Broad Agency Announcement

Quantum Augmented Network (QuANET)

DARPA I2O

HR001123S0035

May 8, 2023

TABLE OF CONTENTS

PART I: OVERVIEW INFORMATION

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Information Innovation Office (I2O)
- **Funding Opportunity Title** – Quantum Augmented Network (QuANET)
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – HR001123S0035
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – Not applicable
- **Dates**
  - Posting Date: May 8, 2023
  - Proposers Day: May 11, 2023
  - Abstract Due Date and Time: May 25, 2023, 12:00 PM Eastern Time
  - Questions Due: June 16, 2023, 12:00 PM Eastern Time
  - Proposal Due Date and Time: July 7, 2023, 12:00 PM Eastern Time
- **Program Overview** - DARPA's QuANET program seeks to develop quantum-augmented networks that add novel security and covertness properties inherent in quantum communications to classical, non-quantum, network infrastructures that currently trade security against interoperability. QuANET will develop the hardware, protocols and software tools required for missions and critical infrastructure, enabling the first viable transition strategy to operationalize quantum communications. QuANET's objective is to implement the world's first operationally fielded quantum-augmented network.
- **Anticipated individual awards** – There are three (3) technical areas for this solicitation. Multiple awards are anticipated for all three technical areas.
- **Types of instruments that may be awarded** – Procurement contract or Other Transactions
- **Agency contact**
  - Points of Contact
    The BAA Coordinator for this effort can be reached at:
    Email: QuANET@darpa.mil.
    DARPA/I2O
    ATTN: HR001123S0035
    675 North Randolph Street
    Arlington, VA 22203-2114

PART II: FULL TEXT OF ANNOUNCEMENT

I.   Funding Opportunity Description

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 and 2 C.F.R. § 200.203. Any resultant award negotiations will follow all pertinent laws and regulations, and any negotiations and/or awards for procurement contracts will use procedures under FAR 15.4, Contract Pricing, as specified in the BAA.

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative proposals in the creation of a quantum augmented network (QuANET). Proposed research areas include the development of environmentally hardened, configurable quantum network cards (qNICs) along with protocols and software infrastructure to incorporate quantum systems into a Transmission Control Protocol/Internet Protocol (TCP/IP) network stack.

Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

A. Program Overview

The DARPA Information Innovation Office (I2O) is soliciting innovative research proposals for the development of a hybrid quantum-classical communication network architecture to enable quantum enhancements to security and covertness on today's classical networks. Today, all digital communication paradigms use a network stack that consists of a layered set of software protocols. The higher layers are closer to applications on computers and servers (commonly called nodes), while the bottom layers are closer to the physical implementation (i.e., network cables). State-of-the-art networks commonly rely on security at the top layers of the stack, assuming that this security also mitigates potential attacks on lower-layers. Unfortunately, advanced persistent threat (APT) attacks are defeating many existing state-of-the-art capabilities, increasing cyber defense costs to U.S. commercial and government entities.

The QuANET program seeks to augment existing software infrastructure and network protocols with quantum properties to mitigate these attack vectors. The program will achieve this goal by blending existing "best-of" quantum communications capabilities into networks operating today in military and critical infrastructure. Quantum information will need to co-exist with classical information (quantum-classical interoperability) incorporating the following:

- Quantum-time synchronization augmenting clock synchronization tasks and time-of-flight tests;
- Quantum sensing and metrology in a communication paradigm to augment situational awareness around message propagation; and,
- Embedding of classical information into quantum systems to mitigate information theft and data corruption.

The hardware advancement QuANET seeks to create is an environmentally hardened, configurable network interface card that directly connects quantum links with classical computing nodes. This hardware design should extend capabilities already available in classical networks.

Many research efforts in quantum communications focus solely on quantum key distribution (QKD). The QuANET program is seeking to develop enabling *network* infrastructure to incorporate the use of quantum communications. Hybrid quantum-classical network infrastructure will allow a wide range of networking and communication experts to develop additional uses for the technology beyond QKD. Proposals focused on QKD are highly discouraged.

The initial design and development of QuANET will focus on the integration of current quantum capabilities into classical infrastructure. Quantum interconnects such as quantum repeaters, switches, and routers are not in scope for the program. Proposals may describe the modularity of their approach with the potential for future interconnects in mind. However, the QuANET program seeks solutions for networks that scale up to the size of a metropolitan area network (MAN).

B. Program Structure

DARPA's QuANET is a 51-month, 4-phase program. Phase 0 (technical area 1 base) is three months and will be focused on the design of quantum-network interface cards (qNICs). Phase 1 (Base) is 18 months and will focus on the fabrication of the qNIC and the development of prototype data stream and topological augmentations. Phase 2 (Option 1) is 18 months and will focus on the integration of data stream and topological augmentation capabilities with the fabricated qNIC, leveraging fiber optic networks. Phase 3 (Option 2) is 12 months and will focus on scalability of fiber-optic, quantum-augmented networks and the initial design for over-air link extensions. Phases 2 and 3 should be proposed as separately priced options. 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.

Selected performers are expected to collaborate with each other. The Government has determined that an Associate Contractor Agreement (ACA) is necessary to help facilitate an open exchange of information. The ACA will help ensure complete compatibility between software components, the system architecture, equipment, data, and other program elements to prevent unnecessary duplication of effort and to maximize integration of capabilities. All selected performers will be required to have their ACAs in place prior to the program kick-off meeting. Additional information on ACAs can be found in Section VIII.
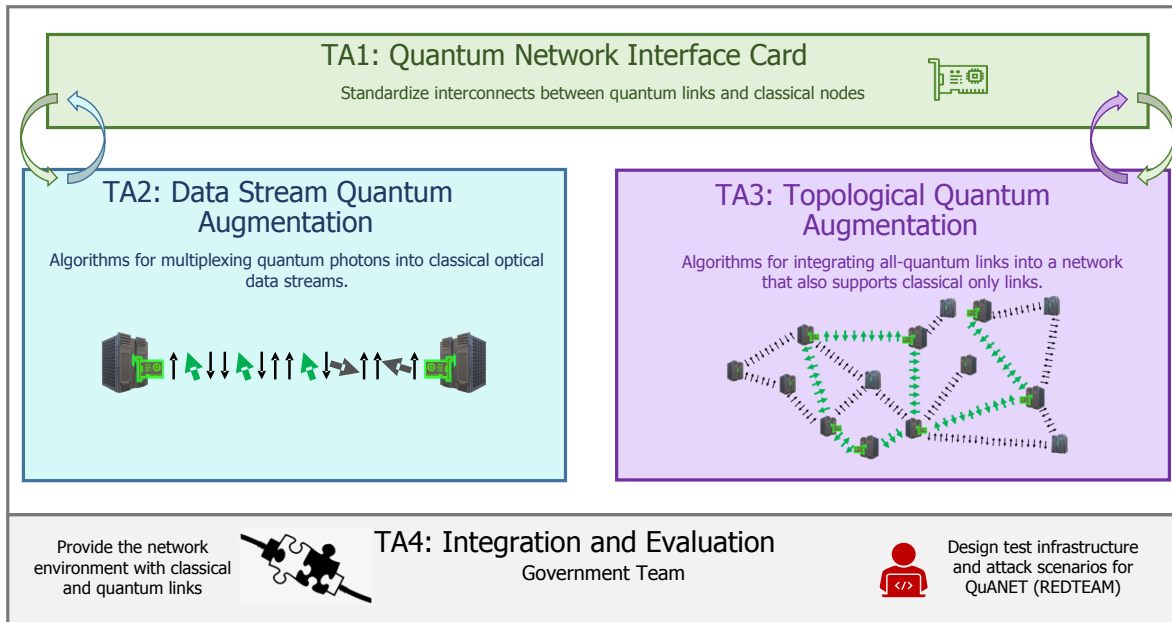
Figure 1: QuANET Program Structure

