DEPARTMENT OF AIR FORCE (DAF)
2027 SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) BAA
Release 2
DIRECT-TO-PHASE-II (D2P2)
PROPOSAL SUBMISSION INSTRUCTIONS

The DAF intends these proposal submission instructions to clarify the Department of War (DoW) BAA as it applies to the topics solicited herein. **Firms must ensure proposals meet all requirements of the STTR Program BAA posted on the DoW SBIR/STTR Innovation Portal (DSIP) at the proposal submission deadline date/time.**

Applicants are encouraged to thoroughly review the DoW Program BAA and register for the DSIP Listserv to remain apprised of important programmatic and contractual changes.

- Full component-specific instructions and topic descriptions are available on DSIP at https://www.dodsbirsttr.mil/submissions/solicitation-documents/active-solicitations. Be sure to select the tab for the appropriate BAA cycle.
- Register for the DSIP Listserv at: https://www.dodsbirsttr.mil/submissions/login.

Please ensure all e-mail addresses listed in the proposal are current and accurate. The DAF is not responsible for ensuring notifications are received by firms changing mailing address/e-mail address/company points of contact after proposal submission without proper notification to the DAF. **If changes occur to the company mail or email addresses or points of contact after proposal submission, the information must be provided to the DAF SBIR/STTR One Help Desk.** The message shall include the subject line, "FY27 STTR BAA Address Change".

Points of Contact:

- For general information related to the DAF SBIR/STTR program and **proposal preparation instructions**, contact the DAF SBIR/STTR One Help Desk at usaf.team@afsbirsttr.us. All applicants have ample opportunity to request clarifying information. **The DAF encourages applicants to request clarifying information as early as possible, as delays in such requests constrain the DAF's ability to provide satisfactory resolution to applicant concerns.**
- For questions regarding the **DSIP electronic submission system**, contact the DoW SBIR/STTR Help Desk at dodsbirsupport@reisystems.com.
- **For technical questions about the topics** during the pre-announcement and open period, please reference the FY27 STTR BAA.
- Air Force SBIR/STTR Contracting Officer (CO):
  Ms. Jennifer M. Snell, Jennifer.Snell.5@us.af.mil

General information related to the DAF Small Business Program can be found at the DAF Small Business website, http://www.airforcesmallbiz.af.mil/. The site contains information related to contracting opportunities within the DAF, as well as business information and upcoming outreach events. Other informative sites include those for the Small Business Administration (SBA), www.sba.gov, and the Procurement Technical Assistance Centers (PTACs), http://www.aptacus.us.org. These centers provide Government contracting assistance and guidance to small businesses, generally at no cost.

PHASE FLEXIBILITY

15 U.S.C. §638 (cc) allows DoW to make a STTR Phase II award to a small business concern with respect to a project, without regard to whether the small business concern was provided an award under Phase I of an STTR program with respect to such project. DAF is conducting a "Direct to

Phase II" implementation of this authority for these FY27 STTR topics and does not guarantee D2P2 opportunities will be offered in future solicitations. Each eligible topic requires documentation to determine whether the feasibility requirement described in the Phase I section of the topic has been met. The feasibility requirements will be described within the individual topic(s) themselves in the Phase I description field.

DIRECT-TO-PHASE-II PROPOSAL SUBMISSION

The DoW FY27 STTR BAA includes all program requirements. D2P2 efforts should address the feasibility of a solution to the selected topic's requirements.

The complete proposal must be submitted electronically through DSIP. Ensure the complete technical volume and additional cost volume information is included in this sole submission. The preferred submission format is Portable Document Format (.pdf). Graphics must be distinguishable in black and white. **VIRUS-CHECK ALL SUBMISSIONS.**

INTRODUCTION: D2P2 proposals must follow the steps outlined below:

1. Applicants must create a Cover Sheet in DSIP; follow the Cover Sheet instructions provided in the DoW FY27 STTR BAA. Applicants must provide documentation satisfying the Phase I feasibility requirement* to be included in the Phase II proposal. Applicants must demonstrate completion of research and development through means other than the SBIR/STTR Programs to establish the feasibility of the proposed Phase II effort based on the criteria outlined in the topic description.
2. Applicants must submit D2P2 proposals using the instructions below.

*NOTE: DAF will not consider the applicant's D2P2 proposal if the applicant fails to demonstrate technical merit and feasibility have been established. It will also not be considered if it fails to demonstrate the feasibility effort was substantially performed by the applicant and/or the principal investigator (PI). Refer to the topics' Phase I descriptions for minimum requirements needed to demonstrate feasibility. Feasibility documentation cannot be based upon or logically extend from any prior or ongoing federally funded SBIR or STTR work. Note, feasibility documentation can be included as part of Volume 5.

DIRECT-TO-PHASE-II PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

A. Proposal Requirements. A D2P2 proposal shall provide sufficient information to persuade the DAF the proposed technology advancement represents an innovative solution to the scientific or engineering problem worthy of support under the stated criteria.

B. Proprietary Information. Information constituting a trade secret, commercial/financial information, confidential personal information, or data affecting National Security must be clearly marked. It shall be treated in confidence to the extent permitted by law. Be advised, in the event of proposal selection, the Work Plan will be incorporated into the resulting contract by reference. Therefore, DO NOT INCLUDE PROPRIETARY INFORMATION in the work plan. See the DoW BAA regarding proprietary information marking.

C. General Content. Proposals should be direct, concise, and informative. Type shall be no smaller than 11-point on standard 8 ½ X 11 paper, with one-inch margins and pages consecutively numbered. Applicants are discouraged from including promotional and non-programmatic items. If included, such material will count toward the page limit.

DIRECT-TO-PHASE-II PROPOSAL FORMAT

Complete proposals must include all of the following:

Volume 1: Cover Sheet

Note: If selected for funding, the proposal's technical abstract and discussion of anticipated benefits will be publicly released. Therefore, do not include proprietary information in this section.

Volume 2: Technical Volume

Volume 3: Cost Volume

Volume 4: Company Commercialization Report

Volume 5: Supporting Documents, e.g. DoD Form 2345 (if applicable), Militarily Critical Data Agreement (if applicable); etc.

Volume 6: Fraud, Waste, and Abuse Training Completion

Volume 7: Disclosures of Foreign Affiliations or Relationships to Foreign Countries

Phase II proposals require a comprehensive, detailed description of the proposed effort. DAF D2P2 efforts are to be proposed in accordance with the information in these instructions. Commercial and military potential of the technology under development is extremely important. Proposals emphasizing dual-use applications and commercial exploitation of resulting technologies are sought.

All D2P2 research or research and development (R/R&D) must be performed by the small business and its team members in the United States, as defined in the DoW STTR BAA. The Principal Investigator's (PI's) primary employment must be with the small business concern at the time of award and during the entire period of performance. Primary employment means more than one-half the PI's time is spent in the small business' employ. This precludes full-time employment with another entity. Only one principal investigator/project manager can be designated to a proposal at any given time.

Knowingly and willfully making false, fictitious, or fraudulent statements or representations may be a felony under18 U.S.C. Section 1001, punishable by a fine up to $250,000, up to five years in prison, or both.

Please note the FWA Training must be completed prior to proposal submission. When training is complete and certified, DSIP will indicate completion of the Volume 6 requirement. The proposal cannot be submitted until the training is complete. The DAF recommends completing submission early, as site traffic is heavy prior to solicitation close, causing system lag. **Do not wait until the last minute.** The DAF will not be responsible for proposals not completely submitted prior to the deadline due to system inaccessibility unless advised by DoW. The DAF will not accept alternative means of submission outside of DSIP.

