



Broad Agency Announcement
ELectronics for G-band ARrays (ELGAR)
Microsystems Technology Office
HR001121S0042
September 30, 2021

Table of Contents

PART I: OVERVIEW INFORMATION	4
PART II: FULL TEXT OF ANNOUNCEMENT	5
I. Funding Opportunity Description	5
A. Background	5
B. Program Description	8
C. Program Structure	9
D. Technical Area	10
E. Schedule/Milestones	12
F. Deliverables	13
G. Government Furnished Equipment/Property/Information	13
H. Intellectual Property	14
II. Award Information	14
A. General Award Information	14
B. Fundamental Research	15
III. Eligibility Information	16
A. Eligible Applicants	16
1. Federally Funded Research and Development Centers (FFRDCs) and Government Entities	16
2. Other Applicants	16
B. Organizational Conflicts of Interest	17
C. Cost Sharing/Matching	17
IV. Application and Submission Information	18
A. Address to Request Application Package	18
B. Content and Form of Application Submission	18
1. Abstract Format	18
2. Full Proposal Format	19
3. Proprietary Information	28
4. Security Information	29
a. Program Security Information	29
b. Controlled Unclassified Information (CUI)	29
i. CUI Proposal Markings	29
ii. CUI Submission Requirements	29
c. Unclassified Submissions	29
d. Classified Submissions	30
5. Disclosure of Information and Compliance with Safeguarding Covered Defense Information Controls	33
6. Human Subjects Research (HSR)/Animal Use	33
7. Approved Cost Accounting System Documentation	33
8. Section 508 of the Rehabilitation Act (29 U.S.C. § 749d)/FAR 39.2	34
9. Small Business Subcontracting Plan	34
10. Intellectual Property	34
a. For Procurement Contracts	34
b. For All Non-Procurement Contracts	34
11. Patents	35

12. System for Award Management (SAM) and Universal Identifier Requirements35

13. Funding Restrictions.....35

C. Submission Information.....35

1. Submission Dates and Times.....36

a. Abstract Due Date.....36

b. Full Proposal Date.....36

c. Frequently Asked Questions (FAQ).....36

2. Abstract Submission Information.....36

3. Proposal Submission Information.....37

a. For Proposers Requesting Technology Investment Agreements.....37

b. For Proposers Requesting Contracts or Other Transaction Agreements.....38

c. Classified Submission Information.....39

4. Other Submission Requirements.....39

V. Application Review Information.....39

A. Evaluation Criteria.....39

1. Overall Scientific and Technical Merit.....39

2. Potential Contribution and Relevance to the DARPA Mission.....40

3. Cost Realism.....40

B. Review and Selection Process.....40

1. Review Process.....40

2. Handling of Source Selection Information.....41

3. Federal Awardee Performance and Integrity Information (FAPIS).....41

VI. Award Administration Information.....42

A. Selection Notices.....42

1. Abstracts.....42

2. Proposals.....42

B. Administrative and National Policy Requirements.....42

1. Meeting and Travel Requirements.....42

2. Solicitation Provisions and Award Clauses, Terms and Conditions.....42

3. Controlled Unclassified Information (CUI) and Controlled Technical Information (CTI) on Non-DoD Information Systems.....42

4. Representations and Certifications.....42

C. Reporting.....43

D. Electronic Systems.....43

1. Wide Area Work Flow (WAWF).....43

2. i-Edison.....43

3. Vault.....43

4. DARPA Embedded Entrepreneurship Initiative (EEI).....43

VII. Agency Contacts.....45

VIII. Other Information.....45

A. Proposers Day.....45

A. Protesting.....45

ATTACHMENT 1: Cost Volume Proposer Checklist

ATTACHMENT 2: Proposal Summary Slide Template

ATTACHMENT 3: ELGAR Controlled Unclassified Information (CUI) Guide

PART I: OVERVIEW INFORMATION

- **Federal Agency Name:** Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office (MTO)
- **Funding Opportunity Title:** EElectronics for G-band ARrays (ELGAR)
- **Announcement Type:** Initial Announcement
- **Funding Opportunity Number:** HR001121S0042
- **Catalog of Federal Domestic Assistance Numbers (CFDA):** Not applicable
- **Dates:** (All times listed herein are Eastern Time)
 - Posting Date: September 30, 2021
 - Proposers Day: October 12, 2021
 - Abstract Due Date: October 29, 2021
 - FAQ Submission Deadline: November 29, 2021
 - Proposal Due Date: December 13, 2021
 - Estimated period of performance start: May 2022
- **Concise description of the funding opportunity:** The ELGAR program will develop the integration technologies needed to create compact, high-performance RF electronics, including monolithic microwave/millimeter wave integrated circuits (MMICs) and transmit and receive array front-end test articles, to enable communication and sensing systems at G-band frequencies.
- **Anticipated Funding Available for Award:** Approximately \$55M of total funding is anticipated for awards made against this BAA.
- **Anticipated individual awards:** Multiple awards are anticipated.
- **Anticipated funding type:** 6.2
- **Types of instruments that may be awarded:** Procurement contract or other transaction.
- **Agency contact:**
 - Dr. Thomas Kazior, Program Manager
BAA Coordinator: HR001121S0042@darpa.mil
DARPA/MTO
ATTN: HR001121S0042
675 North Randolph Street
Arlington, VA 22203-2114

PART II: FULL TEXT OF ANNOUNCEMENT

I. Funding Opportunity Description

The Defense Advanced Research Projects Agency (DARPA) often selects its research efforts through the Broad Agency Announcement (BAA) process. This BAA is being issued, and any resultant selection will be made, using the procedures under Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 and 2 C.F.R. § 200.203. Any negotiations and/or awards will use procedures under FAR 15.4, Contract Pricing. Proposals received as a result of this BAA shall be evaluated in accordance with evaluation criteria specified herein through a scientific review process.

DARPA BAAs are posted on the SAM website, under the Contract Opportunities link, at <https://sam.gov/>. The following information is for those wishing to respond to the BAA.

The Microsystems Technology Office at DARPA seeks innovative proposals to develop fabrication and integration technologies needed to create compact, high-performance III-V RF electronics, including MMICs and transmit and receive array front-end test articles, to enable communication and sensing systems at G-band frequencies. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

A. Background

Due to the growing, insatiable thirst for information, both commercial and defense communications are driving towards increasingly higher data rates and wider bandwidths of operation. This in turn is driving systems toward higher operating frequencies, which more easily supports larger channel bandwidths. For example, today's cellular networks (i.e., cellular networks based on 5G, the fifth-generation technology standard) operate at 6 GHz and below with development underway for 5G at millimeter wave frequencies (from 24.25 GHz to 52.60 GHz). 6G is anticipated to push to even higher millimeter wave frequencies in pursuit of even larger channel bandwidths and higher channel capacities.

The upper millimeter-wave band, known as G-band (110 GHz to 300 GHz), represents an attractive, underutilized portion of the EM spectrum for high data rate communications applications. From the achievable communication channel capacity perspective, particularly appealing is the portion of G-band above 200 GHz, where a local minimum in atmospheric absorption (i.e., an atmospheric transmission window) is located. However, adequate RF electronics does not exist today to support operation in this frequency band, particularly for size, weight and power (SWaP) constrained applications. In particular, the efficiency of G-band electronics is poor (i.e., in single digits) and must be addressed to make G-band systems viable.

As has been the case for communications at lower frequencies, phased arrays and massive multiple-input multiple-output (MIMO) operation are the preferred implementation solution for millimeter-wave systems. In an array, the antenna elements and associated transmit and receive electronics are typically spaced on a $\lambda/2$ lattice grid to enable wide angle scanning while minimizing main beam sidelobes. At G-band, the $\lambda/2$ lattice size is between 0.5 mm and 1.4 mm,

which places a significant constraint on the allowable physical area into which the RF electronics must fit. At the same time, data rate, range, and sensitivity are directly proportional to the amount of power that can be radiated from the array face. High data rate communication links, therefore require high output power density.

G-band arrays can be implemented using either silicon-based (e.g., CMOS, SiGe) RF integrated circuits (ICs) or III-V compound semiconductor (e.g., GaAs, GaN, InP) MMICs. Each approach has advantages but also limitations.

The dense, planar, multi-layer back end of line (BEOL) interconnects and integration technologies developed for commercial electronics have made possible silicon-based G-band RF ICs that physically fit into the $\lambda/2$ lattice. In addition, silicon technology includes compact, low-loss through-substrate vias (TSVs), micro-bump interconnects, and mature integration processes to vertically integrate silicon RF ICs with other array components using low-loss RF interconnects. The silicon RF IC and integration technology have been used to successfully demonstrate phased arrays that operate at G-band.¹

On the other hand, silicon-based solutions have limited RF output power and efficiency due to the fundamental gain and breakdown voltage limitations of the silicon-based transistors. For example, from first principles calculations, the maximum achievable efficiency for a 220 GHz G-band Si transistor is ~24%. Since power amplifiers (PAs) are created by combining multiple transistors to increase output power, the transistor efficiency sets a fundamental upper limit to the PA efficiency (~18% at 220 GHz). This theoretical limit is not achievable in practice due to losses associated with PA impedance matching and power combining networks. Consequently, the power-added efficiencies (PAE) of silicon-based G-band PAs have been limited to less than 10% for frequencies greater than 150 GHz (Figure 1).

Through significant investment in programs such as Sub-millimeter Wave Imaging Focal-plane Technology (SWIFT), Terahertz (THz) Electronics, and Nitride Electronic NeXt-Generation Technology (NEXT), DARPA has successfully developed III-V *transistor* technologies (e.g., InP, GaN) capable of overcoming the gain and breakdown voltage limitations of the silicon-based transistors at G-band. For example, due to the high breakdown field and carrier velocity inherent in III-V materials, III-V transistors that operate at G-band (220 GHz) can theoretically achieve > 39% PAE, setting a fundamental upper limit to the PA efficiency of > 30 % (see Figure 1). Also, III-V multi-finger transistor cells can generate an output power in excess of 40 mW at G-band, so relatively few transistor cells need be combined to achieve considerable PA output power levels. For example, III-V based G-band PAs exceeding 200 mW of output power at 200 GHz have been demonstrated.²

However, while the III-V based transistors have been scaled to support G-band operation, the BEOL interconnects and integration techniques in III-V-based technologies have not been scaled. As a result, the existing III-V fabrication processes, which typically offers only two to

¹ M. Elkhoully et al., "D-band Phased-Array TX and RX Front Ends Utilizing Radio-on-Glass Technology," 2020 IEEE Radio Frequency Integrated Circuits Symposium (RFIC), 2020, pp. 91-94.

² Z. Griffith, M. Urteaga, P. Rowell, "180-265 GHz, 17-24 dBm Output Power Broadband, High-Gain Power Amplifiers in InP HBT," 2017 IEEE MTT-S International Microwave Symposium, pp. 973-976, June 2017.

four non-planar on-chip interconnect metal layers, impose a fundamental limitation on the achievable performance of III-V circuits. In particular, the III-V on-chip interconnects are large and inefficient, leading to passive circuits such as impedance matching and power combining networks that are physically large and lossy. In turn, this has resulted in PA MMICs that do not physically fit within the $\lambda/2$ G-band array lattice and are severely limited to less than 10% achievable PAE for frequencies greater than 150 GHz. (see Figure 1). For example, in a published ~ 100 mW III-V G-band PA MMIC, the total area of the interconnects and passive circuits alone far exceeds the available $\lambda/2$ G-band lattice area at 220 GHz.² In other published G-band PAs operating at 220 GHz the measured PAE is limited to considerably less than 10%, even though the output powers achieved by some of those PAs are substantially greater than 100 mW (see Figure 1). In addition to on-chip interconnect limitations, III-V TSVs and vertical off-chip interconnects also are large and unacceptably lossy. Insertion loss of 3 dB or more for a PA-to-antenna connection is typical, meaning that more than half of the PA output power or more will be lost before being transmitted. This loss is primarily due to the impedance mismatch between the on-chip components (i.e., transmission lines), TSVs, and the off-chip interconnects. This loss severely limits the performance of complex circuits and subsystems such as phased arrays.