C. Technical Areas

The QuANET program will develop technology that will enable the augmentation of classical networks with quantum communication properties. To achieve this goal, QuANET will focus on three (3) technical areas (TAs) as shown in Figure 1. TA4 is a government integration and evaluation team. This BAA is not soliciting proposals for TA4.

TA1 will focus on the development, ruggedization, and miniaturization of a quantum network interface card (qNIC) that directly connects quantum links with classical computing nodes. The device must be capable of sending and receiving quantum information, as well as sending and receiving quantum timing and sensing information, atop classical information. Software embedded in the qNIC is expected to integrate with TA2 and TA3 solutions starting in Phase 2.

TA2 will build algorithms, protocols, and software infrastructure that use quantum timing and sensing information to augment the communication of classical information. These software tools are expected to integrate into a TCP/IP network stack. TA2 capabilities are expected to run on TA1 qNICs starting in Phase 2.

TA3 will build algorithms, protocols, and software infrastructure that integrate quantum secure direct communication links into a mostly classical network infrastructure running TCP/IP. TA3 capabilities are expected to run on TA1 qNICs starting in Phase 2.

TA4 will consist of government partners who will provide an integration testbed along with a separate test and evaluation team. The integration team will provide a classical network infrastructure (nodes, twisted pair and fiber cables) along with quantum links that will support integration of the TA1-TA3 capabilities.

The Government anticipates making one or more awards for each of TA1, TA2, and TA3. Each proposal submitted against this solicitation may address any combination of these TAs. Proposals addressing multiple TAs should be clearly separable, so that the Government can review and potentially award individual TAs. A proposer submitting to multiple TAs may be selected to perform on any combination of proposed TAs.

TA1: Quantum Network Interface Card

The goal of TA1 is the standardization of interconnects between quantum links and classical nodes. TA1 will achieve this standardization through the development of a quantum-network interface card (qNIC). TA1 will focus on quantum in the photonics realm, realizing the qNIC as an extension of an optical NIC with the addition of an entanglement generator and receiver with sufficient sensitivity to receive quantum information. The device must be capable of sending and receiving quantum information, as well as sending and receiving quantum timing and sensing information, atop classical information. Tight coordination with TA2 and TA3 solutions is expected throughout the program, and strong proposals will describe approaches for inter-TA collaboration.
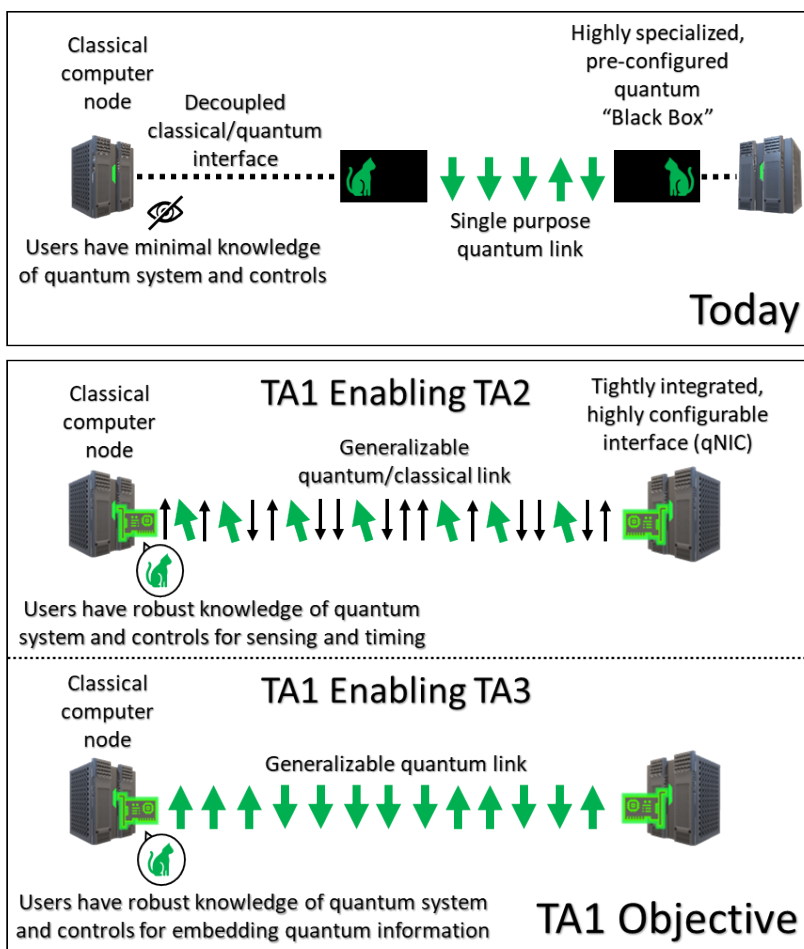

Figure 2: TA1 Objective Overview: Unlike today, users of a qNIC will leverage robust interfaces to enable novel uses of quantum information

Strong proposals will describe:

- **Hardware and Hardware Packaging:**
    - Interoperability of quantum hardware, such as photon sources and entanglement generators and receivers
    - Packaging considerations for the following in support of integration with typical classical compute devices:
        - environmental ruggedization (vibration, temperature, etc.) and
        - reducing initial size, weight, and power (SWAP) throughout the program
- **Embedded Software:** qNIC embedded software that processes quantum data and passes that data to the network stack of the operating system for TA2 and TA3 algorithms. The application programming interfaces (API) for this embedded software should describe:
    - Types of quantum information that can be captured and passed to higher layers of the network stack; and,
    - How the inclusion of these types of quantum information map to existing classical protocol data units (for example, bits, packets, ethernet frames, etc.). Strong proposals will include descriptions of extensions to existing network protocols or novel protocols.