COVER SHEET (VOLUME 1)

Complete the proposal Cover Sheet in accordance with the instructions provided via DSIP. The technical abstract should include a brief description of the program objective(s), a description of the effort, anticipated benefits and commercial applications of the proposed research, and a list of key words/terms. The technical abstract of each successful proposal will be submitted to the Office of the Secretary of War (OSW) for publication and, therefore, must not contain proprietary or classified information.

TECHNICAL VOLUME (VOLUME 2)

The technical proposal includes all items listed below in the order provided. Refer to topic index for page limitations. Pages in excess of this count will not be considered by the Government in evaluations.

1) Table of Contents

A table of contents should be located immediately after the Cover Sheet.

2) Glossary
Include a glossary of acronyms and abbreviations used in the proposal.

3) Milestone Identification
Include a program schedule with all key milestones identified.

4) Identification and Significance of the Problem or Opportunity
Briefly reference the specific technical problem/opportunity to be pursued under this effort.

5) Phase II Technical Objectives
Detail the specific objectives of the Phase II work and describe the technical approach and methods to be used in meeting these objects. The proposal should also include an assessment of the potential commercial application for each objective.

6) Work Plan
The work plan shall be a separate and distinct part of the proposal package, using a page break to divide it from the technical proposal. It must contain a summary description of the technical methodology and task description in broad enough detail to provide contractual flexibility. The following is the recommended format for the work plan; begin this section on a new page. DO NOT include proprietary information.

A) 1.0 – Objective: This section is intended to provide a brief overview of the specialty area. It should explain the purpose and expected outcome.
B) 2.0 – Scope: This section should provide a concise description of the work to be accomplished, including the technology area to be investigated, goals, and major milestones. The key elements of this section are task development and deliverables, i.e., the anticipated end result and/or the effort's product. This section must also be consistent with the information in Section 4.0 below.
C) 3.0 – Background: The applicant shall identify appropriate specifications, standards, and other documents applicable to the effort. This section includes information or explanation for, and/or constraints to, understanding requirements. It may include relationships to previous, current, and/or future operations. It may also include techniques previously determined ineffective.
D) 4.0 – Task/Technical Requirements: The detailed individual task descriptions must be developed in an orderly progression with sufficient detail to establish overall program requirements and goals. The work effort must be segregated into major tasks and identified in separately numbered paragraphs.

Each numbered major task should delineate the work to be performed by subtask. The work plan MUST contain every task to be accomplished in definite, realistic, and clearly stated terms. Use "shall" whenever the work plan expresses a binding provision. Use "should" or "may" to express a declaration or purpose. Use "will" when no contractor requirement is involved, i.e., "... power will be supplied by the Government."

7) Deliverables
Include a section clearly describing the specific sample/prototype hardware/ software to be delivered, as well as data deliverables, schedules, and quantities. Be aware of the possible requirement for unique item identification IAW DFARS 252.211-7003, Item Identification and Valuation, for hardware. If hardware/ software will be developed but not delivered, provide an explanation. At a minimum, the following reports will be required under ALL

Phase II contracts.

A) Scientific and Technical Reports: Rights in technical data, including software, developed under the terms of any contract resulting from a STTR Announcement generally remain with the contractor. The Government obtains SBIR/STTR data rights in all data developed or generated under the SBIR/STTR contract for a period of 20 years, commencing at contract award. Upon expiration of the 20-year SBIR/STTR license, the Government has Government purpose rights to the STTR data.

i. Final Report: The first page of the final report will be a single-page project summary, identifying the work's purpose, providing a brief description of the effort accomplished, and listing potential result applications. The summary may be published by DoW. Therefore, it must not contain any proprietary or classified information. The remainder of the report should contain details of project objectives met, work completed, results obtained, and technical feasibility estimates.

ii. Status Reports: Status reports are due quarterly at a minimum.

B) Additional Reporting: AF may require additional reporting documentation including:

i. Software documentation and users' manuals;
ii. Engineering drawings;
iii. Operation and maintenance documentation
iv. Safety hazard analysis when the project will result in partial or total development and delivery of hardware; and
v. Updates to the commercialization results.

C) Related Work:

Describe significant activities directly related to the proposed effort, including any previous programs conducted by the Principal Investigator, proposing firm, consultants, or others, and their application to the proposed project. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. Also list any applicant-identified subject matter experts, regardless of affiliation, providing comments regarding the applicant's knowledge of the state-of-the-art in the specific approach proposed. Describe previous work not directly related to the proposed effort but similar. Provide the following:

i. Short Description
ii. Client for which work was performed (including individual to be contacted and phone number)
iii. Date of completion

D) Commercialization Potential

The DoW requires a commercialization plan be submitted with the Phase II proposal, specifically addressing the following questions:

i. What is the first planned product to incorporate the proposed technology?
ii. Who are the probable customers, and what is the estimated market size?
iii. How much money is needed to bring this technology to market and how will it be raised?
iv. Does your firm have the necessary marketing expertise and, if not, how will your firm

compensate?

v. Who are the probable competitors, and what price/quality advantage is anticipated by your firm.

The commercialization strategy plan should briefly describe the commercialization potential for the proposed project's anticipated results, as well as plans to exploit it. Commercial potential is evidenced by:

i. The existence of private sector or non-SBIR/STTR Governmental funding sources demonstrating commitment to Phase II efforts/ results.
ii. The existence of Phase III follow-on commitments for the research subject.
iii. The presence of other indicators of commercial technology potential, including the firm's commercialization strategy.

If awarded a D2P2, the awardee will be required to update periodically the commercialization results of the project via SBA. These updates will be required at completion of the effort, and subsequently when the contractor submits a new SBIR/STTR proposal to DoW. Firms not submitting a new proposal to DoW will be requested to provide updates annually after the D2P2 completion.

Note, the "Commercialization Plan" and the "Company Commercialization Report" are distinct documents. The Company Commercialization Report (CCR) comprises Volume 4 as separately indicated in these instructions.

E) Relationship with Future R/R&D Efforts:

State the anticipated results of the proposed approach, specifically addressing plans for Phase III, if any.

Discuss the significance of the D2P2 effort in providing a basis for the Phase III R/R&D effort, if planned.

F) Key Personnel

In the technical volume, identify all key personnel involved in the project. Include information directly related to education, experience, and citizenship. A technical resume for the Principal Investigator, including publications, if any, must also be included. Concise technical resumes for subcontractors and consultants, if any, are also useful. Identify all non-U.S. citizens expected to be involved in the project as direct employees, subcontractors, or consultants. For these individuals, in addition to technical resumes, please provide countries of origin, type of visas or work permits held, and identify the tasks they are anticipated to perform.

Foreign Nationals (also known as Foreign Persons) means any person who is NOT:

a. a citizen or national of the United States; or
b. a lawful permanent resident; or
c. a protected individual as defined by 8 U.S.C. § 1324b

ALL applicants proposing to use foreign nationals MUST follow the FY27 STTR BAA and disclose this information regardless of whether the topic is subject to ITAR restrictions.

When the topic area is subject to export control, these individuals, if permitted to participate, are limited to work in the public domain. Further, tasks assigned must not be capable of assimilation into an understanding of the project's overall objectives. This prevents foreign

persons from acting in key positions, such as Principal Investigator, Senior Engineer, etc. Additional information may be requested during negotiations in order to verify foreign citizens' eligibility to perform on a contract awarded under this BAA.

