



Broad Agency Announcement

Blackjack

Tactical Technology Office

HR001118S0032

Amendment 01

May 25, 2018

The purpose of this amendment is to make revisions to language in the following sections, which are highlighted in yellow throughout the document:

PART II.I.B. Program Overview – Figure 1, page 8

PART II.I.D. Bus and Payload Development Plan, pages 9 and 11

PART II.IV.B.2 Proposal Format, pages 28, 30, 31, 32 and 36

PART II.IV.B.4 Submission Information, page 44

PART II.VI.A.1 A Selection Notices and Notifications of abstracts, page 50

PART II.VI.B.1 Meeting and Travel Requirements, page 50

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**PART I: OVERVIEW INFORMATION**

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Tactical Technology Office (TTO)
- **Funding Opportunity Title** – Blackjack
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – HR001118S0032
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – Not applicable
- **Dates**
  - Proposers' Day: March 15, 2018
  - Posting Date: April 19, 2018
  - Deadline to Request Copies of the Classified and Export Controlled Appendices: April 27, 2018
  - Abstract Due Date and Time (indicate Eastern Time): May 7, 2018 by 4 p.m. Eastern Time
  - Questions Due Date: May 11, 2018 by 2 p.m. Eastern Time
  - Proposal Due Date and Time: June 6, 2018 by 2 p.m. Eastern Time
- **Concise description of the funding opportunity:** Blackjack will develop and demonstrate a low earth orbit constellation that provides global persistent coverage.
- **Total amount anticipated to be awarded** – The total planned budget for award is \$117.5M over three phases of the Blackjack program, which is expected to be awarded to two to eight bus and/or payload performers. The program anticipates future announcements and awards that are not encompassed by this BAA that will be utilized to procure autonomy hardware and software, launch services, ground systems, and constellation flight operations.
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded** – Procurement contract or other transaction.
- **Agency contact**
  - Points of Contact
    - The BAA Coordinator for this effort can be reached at:
    - HR001118S0032@darpa.mil
    - DARPA/TTO
    - ATTN: HR001118S0032
    - 675 North Randolph Street
    - Arlington, VA 22203-2114
- **Other** – Appendices containing additional export controlled and classified information are available upon request as described in Section IV.A of Part II of this announcement.

## **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 CFR § 200.203. Any resultant award negotiations will follow all pertinent law and regulation, 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 following technical area(s): low cost space payloads and/or commoditized satellite buses. Proposed research should investigate innovative approaches that enable revolutionary advances in low size, weight, power, and cost (SWaP-C) payloads that provide military utility from a distributed low earth orbit (LEO) constellation and in commoditized satellite buses capable of hosting military payloads assuming their primary commercial payloads for user terminal connectivity are not installed. Specifically excluded is research that results in evolutionary improvements to the existing state of practice of small quantities of exquisite high-value spacecraft.

DARPA envisions five separate categories of contracts across multiple opportunities; commoditized bus, payload, autonomy/integration, launch, and operations. This BAA is focused on the first two categories: payloads (Track A) and commoditized buses (Track B). Offerors may propose multiple concepts to Track A – payloads and/or a single concept to Track B – commoditized buses, and teaming is encouraged. Offerors should submit a single proposal per proposer DUNS number containing all concepts. Each concept should be separable and severable from any other proposed concepts including a separate Statement of Work, Volume II - Cost Proposal, and Attachment 2 – Cost Summary for each concept. Offerors may not propose solutions that require integration of a specific bus with a specific payload, and no combined bus/payload concept will be accepted. Each bus and payload concept proposed must include its own cost table as outlined in Attachment 2. DARPA includes a notional constellation in Section I.C, however, offerors should include bus/payload mission vignettes to highlight the military utility of their proposed concept and are free to use a low earth orbit constellation that differs from the DARPA notional constellation. Proposals that result in a public/private partnership will be considered.

#### **A. Program Vision**

National Security Space (NSS) assets, critical to our warfighting capabilities, are traditionally placed in geosynchronous orbit to deliver persistent overhead access to any point on the globe. In the increasingly contested space environment, these exquisite, costly, and monolithic systems have become vulnerable targets that would take years to replace if degraded or destroyed and their long development schedules preclude orbital systems that are responsive to new threats. The goal of the Blackjack program is to develop and demonstrate the critical technical elements for building a global high-speed network backbone in low earth orbit (LEO) that enables highly networked, resilient, and persistent DoD payloads that provide infinite over

the horizon sensing, signals, and communication, and hold the ground, surface, and air domains in global constant custody.

Historically, DoD satellites have been custom-designed to specific mission sets with lengthy design and/or enhancement cycles at a high cost per spacecraft. The evolution of commercial space has led to the design of LEO constellations intended for broadband internet service, of which the design and manufacturing could offer economies of scale previously unavailable in the space arena. DARPA is interested in leveraging these advances in order to demonstrate military utility, emphasizing a commoditized bus and low-cost interchangeable payloads with short design cycles and frequent technology upgrades. The Blackjack architecture is founded on the concept that 'good enough' payloads can be optimized around an ability to fly on more than one type of bus. Commoditized buses can be specified via mechanical, electrical, software, and mesh network (both satellite to satellite, and satellite to ground) interface control to provide a platform for dozens or hundreds of different types of proliferated LEO payloads.