TA1 Hardware and hardware packaging

As shown in Figure 2, QuANET TA1 performers will focus on providing a configurable quantum network interface card. TA1 proposals are expected to describe integration with classical NIC hardware and quantum hardware. Strong proposals will describe integration of quantum and classical hardware: sources, entanglement generators, transmitters, and receivers with time synchronization hardware. Additional modules that include short term quantum memories (memory buffers) and frequency converters must be described in detail with proof of experimental validation.

TA1 performers can expect challenges in preventing significant loss of signal while enabling quantum-classical multiplexing required for TA2 applications. Recent work in time-division multiplexing (TDM) and wave-division multiplexing (WDM) have shown that this loss prevention is possible. Strong TA1 proposals will explain their approach for enabling coexistence, and how their approach mitigates significant loss within the qNIC. Note that the metrics provided in Figure 5 in Section I.D speak to the expected source emission throughput.

Strong TA1 proposals will focus on hardware configurability and environmental hardening. While SWAP improvements are expected, they should not come at the expense of other program metrics.

TA1 Software and capability structure

The QuANET program is seeking a network architecture that allows researchers to advance the various uses described within this BAA and enable future use cases for the technology. TA1 proposals should describe any data preprocessing that would occur on the qNIC before data is passed to the TCP/IP stack of the operating system. TA1 proposals should describe how embedded software preprocessing on the qNIC enables different TA2 and TA3 use cases. TA1 solutions should be compatible with one or more open-source operating systems, e.g., a Linux or BSD variant, running on a typical desktop system. Strong TA1 proposals may describe novel protocols, or extensions to existing TCP/IP protocol data units (for example, ethernet frames), for encapsulating measured quantum information. TA1 proposals should describe how these novel protocols or extensions will co-exist with classical networking protocols.

TA1 Performers and program integration requirements

TA1 performers are expected to have experience in quantum communication hardware, fabricating custom networking hardware, and developing embedded software for network interface cards. Further, they are expected to have a deep understanding of host network interfaces and application programming interfaces (APIs). Strong TA1 proposals should describe how iterations of the qNIC design and fabrication will be achieved as feedback and emergent requirements from TA2 and TA3 are provided, and how they will meet program timing requirements given potential supply chain issues.

TA2: Data Stream Quantum Augmentation

TA2 will build the algorithms, protocols, and software infrastructure for multiplexing quantum photons into classical optical streams, enabling the use of quantum timing and sensing information atop classical information. Integrating quantum photons into classical optical data streams will enable the event detection, node verification and high-fidelity timing mechanisms of quantum communications in existing classical networks. Strong proposals will describe use of these mechanisms in the context of preventing rogue/counterfeit nodes accessing secure networks, route injections, and timing attacks. These descriptions should include how proposed solutions extend or replace current protocols such as the address resolution protocol (ARP), or the secure neighbor discovery protocol (SNDP). Strong proposals will also be grounded in classical protocols, leveraging the TCP/IP network stack that has remained resilient over time.

Several methods of clock synchronization and optical quantum sensing in network structures have been proposed and experimentally validated. TA2 teams are expected to coordinate closely with TA1 teams to ensure that the enabling technology and lower-layer functionality needed for their protocols is available. Strong TA2 proposals will describe the enabling quantum technology required for their approach and include metrics that can prove its advantage over other potential methods. TA2 proposers should refer to the Figure 5 metrics table in Section I.D for requirements of the three use cases covered. Strong TA2 proposals will describe how their approach will achieve these metrics. TA2 proposers are not limited to the use cases described and may include additional use cases that do not require novel quantum hardware.
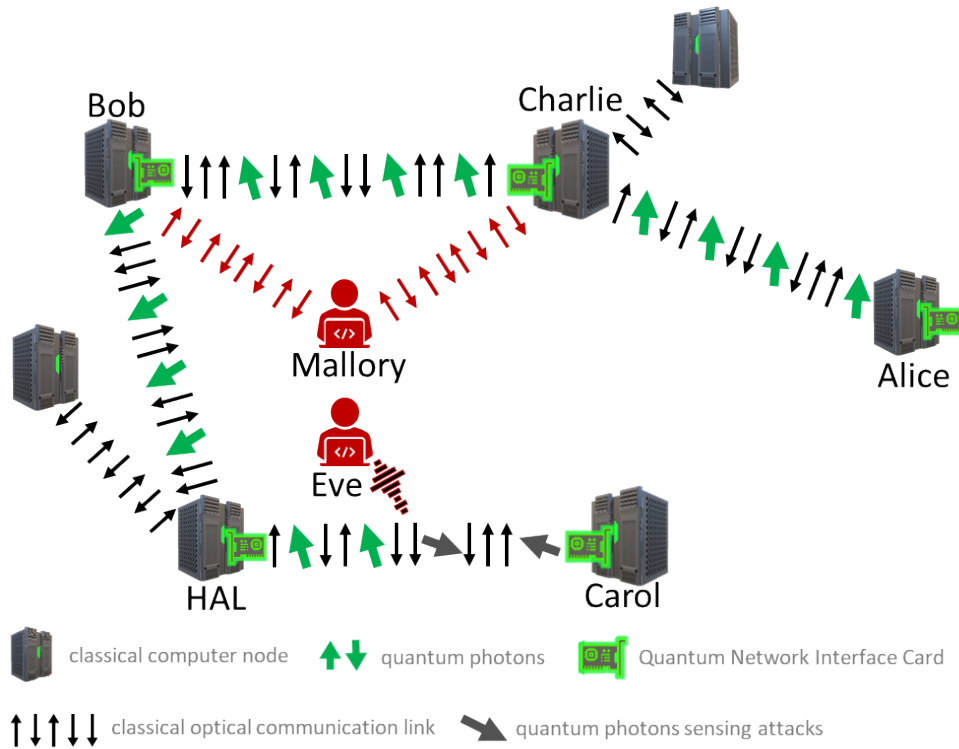
Figure 3: A simple topology with quantum augmented links. Eavesdropping and route injection examples included

Example applications of TA2 technology are shown in Figure 3. In the first application, Bob would like to send a message to Alice. The expected route for this message is Bob -> Charlie -> Alice. Mallory, however, successfully hijacks the message route, and the message is routed via Bob -> Mallory -> Charlie -> Alice. When Alice receives the message, TA2 protocols immediately alert Alice that the message has not been routed through the expected quantum/classical links. This attack may also be mitigated earlier by TA2 node verification protocols, ensuring that Mallory is unable to connect to the network as a valid node. In the second application, Eve attempts to eavesdrop on the fiber optic link between HAL and Carol. When Carol receives a message from HAL, TA2 event detection immediately alerts Carol that an attacker has intercepted the message.