The following will apply to all projects with military or dual-use applications developing beyond fundamental research (basic and applied research ordinarily published and shared broadly within the scientific community):

a. The Contractor shall comply with all U. S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data, and software, or for the provision of technical assistance.
b. The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at any Government installation (whether in or outside the United States), where the foreign person will have access to export-controlled technologies, including technical data or software.
c. The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.
d. The Contractor shall be responsible for ensuring that these provisions apply to its subcontractors.

G) Facilities/Equipment

Describe instrumentation and physical facilities necessary and available to carry out the D2P2 effort. Justify equipment to be purchased (detail in cost proposal). State whether proposed performance locations meet environmental laws and regulations of Federal, state, and local Governments for, but not limited to, airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices, and handling and storage of toxic and hazardous materials.

H) Consultants/Subcontractors

Private companies, consultants, or universities may be involved in the project. All should be described in detail and included in the cost proposal. In accordance with the Small Business Administration (SBA) SBIR/STTR Policy Directive, a minimum of 50% of the R/R&D must be performed by the proposing firm, unless otherwise approved in writing by the Contracting Officer. These requests can only be made upon proposal submission. Signed copies of all consultant or subcontractor letters of intent must be attached to the proposal. These letters should briefly state the contribution or expertise being provided. Include statements of work and detailed cost proposals. Include information regarding consultant or subcontractor unique qualifications. Subcontract copies and supporting documents do not count against the Phase II page limit. Identify any subcontract/consultant foreign citizens per E above.

I) Prior, Current, or Pending Support of Similar Proposals or Awards:

WARNING: While it is permissible, with proper notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work for consideration under numerous Federal program solicitations, it is unlawful to enter into contracts or grants requiring essentially equivalent effort. Any potential for this situation must be disclosed to the solicitation agency(ies) before award. If a proposal submitted in response to this BAA is substantially the

same as another proposal previously, currently, or in the process of being funded by another Federal agency/DoW Component or the DAF, the applicant must so indicate on the Cover Sheet and provide the following:

i. The name and address of the Federal agency(ies) or DoW Component(s) to which proposals were or will be submitted, or from which an awarded is expected or has been received;
ii. The proposal submission or award dates;
iii. The proposal title;
iv. The PI's name and title for each proposal submitted or award received; and
v. Solicitation(s) title, number, and date under which the proposal was or will be submitted, or under which an award is expected or has been received.
vi. If award was received, provide the contract number.
vii. Specify the applicable topics for each STTR proposal submitted or award received.

NOTE: If this section does not apply, state in the proposal and certify in Volume 1: Proposal Cover Sheet, "No prior, current, or pending support for proposed work."

COST VOLUME (VOLUME 3)

A detailed cost proposal must be submitted. Cost proposal information will be treated as proprietary. Proposed costs must be provided by both individual cost element and contractor fiscal year (FY) in sufficient detail to determine the basis for estimates, as well as the purpose, necessity, and reasonableness of each. This information will expedite award if the proposal is selected. Generally, Firm-Fixed-Price contracts are appropriate for Phase II awards. In accordance with the SBA SBIR/STTR Policy Directive, Phase II contracts must include profit or fee.

Cost proposal attachments do not count toward proposal page limitations. The cost proposal includes:

Direct Labor: Identify key personnel by name, if possible, and labor category, if not. Direct labor hours, labor overhead, and/or fringe benefits, and actual hourly rates for each individual are also necessary for the CO to determine whether these hours, fringe rates, and hourly rates are fair and reasonable.

Direct Cost Materials: Costs for materials, parts, and supplies must be justified and supported. Provide an itemized list of types, quantities, prices, and, where appropriate, purpose. If computer or software purchases are planned, detailed information such as manufacturer, price quotes, proposed use, and support for the need will be required.

Other Direct Costs: This includes specialized services such as machining or milling, special test/analysis, and costs for temporary use/lease of specialized facilities/ equipment. Provide usage (hours) expected, rates, and sources, as well as brief discussion concerning the purpose and justification. Proposals including leased hardware must include an adequate lease versus purchase rationale.

Special Tooling, Special Test Equipment, and Material: The inclusion of equipment and materials will be carefully reviewed relative to need and appropriateness to the work proposed. Special tooling and special test equipment purchases must, in the CO's opinion, be advantageous to the Government and relate directly to the effort. These toolings or equipment should not be of a type that an applicant would otherwise possess in the normal course of business. These may include such items as innovative instrumentation and/or automatic test equipment.

Subcontracts: Subcontract costs must be supported with copies of subcontract agreements. Agreement documents must adequately describe the work to be performed and cost bases. The agreement document should include a SOW, assigned personnel, hours and rates, materials (if any), and proposed travel (if any). A letter from the subcontractor agreeing to perform a task or tasks at a fixed price is not considered sufficient. The proposed total of all consultant fees, facility leases or usage fees, and other subcontract or purchase agreements may not exceed one-half of the total contract price, unless otherwise approved in writing by the Contracting Officer.

The prime contractor must accomplish price analysis, including reasonableness, of the proposed subcontractor costs. If based on comparison with prior efforts, identify the basis upon which the prior prices were determined reasonable. If price analysis techniques are inadequate or the FAR requires subcontractor cost or pricing data submission, provide a cost analysis. Cost analysis includes but is not limited to, consideration of materials, labor, travel, other direct costs, and proposed profit rates.

Consultants: For each consultant, provide a separate agreement letter briefly stating the service to be provided, hours required, and hourly rate, as well as a short, concise resume.

Travel: Each effort should include, at a minimum, a kickoff or interim meeting. Travel costs must be justified as required for the effort. Include destinations, number of trips, number of travelers per trip, airfare, per diem, lodging, ground transportation, etc. Per Diem and lodging rates may be found in the Joint Travel Regulation (JTR), Volume 2, www.defensetravel.dod.mil.

Indirect Costs: Indicate proposed rates' bases, e.g., budgeted/actual rates per FY, etc. The proposal should identify the specific rates used and allocation bases to which they are applied. Do not propose composite rates; proposed rates and applications per FY throughout the anticipated performance period are required.

Non-SBIR Governmental/Private Investment: Non-SBIR/STTR Governmental and/or private investment is allowed. However, it is not required, nor will it be a proposal evaluation factor.

NOTE: If no exceptions are taken to an applicant's proposal, the Government may award a contract without exchanges. Therefore, the applicant's initial proposal should contain the applicant's best terms from a cost or price and technical standpoint. If there are questions regarding the award document, contact the Phase I CO identified on the cover page. The Government reserves the right to reopen exchanges later if the CO determines doing so to be necessary.

COMPANY COMMERCIALIZATION REPORT (VOLUME 4)

Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoW FY27 STTR BAA for full details on this requirement. Information contained in the CCR will not be considered by the DAF during proposal evaluations.

SUPPORTING DOCUMENTS VOLUME (VOLUME 5)

All applicants are required to complete the Regulatory Compliance Initial Safety Assessment located here: https://afwerx.com/wp-content/uploads/Regulatory-Compliance-Form-with-Flight-HSR-DAF-FY27_v2.pdf . Failure to submit this form with the initial proposal submission can delay award if a proposal is Selected for negotiations and award.