The Blackjack program has three primary objectives designed to achieve the overall program goal. Objective 1 is to develop payload and mission-level autonomy software and demonstrate autonomous orbital operations including on-orbit distributed decision processors. This will be achieved through autonomous maintenance of spacecraft orbit, spacecraft health, constellation configuration, and the network architecture. Payloads will be developed to operate autonomously with on-orbit data processing, and the system will autonomously perform shared tasks on-orbit based on high-level system directives. Objective 2 is to develop and implement advanced commercial manufacturing for military payloads and the spacecraft bus. Blackjack will develop high-rate manufacturing using COTS-like parts, reduced screening and acceptance testing for individual spacecraft, and reduced expectations for spacecraft life. Mission assurance will be achieved at the constellation level enabling individually expendable low-cost spacecraft nodes. Objective 3 is to demonstrate payloads in LEO to augment NSS. The driver will be to show LEO performance that is on par with current GEO systems with the spacecraft combined bus, payload(s), and launch costs under \$6M per orbital node while the payloads meet size, weight, and power (SWaP) constraints of the commercial bus.

The Blackjack program is an architecture demonstration intending to show the high military utility of global LEO constellations and mesh networks of lower size, weight, and cost spacecraft nodes, and no single type or size of bus or mission/payload type will be optimal for this demonstration. The program will select payload performers from two to six mission areas to complete PDR/CDR level design and development and ensure the overall Blackjack architecture is viable for multiple payload types. Rolling down-selects of one or two primary payloads that will launch on the demonstration satellites will occur during the course of the program.

The program will consider commoditized buses that have existing or in-development production lines that can accommodate a wide range of military payload types without redesign or retooling of the production line for each payload, recognizing that optimal payload performance probably will not be achieved without a specified bus/payload integration early in the design cycle. Once selected, the buses will be expected to accommodate both the Blackjack payloads and multiple types of payloads for potential follow on DOD programs without redesign

of the bus. Blackjack will demonstrate that ‘good enough’ payloads in LEO can perform military missions, augment existing programs, and, over longer time scales than this demonstration, potentially provide mission level results that are on par or better than currently deployed exquisite space systems.

The payloads in the Blackjack spacecraft will be designed in a reciprocal fashion to the commodity buses in that no direct consideration of a specific bus will be used in the initial design. Selection of a payload to fly on a specific bus will not occur until after Payload PDR. Payload providers will be provided draft interface documents at program kick-off that define the interfaces and environments of each bus under consideration for flight. Payloads will be capable of modular attachment to more than one size or type of Blackjack commoditized bus, and designed with simplicity of mechanical, electrical, and network interfaces as a key requirement. Optical payloads will endure more jitter and less bus-level pointing accuracy than is standard on custom optical spacecraft, and RF payloads will endure higher levels of bus-driven electromagnetic interference at certain frequencies than is standard on custom RF spacecraft. To reduce integration risk among various payloads and buses, Blackjack will develop an avionics unit consisting of a high speed processor and encryption devices that every Blackjack payload will connect to directly for network and electrical interface. This unit, named the ‘Pit Boss’ will fly on each Blackjack spacecraft in order to provide a common electrical interface to each payload, provide mission level autonomy functions, enable on-orbit edge computing, manage communication between Blackjack on-orbit nodes and ground users, provide CMD/TLM link to the bus, and encrypt payload data before it is transmitted through the commercial network. The payload mechanical interface will not be to the Pit Boss but direct to a custom payload deck that will provide a flat surface for location of inserts or other attach hardware and will provide typical LEO nadir facing view factors for thermal radiation of excess heat along with limited plate thermal conductance.

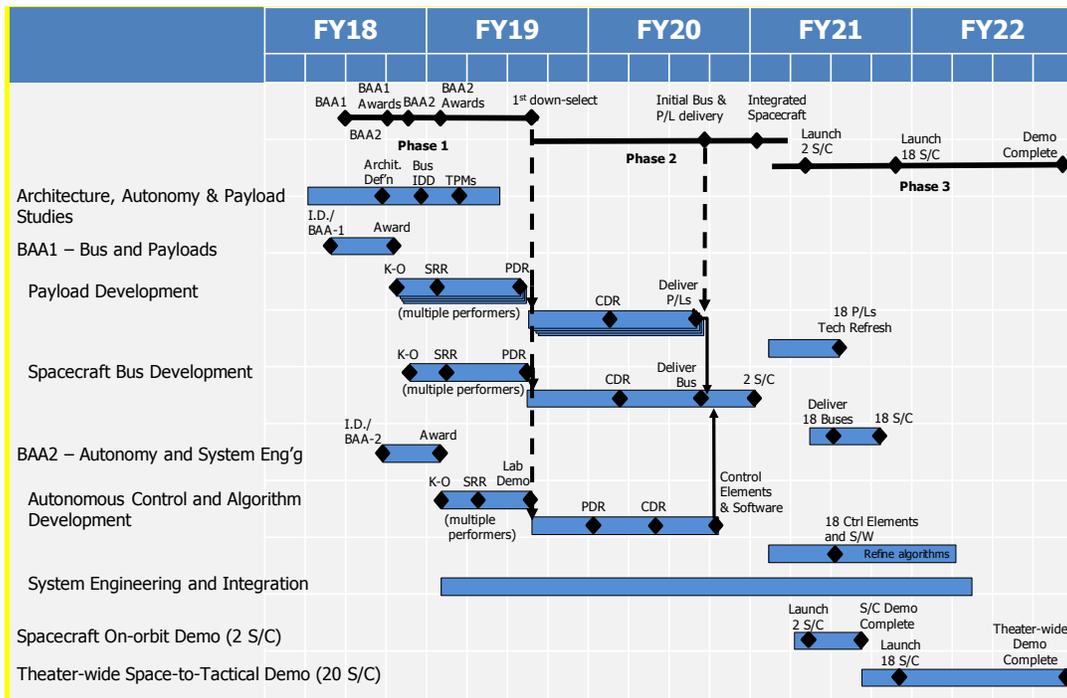
Every Blackjack orbital node will consist of one commoditized bus capable of broadband rate global communications to other nodes, one Pit Boss control unit, and one or more military payloads capable of operating in autonomous modes for over 24 hours providing space to tactical mission effects for DOD users. A general spacecraft node block diagram is shown in Figure 2.

