certain proposed optical clock architectures [3] have shown relative simplicity over others but have not yet been realized in a form factor that is appropriate for SWaP-constrained platforms nor have they been characterized for long-term reliability in dynamic environments. The goal of this SBIR is to develop and demonstrate an optical clock that provides a combination of performance and CSWaP that currently deployed atomic clocks cannot offer.

PHASE I: * We would like this topic to be Direct to Phase II if possible, as commercial development has already demonstrated feasibility **

Determine technical feasibility of realizing a portable optical clock that can be evaluated for deployment in Army applications. Develop a preliminary clock design, model key elements of the proposed clock, and identify subcomponents that demonstrate a clear path to achieving a fractional frequency instability of < 3 x 10^-13 at 1 second and reaching a flicker floor of 10^-14 at 10,000 seconds with size, weight, and power less than commercial rackmount cesium beam tube clocks [4]. Phase I deliverables include a design review including expected device performance as well as quarterly reports and a final report presenting Phase II plans.
DIRECT TO PHASE II: Offerors interested in submitting a Direct-to-Phase-II proposal in response to this topic must provide documentation to substantiate that the scientific and technical merit and feasibility described in the Phase I section of this topic has been met and describes the potential commercial applications. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results.

PHASE II: * We would like this topic to be Direct to Phase II if possible, as commercial development already demonstrated feasibility.

Develop an integrated optical clock system design (physics package, electronics, firmware/software). Build the clock to specifications determined in the Phase I design study and refined through proof-of-concept breadboard demonstration of subcomponents.

Construct and demonstrate a prototype clock, and validate its performance by measuring short-term frequency stability, long-term drift, and flicker floor outlined in Phase I. Perform temperature cycling and inversion tests to determine environmental and acceleration sensitivities. Phase II deliverables include a clock prototype for further Army evaluation, as well as quarterly and final reports.

Awardees of this topic will have the ability to voluntarily participate in quarterly soldier touch-points, a 1-2 day trip within the contiguous US. Touch point will be provided free of charge however participating companies must travel and participate out of company internal operating budgets. Soldier touch point details will be provided to awardees under this topic at Phase II award.

PHASE III DUAL USE APPLICATIONS: Developments in this program should enable widespread deployment of clocks with stability exceeding current rackmount primary frequency standards. These clocks could lead to more reliable and robust global positioning, synchronization, and time-keeping in GPS-denied environments, as well as secure communications. Potential commercial applications include precise synchronization of telecommunication networks for high-bandwidth communications, next-generation satellite atomic clocks for global positioning, and improved reliability of business activities in the event of GPS outages (e.g. time-stamping of global business transactions).

REFERENCES:

KEYWORDS: optical atomic clock; GPS-denied environments; positioning, navigation, and timing (PNT); precise timing