The following documents may be required if applicable to your proposal:

1. DD Form 2345: For proposals submitted under export-controlled topics either International Traffic in Arms or Export Administration Regulations (ITAR/EAR), a copy of the certified DD Form 2345, Militarily Critical Technical Data Agreement, or evidence of application

submission must be included. The form, instructions, and FAQs may be found at the United States/Canada Joint Certification Program website, http://www.dla.mil/HQ/InformationOperations/Offers/Products/LogisticsApplications/JCP/DD2345Ins tructions.aspx. DD Form 2345 approval will be required if proposal if selected for award.

2. Verification of Eligibility of Small Business Joint Ventures (Attachment 3 to the DOW STTR FY27 BAA)
3. Technical Data Rights Assertions (if asserting data rights restrictions)

The following is required of all proposal submissions:

1. Feasibility documentation. D2P2 proposals require a comprehensive, detailed effort description. Proposals should demonstrate sufficient technical progress or problem-solving results to warrant more extensive RDT&E. Developing technologies with commercial and military potential is extremely important. Particularly, DAF is seeking proposals emphasizing technologies' dual-use applications and commercialization.
2. * NOTE: The applicant shall provide information to enable the agency to make the 15 U.S.C. 638(cc) determination of scientific and technical feasibility and merit. Applicants are required to provide information demonstrating scientific and technical merit and feasibility has been established. The DAF will not review the Phase II proposals if it is determined the applicant 1) fails to demonstrate technical merit and feasibility are established or 2) the feasibility documentation does not support substantial performance by the applicant and/or the PI. Refer to the Phase I description within the topic to review the minimum requirements needed to demonstrate scientific and technical feasibility. **Feasibility documentation cannot be based upon or logically extend from any prior or ongoing federally funded SBIR or STTR work.**
3. Feasibility efforts detailed must have been substantially performed by the applicant and/or the PI. If technology in the feasibility documentation is subject to intellectual property (IP) rights, the applicant must provide IP rights assertions. Additionally, applicants shall provide a short summary for each item asserted with less than unlimited rights describing restriction's nature and intellectual property intended for use in the proposed research. Please see FY27 STTR BAA for technical data rights information.

Reference Materials and Marketing Materials

4. If appropriate, include a reference or works cited list as the last page.
5. DO NOT INCLUDE marketing material. Marketing material will NOT be evaluated.

FRAUD, WASTE AND ABUSE TRAINING (VOLUME 6)

Fraud, Waste and Abuse training material can be found in the Volume 6 section of the proposal submission module in DSIP and must be thoroughly reviewed once per year to proceed with proposal submission.

DISCLOSURES OF FOREIGN AFFILIATIONS OR RELATIONSHIPS TO FOREIGN COUNTRIES (VOLUME 7)

Small business concerns must complete the Disclosures of Foreign Affiliations or Relationships to Foreign Countries webform in Volume 7 of the DSIP proposal submission. Please be aware that the Disclosures of Foreign Affiliations or Relationships to Foreign Countries WILL NOT be accepted as a PDF Supporting Document in Volume 5 of the DSIP proposal submission. Do not upload any previous versions of this form to Volume 5. For additional details, please refer to the DoW Program BAA.

TECHNICAL AND BUSINESS ASSISTANCE (TABA)

The Small Business Innovation and Economic Security Act Section 7 mandates agencies to offer TABA. DAF will provide up to $50,000.00 per Phase II award. This total is in addition to the per-topic total identified in the DSIP Volume 3: Cost Proposal.

Awardees can only use TABA funding for the activities outlined in 15 USC 638(q)(1)purposes outlined in 15 USC 638(q)(1)(A) through (E). The list of eligible *activities* includes:

- Access to a network of scientists and engineers engaged in a wide range of technologies
- Assistance with product sales
- Intellectual property protections
- Cybersecurity assistance
- Market research
- Market validation
- Development of regulations and manufacturing plans, or
- Access to technical and business literature available through on-line databases

These activities can be undertaken in furtherance of the following *purposes*:

- Making better technical decisions concerning such projects
- Solving technical problems which arise during the conduct of such projects
- Minimizing technical risks associated with such projects
- Developing and commercializing new commercial products and processes resulting from such projects, including intellectual property protections; and
- Screening for potential foreign involvement in technology development or commercialization activities.

Requests for TABA funding creditable to a TABA provider must include the following information or will be subject to denial:

- TABA provider(s)
- TABA provider(s) point of contact, email address, and phone number
- An explanation of the provider's unique qualifications to provide the TABA service
- Tasks that will be performed by the provider (to include the purpose and objective of the assistance). This task milestone list must track to the milestone payment schedule otherwise provided by the applicant.
- Total provider(s) cost, number of hours, and labor rates. Average/blended rates are acceptable.

If proposing TABA funding to hire new staff, augment staff, or direct staff to conduct or participate in training activities consistent with the purpose of TABA, the following must be included or may be subject to denial.

- Name(s), position(s), business need to be filled, and/or training to be provided
- Number of employees to be hired, augmented, or directed to participate in training activities
- Qualifications of employees hired or augmented, or detailed need for training
- Tasks that will be performed (to include both a description of the activity and the purpose that it will serve)
- Total staff/training cost, number of hours, and labor rates.

A detailed request for TABA funding (as specified above) must be included in the Volume 5: Supporting Documents in DSIP. TABA requests that only specify a TABA request value in Volume 3: Cost Proposal will not be considered.

METHOD OF SELECTION AND EVALUATION CRITERIA

D2P2 proposals are evaluated on a competitive basis by subject matter expert scientists, engineers, or other technical personnel. Throughout evaluation, selection, and award,

confidential proposal and evaluation information will be protected to the greatest extent possible. D2P2 proposals will be disqualified and not evaluated if the Phase I equivalency documentation does not establish the proposed technical approach's feasibility and technical merit.

Proposals will be evaluated for overall merit in accordance with the criteria outlined in the FY27 SBIR/STTR BAA Section 6.0. DAF is seeking varying technical/scientific approaches and/or varying and new technologies that would be responsive to the problem statement(s) and area(s) of interest in the topic. Multiple procurements are planned and anticipated to be awarded as a result of the topic, each proposal is considered a separate procurement and will be evaluated on its own merit, and that the Government may award all, some, or none of the proposals. Any per-award or per-topic funding caps are budgetary estimates only, and more or less funding may become available. Funding decisions are made with complete disregard to the other awards under the same topic.

OTHER FACTORS CONSIDERED DURING PROPOSAL EVALUATIONS

Foreign Risk Evaluation (15 U.S.C. §638(yy)

15 U.S.C. 638(yy), most recently updated by the Small Business Innovation and Economic Security Act of 2026, requires the Department of War, in coordination with the Small Business Administration, to implement a due diligence program to assess security risks presented by small business concerns seeking a Federally funded award.

In accordance with 15 U.S.C. §638, the DAF will evaluate all small business concerns that submit proposals under this release on whether the small business concern presents a security risk for any reason. The measures the DAF will use include:
-The Due Diligence Process pursuant to 15 U.S.C. §638(vv), executed through the DoW SBIR/STTR FRE Program,
-Disclosures required under 15 U.S.C. §638(g) and (o), and
-Coordination with the intelligence community, as defined in section 3 of the National Security Act of 1947 (50 U.S.C. §3003), Federal law enforcement, and other counterintelligence capabilities of the United States Government.

Due Diligence process in accordance with 15 USC §638(vv)

In accordance with 15 U.S.C. §638(vv), the DAF will review all proposals submitted in response to this release to assess security risks presented by small business concerns seeking a Federally funded award.