## **B. Program Overview**

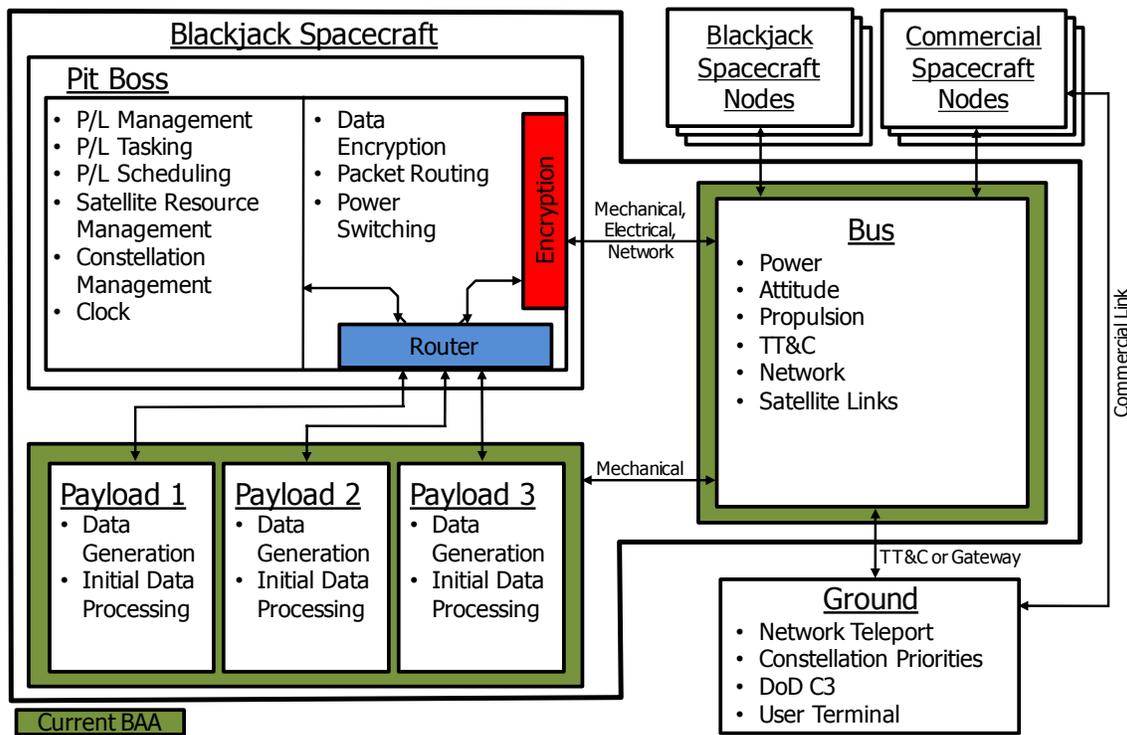
The program is divided into three phases (see Figure 1). Phase 1 will focus on the research and the exploration for the development of the system requirements and preliminary designs. This first phase will include two tracks: Track A for Military Payload development and Track B for Commoditized Spacecraft Bus. DARPA anticipates selecting up to six teams for Track A (Payload) and up to two teams for Track B (Bus) during Phase 1. It is anticipated that up to four Track A performers and two Track B performers will be selected to continue from Phase 1. For Phase 3, up to three Track A performers will be selected to continue from Phase 2 along with one Track B performer.

It is anticipated that a separate BAA or other solicitation, (BAA2 in Figure 1), will be released to procure the Autonomous Control Element (Pit Boss) and Algorithm development along with the system engineering and integration role. Launch and Ground Systems, are

anticipated to be solicited through BAA2 (Autonomy Systems). **Figure 1** illustrates the notional Blackjack schedule. Figure 2 provides a block diagram of the primary elements of the Blackjack satellite and related interfaces.



**Figure 1. Notional Program Schedule**



**Figure 2. Blackjack Satellite Block Diagram**

### C. Design Reference Mission:

DARPA's objective for the Blackjack program is to demonstrate a distributed low-earth orbit constellation that provides global persistent coverage with a total cost of ownership that is less than a single exquisite military satellite. It is envisioned that the Blackjack satellites would operate near, or be proliferated within, a commercial constellation with communications and operations provided by the commercial constellation. The Blackjack satellites will not be an integral or required element of the commercial constellation and will operate independently.

The operational (long-term) design reference mission is for a tens-of-satellites (60 – 200) constellation operating between 500km and 1,300km altitude with one or more payloads on each satellite. Each satellite is envisioned to cost less than \$6M including its launch cost. A single operations center will cover all government satellites/payloads irrespective of the payload(s) on each satellite, and the constellation will be capable of operating without the operations center for 30 days. The operations center will be manned by no more than two people whose primary function is setting constellation level priorities. Blackjack payload data processing will be performed on-orbit without the assistance of ground data processing.

The reference demonstration mission for this BAA is based on 20 spacecraft in two planes with one or more payloads on each satellite. The payload(s) may differ between satellites. The 20 spacecraft demonstration mission will simulate global constant custody in 3000-4000 km wide theaters for multiple hours per day to enable theater-wide autonomous operations.