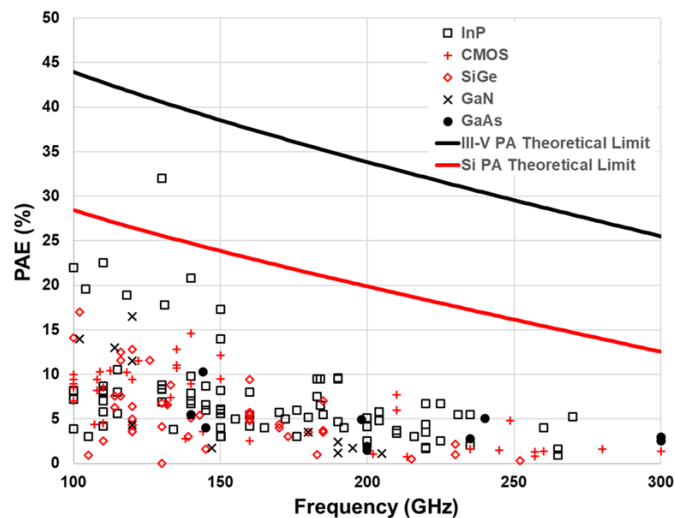


Figure 1. Measured PAE (data points) and theoretical (solid lines) PAE limits for G-band PAs based on Si CMOS, SiGe HBTs, GaAs pHEMTs, GaN HEMTs and InP HBTs. (Buckwalter, private communication, 2021)

As a result, novel integration approaches are needed that will make it possible to combine the superior BEOL and interconnect features of silicon-based technologies with the superior RF performance of the III-V compound semiconductor transistors in order to realize compact, efficient, G-band MMICs and array front-ends. As a part of this initiative, DARPA is interested in novel heterogeneous integration approaches that result in transmit and receive circuit compactness needed to fit all array element electronics within the $\lambda/2$ G-band lattice spacing and enable a revolutionary increase in power density and power efficiency of MMICs and phased arrays at G-band.

B. Program Description

The ELGAR program seeks to develop *integration technologies* needed to create compact, high-performance III-V RF electronics to enable communication and sensing systems at G-band frequencies. These integration technologies include dense, silicon-like, on-chip BEOL and low-loss chip-to-chip interconnects. Once developed, the integration technologies will be leveraged to implement demonstration and validation circuits and test articles including compact, high-efficiency G-band Power Amplifier (PA) MMICs and transmit and receive array front-end test articles that operate at 220 GHz. DARPA anticipates that the most challenging performance aspects of these MMICs and array test articles will be achieving 30% PA PAE, and $> 34 \text{ W/cm}^2$ transmit array power density and 24% transmit array efficiency at the 220 GHz operating frequency (see Figure 2). The MMICs, array front-end test articles, and interconnects will be constrained to a $\lambda/2$ lattice spacing. The array test articles must be able to transmit and receive, at a minimum, circularly polarized signals.

As shown in Figure 2, currently achievable G-band power amplifier performance falls short of the ELGAR goals. While MMIC power or power density can be increased by combining more transistor cells, the power density increase will come at the expense of even lower efficiency.

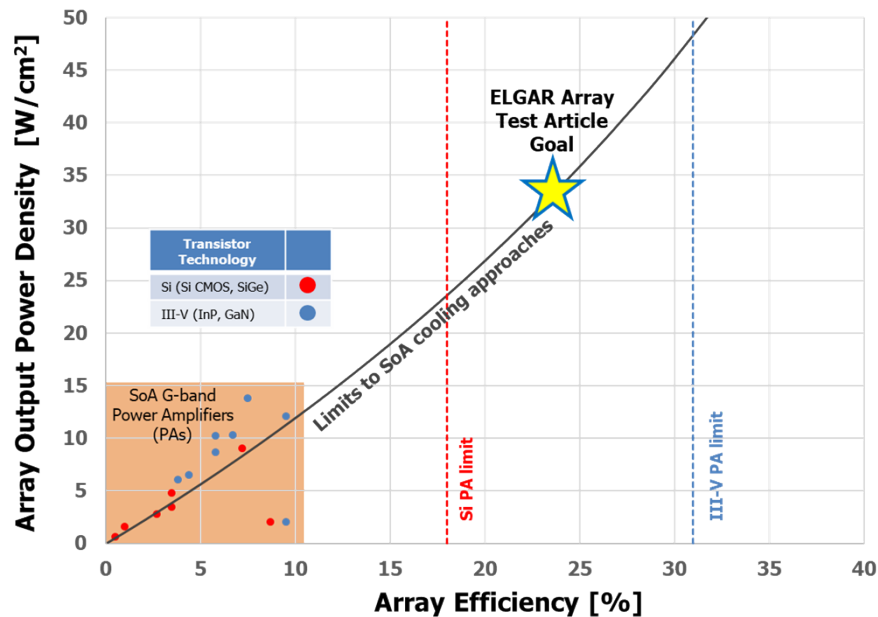


Figure 2. ELGAR array front-end test article 220 GHz power density and efficiency goals compared to published G-band III-V MMICs and Si RFICs from 180 GHz to 240 GHz. Higher array output power density requires higher MMIC and array efficiency due to thermal management constraints.

To achieve these program objectives, ELGAR must overcome two (2) technical challenges:

1) *Achieving efficient, compact G-band MMICs with high output power density*

ELGAR seeks to develop on-chip integration technologies that will simultaneously enable MMIC compaction (to increase power density), reduction in loss (to increase PAE), and

minimization of mechanical stress (from compact multi-layer interconnects) while maintaining the superior RF performance of III-V transistors. Approaches may include but are not limited to:

- III-V-compatible, Si-like Cu damascene or similar planar multi-layer metal interconnects
- Advanced ultra-low-k interlayer dielectrics such as porous oxides, air cavities or similar materials/structures to minimize capacitance
- Novel, low-loss, compact impedance matching and combining networks enabled by the availability of more interconnect layers
- Robust, on-chip capacitors (e.g., MIM caps with high-k dielectrics) with reduced footprint for use in high density on-chip bypass capacitors
- Novel approaches for compacting or reducing the footprint of and loss in multi-finger III-V transistor cells (Note: Development of new III-V device epitaxial layer structures or intrinsic transistor structures is out-of-scope.)
- Novel approaches for routing of bias, RF and ground lines while maintaining signal integrity and isolation in compact MMICs

2) *Achieving low-loss off-chip interconnects between adjacent G-band array components.*

ELGAR seeks to develop off-chip integration technologies to create compact, efficient, array front-end test articles. This may include but is not limited to:

- Approaches to heterogeneously integrate III-V MMICs with non-III-V materials such as antennas and Si ICs
- Approaches to minimize the size and loss of lateral and vertical DC and RF component-to-component interconnects while maintaining signal integrity
- High-aspect-ratio III-V TSVs
- Optimization of RF interconnect and TSV impedance (e.g., TSV diameter/pitch) and impedance match to transmission lines to minimize loss
- Approaches that support chip-to-chip integration with micro-bumps
- Approaches that support vertical 3D chip stacking

While innovation in thermal management solutions is not within the scope of the ELGAR program, the array integration approach must also take into consideration thermal dissipation of the PA. Since the output power density of the ELGAR PA and transmit array front-end test articles is higher than state of the art (SoA) due to the compact PA size, proposers are expected to develop ELGAR integration solutions that will maintain safe PA and array operating temperatures (with conventional air-cooling solutions) for reliable operation.

C. Program Structure

ELGAR is a 48-month, three-phase program focused on developing integration technologies to compact and reduce loss of on-chip and off-chip RF interconnects. Phase 1 (Base) will be 18 months, whereas Phases 2 (Option 1) and 3 (Option 2) will be 15 months each. Information on anticipated progress per program phase for each technical challenge is provided in section D. It is expected that fewer performers will be funded to participate in Phase 2 and Phase 3 of the program. Options may be exercised, at the Government's sole discretion, based on technical progress measured against the metrics and milestones defined in the BAA and funding availability.

D. Technical Area

The ELGAR program has one technical area which will focus addressing the two major technical challenges. Performers must address both technical challenges and meet all metrics in one proposal.

1. Technical Challenge 1 – Achieving efficient, compact G-band MMICs with high output power density

To overcome Technical Challenge 1, proposers are expected to develop compact, low-loss on-chip interconnects that will enable G-band III-V PA MMICs that fit in the G-band lattice, are highly efficient, and have high output power density. Performance metrics are specified in Table 1. To address this technical challenge, the performers will be expected to demonstrate progress as follows:

In *Phase 1* (Base), performers are expected to develop compact transistor cells, Si-like multi-layer interconnects and passive components and approaches. Performers will design and fabricate a compact PA and low noise amplifier (LNA). Successful completion of Phase 1 will be demonstration of a multi-stage PA that 1) fits in the $\lambda/2$ lattice, 2) meets the Phase 1 metrics, 3) provides a path to achieving the Phase 2 and 3 MMIC performance and size goals, and 4) is compatible with the low-loss integration with other array components. It is expected that performers will develop and validate models for the transistor cells, RF interconnects and passive components.

In *Phase 2* (Option 1), performers are expected to optimize the transistor cells, Si-like multi-layer interconnects and passive components for compactness, robustness (operation under high field and high currents), and to minimize loss. Performers will design and fabricate a compact LNA and a compact, high efficiency PA. Successful completion of Phase 2 will be demonstration of a high efficiency PA that 1) fits in the $\lambda/2$ lattice, 2) meets the Phase 2 metrics, 3) provides a path to achieving the Phase 3 MMIC performance and size goals, and 4) is compatible with low-loss integration with other array components. It is expected that performers will refine their models.

In *Phase 3* (Option 2), performers are expected to further optimize the transistor cells, Si-like multi-layer interconnects and passive components for compactness, robustness, to minimize loss and to support high power density operation. Performers will design and fabricate a compact LNA and a compact high-power, high efficiency PA. Successful completion of Phase 3 will be demonstration of a high-efficiency, high-power PA that 1) fits in the $\lambda/2$ lattice, 2) meets the Phase 3 metrics, and 3) can be integrated into the G-band array front end. It is expected that performers will finalize their models.

2. Technical Challenge 2 – Achieving low-loss off-chip interconnects between adjacent G-band array components

To overcome Technical Challenge 2, proposers are expected to develop low-loss off-chip interconnects to integrate the PA MMICs developed under Technical Challenge 1 into a 16

element transmit array front-end test article to achieve high overall transmit array power efficiency. In addition, Technical Challenge 2 will use the low-loss off-chip interconnects to develop a 16 element receive array front-end test article with low noise figure. Performance metrics are specified in Table 1. To address this technical challenge, the performers will be expected to demonstrate progress as follows:

In **Phase 1** (Base), performers are expected to design and fabricate low-loss off-chip interconnect test structures. Successful completion of Phase 1 will be demonstration of a compact low-loss off-chip interconnect test structures that 1) meets the Phase 1 metrics, 2) provides a path to achieving the Phase 2 and 3 array front-end test article performance and size goals, and 3) is compatible with the compact, G-band III-V MMICs. It is expected that performers will develop validated models for TSVs and RF interconnects.