In each of these applications of TA2 technology, quantum information is measured and created at each node in the chain (point-to-point sensing and timing information propagation). Strong proposals will define how data obtained from quantum measurements is propagated through the network stack making these quantum measurements usable in the defined scenarios. Strong proposals will balance quantum sensing and metrology capabilities while mitigating computational bottlenecks in the network.

TA2 teams will need to test and evaluate their approaches while TA1 qNICs are in production. Strong TA2 proposals will include methods of testing and evaluating their approach throughout the program. Test and evaluation methods include, but are not limited to, emulators, simulators, and external testbeds. The QuANET program will not accept bids to build new quantum communication infrastructure, but the use of existing infrastructures such as academic testbeds and national labs will be considered.

Strong TA2 proposals will demonstrate team expertise in classical networking algorithms and protocols combined with expertise in current quantum communication, sensing, and metrology capabilities.

TA3: Topological Quantum Augmentation

The goal of TA3 is the development of algorithms for the integration of quantum links into a network that also supports classical-only links. TA2 investigates quantum/classical integration at the optical stream level; in contrast, TA3 investigates the utility of combining quantum-only and classical-only links. The availability of quantum-only links will enable this TA to further strengthen QuANET network security mechanisms. The work of TA3 performers will ensure the security of information using data embedded into quantum systems for quantum information transmission over classical network infrastructures.

Several quantum algorithms and protocols have been developed for quantum secure direct communication links. While experimentally validated approaches are increasing, there is still a wide variety of choices that rely on highly specialized quantum hardware and hardware architectures. Strong TA3 proposals will abstract quantum algorithms to work on a larger set of enabling technologies, while coordinating with TA1 teams to ensure low-level functionality is available.

Many quantum communication protocols focus only on the point-to-point communication protocols (PPP) within the physical layer of the network stack. These protocols exist at the very bottom of the network layer, dealing only with operations on the physical photons. In order to fully integrate with classical network infrastructures, TA3 performers are expected to also incorporate standard network traffic addressed in higher layers of the network stack, such as headers addressing routing, message validation schemes and corruption mitigations into quantum links. Strong proposals will describe incorporation of these standard network issues within the TCP/IP network infrastructure.

It is expected that TA3 will address integrating classical traffic loss recovery mechanisms (i.e., retransmission). Strong TA3 proposals will also describe the development of decoherence recovery mechanisms needed for robust communications.
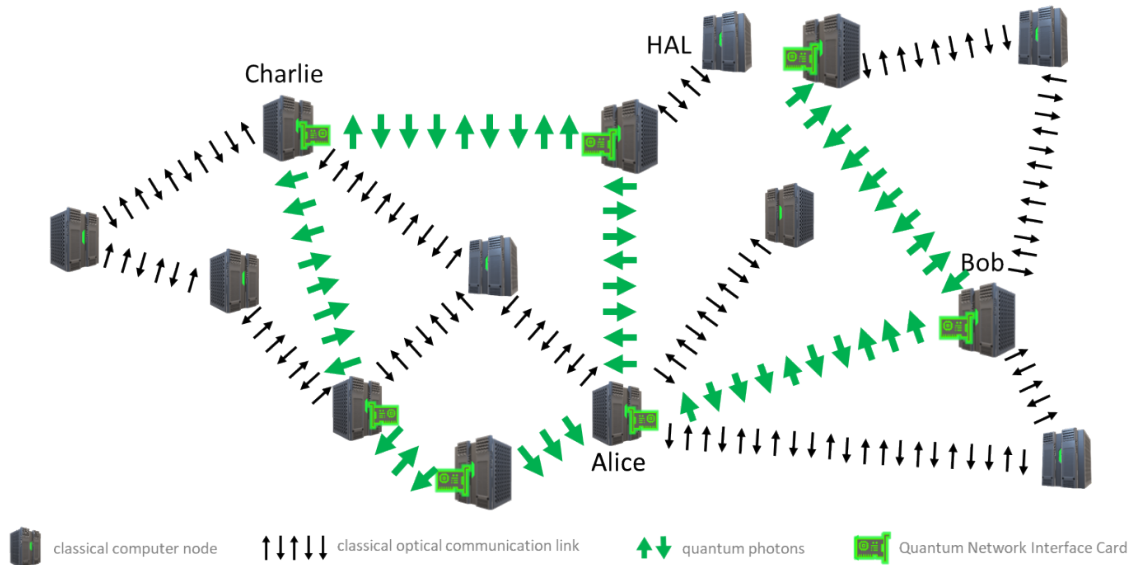
Figure 4: A simple topology with quantum and classical links. Secure path selection needs to ensure that the correct route is used when sending messages, particularly when the security of quantum encoding is requested.

TA3 performers are also expected to address interoperability between quantum and classical links. For example, in Figure 4, there is no quantum-only path from Charlie to HAL.

TA3 teams will need to test and evaluate their approaches while TA1 qNICs are in production. Strong TA3 proposals will include methods of testing and evaluating their approach throughout the program. Test and evaluation methods include, but are not limited to, emulators, simulators, and external testbeds. The QuANET program will not accept bids to build new quantum communication infrastructure, but the use of pre-existing infrastructures such as commercial, academic and national lab testbeds will be considered.

TA3 performers will be initially evaluated against verification of attacks against the network and success in routing over quantum links over an increasing number of nodes and hops. Proposers may add additional metrics to emphasize the strengths of proposed solutions.

Strong TA3 proposals will demonstrate team expertise in classical networking infrastructure and security combined with expertise in current quantum communications algorithms to enable quantum-secure information transmission into classical network infrastructure.

D. Program Phases and Metrics

In order for the Government to evaluate the effectiveness of a proposed solution in achieving the stated program objectives, the following program metrics serve as one basis for determining whether satisfactory progress is being made to warrant continued funding of the program. Although the following program metrics are specified, proposers should note that the Government has identified these goals with the intention of bounding the scope of effort while affording the maximum flexibility, creativity, and innovation in proposing solutions to the stated problem.