### D. Bus and Payload Development Plan

Blackjack will use a three phase program approach leading to an on-orbit demonstration of a 20 spacecraft constellation with one or more military payloads on each of the spacecraft. In Phase 1 (Architecture and Design), bus and payload requirements will be defined in a System Requirements Review (SRR) and each bus or payload will then be matured to the Preliminary Design Review (PDR) level with only ICD information provided at program kick-off. Phase 2 (Detailed Design and Integration) will develop specific bus/payload(s) for a two satellite on-orbit demonstration with the bus, payload, and pit boss performers collaborating for an integrated solution. The performers selected for Phase 2 will mature the remaining bus and payload concepts through Critical Design Review (CDR). After CDR, a second selection for Phase 2, Option 1, will occur to select those performers that will build flight hardware. Each bus and payload provider selected to build flight hardware must deliver two flight units and one engineering demonstration unit. Phase 3 (Launch and Demonstration) is a two-plane demonstration of an objective system. Two initial spacecraft will be delivered for integration with the launch vehicle and then launched into Low Earth Orbit. A six month on-orbit demonstration will be performed, and based on its success, will be followed by the fully populated two-plane demonstration. Any bus or payload performer selected for Phase 3 should plan to deliver 18 additional flight units.

**Deliverables:** All offerors should structure their deliverables as described below.

- Phase 1 – Design work up to and including PDR (Track A&B); one Bus emulator/simulator for government hardware-in-the-loop (HWIL) lab (Track B); 20 commercial user terminals – AESA or functional equivalent (Track B); two Payload scene emulator/simulator for HWIL lab (Track A)
- Phase 2 – Design work up to and including CDR (Track A&B)
- Phase 2, Option 1 – Build one engineering demonstration unit and two flight units (Track A&B)
- Phase 3 – Build 18 additional flight units (Track A&B)
- Potential Follow-on – Build 70 additional flight units at a rate of one to two per week, or build flight units to complete the proposed full constellation if the proposed total differs from the reference constellation 90 spacecraft (Track A&B)

NOTE: A Rough Order of Magnitude (ROM) cost only is requested for Phases 2 and 3 plus a potential follow-on effort.

Table 1 provides the expectations for the primary program deliverables at key milestones in the program. Performers should identify any additional deliverables required to support the program objectives. To support integration and future transition opportunities, DARPA expects at a minimum to receive government purpose rights for the following deliverables provided under this effort: Item 4, 5, 6, and 8.

**Table 1 – Primary Data Deliverables**

Item	Track	Deliverable	Kickoff	SRR	PDR	CDR	End of Phase 2	End of Phase 3
1	A&B	Milestone data packages and presentations	10 working days in advance					
2	A&B	Integrated Master Schedule	Due	Updated	Updated	Updated	Updated	Final
3	A&B	Risk Management Plan	Due		Updated		Updated	Final
4	A	Payload Specifications		Due	Updated	Updated	Updated	Final
5	A	Payload Interface Control Documents (ICDs)*		Due	Updated	Updated	Updated	Final
6	A	Payload Design Data Package			Due	Updated	Updated	Final
7	B	Bus Specifications		Due	Updated	Updated	Updated	Final
8	B	Bus ICDs*		Due	Updated	Updated	Updated	Final
9	A&B	Test plans			Due	Updated	Updated	Final
10	A&B	Test results and analyses for all major			As required	As required	As required	Final

Item	Track	Deliverable	Kickoff	SRR	PDR	CDR	End of Phase 2	End of Phase 3
		risk reduction activities						

\*NOTE: Payload ICDs includes Payload to Bus and Payload to Pit Boss interfaces; Bus ICDs include Bus to Payload, Bus to Pit Boss, Blackjack Bus to Blackjack Bus, Blackjack Bus to Commercial Bus, and Blackjack Bus to Ground (TT&C, Network Teleport, and/or User Terminal)

Both bus and payload proposers are expected to meet the milestones and deliverable dates defined in Table 2 assuming a Q4 FY18 award.

**Table 2- Milestones and Deliverable Dates**

Phase		Payload	Bus	Integration	Launch
1	Q4 FY18	Kickoff	Kickoff		
	Q1 FY19	SRR	SRR		
	Q3 FY19	PDR	PDR		
2	Q4 FY19	Selections announced			
	Q1 FY20	CDR	CDR		
	Q1 FY20	Selections announced			
	Q3 FY20	Prototype delivery (two flight units; one engineering demonstration unit)	Prototype delivery (two flight units; one engineering demonstration unit)		
	Q1 FY21			Integrated S/C delivery	
3	Q2 FY21				Launch 2 prototype S/C
	Q3 FY21	Flight article delivery (qty 18)	Flight article delivery (qty 18)		
	Q4 FY21			Integrated S/C delivery	
	Q4 FY21				Launch 2 planes; 10 S/C per plane

In addition to the deliverables outlined above, the performer shall also provide the following:

- Monthly technical and financial status reports
- Monthly Integrated Master Schedule (IMS) updates, MS Project format

- Final Report

**Design Reviews:** The Performer will execute an SRR, PDR and a CDR with content and entrance and exit criteria tailored from a recognized industry or military standard (e.g., Defense Acquisition Guidance (DAG) guidelines available at <https://dag.dau.mil> and MIL-STD-1521B are suggested sources) for appropriate application to a technology demonstration program. Proposals should clearly address how these standards will be tailored in the proposed effort. Any tailoring of design review content and criteria must include an assessment of the design maturation of the bus or payload, technical risk, and incorporate demonstrable bus/payload technology maturation progress and achievements. Blackjack bus or payload system design review expectations for those aspects of the program are outlined below followed by specific SRR, PDR and CDR guidance and incorporated into the performer's comprehensive list of tailored design review criteria. The tailored SRR, PDR and CDR entrance and exit criteria, as well as the tailored SRR, PDR and CDR content checklists will be evaluated to assess the adequacy of the proposed systems engineering processes. In addition, these checklists will need to be approved by the government prior to the start of the reviews to allow the government to understand and assess the adequacy of the proposed tailoring of these reviews.