In **Phase 2** (Option 1), performers are expected to optimize the TSVs and off-chip interconnects for compactness, robustness (operation under high field and high currents), and to minimize loss. Performers will design and integrate transmit and receive array front-end test articles. Successful completion of Phase 2 will be demonstration of compact low-loss off-chip interconnects on the Phase 2 MMICs and the low loss integration of the compact MMICs with the antenna layer and surrogate beamformer layer to create transmit and receive array front-end test articles that 1) meet the Phase 2 metrics and 2) provides a path to achieving the Phase 3 array performance and size goals. It is expected that performers will refine their off-chip interconnect models.

In **Phase 3** (Option 2), performers are expected to further optimize the TSVs and off-chip interconnects for compactness, robustness, to minimize loss and to support high power density operation. Performers will design and integrate transmit and receive array front-end test articles. Successful completion of Phase 3 will be demonstration of the transmit and receive array front-end test articles that meets the Phase 3 metrics. It is expected that performers will finalize their off-chip interconnect models.

Table 1. ELGAR Metrics

	Metrics (1)	Units	SoA	Phase 1 (18 months)	Phase 2 (15 months)	Phase 3 (15 months)
TC1	PA Output Power (2, 3, 4)	mW	20	60	60	200
	PA Power Added Efficiency (PAE) (2, 4)	%	5	20	30	30
TC2	Vertical Off-chip Interconnect Insertion Loss (5)	dB	3	2	1	1
	Transmit Array Output Power Density (4, 6)	W/cm ²	3		8	34
	Transmit Array Power Efficiency (4, 6)	%	2		19	24
	Receive Array Noise Figure (6, 7)	dB	8		6.5	5

- (1) All metrics measured at 220 GHz with a 10% bandwidth. Transmit and receive array front-end test articles must contain a minimum of 16 elements, be on a $\lambda/2$ pitch at 220 GHz, and be able to transmit and receive circularly polarized signals. In Phase 2 the array test articles will have a threshold of circular polarization with an objective of dual linear polarization to transmit and receive circularly polarized signals. In Phase 3 the array test articles will have a threshold of dual linear polarization to transmit and receive circularly polarized signals. DARPA does not anticipate that the ELGAR program will result in significant innovation in the area of antennas. PAs, LNAs, and all off-chip interconnects and antenna elements must fit within the $\lambda/2$ lattice.

- (2) Si-like multi-layer BEOL used to fabricate compact PAs must not degrade gain or efficiency of III-V transistors when compared with III-V transistors fabricated with traditional III-V BEOL.
- (3) CW saturated output power for multi-stage amplifier; minimum of 15 dB gain.
- (4) PA output power and PAE measured simultaneously; array power density and efficiency measured simultaneously.
- (5) Off-chip interconnects must include a minimum of 2 layers (e.g. MMIC and antenna layers), a III-V layer, and III-V TSV. Transmit insertion loss is measured from output of PA to output of antenna. Receive insertion loss is measured from input of antenna to input of LNA.
- (6) Array test articles to consist of antenna layer and III-V PA or LNA MMICs integrated with a surrogate beamforming IC. Array architecture to be of analog active type with PA or LNA at each radiator. The surrogate beamforming IC is used for evaluation of the array test article power density, efficiency, and noise figure metrics. The surrogate beamformer IC power dissipation is not part of transmit array efficiency calculation. DARPA does not anticipate that the array test articles will be capable of beam steering (i.e., the boresight beam is expected to be static). Array test article components to be integrated with low-loss interconnects between adjacent array functions, such as from output of PA to antenna element or from antenna element to input of LNA and from MMICs to surrogate beamforming IC.
- (7) LNA: minimum of 15 dB gain.

E. Schedule/Milestones

The ELGAR program structure is shown in Figure 3. ELGAR is a 48-month program with an anticipated start in May 2022. Program kickoff and quarterly review sessions or technical interchange meetings are mandatory and represent an opportunity to interact with the Government on planned work, specifics of the technical approach, and any technical or programmatic items of concern.

The performers will construct a research program with milestones to meet or exceed the metrics outlined in the metrics table. This should include milestones for:

- Program kickoff meeting to be held at program start
- Preliminary and Critical Design Reviews (PDRs and CDRs) for test structures, MMICs and array front-end test articles
- Delivery of appropriate test structures, MMIC and array test articles in accordance with the schedule below for independent verification and validation by the government

All hardware deliverables must include test data showing that the milestone/metric has been achieved. It is expected that proposers will define test structures including compact multi-finger transistor cells, on-chip and off-chip interconnect test structures, passive components, with associated interim performance goals such as interconnect loss, and present these test structure designs and test results at periodic review sessions.

Demonstration of the 16-element array front-end test articles will include low-loss integration of the transmit (PA) and receive (LNA) MMICs with the antenna and a surrogate beamforming chip. The purpose of the surrogate beamforming chip is to demonstrate the integration technology and to allow RF test of the transmit and receive array front-end test articles metrics. While beam steering capability in the array test articles is not required (i.e., the boresight beam is expected to be static), the integration approach must be compatible with beam steering. While the MMIC to antenna interconnect must be a low-loss 220 GHz interconnect, the surrogate

beamformer to MMIC interconnects can be proposer-defined and must minimize loss as well as provide DC bias to the MMICs.

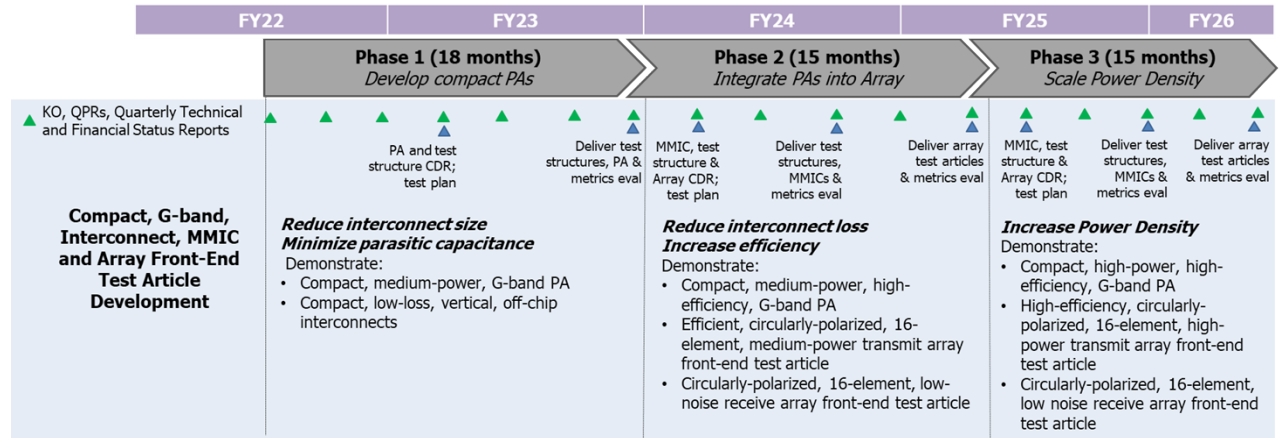


Figure 3. ELGAR program structure.

F. Deliverables

All performers shall deliver a detailed spend plan at program kickoff and execution of subsequent option awards, quarterly technical reports, monthly technical status updates, and monthly financial reports including updated expenditures. Performers shall prepare and submit briefing materials and participate in quarterly progress reviews, either via teleconference or at the performer’s site at the discretion of DARPA. All performers shall participate in and support program-wide reviews held at least annually and scheduled at the Program Manager’s discretion.

Performers are expected to deliver critical design review (CDR) packages including details of design, modeling, and simulation of all test structures, MMICs (PAs and LNAs), and transmit and receive array front-end test articles.

Performers will deliver a minimum of four (4) of each of compact multi-finger transistor cells, on-chip and off-chip interconnect test structures, MMICs (PAs and LNAs), and transmit and receive array front-end test articles in accordance with the schedule above for independent verification and validation (IV&V) by government SMEs. To ensure consistency in characterization, the performer, in consultation and collaboration with the government IV&V team, will design and fabricate appropriate on-chip and off-chip interconnect test structures, multi-finger transistor cells, MMICs and array test articles and generate a test methodology and test plan. This includes appropriate on-wafer test structures. End of Phase deliverables should be received by the government no less than six (6) weeks before end of phase to allow time for IV&V and so that performers moving to the next phase will be continuously funded.

G. Government Furnished Equipment/Property/Information

No Government Furnished Equipment, Property, or Information will be provided for the effort solicited in this BAA.

H. Intellectual Property

Any use of proposer-defined intellectual property (patents, proprietary information, etc.) should be clearly marked as such within the proposal. Include all proprietary claims to the results, prototypes, intellectual property, or systems supporting the effort and/or necessary for the use of the research, results and/or prototype. If there are no proprietary claims, this should be stated. For forms to be completed regarding intellectual property, see Section IV.B.10.

II. Award Information

A. General Award Information

Multiple awards are anticipated. The amount of resources made available under this BAA will depend on the quality of the proposals received and the availability of funds.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation, and to make awards without discussions with proposers. The Government also reserves the right to conduct discussions if it is later determined to be necessary. If warranted, portions of resulting awards may be segregated into pre-priced options. Additionally, DARPA reserves the right to accept proposals in their entirety or to select only portions of proposals for award. In the event that DARPA desires to award only portions of a proposal, negotiations may be opened with that proposer. The Government reserves the right to fund proposals in phases with options for continued work at the end of one or more of the phases, as applicable.

Awards under this BAA will be made to proposers on the basis of the evaluation criteria listed below (see section labeled "Application Review Information," Sec. V.), and program balance to provide overall value to the Government. The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. Such additional information may include but is not limited to Representations and Certifications (see Section VI.B.4., "Representations and Certifications"). The Government reserves the right to remove proposers from award consideration should the parties fail to reach agreement on award terms, conditions and cost/price within a reasonable time or the proposer fails to timely provide requested additional information. Proposals identified for negotiation may result in a procurement contract or other transaction, depending upon the nature of the work proposed, the required degree of interaction between parties, whether or not the research is classified as Fundamental Research, and other factors.

Proposers looking for innovative, commercial-like contractual arrangements are encouraged to consider requesting Other Transactions. To understand the flexibility and options associated with Other Transactions, consult <http://www.darpa.mil/work-with-us/contract-management#OtherTransactions>.

In accordance with 10 U.S.C. § 2371b(f), the Government may award a follow-on production contract or Other Transaction (OT) for any OT awarded under this solicitation if: (1) that participant in the OT, or a recognized successor in interest to the OT, successfully completed the entire prototype project provided for in the OT, as modified; and (2) the OT provides for the

award of a follow-on production contract or OT to the participant, or a recognized successor in interest to the OT.

In all cases, the Government contracting officer shall have sole discretion to select award instrument type, regardless of instrument type proposed, and to negotiate all instrument terms and conditions with selectees. DARPA will apply publication or other restrictions, as necessary, if it determines that the research resulting from the proposed effort will present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Any award resulting from such a determination will include a requirement for DARPA permission before publishing any information or results on the program. For more information on publication restrictions, see the section below on Fundamental Research.

B. Fundamental Research

It is DoD policy that the publication of products of fundamental research will remain unrestricted to the maximum extent possible. National Security Decision Directive (NSDD) 189 defines fundamental research as follows:

‘Fundamental research’ means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons.

As of the date of publication of this solicitation, the Government expects that program goals as described herein may be met by proposed efforts for fundamental research and non-fundamental research. Some proposed research may present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Based on the anticipated type of proposer (e.g., university or industry) and the nature of the solicited work, the Government expects that some awards will include restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program.

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to determine whether the proposed research shall be considered fundamental and to select the award instrument type. Appropriate language will be included in resultant awards for non-fundamental research to prescribe publication requirements and other restrictions, as appropriate. This language can be found at <http://www.darpa.mil/work-with-us/additional-baa>.