Proposals should cite the quantitative and qualitative success criteria that the proposed effort will achieve by the time of each Phase's program metric measurement.

Capabilities	Phase 0 (3 months)	Phase 1 (18 months)	Phase 2 (18 months)	Phase 3 (12 months)
TA1: Quantum Network Interface Card	Throughput efficiency and robustness			
	[Completed design specifications of network interface]	Initial implementation to match a kb/s throughput	50% improvement in throughput over initial design	Mb/s throughput Over-air interface component designed
TA2: Node verification	Verification accuracy			
		70%	80%	85% Over-air protocols outlined
TA2: Detect route injection	Detection time			
		1/2 day	1 hour	1 hour Over-air protocols outlined
TA2: Detect unwanted listeners	Detection time			
		1 day	12 hours	1 hour Over-air protocols outlined
TA3: Attack verification	Attack verification accuracy: true positive (TP) vs false positives (FP)			
		60% TP vs 40% FP	80% TP vs 20% FP	90% TP vs <5% FP Over-air protocols outlined
TA3: Route determination		80% success rate with initial 6 node network	90% success rate with 20 node network	85% success rate with 100 node network

Figure 5: QuANET Program Metrics

Phase 0, which is limited to TA1 performers only, will focus on the initial design of the qNICs. At the end of Phase 0, TA1 performers will have completed design specifications for a qNIC that has been validated by the government integration team and have presented a Phase 1 timeline for fabrication and testing of the qNIC.

Phase 1 and Phase 2 will focus on development of capabilities leveraging fiber optic links. At the end of Phase 1, TA1 performers will have designed, fabricated, and tested a qNIC capable of transmitting kb/s-scale data. TA2 performers will have achieved a verification accuracy of at least 70%, detection of route injection attacks in half a day (1/2) and detection of unwanted listeners in one (1) day. TA3 performers will have achieved attack verification with 60% accuracy and route determination with a rate of success of at least 80% in a 6-node network.

At the end of Phase 2, TA1 performers will have developed a qNIC with 50% throughput improvement when compared to Phase 1 results. TA2 performers will increase verification accuracy to 80%, reduce route injection detection time to one (1) hour and detection of unwanted listeners to twelve (12) hours. TA3 performers will have increased attack verification accuracy to at least 80% and route determination to at least 90% success on a twenty (20) node network.

Phase 3 will focus on over-air links. TA1's fiber optic qNIC will have achieved Mb/s throughput and have established an over-air interface component design. TA2 and TA3 will have achieved algorithm design changes needed for over-air communications.

E. Schedule and Milestones

The intent of QuANET is to produce the first operationally-fielded quantum-augmented network. QuANET will collaborate with potential transition partners early and continuously throughout the program to ensure that QuANET capabilities support transition partner needs. Collaboration will ensure Department of Defense (DoD) relevance and provide QuANET with a continuous understanding of the rapidly evolving state of quantum communications.

Transition partners will interact with performers during the scheduled integration, workshop and principal investigator (PI) meetings. Integration events will occur every twelve (12) months, while workshops and PI meetings will alternate every three (3) months.

The Government will specify the locations for all the program events (i.e., kickoff, PI meetings, integration, workshops, etc.) to be conducted in-person. For budgeting purposes, assume locations alternate between Washington, DC and San Diego, CA starting in Washington, DC.

A summary of the program schedule with corresponding events is shown in Figure 6.
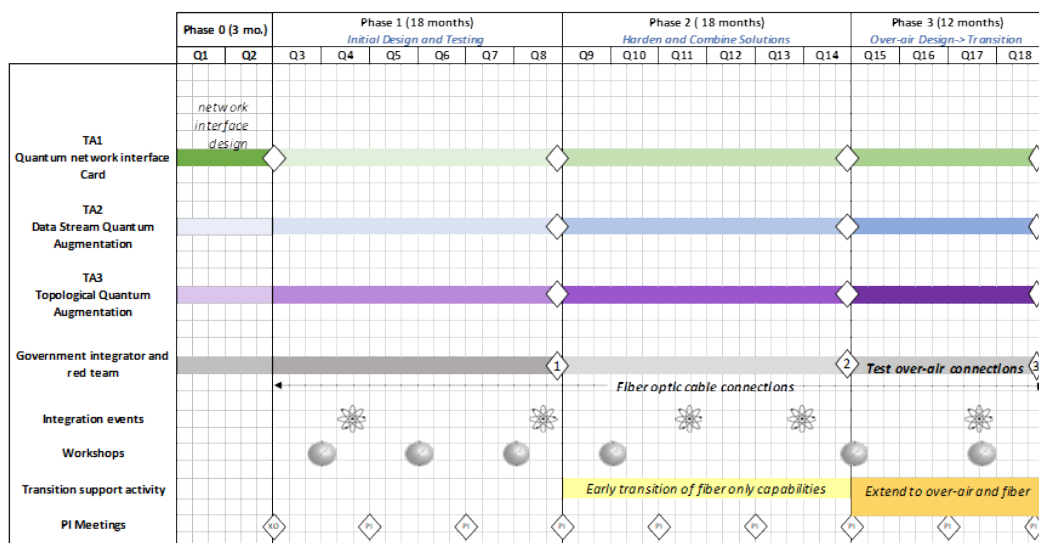
Figure 6: QuANET Program Schedule

F. Deliverables

All performers will be required to provide, at a minimum, the following deliverables:
- Any technical documents and products derived from work funded by this program
- Hardware instances produced by TA1 with documentation, including electrical requirements, mechanical details, and other details as needed for installation, reliable operation, and diagnosis
- Commented source code, any other necessary data, build scripts, and documentation (including at minimum user manuals and a detailed software design document) necessary for the government to reproduce any executable software and test results developed on this program

- Annotated slide presentations, delivered within one (1) week after each PI meeting, development workshop, or other program events
- Quarterly technical status reports detailing progress made, tasks accomplished, major risks, planned activities, trip summaries, changes to key personnel, and any potential issues or problem areas that require the attention of the Government Team must be provided within fifteen (15) calendar days of the end of each quarter
- Monthly financial status reports, provided within fifteen (15) calendar days of the end of each month
- A final phase report for each program phase that concisely summarizes the effort conducted, technical achievements, and remaining technical challenges will be due 30 calendar days after the end of each phase
- A final report at the end of the overall period of performance that summarizes the project

G. Government-furnished Property/Equipment/Information

Proposals should clearly state any assumptions regarding the use of proposed Government test facilities and capabilities, as well as any proposed Government-Furnished Equipment (GFE) used as part of their research, development, test, and evaluation approach. Proposers should not assume that the Government will provide them with any tools or hardware needed to perform their tasks. Cost Volumes should include a separate list of the cost of each GFE item if it is unavailable from the Government.