#### General:

- Requirements Development - A complete set of Bus-interface and/or Payload demonstration system performance and design requirements is established down to the lowest expected level of the system hierarchy (i.e., system, subsystem, and component) for the subject review. Each requirement must include verification provisions. System interfaces are identified and documented.
- Design Definition - The conceptual design of the operational Bus-interface and/or Payload system architecture is established down to the lowest expected level of the system hierarchy for the subject review, satisfies established requirements, and is sufficiently detailed to enable the next level of design definition. Appropriate design margins are identified and maintained.
- Risk Management - Technical risks are identified and assessed (e.g., consequence and likelihood). Mitigation plans are in place along with associated completion criteria. Technical risks have been updated with results of any mitigation activities.
- Technology Maturation – Bus-interface and/or Payload system attributes requiring maturation have been identified and associated analysis, test, and demonstration objectives have been documented. The representative test article design is documented.

#### SRR

- Requirements Development – Bus-interface and/or Payload (Level 1) requirements and preliminary allocation of subsystem (Level 2) requirements are complete. Preliminary interfaces defined – Bus to Payload; Bus to Pit Boss; Bus to Commercial Constellation; Payload to Pit Boss.
- Conceptual Design – Bus-interface and/or Payload conceptual design is completed and approach is shown to be feasible through initial analysis. A pathway to the preliminary design is identified.
- Software Development – Payload software development plan including verification and validation approach

- Trade Studies – Results of any trade studies completed to validate design approach.
- Cost – initial cost estimates are documented and show a feasible path to Payload and Bus Bill of Materials (BOM) cost that meets cost metrics

#### PDR

- Requirements Development – Bus-interface and/or Payload (Level 1) and subsystem (Level 2) requirements are complete. Initial verification methods (e.g., Analysis, Integration, Test, and Demonstration) are identified. External interfaces are documented (Bus to Payload; Bus to Pit Boss; Bus to Commercial Constellation; Bus to Bus; Payload to Pit Boss; and Payload to Bus).
- Design Definition – Assess the allocated design documented in subsystem requirements. Bus-interface and/or Payload preliminary design is complete to the subsystem level (Level 2), closes around documented requirements, adequately demonstrates that performance achieves minimum and maximum threshold ranges, and payloads meet SWaP-C constraints.
- Software Development – Development plan with processes and metrics to measure progress.
- Risk Management – Risks must include bus and payload design risks.
- Technology Maturation - Desired technology maturation can be achieved via planned development within program budget and schedule. Test plans define objectives and expected results that will validate design proof-of-concept.
- Cost – Revised Payload and Bus BOM cost based on preliminary design is documented and within established cost metrics.

#### CDR

- Requirements Development – Bus-interface and Payload component (Level 3) requirements are complete. Verification approach for each requirement has been established. Internal interfaces between subsystems are documented.
- Design Definition – Bus-interface and Payload critical designs are complete to the component level (Level 3) and achieves compliance with all associated requirements.
- Cost – Final design Payload and Bus BOM costs are documented and within cost metrics.

**Government Management Approach and Operations:** The Government recognizes that a streamlined, collaborative management approach is essential to achieving the program technical, cost, and schedule objectives. The Government Program Office is comprised of a core technical and programmatic team, which may be augmented with Government-led Integrated Product Teams (IPT) for targeted technical disciplines, for example, systems engineering, integration, modeling & simulation, etc. The performers will interface with the Government team via coordination meetings at the technical level, status meetings at the management level and quarterly program management reviews. The proposers are asked to provide a management approach to allow for collaboration with the Government team to ensure a successful program.

#### E. **Commoditized Bus**

DARPA is seeking offerors to provide a commoditized satellite bus offering various payload options, along with constellation communication services and architecture services. The bus should be as identical as possible to a commercial bus save for the removal of commercial payload elements and the substitution of military payloads.

All bus offerors should meet the following Bus Nominal Parameters in order to be considered for an award. Buses that provide similar or greater mission utility with greater accommodation capability in available payload volume, mass accommodated, and power provided are anticipated to be of greater overall value to the Blackjack mission.