The DAF will assess using a risk-based based approach as appropriate:

i) the cybersecurity practices,
ii) patent analysis,
iii) employee analysis,
iv) foreign ownership of a small business concern seeking an award, including the financial ties and obligations (which shall include surety, equity, and debt obligations) of the small business concern and employees of the small business concern to a foreign country, foreign person, or foreign entity,
v) foreign affiliations of a covered individual, owner, or other key personnel of a small business concern with an entity in a foreign country of concern,
vi) investment relationships of a small business concerns with an individual or entity in a foreign country of concern,
vii) technology licensing agreements or joint ventures (including joint venture like agreements) with an individual or entity in a foreign country of concern, and
viii) business relationships between a covered individual, owner, or other key personnel of a small business concern and an individual or entity in a foreign country of concern.

The DAF will also assess proposals utilizing open-source analysis and analytical tools, for the nondisclosures of the information set forth in 15 U.S.C. §638(g)(13) or (o)(17) and examine any

relationship of a small business concern seeking an award to any entity or individual included on the lists described in subsections 15 U.S.C. §638(g(16)(D) and (o)(20)(D).

If DAF assesses that a small business concern has security risk(s), DAF will review the proposal, the evaluation, and the security risks and may choose to either 1) create a plan to mitigate the risk(s) or 2) DAF may decide to not select the proposal for award based upon a totality of the review.

Disclosures Submitted Under 15 U.S.C. §638(g)(13) or 15 U.S.C. §638(o)(17)
The DAF will evaluate whether applicant SBCs under this release present security risks for any reason through evaluation of disclosures submitted under 15 U.S.C. §638(g)(13) or (o)(17). Applicants will be required to disclose, under penalty of perjury, the representations, attestations, and certifications required under 15 U.S.C. §638(g)(13) and (o)(17). Applicants will fulfill these disclosure requirements by completing Volume VII: Disclosures of Foreign Affiliations or Relationships to Foreign Countries. In addition, a written statement with any substantial changes to a foreign disclosure form must be provided to the awarding agency within 30 days of any changes while on a project for the DAF. This review will be conducted as part of the DAF's Due Diligence process outlined above.

Denial of Awards under 15 U.S.C. §638(g)(16) or 15 U.S.C. §638(o)(20)
The DAF will not make an award if the DAF determines that the small business concern submitting the proposal:

Has an owner or covered individual that is party to a malign foreign talent recruitment program; has a business entity, parent company, or subsidiary located in the People's Republic of China or another foreign country of concern;
Has an owner or covered individual that has a foreign affiliation with a research institution located in the People's Republic of China or another foreign country of concern;
Has an owner or covered individual that has a foreign affiliation with a research institution located in the People's Republic of China or another foreign country of concern; or has a security risk connecting the SBC to an entity, including any affiliates of the entity, or individual on:

i) The UFLPA Entity List maintained by the Department of Homeland Security;
ii) The Non-SDN Chinese Military-Industrial Complex Companies List of the Office of Foreign Assets Control maintained by the Department of the Treasury;
iii) The Section 889 Prohibition List established under section 889 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Public Law 115-232; 132 Stat. 1917) and maintained by the Department of War;
iv) The list of Chinese Military Companies required under section 1260H of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (10 U.S.C. 113 note) and maintained by the Department of War;
v) The Military End User List maintained by the Bureau of Industry and Security of the Department of Commerce;
vi) The Entity List maintained by the Bureau of Industry and Security of the Department of Commerce;
vii) The List of Equipment and Services maintained by the Federal Communications Commission; or
viii) The Withhold Release Orders and Findings List maintained by U.S. Customs and Border Protection.

The DAF will not make an award if the DAF determines that the SBC submitting the proposal has a security risk with a primary source that is classified or has a security risk that the DAF determines warrants a denial.

Communication of Award Denials
Denial IAW 15 U.S.C. §638(g)(16) or 15 U.S.C. 638(o)(20): If the DAF denies an award in

accordance with 15 U.S.C. §638(g)(16) or (o)(20) or upon making a determination that the small business concern has a security risk described in that paragraph, the DAF will, as appropriate pursuant to the discretion of the DAF and in a manner that does not compromise security, provide a notification advising the small business: 1) of such determination, 2) the basis for such determination, and 3) a statement that denial of award does not prohibit the small business concern from being eligible for an award in a subsequent award cycle.

Denial IAW 15 U.S.C. § 638(vv): If the DAF denies an award as a result of the reviews and processes outlined in 15 U.S.C. §638(vv), the DAF will, as appropriate pursuant to the discretion of the DAF and in a manner that does not compromise security, a notification advising the small business: 1) of such determination, 2) the basis for such determination, and 3) a statement that denial of award does not prohibit the small business concern from being eligible for an award in a subsequent award cycle.

MAJORITY OWNERSHIP IN PART BY MULTIPLE VENTURE CAPITAL, HEDGE FUND, AND PRIVATE EQUITY FIRMS

Small business concerns that are owned in majority part by multiple venture capital operating companies (VCOCs), hedge funds, or private equity funds are not eligible to submit applications or receive awards for DAF Topics.

PERFORMANCE OF WORK REQUIREMENTS AND LOCATION OF WORK

Not less than 40% of the R/R&D work must be performed by the SBC, and not less than 30% of the R/R&D work must be performed by a single partnering research institution. The DAF measures percentage of work by both direct and indirect costs, not including profit. Deviations from these STTR requirements are not allowed, as the performance of work requirements are specified in statute at 15 USC 638(e).

All R/R&D work must be performed in the United States. Based on a rare and unique circumstance, the DAF may approve a particular portion of the R/R&D work to be performed or obtained in a country outside of the United States. The awarding Funding Agreement officer must approve each specific condition in writing. Applicants seeking this approval must make such a request with their initial proposal submission. The DAF will not consider these requests prior to proposal submission.

DAF USE OF SUPPORT CONTRACTORS

Restrictive notices notwithstanding, proposals may be handled for administrative purposes only, by support contractors. These support contractors may include, but are not limited to APEX, Peerless Technologies, Engineering Services Network, HPC- COM, Mile Two, REI Systems, MacB (an Alion company), Montech, Oasis, Canvas, and Infinite Management Solutions. In addition, only Government employees and technical personnel from Federally Funded Research and Development Centers (FFRDCs) MITRE and Aerospace Corporations working under contract to provide technical support to AF Life Cycle Management Center and Space Force may evaluate proposals. All support contractors are bound by appropriate non-disclosure agreements. **Contact the DAF SBIR/STTR Contracting Officer (Jennifer.Snell.5@us.af.mil) with concerns about any of these contractors**.

PROPOSAL STATUS AND FEEDBACK

The Principal Investigator (PI) and Corporate Official (CO) indicated on the Proposal Cover Sheet will be notified by e-mail regarding proposal selection or non-selection. Small Businesses will receive a notification for each proposal submitted. Please read each notification carefully and note the Proposal Number and Topic Number referenced.

Automated feedback will be provided for proposals designated Not Selected. Additional feedback may be provided at the sole discretion of the DAF.

IMPORTANT: Proposals submitted to the DAF are received and evaluated by different organizations, handled by topic. Each organization operates within its own schedule for proposal

evaluation and selection. Updates and notification timeframes will vary. If contacted regarding a proposal submission, it is not necessary to request information regarding additional submissions. Separate notifications are provided for each proposal.