For certain research projects, it may be possible that although the research to be performed by a potential awardee is non-fundamental research, its proposed subawardee’s effort may be fundamental research. It is also possible that the research performed by a potential awardee is fundamental research while its proposed subawardee’s effort may be non-fundamental research. In all cases, it is the potential awardee’s responsibility to explain in its proposal which proposed efforts are fundamental research and why the proposed efforts should be considered fundamental research.

III. Eligibility Information

A. Eligible Applicants

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA.

1. Federally Funded Research and Development Centers (FFRDCs) and Government Entities

a) FFRDCs

FFRDCs are subject to applicable direct competition limitations and cannot propose to this solicitation in any capacity unless they meet the following conditions. (1) FFRDCs must clearly demonstrate that the proposed work is not otherwise available from the private sector. (2) FFRDCs must provide a letter, on official letterhead from their sponsoring organization, that (a) cites the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and (b) certifies the FFRDC's compliance with the associated FFRDC sponsor agreement's terms and conditions. These conditions are a requirement for FFRDCs proposing to be awardees or subawardees.

b) Government Entities

Government Entities (e.g., Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations. Government Entities must clearly demonstrate that the work is not otherwise available from the private sector and provide written documentation citing the specific statutory authority and contractual authority, if relevant, establishing their ability to propose to Government solicitations and compete with industry. This information is required for Government Entities proposing to be awardees or subawardees.

c) Authority and Eligibility

At the present time, DARPA does not consider 15 U.S.C. § 3710a to be sufficient legal authority to show eligibility. While 10 U.S.C. § 2539b may be the appropriate statutory starting point for some entities, specific supporting regulatory guidance, together with evidence of agency approval, will still be required to fully establish eligibility. DARPA will consider FFRDC and Government Entity eligibility submissions on a case-by-case basis; however, the burden to prove eligibility for all team members rests solely with the proposer.

2. Other Applicants

Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary nondisclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances.

B. Organizational Conflicts of Interest

FAR 9.5 Requirements

In accordance with FAR 9.5, proposers are required to identify and disclose all facts relevant to potential OCIs involving the proposer's organization and *any* proposed team member (subawardee, consultant). Under this Section, the proposer is responsible for providing this disclosure with each proposal submitted to the solicitation. The disclosure must include the proposer's, and as applicable, proposed team member's OCI mitigation plan. The OCI mitigation plan must include a description of the actions the proposer has taken, or intends to take, to prevent the existence of conflicting roles that might bias the proposer's judgment and to prevent the proposer from having unfair competitive advantage. The OCI mitigation plan will specifically discuss the disclosed OCI in the context of each of the OCI limitations outlined in FAR 9.505-1 through FAR 9.505-4.

Agency Supplemental OCI Policy

In addition, DARPA has a supplemental OCI policy that prohibits contractors/performers from concurrently providing Scientific Engineering Technical Assistance (SETA), Advisory and Assistance Services (A&AS) or similar support services and being a technical performer. Therefore, as part of the FAR 9.5 disclosure requirement above, a proposer must affirm whether the proposer or *any* proposed team member (subawardee, consultant) is providing SETA, A&AS, or similar support to any DARPA office(s) under: (a) a current award or subaward; or (b) a past award or subaward that ended within one calendar year prior to the proposal's submission date. If SETA, A&AS, or similar support is being or was provided to any DARPA office(s), the proposal must include:

- The name of the DARPA office receiving the support;
- The prime contract number;
- Identification of proposed team member (subawardee, consultant) providing the support; and
- An OCI mitigation plan in accordance with FAR 9.5.

Government Procedures

In accordance with FAR 9.503, 9.504 and 9.506, the Government will evaluate OCI mitigation plans to avoid, neutralize or mitigate potential OCI issues before award and to determine whether it is in the Government's interest to grant a waiver. The Government will only evaluate OCI mitigation plans for proposals that are determined selectable under the solicitation evaluation criteria and funding availability.

The Government may require proposers to provide additional information to assist the Government in evaluating the proposer's OCI mitigation plan.

If the Government determines that a proposer failed to fully disclose an OCI; or failed to provide the affirmation of DARPA support as described above; or failed to reasonably provide additional information requested by the Government to assist in evaluating the proposer's OCI mitigation plan, the Government may reject the proposal and withdraw it from consideration for award.

C. Cost Sharing/Matching

Cost sharing is not required; however, it will be carefully considered where there is an applicable statutory condition relating to the selected funding instrument. Cost sharing is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

For more information on potential cost sharing requirements for Other Transactions for Prototype, see <http://www.darpa.mil/work-with-us/contract-management> and <https://acquisitioninnovation.darpa.mil>.

IV. Application and Submission Information

PROPOSERS ARE CAUTIONED THAT EVALUATION RATINGS MAY BE LOWERED AND/OR PROPOSALS REJECTED IF PROPOSAL PREPARATION (PROPOSAL FORMAT, CONTENT, ETC.) AND/OR SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.

A. Address to Request Application Package

This announcement, any attachments, and any references to external websites herein constitute the total solicitation. If proposers cannot access the referenced material posted in the announcement found at www.darpa.mil, contact the administrative contact listed herein.

B. Content and Form of Application Submission

All submissions, including abstracts and proposals must be written in English with type not smaller than 12 point font. Smaller font may be used for figures, tables, and charts. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title/proposal short title.

1. Abstract Format

Proposers are strongly encouraged to submit an abstract in advance of a full proposal. Abstracts should follow the format described below in this section. The cover sheet should be clearly marked "ABSTRACT" and the total length of Section II should not exceed 4 pages.

Section I. Administrative

A. Cover sheet to include:

- (1) BAA number (HR001121S0042);
- (2) Lead Organization submitting abstract;
- (3) Type of organization, selected among the following categories:
Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
- (4) Proposer's internal reference number (if any);
- (5) Other team members (if applicable) and type of organization for each;
- (6) Proposal title;
- (7) Technical point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;
- (8) Administrative point of contact to include:

- Salutation, last name, first name, street address, city, state, zip code (+4),
 telephone, fax (if available), electronic mail;
 (9) Total funds requested from DARPA, and the amount of cost share (if any); AND
 (10) Date proposal abstract was submitted.

(Note: An official transmittal letter is not required when submitting a Proposal Abstract.)

Section II. Abstract Details

A. Innovative Claims

Summary of innovative claims for the proposed research. This section is the centerpiece of the abstract and should succinctly describe the uniqueness and benefits of the proposed approach relative to the current state-of-art alternate approaches.

B. Technical Approach

Technical rationale, technical approach, and constructive plan for accomplishment of technical goals in support of innovative claims and deliverable production.

C. Deliverables

Deliverables associated with the proposed research and the plans and capability to accomplish technology transition and commercialization.

D. Cost and Schedule

Provide a cost estimate for resources (e.g. labor, materials) and any subcontractors over the proposed timeline of the project, broken down by Government fiscal year.

2. Full Proposal Format

All full proposals must be in the format given below. Proposals shall consist of two volumes: Volume I – Technical and Management Proposal (3 sections), and Volume II – Cost Proposal (4 sections). The submission of other supporting materials along with the proposals is strongly discouraged and will not be considered for review. Section II of Volume I, Technical and Management Proposal, shall not exceed 25 pages. The page limitation for full proposals includes all figures, tables, and charts. There is no page limit for Volume II, Cost Proposal.

A summary slide of the proposed effort, in PowerPoint format, should be submitted with the proposal. A template slide is provided as Attachment 2 to the BAA. Submit this PowerPoint file in addition to Volumes I and II of your full proposal. This summary slide does not count towards the total page count.

a. Volume I, Technical and Management Proposal

Section I. Administrative

A. Cover sheet to include:

- (1) BAA number (HR001121S0042);
- (2) Lead Organization submitting proposal;
- (3) Type of organization, selected among the following categories:
Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
- (4) Proposer's internal reference number (if any);
- (5) Other team members (if applicable) and type of organization for each;
- (6) Proposal title;
- (7) Technical point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;
- (8) Administrative point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;
- (9) Total funds requested from DARPA, and the amount of cost share (if any); AND
- (10) Date proposal was submitted.

B. Official transmittal letter.

The transmittal letter should identify the BAA number, the proposal by name, and the proposal reference number (if any), and should be signed by an individual who is authorized to submit proposals to the Government.

Section II. Detailed Proposal Information

A. Executive Summary

Summarize the technical approach, anticipated performance, and expected outcomes of the proposed effort. The executive summary should be concise and to the point. Tables, graphs, and diagrams can be used as supplemental material along with narrative to convey the information.

B. Technical Approach

This section is the centerpiece of the proposal and should succinctly summarize the innovative claims for the proposed research and clearly describe the proposed approach without using any jargon. This section should demonstrate that the proposer has a clear understanding of the state-of-the-art and should provide sufficient justification for the feasibility of the proposed approach(es). This section should include a detailed technical rationale, technical approach, and constructive plan for accomplishment of technical goals in support of innovative claims and deliverable creation. The proposal must provide a detailed analysis of how the proposed approach will meet the DARPA metrics and goals, with particular emphasis on describing the approach to meeting the MMIC and array front-end test article efficiency metrics and size goals.

The Technical Approach must:

- Clearly state how the Technical Approach will address all of the Technical Challenges stated in the Program Description including the assumptions and rationale of the proposed on-chip and off-chip interconnect technology
- Provide detailed description of the proposed MMIC and array front-end test article architecture and compaction/integration approach including modeling, simulation, and/or experimental evidence of the feasibility of the proposed approaches
- Include a 220 GHz characterization and measurement plan, including proposed on-chip and off-chip interconnect test structures and test MMICs, calibration plan, surrogate beamforming chip to be used for testing the 16-element array front-end test articles and the identification of facilities and team members primarily responsible for MMIC and array front-end test article characterization
- Clearly state and justify any proposer-defined interim performance goals

C. Statement of Work (SOW)

In plain English, clearly define the technical tasks/subtasks to be performed, their durations, and dependencies among them. The page length for the SOW will be dependent on the amount of the effort. For each task/subtask, provide:

1. A general description of the objective (for each defined task/activity);
2. A detailed description of the approach to be taken to accomplish each defined task/activity;
3. Identification of the primary organization responsible for task execution (prime, sub, team member, by name, etc.);
4. The completion criteria for each task/activity - a product, event or milestone that defines its completion;
5. Define all deliverables (reporting, data, reports, software, etc.) to be provided to the Government in support of the proposed research tasks/activities; AND
6. Clearly identify any tasks/subtasks (prime or subcontracted) that will be accomplished on-campus at a university, if applicable.

*Note: Each phase of the program must be separately defined in the SOW. Include a SOW for each subcontractor and/or consultant in the **Cost Proposal Volume**. Do not include any proprietary information in the SOW(s).*

D. Schedules and measurable milestones

Schedules and measurable milestones for the proposed research. (Note: Measurable milestones should capture key development points in tasks and should be clearly articulated and defined in time relative to start of effort.) Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options. Additionally, proposals should clearly explain the technical approach(es) that will be employed to meet or exceed each program metric and provide ample justification as to why the approach(es) is/are feasible. The milestones must not include proprietary information.

E. Results and Technology Transfer

Description of the results, products, transferable technology, and expected technology transfer. This should also address mitigation of life-cycle and sustainment risks associated with transitioning intellectual property for U.S. military applications, if applicable. See also

Section IV.B.10, “Intellectual Property.” If there are no proprietary claims, this should be stated.