**Table 3 -Key Bus Parameters**

<b>Parameter</b>	<b>Nominal</b>
Payload Volume and Max Dimensions	> 50 x 50 x 50 cm (stowed)
Payload Mass	> 45 kg
Payload Power	> 150W (orbit avg) > 500W (peak)
Payload Thermal Dissipation	> 100W (orbit avg) > 300W (peak for 5 min)
Per Unit Bus Cost (Recurring with AI&T)	< \$3M recurring
Per Unit Launch Cost	< \$4M
Payload Data Throughput	> 1 Mbps
Design Life	2 years at 95% confidence
Autonomy (ops without human interaction)	> 1day, with 30 day goal

Bus proposers should address the following aspects in their proposals, as applicable:

- Commercial constellation OV-1, to include: space and ground elements, purposes, and rollout schedules
- Constellation status, to include: development status and schedule, current and future production rates, launch campaign and approach
- Space and ground network topology, to include: space to space, space to ground, ground to ground, data routing approach/control, encryption architecture and cyber security, data throughputs and latencies, data prioritization/quality of service capabilities, teleport locations, protocols, management, command and control
- Space and ground communications network description, including at least topology, services offered, ROM costs for satellite to satellite and satellite to ground data, external interfaces, protocols and standards employed or adhered to, management and control methods, security/IA provisioning, and cyber protection mechanisms
- Constellation design, to include: altitude, inclination, eccentricity, right ascension of the ascending node (RAAN), number of planes, number of satellites per plane, and constellation expansion plan

- Constellation operations, to include: operation center locations, expected manning profiles, any automation, fault resolution approach, willingness to co-locate/host DoD operations center, willingness to perform assembly, integration, and test of DoD payload onto commercial buses, willingness to operate DoD satellites, willingness to integrate DoD satellites into commercial constellation
- Inter-satellite links, to include: frequency, data rate, range, slew rate, acquisition time, field of view and regard, number of simultaneous connections, ability to support out of constellation satellites, plans to add/remove in future iterations. If no inter-satellite links are provided as part of the bus, provide as an alternative the network and data rate capabilities for two or more DoD satellites to share information and collaborate via commercial up/down links in the performer ground systems
- Bus capabilities, to include: description of the bus, overall size, payload volume and dimensions including mounting diagram(s) and keep out areas, payload power available, payload data/power interface, payload mechanical/electrical/thermal interface, pointing knowledge, pointing control accuracy, pointing jitter, pointing slew rate, position knowledge, position control accuracy, translation rate, timing knowledge, Delta IV available, design life, dependency on GPS, default and possible pointing attitudes, payload field of view. Discuss limitations, if any, of an architecture for onboard DoD payload(s) to provide commands to (and receive telemetry from) the bus flight computer instead of typical ground command and telemetry system
- Production approach for DoD satellites, to include: projected unit bus price, price breaks for quantities of 10 – 250, delivery schedule for quantities of 10 – 250, industrial base risks, automated assembly/calibration/test, assembly flow for both commercial and DoD buses, any changes to commercial production lines to accommodate DoD buses, ability for DoD buses to rejoin commercial assembly/test production line, potential for classified facilities, and lead times for commodity (no design/build adjustments from commercial standard) bus delivery
- Non-recurring development costs and estimated recurring production costs, broken down by subsystem. The Government will review the Statement of Work (SOW) and IMS to assess whether they adequately detail activities to work breakdown structure (WBS) Level 4 or below and are traceable to the Cost Proposal.
- Launch strategy, to include: opportunity for DoD rideshare, number of satellites per launch vehicle, launch loads/environments, DoD full or partial use of commercial dispenser/adaptor, ROM launch costs (assuming Blackjack integrated satellite meets the volumetric and environmental constraints of the commercial satellite launch environment)

## F. **Payloads**

DARPA is interested in low SWaP-C payloads that provide military utility when flown in a distributed LEO constellation. Proposers should describe their proposed technologies and how they could contribute to achieving the overall Blackjack system-level vision. This description and initial concept does not require rigorous engineering detail, but it should at least include performance estimates and other information that indicates the feasibility of the concept to meet proposed mission effectiveness capabilities when integrated into the Blackjack system architecture. The description should emphasize the ability of the payload to autonomously

produce tactically relevant information to military users and platforms in theater (i.e. not raw sensor data and not processed through a ground system).

A non-exhaustive list of mission areas of interest are missile detection; position, navigation, and timing (PNT) services; military protected communications; radar; electro-optic and infrared imaging for tactical ISR; and radio frequency collection. Additionally, adding a physical payload is not the only approach to adding new functionality; a mission capability could be achieved by adding software (i.e. “mass-less payload”) to allow a secondary use of the primary payload. Offerors should also consider opportunities for coherent and non-coherent signal processing from multiple satellites/payloads. Of interest are data products that are uniquely enabled by the Blackjack architecture, which is supported by proliferated payloads, common timing signals, bi-directional data links, on board computational capabilities, and the proliferated LEO constellation architecture. Some examples of signal processing enabled by Blackjack are coherent change detection, radar processing techniques, and distributed array processing. This is not an exhaustive list and offerors are encouraged to submit LEO payloads for other mission areas that are of interest to the DoD. All payloads must be capable of surviving launch and on-orbit operations. Payload offerors should expect to adapt their payloads to an existing commoditized bus design and may not be assigned to a specific bus type until CDR, or later. Payloads must be platform agnostic and compatible with the selected bus type.

The interface between the spacecraft and the payloads will be developed jointly with bus and payload providers through Phase 1 of the effort. Payload offerors should anticipate that the electrical interface will be a single connector containing unregulated power, bi-directional data, and analog telemetry. Data protocol is TBD but will be routable and packetized. Payload offerors should propose any payload level autonomy required to enable their proposed payload to operate without ground command and control. The payload may assume that data may be transferred from a payload on one satellite to the same payload on a different satellite, and to other payloads (physical or mass-less) on the same satellite. If data transfer is used, offerors should describe bandwidth and latency requirements. The payload is not responsible for data encryption.