DAF anticipates that all proposals will be evaluated and selections finalized within approximately 90 calendar days of solicitation close. Please refrain from contacting the DAF for proposal status before that time.

Refer to the DoW STTR Program BAA for procedures to protest the Announcement.
As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to: Air Force SBIR/STTR Contracting Officer Jennifer M. Snell, Jennifer.Snell.5@us.af.mil and to the individual PCO listed on your firm's selection notification. The DAF uses its best efforts to resolve concerns raised by interested parties at the contracting officer level through open and frank discussions. For agency protests, the DAF provides for inexpensive, informal, procedurally simple, and expeditious resolution of protests.

DAF SUBMISSION OF FINAL REPORTS

All Final Reports will be submitted to the awarding DAF organization in accordance with Contract instructions. Companies will not submit Final Reports directly to the Defense Technical Information Center (DTIC).

DAF
DoW 2027 STTR BAA
Direct to Phase II Topic Index
Release 2

Topic Number	Topic Name	Award Maximum Value*	Award Maximum Duration**	Technical Volume (Volume 2) Page/Slide Limit***
DAF27TZ02-DV004	B-52 Multi-Factor AI Performance Charts	$2,000,000.00	24	35
DAF27TZ02-DV005	RF Spectrum Operations Enhanced with Distributed AI-Assisted Sharing of Knowledge Sharing (RF-DASK)	$2,000,000.00	24	35
DAF27TZ02-DV006	Wideband Antenna for RF Photonics Modules	$2,000,000.00	24	35

*Proposals in excess of this amount will not be considered for evaluation or award.
**Proposals in excess of this duration will not be considered for evaluation or award.
***Pages/slides in excess of this number will not be considered during evaluations.

DAF27TZ02-DV004 TITLE: B-52 Multi-Factor AI Performance Charts

OUSW(R&E) CRITICAL TECHNOLOGY AREA(S): Applied Super Intelligence (ASI)

COMPONENT TECHNOLOGY PRIORITY AREA(S): Trusted AI and Autonomy

PROJECTED CMMC LEVEL REQUIREMENT: Level 2 (Self)

OBJECTIVE: Develop and validate a capability that modernizes B-52 AI Performance Chart capability that automates approved performance calculations, supports disconnected EFB operations, and provides accurate, auditable outputs for aircrew decision-making.

DESCRIPTION: The B-52 Stratofortress has been the backbone of the United States Air Force's long-range strategic bomber capability for more than six decades. Despite multiple upgrades to its avionics and mission systems, aircrews continue to rely on labor-intensive, manually interpreted paper Technical Order performance charts and multi-step worksheets to calculate critical operational calculations such as takeoff and landing distances, brake energy limits, crosswind restrictions, runway condition impacts, directional control limits, and degraded-performance scenarios. These manual processes are time-consuming, increase cognitive workload and introduce opportunities for human error, and require aircrews to make high-stakes decisions under challenging time constraints, often during dynamic operational scenarios. Continued reliance on manual processes reduces operational efficiency, increases crew workload, and can negatively impact decision-making, especially in contested or degraded environments.

The current state of the art within commercial aviation utilizes Electronic Flight Bag (EFB)-based performance planning tools capable of rapidly calculating aircraft performance using approved aircraft data and validated calculation methodologies. While these solutions demonstrate the feasibility of digital performance-planning capabilities, they do not incorporate B-52-specific TO data, military performance procedures, cybersecurity requirements, airworthiness considerations, or Department of the Air Force EFB integration requirements. As a result, a capability gap exists between current B-52 performance-planning processes and modern digital aviation decision-support systems. The proposed effort will begin at approximately TRL 3-4, leveraging prior Phase-I-like work including operational requirements analysis, commercial market research, chart digitization methodologies, deterministic algorithm concepts, and successful demonstrations of related technologies in both government and commercial aviation sectors. Commercial aviation performance applications, technical-order digitization technologies, and deterministic calculation engines have demonstrated feasibility and provide a strong foundation for this effort. The objective of the Phase II effort is to advance the capability to TRL 6 through development, validation, and operational demonstration of a prototype capability suitable for transition into the Air Force EFB ecosystem. The Government is particularly interested in approaches that leverage secure research infrastructure, advanced computing resources, AI-assisted data extraction capabilities, and development of government-owned intellectual property to accelerate chart digitization, data validation, and long-term sustainment. Additionally, the Government seeks to leverage existing federally funded research investments such as those within U.S. National Laboratories or other Federally Funded Research & Development Centers (FFRDCs) to the maximum extent possible. Leveraging existing investments around AI security, vulnerability assessments, red teaming, model assurance, secure deployment of advanced models, and evaluation of AI systems supporting national security missions will help accelerate technology maturation and transition.

To meet this goal, the Phase II D2P2 effort is expected to include the following activities:

1. Integration of the AI-driven solution for chart mining and digitization to extract data; Refinement of deterministic algorithms to calculate performance metrics (e.g., takeoff/landing distances, brake energy limits, crosswind tolerances) based on TO and other authoritative data sources.

2. Development of intuitive user interface and operational workflows that align with aircrew feedback and mission requirements, ensuring a transparent and user-friendly application.

3. Rigorous testing and validation of algorithm accuracy, decision-support reliability, and adherence to airworthiness and compliance standards, incorporating inputs from operational stakeholders and SMEs.

4. Coordination with USG relevant Program Offices and certification authorities to support EFB system accreditation, operational testing, and fielding - this would translate into the existing U.S. Government EFB system with offline capabilities to ensure reliable operation in contested, degraded, or denied environments.

5. Coordination with U.S. National Laboratories or FFRDCs already investing in similar capabilities to enable rapid technology advancement, alignment of development roadmaps towards broader national security priorities, and aid in the transition into operational systems.

This STTR effort stands to vastly improve the DoW's technological state by eliminating the inefficiencies of current manual performance calculations and transitioning the B-52 platform into a new era of data-driven, AI-enhanced operations that rapidly generate transparent and auditable aircraft performance assessments using approved source data. The capability shall not generate unvalidated performance estimates, extrapolated values, or inferred outputs when required data are unavailable or outside approved limits. The resulting solution will enable faster, more reliable decision-making, directly enhancing safety and mission outcomes while reducing aircrew workload. Moreover, the offline functionality ensures the tool's efficacy in a range of operational environments, including denied, degraded, and contested settings. Minimum acceptable deliverables include:

• A prototype closed loop EFB-compatible software capability suitable for operational evaluation.

• Digitized and validated performance datasets derived from approved B-52 source material.

• Verified and validated calculation methodologies demonstrating agreement with approved reference calculations.

• User workflows and interfaces suitable for operational aircrew use.

• Test and validation reports documenting accuracy, reliability, and operational suitability.

• Sustainment and transition documentation supporting future EFB integration, cybersecurity accreditation, airworthiness review, and operational fielding.

Through these efforts, the B-52 will evolve to keep pace with the Air Force’s operational imperatives, including enhanced readiness to deploy and fight (Operational Imperative 7) and modernization priorities such as trusted AI and autonomy. Success in Phase II will position this innovation for further development and transition under Phase III, facilitating its adoption as a fielded capability that aligns with the U.S. Air Force’s modernization goals and long-term sustainment strategy for the B-52 fleet.

PHASE I: As this is a STTR Direct-to-Phase-II (D2P2) topic, no Phase I awards will be made. To qualify, applicants must demonstrate feasibility via prior "Phase I-type" efforts, providing data validating deterministic algorithms. Documentation should include validated algorithm outputs, prototype results, proving accuracy and offline functionality.