F. Risk Analysis and Mitigation Plan

Identify the major technical and programmatic risks in the program. Include a risk matrix. For each risk, assign a probability of occurrence on a scale of 1-10, where 10 indicates a high likelihood that the risk will impact program success, as well as an assessment of impact, also on a scale of 1-10, where 10 indicates that this risk would maximally limit the program from delivering prototypes on schedule or meeting performance objectives. For each item with total risk (likelihood × impact) exceeding 40, include a plan for mitigating the risk and assessing risk reduction.

G. Ongoing Research

Comparison with other ongoing research indicating advantages and disadvantages of the proposed effort.

H. Proposer Accomplishments

Discussion of proposer’s previous accomplishments and work in closely related research areas.

I. National Security Impact Statement

To reduce the potential for unintended foreign access to critical U.S. national security technologies developed under this effort, proposals shall describe:

- How the proposed work contributes to U.S. national security and U.S. technological capabilities. The proposer may also summarize previous work that contributed to U.S. national security and U.S. technological capabilities.
- Plans and capabilities to transition technologies developed under this effort to U.S. national security applications and/or to U.S. industry. The proposer may also discuss previous technology transitions to the benefit of U.S. interests.
- Any plans to transition technologies developed under this effort to foreign governments or to companies that are foreign owned, controlled or influenced. The proposer may also discuss previous technology transition to these groups.
- How the proposer will assist its employees and agents performing work under this effort to be eligible to participate in the U.S. national security environment.

J. Facilities and Equipment

Description of the facilities and equipment that would be used for the proposed effort and how they will support meeting program metrics.

K. Teaming

Describe the formal teaming arrangements which will be used to execute this effort. Describe the programmatic relationship between investigators and the rationale for choosing this teaming strategy. Present a coherent organization chart and integrated management strategy for the program team. For each person, indicate: (1) name, (2) affiliation, (3) abbreviated listing of all technical area tasks they will work on with roles, responsibilities, and percent

time indicated, (4) discussion of the proposers' previous accomplishments, relevant expertise and/or unique capabilities.

L. Security Management

Describe security management architecture and/or approach for the proposed effort. If proposing the use of Export Administration Regulations (EAR) controlled elements from the Commerce Control List (CCL) or International Traffic in Arms Regulations (ITAR) protected technologies, address protection procedures of the EAR/ITAR elements. Detail unique additional security requirements information system certification expertise for controlled unclassified information (CUI) or classified processing, OPSEC, program protection planning, test planning, transportation plans, work being performed at different classification levels, and/or utilizing test equipment not approved at appropriate classification level (may not be applicable for fundamental research).

Section III. Additional Information

Information in this section may include a brief bibliography of relevant technical papers and research notes (published and unpublished) which document the technical ideas upon which the proposal is based. Copies of not more than three (3) relevant prior papers may be included in the submission.

b. Volume II, Cost Proposal – {No Page Limit}

All proposers, including FFRDCs, must submit the following:

Section I. Administrative

Cover sheet to include:

- (1) BAA number (HR001121S0042);
- (2) Lead Organization submitting proposal;
- (3) Type of organization, selected among the following categories:
Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
- (4) Proposer's internal reference number (if any);
- (5) Other team members (if applicable) and type of organization for each;
- (6) Proposal title;
- (7) Technical point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail (if available);
- (8) Administrative point of contact to include:
Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), and electronic mail (if available);
- (9) Award instrument requested:
Cost-Plus-Fixed Fee (CPFF), Cost-contract—no fee, cost sharing contract—no fee, or other type of procurement contract (*specify*) or Other Transaction;
- (10) Place(s) and period(s) of performance;

- (11) Total proposed cost separated by basic award and option(s), if any, by calendar year and by government fiscal year;
- (12) Name, address, and telephone number of the proposer's cognizant Defense Contract Management Agency (DCMA) administration office (*if known*);
- (13) Name, address, and telephone number of the proposer's cognizant Defense Contract Audit Agency (DCAA) audit office (*if known*);
- (14) Date proposal was prepared;
- (15) DUNS number;
- (16) TIN number;
- (17) CAGE Code;
- (18) Subcontractor Information;
- (19) Proposal validity period (120 days is recommended); AND
- (20) Any Forward Pricing Rate Agreement, other such approved rate information, or such documentation that may assist in expediting negotiations (if available).

Attachment 1, the Cost Volume Proposer Checklist, must be included with the coversheet of the Cost Proposal.

Section II. Detailed Cost Information (Prime and Subcontractors)

The proposers', to include eligible FFRDCs', cost volume shall provide cost and pricing information (See Note 1), or other than cost or pricing information if the total price is under the referenced threshold, in sufficient detail to substantiate the program price proposed (e.g., realism and reasonableness). In doing so, the proposer shall provide, for **both the prime and each subcontractor**, a "Summary Cost Breakdown" by phase and performer fiscal year, and a "Detailed Cost Breakdown" by phase, technical task/sub-task, and month. The breakdown/s shall include, at a minimum, the following major cost items along with associated backup documentation:

Total program cost broken down by major cost items:

A. Direct Labor

A breakout clearly identifying the individual labor categories with associated labor hours and direct labor rates, as well as a detailed Basis-of-Estimate (BOE) narrative description of the methods used to estimate labor costs;

B. Indirect Costs

Including Fringe Benefits, Overhead, General and Administrative Expense, Cost of Money, Fee, etc. (must show base amount and rate);

C. Travel

Provide the purpose of the trip, number of trips, number of days per trip, departure and arrival destinations, number of people, etc.;

D. Other Direct Costs

Itemized with costs; back-up documentation is to be submitted to support proposed costs;

E. Material/Equipment

(i) An itemization of any information technology (IT) purchase, as defined by FAR 2.101 – Documentation supporting the reasonableness of the proposed equipment costs (vendor quotes, past purchase orders/purchase history, detailed engineering estimates, etc.) shall be provided, including a letter stating why the proposer cannot provide the requested resources from its own funding for prime and all sub-awardees.

(ii) A priced Bill-of-Material (BOM) clearly identifying, for each item proposed, the quantity, unit price, the source of the unit price (i.e., vendor quote, engineering estimate, etc.), the type of property (i.e., material, equipment, special test equipment, information technology, etc.), and a cross-reference to the Statement of Work (SOW) task/s that require the item/s. At time of proposal submission, any item that exceeds \$2,000 must be supported with basis-of-estimate (BOE) documentation such as a copy of catalog price lists, vendor quotes or a written engineering estimate (additional documentation may be required during negotiations, if selected).

(iii) If seeking a procurement contract and items of Contractor Acquired Property are proposed, exclusive of material, the proposer shall clearly demonstrate that the inclusion of such items as Government Property is in keeping with the requirements of FAR Part 45.102. In accordance with FAR 35.014, “Government property and title,” it is the Government’s intent that title to all equipment purchased with funds available for research under any resulting contract will vest in the acquiring nonprofit institution (e.g., Nonprofit Institutions of Higher Education and Nonprofit Organizations whose primary purpose is the conduct of scientific research) upon acquisition without further obligation to the Government. Any such equipment shall be used for the conduct of basic and applied scientific research. The above transfer of title to all equipment purchased with funds available for research under any resulting contract is not allowable when the acquiring entity is a for-profit organization; however, such organizations can, in accordance with FAR 52.245-1(j), be given priority to acquire such property at its full acquisition cost.

F. Consultants

If consultants are to be used, proposer must provide a copy of the consultant’s proposed SOW as well as a signed consultant agreement or other document which verifies the proposed loaded daily / hourly rate and any other proposed consultant costs (e.g. travel);

G. Subcontracts

Itemization of all subcontracts. Additionally, the prime contractor is responsible for compiling and providing, as part of its proposal submission to the Government, subcontractor proposals prepared at the same level of detail as that required by the prime. Subcontractor proposals include Interdivisional Work Transfer Agreements (ITWA) or similar arrangements. If seeking a procurement contract, the prime contractor shall provide a cost reasonableness analysis of all proposed subcontractor costs/prices. Such analysis shall indicate the extent to which the prime contractor has negotiated subcontract costs/prices and whether any such subcontracts are to be placed on a sole-source basis.

All proprietary subcontractor proposal documentation, prepared at the same level of detail as that required of the prime, which cannot be uploaded to the DARPA BAA website

(<https://baa.darpa.mil>, BAAT) as part of the proposer’s submission, shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the proposer or by the subcontractor organization. This does not relieve the proposer from the requirement to include, as part of their submission (via BAAT), subcontract proposals that do not include proprietary pricing information (rates, factors, etc.).

A Rough Order of Magnitude (ROM), or similar budgetary estimate, is not considered a fully qualified subcontract cost proposal submission. Inclusion of a ROM, or similar budgetary estimate, may result in the full proposal being deemed non-conforming or evaluation ratings may be lowered;

H. Cost-Sharing

The amount of any industry cost-sharing (the source and nature of any proposed cost-sharing should be discussed in the narrative portion of the cost volume).

I. Fundamental Research

Written justification required per Section II.B, “Fundamental Research,” pertaining to prime and/or subcontracted effort being considered Contracted Fundamental Research.

Note 1:

(a) “Cost or Pricing Data” as defined in FAR 15.403-4 shall be required if the proposer is seeking a procurement contract per the referenced threshold, unless the proposer requests and is granted an exception from the requirement to submit cost or pricing data. Per DFARS 215.408(5), DFARS 252.215-7009, Proposal Adequacy Checklist, applies to all proposers/proposals seeking a FAR-based award (contract).

(b) In accordance with DFARS 215.403-1(4)(D), DoD has waived cost or pricing data requirements for nonprofit organizations (including educational institutions) on cost-reimbursement-no-fee contracts. In such instances where the waiver stipulated at DFARS 215.403-1(4)(D) applies, proposers shall submit information other than cost or pricing data to the extent necessary for the Government to determine price reasonableness and cost realism; and cost or pricing data from subcontractors that are not nonprofit organizations when the subcontractor’s proposal exceeds the cost and pricing data threshold at FAR 15.403-4(a)(1).

(c) As amended by Section 832 of the 2021 National Defense Authorization Act, “Extension of Pilot Program For Streamlining Awards For Innovative Technology Projects,” small businesses and nontraditional defense contractors (as defined therein) are alleviated from submission of certified cost and pricing data for new contract awards valued at less than \$7,500,000. In such instances where this “waiver” applies, proposers seeking a FAR-based contract shall submit information other than certified cost or pricing data to the extent necessary for the Government to determine price reasonableness and cost realism; and certified cost or pricing data from subcontractors that are not small businesses or nontraditional defense contractors when such subcontract proposals exceed the cost and pricing data threshold at FAR 15.403-4(a)(1).

Note 2:

Proposers requesting an Other Transaction who meet the definition of “nontraditional defense contractor,” as defined at 10 U.S. Code § 2302(9), should submit information similar to “data

other than certified cost or pricing data,” as defined at FAR 2.101, to the maximum extent possible to allow for the Government to evaluate cost realism. Proposers (to include subcontractors) who do not meet the definition of a nontraditional defense contractor (who are, therefore, considered a traditional defense contractor) shall submit “data other than certified cost or pricing data.” It is incumbent on a proposer requesting an Other Transaction to provide an adequate amount of cost information needed in order for the Government to be able to evaluate cost realism. Failure to provide an adequate amount of cost information will result in the proposal being deemed non-conforming.

Note 3:

Proposers are required to provide the aforementioned cost breakdown as an editable MS Excel spreadsheet, inclusive of calculations formulae, with tabs (material, travel, ODC’s) provided as necessary. The Government also requests and recommends that the Cost Proposal include MS Excel file(s) that provide traceability between the Bases of Estimate (BOEs) and the proposed costs across all elements and phases. This includes the calculations and adjustments that are utilized to generate the Summary Costs from the source labor hours, labor costs, material costs, etc. input data. It is requested that the costs and Subcontractor proposals be readily traceable to the Prime Cost Proposal in the provided MS Excel file(s) – although this is not a requirement, providing information in this manner will assist the Government in understanding what is being proposed both technically and in terms of cost realism. NOTE: If the PDF submission differs from the Excel submission, the PDF will take precedence.