### 1. **Key Payload Parameters**

All payload offerors should meet the following Payload Nominal Parameters listed in Table 4 in order to be considered for an award. Payloads that provide similar or greater mission utility with smaller size, mass, power, or cost targets than listed in the table are anticipated to provide greater overall value to the Blackjack mission. Of specific interest are payload options that are near integer fractions (1/2, 1/3, etc) of the Table 4 parameters (exceptions are design life and autonomy) as that type of fractionation will enable options of multiple mission types and payload phenomenology on the same spacecraft. Blackjack demo missions will not fly a large number of payloads on one spacecraft, but more than one payload is highly likely on at least a subset of the total number of demo spacecraft.

**Table 4 - Payload Key Parameters**

<b>Parameter</b>	<b>Nominal</b>
Size (stowed)	< 50 x 50 x 50 cm

Mass	< 50 kg
Power	< 100W (orbit average) < 500W (peak)
Cost (Recurring with AI&T )	< \$1.5M recurring
Data Through Bus	< 1 Mbps
Design Life	2 years at 95% confidence
Autonomy (ops without human interaction)	> 1day

In some cases and in certain types of payloads the current state of the art may be such that the offerer believes no payload with realistic cost and schedule can meet every nominal parameter listed in Table 4. If the offerer presents a clear rationale, describing why a specific type of payload that will successfully meet Blackjack cost and schedule criteria needs to fall outside of a nominal payload bound, that payload will be considered for an award.

## 2. Payload Envelope

The estimated payload environmental envelope is listed in the table below. Offerors should be aware, and plan to address, that the host space vehicle is most likely designed for a general purpose communications mission and not any specific military mission/payload. These values are the Government's current best estimate and are subject to change. A detailed bus ICD and environment specification will be provided at the first kick-off meeting after award.

**Table 5 – Payload Envelope**

<b>Payload Envelope</b>	<b>Nominal</b>	<b>Best Case (provided by bus)</b>
Altitude	500 – 1,300 km	N/A
Radiation	Natural space environment	N/A
Thermal	0 W to bus < 400 cm <sup>2</sup> view to space	< 25 W to bus < 2500 cm <sup>2</sup> view to space
Bus position knowledge	< 500 m, per axis	< 100 m, per axis
Bus attitude knowledge	< 200 urad, per axis	< 60 urad, per axis
Bus jitter at payload interface	< 200 urad	< 60 urad

Payload proposers should address the following aspects in their proposals, as applicable:

- Payload's mission, to include: military relevance, capabilities, and limitations
- Payload design, to include: desired field of view, size, weight, power, thermal, pointing requirements, data generation, command and control, ability to operate without ground tasking, on-orbit data processing algorithms and approach
- Payload production, to include: price breaks for quantities of 10 – 250, delivery schedule for quantities of 10 – 250, industrial base risks, automated assembly/calibration/test

- Payload data processing, to include: computational needs, data storage, on-payload vs. off-payload, on board vs. ground, data dissemination approaches
- Multi-payload collaboration, to include: opportunities/approach for same or different payloads on the satellite, opportunities/approach for payloads on different satellites, benefits of multiple payloads with overlapping fields of view/regard
- Payload secondary missions, to include: other uses of payload beyond primary mission, hardware/software changes required to enable secondary uses
- Autonomous operations approach, to include: approach to meeting 30 day autonomous operations
- Payload production, to include: projected payload unit price, price breaks for quantities of 10 – 250, delivery schedule for quantities of 10 – 250, industrial base risks, automated assembly/calibration/test
- Non-recurring development costs and estimated recurring production costs, broken down by subsystem. The Government will review the SOW and IMS to assess whether they adequately detail activities to WBS Level 4 or below and are traceable to the Cost Proposal.
- Price for non-space qualified ground test units, sensor and processors, for incorporation in constellation-level Government simulation lab
- Testing approach, to include: ground testing, on-orbit testing

The sections below provide additional instructions for specific payload missions that may be feasible Blackjack mission payloads and additional information as described for each will support proposal evaluations. DARPA recognizes that the following sections may be interpreted by some as emphasis areas but asks that the proposers instead recognize that DARPA could not analyze all possible mission areas prior to release of this BAA. Mission payloads outside of the following areas, such as RF collection, radar, and tactical ISR including Electro-optical and Infrared (EO/IR) and geolocation systems, may have military utility that is as high or higher than those payload types explicitly listed below.

### **3. Overhead Persistent Infrared (OPIR)/Missile Detection/Warning Mission Area**

DARPA is interested in payloads that provide military utility against current and emerging threats. The classified information in the bidder's library contains a non-exhaustive list of such threats. Please contact DARPA security through the instructions in this BAA to receive the bidder's library via secure channels.

In addition to the general payload proposal topics each OPIR/Missile Detection/Warning payload offeror should also describe their approach to the following design considerations.

- Payload concept, to include: block diagram showing major subsystems and interconnects
- Payload operating concept, to include: adjustments to the payload operations required to maintain detection sensitivity, probability of detection, required pointing/timing knowledge, approach to heterogeneous autonomous control for predictive and responsive ops modes for selected threat scenarios
- Key technologies used, risk assessment, and any proposed mitigation strategies

- Assessment of compliance with environmental envelope, identification of deviations, and options to mitigate
- Assessment of system performance including on-board processing
- Detection thresholds
- Reporting approach, to include: approach to generating exceedance data (e.g., Object Sighting Messages), message format, reporting delay, integration approach with existing DoD systems (Missile Defense Agency (MDA)'s Missile Defense Space Center)
- Extended payload use cases, to include: secondary missions, other uses cases of the payload, approaches to maximize payload flexibility
- Government purpose rights and the design parameters listed below to facilitate independent Government assessment against representative classes of threats

**Table 5 – Design Considerations**

Field of View	Focal Length	Aperture-Obscuration Size
Optics Temperature	Optics Transmittance/Emittance	Well Depth (Gain Capacitor Size)
Dark Current	Frame Rate	Jitter (line-of-sight stability)
FPA Dimensions	Pixel Pitch	Wavelength Band
Ensquared Energy (EOD)	Read Out Noise	ADC Bit Resolution
Integration time(s)	Quantum efficiency	Solar Exclusion Angle

#### 4. Position, Navigation, and Timing

DARPA is interested in payloads to provide Positioning, Navigation, and Timing (PNT), and Communications in contested environments.