H. Intellectual Property

The program will emphasize creating and leveraging open-source technology and architecture. Intellectual property rights asserted by proposers are strongly encouraged to be aligned with open-source regimes.

A key goal of the program is to establish an open, standards-based, multi-source, plug-and-play architecture that allows for interoperability and integration. This goal includes the ability to easily add, remove, substitute, and modify software and hardware components. This type of architecture will facilitate rapid innovation by providing a base for future users or developers of program technologies and deliverables. Therefore, it is desired that all noncommercial software (including source code), software documentation, hardware designs and documentation, and technical data generated by the program be provided as deliverables to the Government, with a minimum of Government Purpose Rights (GPR), as lesser rights may adversely impact the lifecycle costs of affected items, components, or processes.

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, as applicable.

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 IV.B.3.d, "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/or cost/price within a reasonable time, and the proposer fails to timely provide requested additional information. Proposals identified for negotiation may result in a procurement contract or a cooperative agreement, 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. § 4022(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.§ 4892 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#OtherTransactions.

IV. Application and Submission Information

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 BAA Coordinator 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. All monetary references shall be in U.S. Dollars.

1. Abstracts Format

Proposers are strongly encouraged to submit an abstract in advance of a full proposal. The abstract is a concise version of the proposal comprising a maximum of 4 pages for abstracts addressing one TA, plus an additional 2 pages for each TA beyond one, including all figures, tables, and charts. The required cover sheet, summary slide, and optional submission letter, table of contents, or appendices are not included in the page count.

The strongly suggested abstract components are:

   A. Cover Sheet (required): Include the administrative and technical points of contact (title, name, address, phone, e-mail, lead organization). Also include the BAA number, title of the proposed project (not the BAA title), Technical Area, subcontractors, estimated cost, duration of the project, and the label "ABSTRACT."
   B. Technical Plan: Outline and address all technical challenges inherent in the approach and possible solutions for overcoming potential problems. Describe milestones and how they will be achieved.
   C. Management and Capabilities Plan: Identify the principal investigator, provide a brief summary of expertise of the team, including subcontractors and key personnel, and include relevant expertise to **both** quantum communications **and** classical networking.
   D. Cost and Schedule: Provide a cost estimate for resources over the proposed timeline of the project. Include cost estimates for each potential subcontractor (it may be a rough order of magnitude).
   E. Executive Summary Slide: The slide template is provided as an attachment to the BAA posted at https://SAM.gov.

2.   Proposals Format

All proposals should be in the format given below. 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 shall consist of two volumes: 1) Volume I, Technical and Management Proposal (composed of 3 parts), and 2) Volume II, Cost Proposal. The maximum pages count for Volume I is 30 pages for proposals addressing one TA, plus an additional 5 pages for each TA beyond one, and excludes the cover page, summary slide, official transmittal letter, and any table of contents or appendices, but does include figures, tables, and charts.

NOTE: Non-conforming submissions that do not follow the instructions herein may be rejected without further review.

   a)   Volume I, Technical and Management Proposal
      (1)   Section I: Administrative
         (a)   Cover Sheet to Include
(1) BAA number (HR001123S0035
(2) Technical area;
(3) Lead Organization submitting proposal;

(4) Type of organization, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", OR "OTHER NONPROFIT";

(5) Proposer's reference number (if any);

(6) Other team members (if applicable) and type of organization for each;

(7) Proposal title;

(8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);

(9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);

(10) Total funds requested from DARPA, and the amount of cost share (if any); AND

(11) Date proposal was submitted.

(b)   Official transmittal letter

(2)   Section II: Summary of Proposal

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

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

C. Deliverables associated with the proposed research and the plans and capability to accomplish technology transition and commercialization. Include in this section all proprietary claims to the results, prototypes, intellectual property, or systems supporting 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.3.i of this BAA. There will be no page limit for the listed forms.

D. General discussion of other research in this area.

E. A clearly defined organization chart for the program team which includes, as applicable: (1) the programmatic relationship of team member; (2) the unique capabilities of team members; (3) the task of responsibilities of team members; (4) the teaming strategy among the team members; (5) the principal investigator (PI), co-PI, and program manager (if applicable) for each team member to include subcontractor's PI, co-PI, and program manager; and (6) the key personnel along with the amount of effort to be expended by each person during each year.

F. A summary slide of the proposed effort, in PowerPoint format, should be submitted with the proposal. Submit this PowerPoint file in addition to Volumes 1 and 2. The format for the summary slide is included as an attachment to this BAA and does not count against the page limit.

(3)   Section III: Detailed Proposal Information

A. Statement of Work (SOW) - 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:

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

Note: It is recommended that the SOW should be developed so that each Phase of the program is separately defined.

Do not include any proprietary information in the SOW.

B. Description of the results, products, transferable technology, and expected technology transfer path to supplement information included in the summary of the proposal. 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.3.i of this BAA, "Intellectual Property."
C. Detailed technical approach enhancing and completing the Summary of Proposal.
D. Comparison with other ongoing research indicating advantages and disadvantages of the proposed effort.
E. Discussion of proposer's previous accomplishments and work in closely related research areas.
F. Description of Security Management architecture and/or approach for the proposed effort. Detail unique additional security requirements information system certification expertise for CUI or classified processing, Operation Security (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).
G. Description of the facilities that would be used for the proposed effort. (as applicable)
H. Detail support enhancing that of Summary of Proposal, including formal teaming agreements which are required to execute this program. (as applicable)
I. Provide description of milestone, cost, and accomplishments.

b) Volume II, Cost Proposal

All proposers, including FFRDCs, must submit the following:

1. Cover sheet to include:
    (1) BAA number (HR001123S0035);
    (2) Technical area;
    (3) Lead Organization submitting proposal;

(4) Type of organization selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", OR "OTHER NONPROFIT";

(5) Proposer's reference number (if any);

(6) Other team members (if applicable) and type of organization for each;

(7) Proposal title;

(8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);

(9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available);

(10) Award instrument requested: cost-plus-fixed-fee (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (specify)

(11) Place(s) and period(s) of performance;

(12) Total proposed cost separated by basic award and option(s) (if any);

(13) Name, address, and telephone number of the proposer's cognizant Defense Contract Management Agency (DCMA) administration office (if known);

(14) Name, address, and telephone number of the proposer's cognizant Defense Contract Audit Agency (DCAA) audit office (if known);

(15) Date proposal was prepared;

(16) Data Universal Numbering System (DUNS) number;

(17) Taxpayer Identification Number (TIN);

(18) Commercial and Government Entity (CAGE) Code;

(19) Subawardee information; and

(20) Proposal validity period.