Note 4:

The Government strongly encourages that proposers use the provided MS Excel™ DARPA Standard Cost Proposal Spreadsheet in the development of their cost proposals. A customized cost proposal spreadsheet may be an attachment to this solicitation. If not, the spreadsheet can be found on the DARPA website at <http://www.darpa.mil/work-with-us/contract-management> (under “Resources” on the right-hand side of the webpage). All tabs and tables in the cost proposal spreadsheet should be developed in an editable format with calculation formulas intact to allow traceability of the cost proposal. This cost proposal spreadsheet should be used by the prime organization and all subcontractors. In addition to using the cost proposal spreadsheet, the cost proposal still must include all other items required in this announcement that are not covered by the editable spreadsheet. Subcontractor cost proposal spreadsheets may be submitted directly to the Government by the proposed subcontractor via e-mail to the address in Part I of this solicitation. **Using the provided cost proposal spreadsheet will assist the Government in a rapid analysis of your proposed costs and, if your proposal is selected for a potential award, speed up the negotiation and award execution process.**

Any questions pertaining to use of the DARPA Standard Cost Proposal Spreadsheet, to include permitted changes and prohibited changes thereto, should be directed to costproposal@darpa.mil. Please read the instructions provided within the DARPA Standard Cost Proposal Spreadsheet, "Instructions" tab, to include the General Spreadsheet Instruction document embedded therein. It is very important that proposers not make changes to the format of the spreadsheet where specifically instructed not to do so (to include embedding documents or supporting cost information otherwise to be included in the Volume 2 written document).

Submission of the spreadsheet alone does not make for a complete Volume 2 submission. Please see proposal preparation instructions above.

Section III. Other Transaction Request, if applicable

All proposers requesting an Other Transaction (OT) must include a detailed list of payment milestones (Milestone Plan). Each milestone must include the following:

- Milestone description
- Completion/Exit criteria (to include identifying all associated data deliverables excluding those specifically providing project status)
- Due date
- Payment/funding schedule (to include, if cost share is proposed, awardee and Government share amounts)
- For each data deliverable, identify the proposed Government data rights (keeping in mind how each data deliverable will need to be used by the Government given the goals and objectives of the proposed project)

It is noted that, at a minimum, milestones should relate directly to accomplishment of program technical metrics as defined in the BAA and/or the proposer's proposal. Agreement type, expenditure or fixed-price based, will be subject to negotiation by the Agreements Officer. Do not include proprietary data.

Section IV. Other Cost Information

Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates.

The cost proposal should include identification of pricing assumptions of which may require incorporation into the resulting award instrument (i.e., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Experts, etc.).

The proposer should include supporting cost and pricing information in sufficient detail to substantiate the summary cost estimates and should include a description of the method used to estimate costs and supporting documentation.

Cost proposals submitted by FFRDC's (prime or subcontractor) will be forwarded, if selected for negotiation, to their sponsoring organization contracting officer for review to confirm that all required forward pricing rates and factors have been used.

3. Proprietary Information

Proposers are responsible for clearly identifying proprietary information. Submissions containing proprietary information must have the cover page and each page containing such information clearly marked with a label such as "Proprietary" or "Company Proprietary." Note, "Confidential" is a classification marking used to control the dissemination of U.S. Government

National Security Information as dictated in Executive Order 13526 and should not be used to identify proprietary business information.

4. Security Information

a. Program Security Information

Proposers should include with their proposal any proposed solution(s) to program security requirements unique to this program. If proposing the use of Export Administration Regulations (EAR) controlled elements from the Commerce Control List (CCL) or International Traffic in Arms Regulations (ITAR) protected technologies, proposers should address protection procedures of the EAR/ITAR elements. Other common program security requirements include but are not limited to: operational security (OPSEC) contracting/sub-contracting plans; foreign participation or materials utilization plans; program protection plans (which may entail the following) manufacturing and integration plans; range utilization and support plans (air, sea, land, space, and cyber); data dissemination plans; asset transportation plans; classified test activity plans; disaster recovery plans; classified material / asset disposition plans and public affairs / communications plans.

b. Controlled Unclassified Information (CUI)

For Unclassified proposals containing controlled unclassified information (CUI), applicants will ensure personnel and information systems processing CUI security requirements are in place.

i. CUI Proposal Markings

If an unclassified submission contains CUI or the suspicion of such, as defined by Executive Order 13556 and 32 CFR Part 2002, the information must be appropriately and conspicuously marked CUI in accordance with DoDI 5200.48. Identification of what is CUI about this DARPA program will be detailed in a DARPA CUI Guide and will be provided as an attachment to the BAA or may be provided at a later date.

ii. CUI Submission Requirements

Unclassified submissions containing CUI may be submitted via DARPA's BAA Website (<https://baa.darpa.mil>) in accordance with Section IV.C.2. of this BAA.

Proposers submitting proposals involving the pursuit and protection of DARPA information designated as CUI must have, or be able to acquire prior to contract award, an information system authorized to process CUI information IAW NIST SP 800-171 and DoDI 8582.01.

c. Unclassified Submissions

DARPA anticipates that submissions received under this BAA will be unclassified. However, should a proposer wish to submit classified information, an *unclassified* email must be sent to the

Proposers submitting classified information must have, or be able to obtain prior to contract award, cognizant security agency approved facilities, information systems, and appropriately cleared/eligible personnel to perform at the classification level proposed. All proposer personnel performing Information Assurance (IA)/Cybersecurity related duties on classified Information Systems shall meet the requirements set forth in DoD Manual 8570.01-M (Information Assurance Workforce Improvement Program).

Proposers choosing to submit classified information from other collateral classified sources (i.e., sources other than DARPA) must ensure (1) they have permission from an authorized individual at the cognizant Government agency (e.g., Contracting Officer, Program Manager); (2) the proposal is marked in accordance with the source Security Classification Guide (SCG) from which the material is derived; and (3) the source SCG is submitted along with the proposal.

When a proposal includes a classified portion, and when able according to security guidelines, we ask that proposers send an e-mail to HR001121S0042@darpa.mil as notification that there is a classified portion to the proposal. When sending the classified portion via mail according to the instructions, proposers should submit six (6) hard copies of the classified portion of their proposal and two (2) CD-ROMs containing the classified portion of the proposal as a single searchable Adobe PDF file. Please ensure that all CDs are well-marked. Each copy of the classified portion must be clearly labeled with HR001121S0042, proposer organization, proposal title (short title recommended), and Copy _ of _.

Confidential and Secret Information

Use transmission, classification, handling, and marking guidance provided by previously issued SCGs, the DoD Information Security Manual (DoDM 5200.01, Volumes 1 - 4), and the National Industrial Security Program Operating Manual, including the Supplement Revision 1, (DoD 5220.22-M and DoD 5200.22-M Sup. 1) when submitting Confidential and/or Secret classified information.

Confidential and Secret classified information may be submitted via ONE of the two following methods:

- Hand-carried by an appropriately cleared and authorized courier to the DARPA CDR. Prior to traveling, the courier shall contact the DARPA Classified Document Registry (CDR) at 703-526-4052 to coordinate arrival and delivery.

OR

- Mailed via U.S. Postal Service (USPS) Registered Mail or USPS Express Mail. All classified information will be enclosed in opaque inner and outer covers and double-wrapped. The inner envelope shall be sealed and plainly marked with the assigned classification and addresses of both sender and addressee.

The inner envelope shall be addressed to:

Defense Advanced Research Projects Agency
ATTN: Program Security Officer, MTO
Reference: HR001121S0042
675 North Randolph Street
Arlington, VA 22203-2114

The outer envelope shall be sealed with no identification as to the classification of its contents and addressed to:

Defense Advanced Research Projects Agency
Security & Intelligence Directorate, Attn: CDR
675 North Randolph Street
Arlington, VA 22203-2114

Top Secret Information

Use classification, handling, and marking guidance provided by previously issued SCGs, the DoD Information Security Manual (DoDM 5200.01, Volumes 1 - 4), and the National Industrial Security Program Operating Manual, including the Supplement Revision 1, (DoD 5220.22-M and DoD 5200.22-M Sup. 1). Top Secret information must be hand-carried by an appropriately cleared and authorized courier to the DARPA CDR. Prior to traveling, the courier shall contact the DARPA CDR at 703-526-4052 to coordinate arrival and delivery.

Sensitive Compartmented Information (SCI)

SCI must be marked, managed and transmitted in accordance with DoDM 5105.21 Volumes 1 - 3. Questions regarding the transmission of SCI may be sent to the DARPA Technical Office PSO via the BAA mailbox or by contacting the DARPA Special Security Officer (SSO) at 703-812-1970.

Successful proposers may be sponsored by DARPA for access to SCI. Sponsorship must be aligned to an existing DD Form 254 where SCI has been authorized. Questions regarding SCI sponsorship should be directed to the DARPA Personnel Security Office at 703-526-4543.

Special Access Program (SAP) Information

SAP information must be marked in accordance with DoDM 5205.07 Volume 4 and transmitted by specifically approved methods which will be provided by the Technical Office PSO or their staff.

Proposers choosing to submit SAP information from an agency other than DARPA are required to provide the DARPA Technical Office Program Security Officer (PSO) written permission from the source material's cognizant Special Access Program Control Officer (SAPCO) or designated representative. For clarification regarding this process, contact the DARPA Technical Office PSO via the BAA mailbox or the DARPA SAPCO at 703-526-4102.

Additional SAP security requirements regarding facility accreditations, information security, personnel security, physical security, operations security, test security, classified transportation plans, and program protection planning may be specified in the DD Form 254.

NOTE: prior to drafting the submission, if use of SAP Information Systems is to be proposed, proposers must first obtain an Authorization-to-Operate from the DARPA Technical Office PSO (or other applicable DARPA Authorization Official) using the Risk Management Framework (RMF) process outlined in the Joint Special Access Program (SAP) Implementation Guide (JSIG), Revision 3, dated October 9, 2013 (or successor document).

SAP IT disposition procedures must be approved in accordance with the DoD CIO Memorandum of April 20, 2020³.

5. Disclosure of Information and Compliance with Safeguarding Covered Defense Information Controls

The following provisions and clause apply to all solicitations and contracts; however, the definition of “controlled technical information” clearly exempts work considered fundamental research and therefore, even though included in the contract, will not apply if the work is fundamental research.

DFARS 252.204-7000, “Disclosure of Information”

DFARS 252.204-7008, “Compliance with Safeguarding Covered Defense Information Controls”

DFARS 252.204-7012, “Safeguarding Covered Defense Information and Cyber Incident Reporting”

The full text of the above solicitation provision and contract clauses can be found at

<http://www.darpa.mil/work-with-us/additional-baa#NPRPAC>.

Compliance with the above requirements includes the mandate for proposers to implement the security requirements specified by National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, “Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations” (see

<https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-171r2.pdf>) and DoDI 8582.01 that are in effect at the time the solicitation is issued.

For awards where the work is considered fundamental research, the contractor will not have to implement the aforementioned requirements and safeguards. However, should the nature of the work change during performance of the award, work not considered fundamental research will be subject to these requirements.

6. Human Subjects Research (HSR)/Animal Use

Proposers that anticipate involving human subjects or animals in the proposed research must comply with the approval procedures detailed at <http://www.darpa.mil/work-with-us/additional-baa>, to include providing the information specified therein as required for proposal submission.