PHASE II: Phase II will produce a validated, EFB-integrated AI Performance Chart prototype for the B-52, delivering automated, traceable outputs for critical performance metrics like takeoff/landing distances and brake energy limits. Achievements include TO-compliant algorithm validation, rigorous offline testing, and a prototype demonstration in an operationally relevant environment to enhance mission safety, efficiency, and readiness in contested environments. The prototype should be cyber-compliant for EFB use, and demonstrate feasibility of digitized, automated performance decision support—without attempting full-scale automation, certification, or fleet deployment.

Phase II Technical Efforts include:- Integration of the AI-driven solution for chart mining and digitization to extract data; software model optimization techniques and high performance computing desired.

- Must be closed loop in flight application without reliance on internet, cloud, AI inference, or other external sources

- Compatible with existing Government Hardware.- Approaches that leverage secure research environments, high-performance computing (HPC) resources, deep scientific expertise, cutting-edge research facilities, AI-assisted data extraction capabilities, and expertise in model optimization and reduction are highly desirable to accelerate chart digitization, improve validation processes, support handling of CUI data, and enable deployment on resource-constrained EFB platforms.

- Refinement of deterministic algorithms to calculate performance metrics (e.g., takeoff/landing distances, brake energy limits, crosswind tolerances) based on TO and other authoritative data sources.

- Development of intuitive user interface and operational workflows that align with aircrew feedback and mission requirements, ensuring a transparent and user-friendly application.

- Rigorous testing and validation of algorithm accuracy, decision-support reliability, and adherence to airworthiness and compliance standards, incorporating inputs from operational stakeholders and SMEs.

- Prevent generation of unvalidated performance data/estimates when inputs are unclear, outside performance parameters, or unknown.

- Coordination with USG relevant Program Offices and certification authorities to support EFB system accreditation, and operational test. This would translate into the existing U.S. Government EFB system with offline capabilities to ensure reliable operation in contested, degraded, or denied environments.

- Coordination with U.S. National Laboratories or FFRDCs already investing in similar capabilities to enable rapid technology advancement, alignment of development roadmaps towards broader national security priorities, and aid in the transition into operational systems.

PHASE III DUAL USE APPLICATIONS: Expected TRL at entry is approximately TRL 6. The Phase III effort will field a certified, TO-compliant AI-driven EFB system for B-52 performance calculations, enhancing mission readiness and safety. Expected activities in Phase 3 include: operational test and evaluation, USG certification activities, fielding, and training. In addition, a long term sustainment and funding model should be in place for continuous revisions and updates to the TOs. Commercial aviation is well advanced in this arena so will not benefit. Other industries that rely on legacy data, however, may benefit from chart digitization and software model reduction techniques. Transition strategies include collaboration with the B-52 SPO for deployment and aligning with broader Air Force AI modernization goals. Coordination is already in place with the B-52 and EFB program offices to include long term funding plans. Following successful fielding on the B-52 platform, the framework may be expanded to additional Air Force aircraft communities that continue to rely on manual TO performance-chart calculations, including mobility, tanker, ISR, training, and other legacy aircraft platforms. This could also be leveraged DoW wide for all organizations that continue to rely on legacy data.

REFERENCES:

1. Technical Order 1B-52H-1-1, "Flight Manual, B-52H Airplane Performance Data," United States Air Force, latest update available
2. United States Air Force Operational Imperatives, with emphasis on Operational Imperative 7: "Readiness to Deploy and Fight," Air Force Modernization Priorities, 2023

3. Department of Defense Directive 3000.09, "Autonomy in Weapon Systems," 2023, outlining trusted autonomy and AI implementation guidelines
4. "B-52 Stratofortress Sustainment Program: Advancing Operational Efficiency through Technology Modernization," US Air Force Global Strike Command Report, 2022
5. Federal Aviation Administration (FAA) Advisory Circular 61-23C, "Pilot's Handbook of Aeronautical Knowledge," highlighting best practices for performance factors, calculations, and operational safety in aviation-related decision-making
6. IEEE 12207:2017, "Systems and software engineering – Software life cycle processes," addressing standards for software development lifecycles, relevant to the EFB software integration
7. "Applications of Deterministic Algorithms in Aviation Performance Metrics," Journal of Aerospace Information Systems, Vol. 15, No. 4, April 2022
8. AFWERX Technology Transition Strategy Best Practices Guidelines, relevant for transitioning innovative capabilities into operational use, 2023.National Defense Strategy of the United States of America, 2022, emphasizing modernization priorities for strategic bombers and integration of advanced technologies like AI
9. "Optimizing Large Aircraft Performance in Contested Environments Using Deterministic Algorithms," Proceedings of the NATO Science & Technology Organization Workshop on Mission-Specific Aircraft Enhancements, 2021.
10. "National labs work to optimize AI infrastructure amid Genesis Mission"https://fedscoop.com/doe-national-labs-ai-infrastructure-data-center/,"ORNL and VA Use Security Framework on Summit for Health Research"https://www.hpcwire.com/off-the-wire/ornl-and-va-use-security-framework-on-summit-for-health-research/

KEYWORDS: B-52; AI Performance Charts; Electronic Flight Bag; Deterministic Algorithms; Aircraft Performance; Offline Capability; Operational Efficiency; Technical Orders; Aircrew Decision Support; Trusted AI; AI for National Security, AI Centers of Excellence

DAF27TZ02-DV005 TITLE: RF Spectrum Operations Enhanced with Distributed AI-Assisted Sharing of Knowledge Sharing (RF-DASK)

OUSW(R&E) CRITICAL TECHNOLOGY AREA(S): Applied Super Intelligence (ASI)

COMPONENT TECHNOLOGY PRIORITY AREA(S): Emerging Threat Reduction, Advanced Computing and Software

PROJECTED CMMC LEVEL REQUIREMENT: Level 2 (Self)

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 a dynamic and scalable signal representation to describe complex waveforms in a compressed format for RF spectrum knowledge sharing between Electronic Support (ES) systems and control the deployment and operation of Electronic Countermeasures. The proposed solution should support distributed operation in a network along with perform emitter detection, classification and geolocation.

DESCRIPTION: Current ES systems are designed to detect enemy electronic signals by extracting Pulse Descriptor Words (PDWs) from these signals. Modern radar systems used by adversaries increasingly employ Artificial Intelligence (AI) and it is becoming increasingly difficult to identify, characterize, and represent their waveforms using PDWs alone.

To deploy effective Electronic Countermeasures (ECM), there is a need to develop novel methods, including machine learning (ML) [1,2] to enable dynamic and scalable data representation and compression methods that represent complex waveforms, which can be efficiently shared with other nodes in the network. The main goal of this project is to develop advanced techniques for dynamic and scalable signal representation to describe complex waveforms in a compressed format for radio frequency (RF) spectrum knowledge sharing and support network level information dissemination for emitter detection, classification and geolocation representative of activity segmentation [3]. Operational size, weight and power (SWaP) constraints should be determined to implement the proposed algorithms on hardware platforms and the developed techniques should be evaluated and demonstrated with hardware-in-the-loop experiments in relevant spectrum environments.