2. Additional Cost Proposal Information

(a) Supporting Cost and Pricing Data

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.

(b) Cost Breakdown Information and Format

Detailed cost breakdown to include:
- Total program costs broken down by major cost items (direct labor, including labor categories; subcontracts; materials; other direct costs; overhead charges, etc.) and further broken down by task and phase
- Major program tasks by fiscal year

- An itemization of major subcontracts and equipment purchases.
- Documentation supporting the reasonableness of the proposed equipment costs (vendor quotes, past purchase orders/purchase history, detailed engineering estimates, etc.) shall be provided.
- 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.
- A summary of projected funding requirements by month
- The source, nature, and amount of any industry cost-sharing
- Identification of pricing assumptions of which may require incorporation into the resulting award instrument (e.g., use of Government Furnished Property/Facilities/Information, access to Government subject matter experts, etc.)

Tables included in the cost proposal in editable (e.g. MS Excel) format with calculation formulas intact. NOTE: If PDF submissions differ from the Excel submission, the PDF will take precedence.

The Government requires 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**.

NOTE: The cost proposal spreadsheet is a supplement to, and not a substitution for, the Cost Volume. The Cost Volume should be submitted as previously outlined.

Per FAR 15.403-4, certified cost or pricing data shall be required if the proposer is seeking a procurement contract award per the referenced threshold, unless the proposer requests and is granted an exception from the requirement to submit cost or pricing data. Certified cost or pricing data is not required if the proposer proposes an award instrument other than a procurement contract.

(c)   Subaward Proposals

The proposer is responsible for compiling and providing all subaward proposals for the Procuring Contracting Officer (PCO), as applicable. Subaward proposals should include Interdivisional Work Transfer Agreements (ITWA) or similar arrangements. 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 for each.

All proprietary subaward proposal documentation, prepared at the same level of detail as that required of the proposer's proposal and which cannot be uploaded with the proposal, shall be provided to the Government either by the proposer or by the subawardee organization when the proposal is submitted. Subaward proposals submitted to the Government by the proposer's awardee should be submitted electronically to QuANET@darpa.mil, and the proposed awardee will not be allowed to view. The subawardee must provide the same number of electronic copies to the PCO/GO/AO as is required of the awardee. See Section IV.B.4. of this BAA for proposal submission information.

3.   Additional Proposal Information

a)   Proprietary Markings

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"." 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.

b)   Security Information
(1)   Program Security Information
(a)   Program Security
Proposers should include with their proposal any proposed solution(s) to program security requirements unique to this program. 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.

(2)   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.

(a)   CUI Proposal Markings
If an unclassified submission contains CUI or the suspicion of such, as defined by Executive Order 13556 and 32 C.F.R. Part 2002, the information must be appropriately and conspicuously

marked CUI in accordance with DoD Instruction (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.

(b) CUI Submission Requirements

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

(c) 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 in accordance with (IAW) NIST SP 800-171 and DoDI 8582.01.

(d) 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 BAA mailbox requesting submission instructions from the Technical Office Program Security Officer (PSO). If a determination is made that the award instrument may result in access to classified information, a Security Classification Guide (SCG) and/or DD Form 254 will be issued by DARPA and attached as part of the award.

c) 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.

d) 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.

A small business joint venture offeror must submit, with its offer, the representation required in paragraph (c) of FAR solicitation provision 52.212-3, Offeror Representations and Certifications-Commercial Products and Commercial Services, and paragraph (c) of FAR solicitation provision 52.219-1, Small Business Program Representations, in accordance with 52.204-8(d) and 52.212-3(b) for the following categories: (A) Small business; (B) Service-disabled veteran-owned small business; (C) Women-owned small business (WOSB) under the WOSB Program; (D) Economically disadvantaged women-owned small business under the WOSB Program; or (E) Historically underutilized business zone small business.

e) 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.

f) Approved Cost Accounting System Documentation

Proposers that do not have a Cost Accounting Standards (CAS) complaint accounting system considered adequate for determining accurate costs that are negotiating a cost- type procurement contract must complete a Standard Form, (SF 1408). For more information on CAS compliance, see http://www.dcaa.mil. 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.

g) 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 submits a proposal for a procurement contract and includes subcontractors might be required to submit a subcontracting plan with their proposal. The plan format is outlined in FAR 19.704.

h) 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. § 749d)/FAR 39.2.

i) 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.

<div align="center">(1)   For Procurement Contracts</div>

Proposers responding to this BAA requesting procurement contracts will need to complete the certifications at Defense Federal Acquisition Regulation Supplement (DFARS) 252.227-7017. See http://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)

j)   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.

4.   Submission Information

For abstract and proposal submission dates, see Part 1: Overview Information. Submissions received after these dates and times may not be reviewed.

Abstracts must be received via DARPA's BAA Website (https://baa.darpa.mil) on or before the submission dated stated in Part 1: Overview Information.

The proposal must be received via DARPA's BAA Website (https://baa.darpa.mil) on or before July 7, 2023, 12:00 PM Eastern Time, in order to be considered during the initial round of selections; however, proposals received after this deadline may be received and evaluated up to six months (180 calendar days) from date of posting on the System for Award Management, Contract Opportunities (https://SAM.gov). Proposals submitted after the due date specified in the BAA, but before the solicitation closing date, may be selected. Proposers are warned that the likelihood of available funding is greatly reduced for proposals submitted after the initial closing date deadline.

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 HR001123S0035. Submissions may not be submitted by fax or e-mail; any submission received through fax or e-mail 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 five (5) business days after notification that a proposal was not selected.

Since proposers may encounter heavy traffic on the web server, it is highly recommended that proposers not wait until the day proposals are due to request an account and/or upload the submission. Full proposals should not be submitted via e-mail. Any full proposals submitted by e-mail will not be accepted or evaluated.

a) Abstract Submission

Refer to Section VI.A.1. for DARPA response to abstract submissions.

b) Proposal Submission

Refer to Section VI.A.2. for how DARPA will notify proposers as to whether or not their proposal has been selected for potential award.

> **(1)** For Proposers Requesting Procurement Contracts or OTs and Submitting to a DARPA-approved Proposal Submissions Website

Unclassified full proposals sent in response to this BAA may be submitted via DARPA's BAA Website (https://baa.darpa.mil). Note: If an account has recently been created for the DARPA BAA Website, this account may be reused. Accounts are typically disabled and eventually deleted following 75-90 days of inactivity – if you are unsure when the account was last used, it is recommended that you create a new account. 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. The "Password Reset" option at the URL listed above can be used if the password is not received in a timely fashion. 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. Note: Even if a submitter's organization has an existing registration, each user submitting a proposal must create their own Organization Registration.