7. Approved Cost Accounting System Documentation

Proposers that do not have a Cost Accounting Standards (CAS) compliant accounting system considered adequate for determining accurate costs that are negotiating a cost-type procurement

³ The title of this memorandum is CUI and the memo is classified SECRET//HANDLE VIA SPECIAL ACCESS CHANNELS ONLY. This memorandum may be provided under separate cover.

contract must complete an SF 1408. For more information on CAS compliance, see <http://www.dcaa.mil/cas.html>. To facilitate this process, proposers should complete the SF 1408 found at <http://www.gsa.gov/portal/forms/download/115778> and submit the completed form with the proposal. To complete the form, check the boxes on the second page, then provide a narrative explanation of your accounting system to supplement the checklist on page one. For more information, see (http://www.dcaa.mil/preaward_accounting_system_adequacy_checklist.html).

8. Section 508 of the Rehabilitation Act (29 U.S.C. § 749d)/FAR 39.2

All electronic and information technology acquired or created through this BAA must satisfy the accessibility requirements of Section 508 of the Rehabilitation Act (29 U.S.C § 794d)/FAR 39.2.

9. Small Business Subcontracting Plan

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. § 637(d)) and FAR 19.702(a)(1), each proposer who is a large business concern and seeking a procurement contract that has subcontracting possibilities is required to submit a subcontracting plan with their proposal. The plan format is outlined in FAR 19.704. As of the date of publication of this BAA, per FAR 19.702, the threshold for submission of a small business subcontracting plan is \$700,000 (total contract amount including options).

10. Intellectual Property

All proposers must provide a good faith representation that the proposer either owns or possesses the appropriate licensing rights to all intellectual property that will be utilized under the proposed effort.

a. For Procurement Contracts

Proposers responding to this BAA requesting procurement contracts will need to complete the certifications at DFARS 252.227-7017. See www.darpa.mil/work-with-us/additional-baa for further information. If no restrictions are intended, the proposer should state “none.” The table below captures the requested information:

Technical Data Computer Software To be Furnished With Restrictions	Summary of Intended Use in the Conduct of the Research	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(NARRATIVE)	(LIST)	(LIST)	(LIST)

b. For All Non-Procurement Contracts

Proposers responding to this BAA requesting a Technology Investment Agreement or Other Transaction for Prototypes shall follow the applicable rules and regulations governing these various award instruments, but, in all cases, should appropriately identify any potential

restrictions on the Government's use of any Intellectual Property contemplated under the award instrument in question. This includes both Noncommercial Items and Commercial Items. Proposers are encouraged use a format similar to that described in Paragraph a. above. If no restrictions are intended, then the proposer should state "NONE."

11. Patents

Include documentation proving your ownership of or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) that will be utilized under your proposal for the DARPA program. If a patent application has been filed for an invention that your proposal utilizes, but the application has not yet been made publicly available and contains proprietary information, you may provide only the patent number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and a summary of the patent title, together with either: (1) a representation that you own the invention, or (2) proof of possession of appropriate licensing rights in the invention.

12. System for Award Management (SAM) and Universal Identifier Requirements

All proposers must be registered in SAM unless exempt per FAR 4.1102. FAR 52.204-7, "System for Award Management" and FAR 52.204-13, "System for Award Management Maintenance" are incorporated into this solicitation. See <http://www.darpa.mil/work-with-us/additional-baa> for further information.

International entities can register in SAM by following the instructions in this link: https://www.fsd.gov/sys_attachment.do?sys_id=c08b64ab1b4434109ac5ddb6bc4bcbb8.

13. Funding Restrictions

Not applicable.

C. Submission Information

DARPA will acknowledge receipt of all submissions and assign an identifying control number that should be used in all further correspondence regarding the submission. DARPA intends to use electronic mail correspondence regarding HR001121S0042. Submissions may not be submitted by fax or e-mail; any so sent will be disregarded.

Submissions will not be returned. An electronic copy of each submission received will be retained at DARPA and all other non-required copies destroyed. A certification of destruction may be requested, provided the formal request is received by DARPA within 5 days after notification that a proposal was not selected.

All administrative correspondence and questions on this solicitation, including requests for clarifying information on how to submit an abstract or full proposal to this BAA should be directed to HR001121S0042@darpa.mil. DARPA intends to use electronic mail for correspondence regarding HR001121S0042. Proposals and abstracts may not be submitted by

fax or e-mail; any so sent will be disregarded. DARPA encourages use of the Internet for retrieving the BAA and any other related information that may subsequently be provided.

1. Submission Dates and Times

a. Abstract Due Date

Abstracts must be submitted to DARPA/MTO on or before 4:00 PM, Eastern Time, 29 October 2021. Abstracts received after this time and date may not be reviewed.

b. Full Proposal Date

Full proposals must be submitted to DARPA/MTO on or before 4:00 PM, Eastern Time, 13 December 2021, in order to be considered during the single round of selections. Proposals received after this deadline will not be reviewed.

Failure to comply with the submission procedures may result in the submission not being evaluated.

c. Frequently Asked Questions (FAQ)

DARPA will post a consolidated Question and Answer (FAQ) document on a regular basis. To access the posting go to: <http://www.darpa.mil/work-with-us/opportunities>. Under the HR001121S0042 summary will be a link to the FAQ. Submit your question/s by e-mail to HR001121S0042@darpa.mil. In order to receive a response sufficiently in advance of the proposal due date, send your question/s on or before 5:00 PM, Eastern Time, 29 November 2021.

2. Abstract Submission Information

Proposers are strongly encouraged to submit an abstract in advance of a full proposal in order to provide potential proposers with a rapid response and to minimize unnecessary effort in proposal preparation and review. DARPA will acknowledge receipt of the submission and assign a control number that should be used in all further correspondence regarding the abstract.

All abstracts sent in response to HR001121S0042 shall be submitted via DARPA's BAA Website (<https://baa.darpa.mil>). Visit the website to complete the two-step registration process. Submitters will need to register for an Extranet account (via the form at the URL listed above) and wait for two separate e-mails containing a username and temporary password. After accessing the Extranet, submitters may then create an account for the DARPA BAA website (via the "Register your Organization" link along the left side of the homepage), view submission instructions, and upload/finalize the abstract. Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that submission process be started as early as possible.

All abstracts submitted electronically through the DARPA BAA Submission website must be uploaded as zip files (.zip or .zipx extension). The final zip file should only contain the

document(s) requested herein and must not exceed 50 MB in size. Only one zip file will be accepted per abstract; abstracts not uploaded as zip files will be rejected by DARPA.

NOTE: YOU MUST CLICK THE 'FINALIZE PROPOSAL ABSTRACT' BUTTON AT THE BOTTOM OF THE CREATE PROPOSAL ABSTRACT PAGE. FAILURE TO DO SO WILL RESULT IN YOUR ABSTRACT NOT BEING OFFICIALLY SUBMITTED TO THIS BAA AND THEREFORE NOT BEING REVIEWED.

Please note that the DoD-issued certificate associated with the BAA website is not recognized by all commercial certificate authorities, resulting in untrusted connection errors/messages. You can either bypass the warning (possibly by adding <https://baa.darpa.mil> to your listed of trusted sites, or arpa.mil as a trusted domain), or visit DISA's site to download the Root Certificate Authority (CA): <https://public.cyber.mil/from-iase/>.

Technical support for DARPA's BAA Website may be reached at BAAT_Support@darpa.mil, and is typically available during regular business hours, (9:00 AM - 5:00 PM EST Monday - Friday).

3. Proposal Submission Information

The typical proposal should express a consolidated effort in support of one or more related technical concepts or ideas. Disjointed efforts should not be included into a single proposal. Proposals not meeting the format described in the BAA may not be reviewed.

a. For Proposers Requesting Technology Investment Agreements

Proposers requesting Technology Investment Agreements (TIA) awarded under 10 U.S.C. 2371 must include the completed form indicated below. This requirement only applies only to those who expect to receive a TIA as their ultimate award instrument.

The National Defense Authorization Act (NDAA) for FY 2019, Section 1286, directs the Secretary of Defense to protect intellectual property, controlled information, key personnel, and information about critical technologies relevant to national security and limit undue influence, including foreign talent programs by countries that desire to exploit United States' technology within the DoD research, science and technology, and innovation enterprise. This requirement is necessary for all research and research-related educational activities. The DoD is using the form below to collect the necessary information to satisfy these requirements.

The Research and Related Senior/Key Person Profile (Expanded) form, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_KeyPersonExpanded_3_0-V3.0.pdf, will be used to collect the following information for all senior/key personnel, including Project Director/Principal Investigator and Co-Project Director/Co-Principal Investigator, whether or not the individuals' efforts under the project are funded by the DoD. The form includes 3 parts: the main form administrative information, including the Project Role, Degree Type and Degree Year; the biographical sketch; and the current and pending support. The biographical sketch and current and pending support are to be provided as attachments:

- Biographical Sketch: Mandatory for Project Directors (PD) and Principal Investigators (PI), optional, but desired, for all other Senior/Key Personnel. The biographical sketch should include information pertaining to the researchers:
 - Education and Training.
 - Research and Professional Experience.
 - Collaborations and Affiliations (for conflict of interest).
 - Publications and Synergistic Activities.
- Current and Pending Support: Mandatory for all Senior/Key Personnel including the PD/PI. This attachment should include the following information:
 - A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.
 - Title and objectives of the other research projects.
 - The percentage per year to be devoted to the other projects.
 - The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other proposals are awarded.
 - Name and address of the agencies and/or other parties supporting the other research projects
 - Period of performance for the other research projects.

Additional senior/key persons can be added by selecting the “Next Person” button at the bottom of the form. Note that, although applications without this information completed may pass Grants.gov edit checks, if DARPA receives an application without the required information, DARPA may determine that the application is incomplete and may cause your submission to be rejected and eliminated from further review and consideration under the solicitation. DARPA reserves the right to request further details from the applicant before making a final determination on funding the effort.

b. For Proposers Requesting Contracts or Other Transaction Agreements

Proposers requesting contracts or other transaction agreements must submit proposals via DARPA's BAA Website (<https://baa.darpa.mil>). Note: If an account has already been created for the DARPA BAA Website, this account may be reused. If no account currently exists for the DARPA BAA Website, visit the website to complete the two-step registration process. Submitters will need to register for an Extranet account (via the form at the URL listed above) and wait for two separate e-mails containing a username and temporary password. After accessing the Extranet, submitters may then create an account for the DARPA BAA website (via the "Register your Organization" link along the left side of the homepage), view submission instructions, and upload/finalize the proposal. Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that submission process be started as early as possible.

All unclassified full proposals submitted electronically through the DARPA BAA website must be uploaded as zip files (.zip or .zipx extension). The final zip file should not exceed 50 MB in size. Only one zip file will be accepted per submission and submissions not uploaded as zip files will be rejected by DARPA.

NOTE: YOU MUST CLICK THE 'FINALIZE FULL PROPOSAL' BUTTON AT THE BOTTOM OF THE CREATE FULL PROPOSAL PAGE. FAILURE TO DO SO WILL RESULT IN YOUR PROPOSAL NOT BEING OFFICIALLY SUBMITTED TO THIS BAA AND THEREFORE NOT BEING REVIEWED.

Classified submissions and proposals should NOT be submitted through DARPA's BAA Website (<https://baa.darpa.mil>), though proposers will likely still need to visit <https://baa.darpa.mil> to register their organization (or verify an existing registration) to ensure the BAA office can verify and finalize their submission.

Please note that the DoD-issued certificate associated with the BAA website is not recognized by all commercial certificate authorities, resulting in untrusted connection errors/messages. You can either bypass the warning (possibly by adding <https://baa.darpa.mil> to your listed of trusted sites, or arpa.mil as a trusted domain), or visit DISA's site to download the Root Certificate Authority (CA): <https://public.cyber.mil/from-iase/>.