PHASE I: As this is a Direct-to-Phase II (D2P2) topic, no Phase I awards will be made. The offeror is required to provide detail and documentation in the Direct to Phase II proposal which demonstrates accomplishment of a “Phase I-like” effort, including a feasibility study. This includes determining, insofar as possible, the scientific and technical merit and feasibility of ideas appearing to have commercial potential. It must have validated the product-market fit between the proposed solution and a potential Air Force stakeholder. The offeror should have defined a clear, immediately actionable plan with the proposed solution and the AF customer. Relevant areas of demonstrated experience and success include high-fidelity M&S, solutions to complex RF problems using AI/ML, concept development, solution demonstration and product evaluation.

PHASE II: Eligibility for a Direct to Phase Two (D2P2) is predicated on the offeror having performed a “Phase I-like” effort predominantly separate from the SBIR/STTR Programs. These efforts will include M&S, simulation of prototype concepts, cost benefit analysis, system-of-systems studies, experimentation and evaluation of operational imperatives to enable future concepts. Prototypes, M&S and experimentation should explore a wide range of integrating commercial capabilities to

support the operational imperatives. These capabilities should consider areas that are unique to military operations, logistics, mission planning, mission execution, base sustainment and logistics.

An important goal for Phase II effort is to demonstrate the baseline and proposed PDW extraction methods and analyze performance through both simulation and hardware experiments. Experiments should address military-unique requirements that may not be otherwise met by commercial capabilities.

PHASE III DUAL USE APPLICATIONS: Phase III shall include upgrades to the analysis, M&S, T&E results and provide mature prototypes of system concepts. Phase III shall provide a business plan and address the ability to transition technology and system concepts to commercial applications. The adapted non-Defense commercial solutions shall provide expanded mission capability for a broad range of potential Governmental and civilian users and alternate mission applications. Integration and other technical support to operational users may be required.

REFERENCES:

1. S. Apfeld, A. Charlish, “Recognition of Unknown Radar Emitters with Machine Learning,” IEEE Transactions on Aerospace and Electronic Systems Vol. 57, No. 6, 2021.

2. M. Demircan and A. G. Pakfiliz, “A Novel Machine Learning Approach for Optimizing Radar Warning Receiver Preprogramming,” Acadlore Trans. Mach. Learn., vol. 3, no. 4, pp. 202-213, 2024.

3. Z. Huang, A. Pemasiri, S. Denman, C. Fookes and T. Martin, “Multi-Stage Learning for Radar Pulse Activity Segmentation,” IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), pp. 7340-7344, 2024.

KEYWORDS: Radar, Pulse Descriptor Words, Artificial Intelligence, Machine Learning, Deep Learning Neural Networks, Emitter Identification, Classification, Geolocation

DAF27TZ02-DV006 TITLE: Wideband Antenna for RF Photonics Modules

OUSW(R&E) CRITICAL TECHNOLOGY AREA(S): Quantum and Battlefield Information Dominance (Q-BID)

COMPONENT TECHNOLOGY PRIORITY AREA(S): Integrated Sensing and Cyber, Microelectronics

PROJECTED CMMC LEVEL REQUIREMENT: Level 2 (Self)

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: Design, fabricate, and experimentally test a wideband antenna solution ready to be integrated with standard RF-photonics transceiver modules. The antenna module must satisfy two key requirements. First, they should be fully compatible with standard packaging assemblies of RF-photonic modules. Second, they must deliver stable and efficient performance across a broad frequency bandwidth. However, integrating antennas with RF-photonic modules presents a significant challenge due to the electrically small size of the antennas and the bandwidth limitations imposed by Chu's limit. To address this challenge, innovative antenna designs are required. These solutions may incorporate passive and/or nonlinear materials or elements to counteract the dispersive behavior of the antenna and enable broadband radiation while remaining suitable for integration with RF-photonic modules. The final design should ensure seamless integration of the RF-photonic and antenna modules, enabling them to work synergistically with minimized size, weight, power, and cost (SWaP-C).

DESCRIPTION: Given its inherent broadband capabilities, RF photonics is a promising technology for both civilian and military applications. It is employed in several platforms, including autonomous vehicles, UAVs, and mobile devices, to sense and navigate complex environments and detect and track mobile targets, among many other use-case scenarios.

Current studies are establishing and advancing RF photonic technology for several applications. However, these advances, especially in the radio frequencies or lower millimeter-wave regime, are still based on bulky antenna solutions, preventing the realization of compact systems that can be easily accommodated in small platforms. Proposals are sought to provide innovative antenna solutions addressing the need for integration with commonly packaged RF photonic modules without impacting their operation bandwidth. The proposed efforts shall build upon the existing integration-friendly antenna solutions to develop a novel antenna technology amenable to integrating electrically small broadband RF-photonic modules. By the end of Phase I, a broadband antenna module compatible with RF-photonics should be numerically analyzed. Phase II should focus on a proof-of-concept experiment of the integrated broadband antenna module with a selected RF photonics system.

Overall, this topic aims to advance RF photonics technology with integrated antennas to meet demanding requirements, such as large bandwidth, reduced size and weight, and low profile. Relevant metrics that the proposers should consider are an antenna solution fully compatible to be integrated with the standard packaging topologies of RF photonic modules, an antenna module with excellent performance in the high RF regime, and with a bandwidth beyond Chu's limit.

PHASE I: As this is a Direct-to-Phase II (D2P2) topic, no Phase I awards will be made. In the Phase I effort, a feasibility study and initial development of the proposed antenna solution will be carried out. This endeavor should involve the design of the antenna module. Comparison between the proposed

and the simulation-backed-up performance metrics, including the level of integration and isolation, the operational bandwidth, return loss, and radiation efficiency, should be carried out. At the completion of this phase, a preliminary design of the antenna module, meeting the indicated metrics for the proof-of-concept experiment, will be demonstrated and reported.

PHASE II: The Phase II effort should begin by finalizing and completing the design for the proof-of-concept experiment started at the end of Phase I. The performer shall accomplish the fabrication and complete characterization of the designed antenna module, including integration with a selected RF photonic module. Characterization should include the frequency dependence of parameters such as radiation pattern, return loss, efficiency, group delay, and isolation. A comparison among the proposed, simulation-backed-up, and experimental metrics shall be reported, along with relevant analyses and discussion. This phase should conclude with the experimental verification of the prototype antenna.

PHASE III DUAL USE APPLICATIONS: The Phase III effort should focus on additional research and refinement of the antenna module designed and experimentally tested in Phases I and II. The design of the final antenna module should incorporate the update in the design procedures guided by the experimental results conducted in Phase II. Manufacturability specific to the Air Force Concept of Operations (CONOPS) and end-user requirements will be examined. The study and development of low-profile broadband antenna solutions that can be integrated with RF photonic modules can benefit numerous programs within the DOD and several applications in commercial markets.

REFERENCES:

1. S. Shi*et al*., "Ultrawideband Modular RF Frontend Development for Photonically Enabled Imaging Receiver," in*IEEE Microwave and Wireless Technology Letters*, vol. 34, no. 6, pp. 805-808, June 2024
2. C. Ma*et al*., "High-Resolution Microwave Photonic Radar With Sparse Stepped Frequency Chirp Signals," in*IEEE Transactions on Geoscience and Remote Sensing*, vol. 60, pp. 1-10, 2022
3. D. W. Prather*et al*., "Fourier-Optics Based Opto-Electronic Architectures for Simultaneous Multi-Band, Multi-Beam, and Wideband Transmit and Receive Phased Arrays," in*IEEE Access*, vol. 11, pp. 18082-18106, 2023

KEYWORDS: Integrated antennas; RF photonics; antenna-in-package; imaging; Chu’s limit; sensors