All unclassified proposals submitted electronically through DARPA's BAA Website must be uploaded as zip archives (i.e., files with a .zip or .zipx extension). The final zip archive should be no greater than 100 MB in size. Only one zip archive will be accepted per submission – subsequent uploads for the same submission will overwrite previous uploads, and submissions not uploaded as zip archives will be rejected by DARPA.

Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; proposers should start this process as early as possible. 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 Eastern Time).

5. Funding Restrictions

Not Applicable

6. Frequently Asked Questions (FAQ)

DARPA will post a consolidated Frequently Asked Questions (FAQ) document. To access the posting go to: http://www.darpa.mil/work-with-us/opportunities. Under the HR00112320035 summary will be a link to the FAQ. Submit your question/s by E-mail to QuANET@darpa.mil. Questions must be received by the FAQ/Questions due date listed in Part 1, Overview Information.

7. 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.

The proposal clearly explains the technical approach(es) that will be employed to meet or exceed each program goal and metric listed in Section I.D. and provides ample justification as to why the approach(es) is feasible. The Government will also consider the structure, clarity, and responsiveness to the Statement of Work; the quality of proposed deliverables; and the linkage of the Statement of Work, technical approach(es), risk mitigation plans, costs, and deliverables of the prime awardee and all subawardees through a logical, well structured, and traceable technical plan.

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 capability to transition the technology to the research, industrial, and/or operational military communities in such a way as to enhance U.S. defense. 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 and Schedule 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.

The proposed schedule aggressively pursues performance metrics in an efficient time frame that accurately accounts for the anticipated workload. The proposed schedule identifies and mitigates any potential schedule risk.

B. Review of Proposals

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, consistent with instructions and evaluation criteria specified in the BAA herein, and availability of funding.

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 (FAPIIS)

Per 41 U.S.C. § 2313, as implemented by FAR 9.103 and 2 C.F.R. § 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 FAPIIS). 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 FAPIIS or other systems prior to making an award.

VI. Award Administration Information

A.   Selection Notices and Notifications

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 award 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 Point of Contact (POC) and/or Administrative POC identified on the proposal coversheet.

B. Administrative and National Policy Requirements

1. Meeting and Travel Requirements

There will be a program kickoff meeting and all key participants are required to attend. 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 http://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 http://www.darpa.mil/work-with-us/additional-baa.

C. Reporting

The number and types of reports will be specified in the award document, but will include at a minimum monthly technical and 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. A final report that summarizes the project and tasks will be required at the conclusion of the period of performance for the award.

D. Electronic Systems

1. Wide Area Work Flow (WAWF)

Performers will be required to submit invoices for payment directly to https://piee.eb.mil/, unless an exception applies. Performers must register in WAWF 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 patent reports and notifications to be submitted electronically through i-Edison (https://public.era.nih.gov/iedison).

E. DARPA Embedded Entrepreneur 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 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 strategy 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 email to QuANET@darpa.mil. All requests must include the name, email address, and phone number of a point of contact.

Points of Contact
The BAA Coordinator and Technical POC for this effort may be reached at QuANET@darpa.mil.
DARPA/I2O
ATTN: HR001123S0035
675 North Randolph Street
Arlington, VA 22203-2114

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

VIII. Other Information

Proposers Day
A Proposers Day for this effort will be held on May 11, 2023 at DARPA. The Special Notice regarding this Proposers Day can be found at https://sam.gov/opp/310838340cf547d999218359659a63ef/view. For further information regarding the QuANET Proposers Day, including slides from the event, please see http://www.darpa.mil/work-with-us/opportunities under HR001123S0035.

Associate Contractor Agreement (ACA)

This same or similar language will be included in procurement contract awards against HR001123S0035. Awards other than FAR based contracts will contain similar agreement language:

(a) It is recognized that success of the QuANET research effort depends in part upon the open exchange of information between the various Associate Contractors involved in the effort. This language is intended to ensure that there will be appropriate coordination and integration of work by the Associate Contractors to achieve complete compatibility and to prevent unnecessary duplication of effort. By executing this contract, the Contractor assumes the responsibilities of an Associate Contractor. For the purpose of this ACA, the term Contractor includes subsidiaries, affiliates, and organizations under the control of the contractor (e.g. subcontractors).

(b) Work under this contract may involve access to proprietary or confidential data from an Associate Contractor. To the extent that such data is received by the Contractor from any Associate Contractor for the performance of this contract, the Contractor hereby agrees that any proprietary information received shall remain the property of the Associate Contractor and shall be used solely for the purpose of the QuANET research effort. Only that information which is received from another contractor in writing and which is clearly identified as proprietary or confidential shall be protected in accordance with this provision. The obligation to retain such information in confidence will be satisfied if the Contractor receiving such information utilizes the same controls as it employs to avoid disclosure, publication, or dissemination of its own proprietary information. The receiving Contractor agrees to hold such information in confidence as provided herein so long as such information is of a proprietary/confidential or limited rights nature.

(c) The Contractor hereby agrees to closely cooperate as an Associate Contractor with the other Associate Contractors on this research effort. This involves as a minimum:
    (1) maintenance of a close liaison and working relationship;
    (2) maintenance of a free and open information network with all Government-identified associate Contractors;
    (3) delineation of detailed interface responsibilities;
    (4) entering into a written agreement with the other Associate Contractors setting forth the substance and procedures relating to the foregoing, and promptly providing the Procuring Contracting Officer with a copy of same; and,
    (5) receipt of proprietary information from the Associate Contractor and transmittal of Contractor proprietary information to the Associate Contractors subject to any applicable proprietary information exchange agreements between associate contractors when, in either case, those actions are necessary for the performance of either.
(d) In the event that the Contractor and the Associate Contractor are unable to agree upon any such interface matter of substance, or if the technical data identified is not provided as scheduled, the Contractor shall promptly notify the DARPA QuANET Program Manager. The Government will determine the appropriate corrective action and will issue guidance to the affected Contractor.
(e) The Contractor agrees to insert in all subcontracts hereunder which require access to proprietary information belonging to the Associate Contractor, a provision which shall conform substantially to the language of this ACA, including this paragraph (e).

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA. Historically Black Colleges and Universities, Small Businesses, Small Disadvantaged Businesses and Minority Institutions are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement will be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this research for exclusive competition among these entities.