Technical support for DARPA's BAA Website may be reached at BAAT_Support@darpa.mil, and is typically available during regular business hours (9:00 AM - 5:00 PM EST, Monday - Friday).

c. Classified Submission Information

See Section IV.B.4, "Security Information," for guidance on submitting classified abstracts and proposals.

4. Other Submission Requirements

Not applicable.

V. Application Review Information

A. Evaluation Criteria

Proposals will be evaluated using the following criteria, listed in descending order of importance:

1. Overall Scientific and Technical Merit

The proposed technical approach is innovative, feasible, achievable, and complete. The proposed technical team has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements provided are complete and in a logical sequence with all proposed deliverables clearly defined such that a final outcome that achieves

the goal can be expected as a result of award. The proposal identifies major technical risks and planned mitigation efforts are clearly defined and feasible.

2. Potential Contribution and Relevance to the DARPA Mission

The potential contributions of the proposed effort are relevant to the national technology base. Specifically, DARPA's mission is to make pivotal early technology investments that create or prevent strategic surprise for U.S. National Security.

The proposer clearly demonstrates its plans and capabilities to contribute to U.S. national security and U.S. technological capabilities. The evaluation will consider the proposer's plans and capabilities to transition proposed technologies to U.S. national security applications and to U.S. industry. The evaluation may consider the proposer's history of transitioning or plans to transition technologies to foreign governments or to companies that are foreign owned, controlled, or influenced. The evaluation will also consider the proposer's plans and capabilities to assist its employees and agents to be eligible to participate in the U.S. national security environment. In addition, the evaluation will take into consideration the extent to which the proposed intellectual property (IP) rights structure will potentially impact the Government's ability to transition the technology.

3. Cost Realism

The proposed costs are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the solicitation. The proposed costs are consistent with the proposer's Statement of Work and reflect a sufficient understanding of the costs and level of effort needed to successfully accomplish the proposed technical approach. The costs for the prime proposer and proposed subawardees are substantiated by the details provided in the proposal (e.g., the type and number of labor hours proposed per task, the types and quantities of materials, equipment and fabrication costs, travel and any other applicable costs and the basis for the estimates).

It is expected that the effort will leverage all available relevant prior research in order to obtain the maximum benefit from the available funding. For efforts with a likelihood of commercial application, appropriate direct cost sharing may be a positive factor in the evaluation. DARPA recognizes that undue emphasis on cost may motivate proposers to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. DARPA discourages such cost strategies.

B. Review and Selection Process

1. Review Process

It is the policy of DARPA to ensure impartial, equitable, comprehensive proposal evaluations based on the evaluation criteria listed in Section V.A, and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals.

DARPA will conduct a scientific/technical review of each conforming proposal. Conforming proposals comply with all requirements detailed in this solicitation; proposals that fail to do so may be deemed non-conforming and may be removed from consideration. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort.

It is the policy of DARPA to ensure impartial, equitable, comprehensive proposal evaluations based on the evaluation criteria listed above and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals. Pursuant to FAR 35.016, the primary basis for selecting proposals for acceptance shall be technical, importance to agency programs, and fund availability. In order to provide the desired evaluation, qualified Government personnel will conduct reviews and (if necessary) convene panels of experts in the appropriate areas.

2. Handling of Source Selection Information

DARPA policy is to treat all submissions as source selection information (see FAR 2.101 and 3.104), and to disclose their contents only for the purpose of evaluation. Restrictive notices notwithstanding, during the evaluation process, submissions may be handled by support contractors for administrative purposes and/or to assist with technical evaluation. All DARPA support contractors performing this role are expressly prohibited from performing DARPA-sponsored technical research and are bound by appropriate nondisclosure agreements.

Subject to the restrictions set forth in FAR 37.203(d), input on technical aspects of the proposals may be solicited by DARPA from non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements.

3. Federal Awardee Performance and Integrity Information (FAPIS)

Per 41 U.S.C. 2313, as implemented by FAR 9.103 and 2 CFR § 200.205, prior to making an award above the simplified acquisition threshold, DARPA is required to review and consider any information available through the designated integrity and performance system (currently FAPIS). Awardees have the opportunity to comment on any information about themselves entered in the database, and DARPA will consider any comments, along with other information in FAPIS or other systems prior to making an award.

VI. Award Administration Information

A. Selection Notices

1. Abstracts

DARPA will respond to abstracts with a statement as to whether DARPA is interested in the idea. If DARPA does not recommend the proposer submit a full proposal, DARPA will provide feedback to the proposer regarding the rationale for this decision. Regardless of DARPA's response to an abstract, proposers may submit a full proposal. DARPA will review all conforming full proposals using the published evaluation criteria and without regard to any comments resulting from the review of an abstract.

2. Proposals

As soon as the evaluation of a proposal is complete, the proposer will be notified that (1) the proposal has been selected for funding pending contract negotiations, in whole or in part, or (2) the proposal has not been selected. These official notifications will be sent via email to the Technical POC identified on the proposal coversheet.

B. Administrative and National Policy Requirements

1. Meeting and Travel Requirements

All key participants are required to attend the program kickoff meeting. Performers should also anticipate regular program-wide PI Meetings and periodic site visits at the Program Manager's discretion.

2. Solicitation Provisions and Award Clauses, Terms and Conditions

Solicitation clauses in the FAR and DFARS relevant to procurement contracts and FAR and DFARS clauses that may be included in any resultant procurement contracts are incorporated herein and can be found at www.darpa.mil/work-with-us/additional-baa.

3. Controlled Unclassified Information (CUI) and Controlled Technical Information (CTI) on Non-DoD Information Systems

Further information on Controlled Unclassified Information identification, marking, protecting and control, to include processing on Non-DoD Information Systems, is incorporated herein and can be found at www.darpa.mil/work-with-us/additional-baa.

4. Representations and Certifications

In accordance with FAR 4.1102 and 4.1201, proposers requesting a procurement contract must complete electronic annual representations and certifications at <https://www.sam.gov/>.

In addition, all proposers are required to submit for all award instrument types supplementary DARPA-specific representations and certifications at the time of proposal submission. See <http://www.darpa.mil/work-with-us/reps-certs> for further information on required representation and certification depending on your requested award instrument.

C. Reporting

The number and types of reports will be specified in the award document, but will include as a minimum quarterly technical and monthly financial status reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed on before award. Reports and briefing material will also be required as appropriate to document progress in accomplishing program metrics. A Final Report that summarizes the project and tasks will be required at the conclusion of the performance period for the award, notwithstanding the fact that the research may be continued under a follow-on vehicle.

D. Electronic Systems

1. Wide Area Work Flow (WAWF)

Unless using another means of invoicing, performers will be required to submit invoices for payment directly via to <https://wawf.eb.mil>. Registration in WAWF will be required prior to any award under this BAA.

2. i-Edison

The award document for each proposal selected for funding will contain a mandatory requirement for invention disclosures (and associated elections, confirmatory instruments, etc.) and patent reports to be submitted electronically through i-Edison (<https://public.era.nih.gov/iedison>).

3. Vault

The award document for each proposal selected for funding will contain a mandatory requirement for technical and status reports to be submitted electronically through DARPA's Vault (or similar) web-based tool.

4. DARPA Embedded Entrepreneurship Initiative (EEI)

Awardees pursuant to this solicitation may be eligible to participate in the DARPA Embedded Entrepreneurship Initiative (EEI) during the award's period of performance. EEI is a limited scope program offered by DARPA, at DARPA's discretion, to a small subset of awardees. The goal of DARPA's EEI is to increase the likelihood that DARPA-funded technologies take root in the U.S. and provide new capabilities for national defense. EEI supports DARPA's mission "to make pivotal investments in breakthrough technologies and capabilities for national security" by accelerating the transition of innovations out of the lab and into new capabilities for the Department of Defense (DoD). EEI investment supports development of a robust and deliberate

Go-to-Market strategy for selling technology product to the government and commercial markets and positions DARPA awardees to attract U.S. investment. The following is for informational and planning purposes only and does not constitute solicitation of proposals to the EEI.

There are three elements to DARPA's EEI: (1) A Senior Commercialization Advisor (SCA) from DARPA who works with the Program Manager (PM) to examine the business case for the awardee's technology and uses commercial methodologies to identify steps toward achieving a successful transition of technology to the government and commercial markets; (2) Connections to potential industry and investor partners via EEI's Investor Working Groups; and (3) Additional funding on an awardee's contract for the awardee to hire an embedded entrepreneur to achieve specific milestones in a Go-to-Market strategy for transitioning the technology to products that serve both defense and commercial markets. This embedded entrepreneur's qualifications should include business experience within the target industries of interest, experience in commercializing early stage technology, and the ability to communicate and interact with technical and non-technical stakeholders. Funding for EEI is typically no more than \$250,000 per awardee over the duration of the award. An awardee may apportion EEI funding to hire more than one embedded entrepreneur, if achieving the milestones requires different expertise that can be obtained without exceeding the awardee's total EEI funding. The EEI effort is intended to be conducted concurrent with the research program without extending the period of performance.

EEI Application Process:

After receiving an award under the solicitation, awardees interested in being considered for EEI should notify their DARPA Program Manager (PM) during the period of performance. Timing of such notification should ideally allow sufficient time for DARPA and the awardee to review the awardee's initial transition plan, identify milestones to achieve under EEI, modify the award, and conduct the work required to achieve such milestones within the original award period of performance. These steps may take 18-24 months to complete, depending on the technology. If the DARPA PM determines that EEI could be of benefit to transition the technology to product(s) the Government needs, the PM will refer the performer to DARPA Commercial Strategy.

DARPA Commercial Strategy will then contact the performer, assess fitness for EEI, and in consultation with the DARPA technical office, determine whether to invite the performer to participate in the EEI. Factors that are considered in determining fitness for EEI include DoD/Government need for the technology; competitive approaches to enable a similar capability or product; risks and impact of the Government's being unable to access the technology from a sustainable source; Government and commercial markets for the technology; cost and affordability; manufacturability and scalability; supply chain requirements and barriers; regulatory requirements and timelines; Intellectual Property and Government Use Rights, and available funding.

Invitation to participate in EEI is at the sole discretion of DARPA and subject to program balance and the availability of funding. EEI participants' awards may be subsequently modified bilaterally to amend the Statement of Work to add negotiated EEI tasks, provide funding, and specify a milestone schedule which will include measurable steps necessary to build, refine, and

execute a Go-to-Market technology transition plan aimed at delivering new capabilities for national defense. Milestone examples are available at: <https://www.darpa.mil/work-with-us/contract-management>

Awardees under this solicitation are eligible to be considered for participation in EEI, but selection for award under this solicitation does not imply or guarantee participation in EEI.

VII. Agency Contacts

Administrative, technical or contractual questions should be sent via e-mail to HR001121S0042@darpa.mil. All requests must include the name, email address, and phone number of a point of contact.

The technical POC for this effort is:

Dr. Thomas Kazior
DARPA/MTO
ATTN: HR001121S0042
675 North Randolph Street
Arlington, VA 22203-2114
BAA Email: HR001121S0042@darpa.mil

VIII. Other Information

A. Proposers Day

The ELGAR Proposers Day will be held on October 12, 2021 virtually. Advance registration is required for the virtual meeting. See DARPA-SN-21-47 posted at <https://sam.gov> for all details. Attendance at the ELGAR Proposers Day is not required to propose to this solicitation.

A. Protesting

For information concerning agency level protests see <http://www.darpa.mil/work-with-us/additional-baa#NPRPAC>.