The system is expected to provide position, velocity, clock, and communications. Both one-to-one and one-to-many approaches are of interest. The system is expected to include any user terminals and their acquisition strategy (including whether you can use the existing, modify existing, or require new terminals). The reference one-to-one architecture provides <0.3m range accuracy, <0.6m cross-range accuracy, <1nsec timing, and >1Mbps communications at 40,000km using a photon-counting laser communication link with bistatic 2-cm apertures.

All offerors should describe how their approach performs relative to the following Design Parameters.

**Table 6 – PNT Design Parameters**

<b>PNT Design Parameter</b>	<b>Nominal</b>	<b>Goal</b>
Transmit Power		Eye-safe
Position accuracy	<0.6m	<0.01m
Timing accuracy	<1nsec	<0.1nsec
Data rate through PNT signal	>1Mbps @1,000km	>1Gbps @40,000km
Range	>1,000km	>80,000km

Field of regard	>100deg cone	>Hemisphere
Slew rate	>1deg/sec	>100deg/sec
Doppler (range-rate) accuracy	<1m/sec	<1mm/sec

In addition to the general payload proposal topics each PNT payload offeror should also describe their approach to the following design considerations.

- Modulation format, to include: modulation, error correction approach, automated data retransmission
- Aperture, to include: transmit and receive size, vibration isolation
- Transmission medium, to include: wave length, pulse width (if any), emitted power
- Link budgets, to include as applicable: Ground – LEO, LEO – LEO, GEO – LEO
- User equipment, to include: reuse of existing equipment, new equipment required, equipment required for Blackjack demonstration
- Ground terminal recurring BOM cost

### 5. Tactical Communications

DARPA is interested in payloads to provide new or augmented communications capability for use in contested environments as it relates to satellite communications.

The system is expected to include any user terminals and their acquisition strategy (including whether you can use the existing, modify existing, or require new terminals). Reference missions include service to LEO spacecraft, dismounted troops, networked weapons, tactical communication to theater users, combined PNT and communications, interference detection and geolocation, and high frequency applications.

In addition to the general payload proposal topics each communications payload offeror should also describe their approach to the following design considerations.

- Modulation format, to include; modulation, error correction approach, automated data retransmission
- Aperture, to include; transmit and receive size, vibration isolation
- Transmission medium, to include; wave length, pulse width (if any), emitted power
- Link budgets, to include as applicable; Ground – LEO, LEO – LEO, GEO – LEO
- User equipment, to include; reuse of existing equipment, new equipment required, equipment required for Blackjack demonstration
- Ground terminal recurring BOM cost

### 6. Massless Secondary Payloads

DARPA is interested in payloads that reuse other payloads with software, processing, or concept of operations changes. It is envisioned that an additional functionality or secondary payload might be enabled via software alone, i.e. a timing waveform added to a communications payload could provide a GPS like functionality, or a GPS Radio Occultation capability could be possible with a suitable GPS space navigation bus subsystem. For both examples, the performance would depend on how good the bus system clock performs to allow higher

precision timing measurements via the communications payload or the ability of the GPS system to measure GPS carrier phase and determine ionospheric phase delays (dispersion & refraction) to infer ionosphere electron density. These new missions are enabled by having sufficient performance or headroom in subsystem performance like pointing stability and knowledge, or clock stability and accuracy, or better quality GPS receivers to allow new functionality or performance. These key subsystems and their performance metrics should be identified and the proposer should provide the Government options to upgrade basic payload performance to enable future optimization of mission payload functions.

In addition to the general payload proposal topics, each massless payload offeror should also describe their approach to the following design considerations.

- Required performance headroom, to include: processing, storage, change from baseline, required upgrades to bus/payload
- Data requirements, to include: information required about bus/payload, timing knowledge, pointing knowledge, position knowledge

#### **G. Pit Boss (Autonomous Control Element)**

The Pit Boss is an avionics box and computing node mounted on each Blackjack satellite that provides mission level autonomy. The Pit Boss will be electronically situated between the Payloads and the Spacecraft Bus (see Figure 2), providing electrical and network connectivity for each Payload. The Pit Boss will provide packet routing between the Payloads, the networked Blackjack spacecraft constellation nodes, and the broader commercial spacecraft constellation nodes. It will provide cyber protection and data encryption and decryption for secure communications across the networked elements. The Pit Boss will also provide payload management, payload power switching, tasking, and scheduling, satellite resource management, constellation management, and a clock signal. Mission autonomy software will be hosted on the Pit Boss to enable collaboration among Blackjack constellation nodes and to enable long-term operations without human interaction. A Pit Boss preliminary functional description and interface definition will be provided at Kickoff.

## **II. Award Information**

### **A. General Award Information**

Multiple awards are anticipated in Phase 1 for Track A: Payload and Track B: Spacecraft Bus. 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 VI.B.4, “Representations and Certifications”). The Government reserves the right to remove proposals from award consideration, should the parties fail to reach agreement on award terms, conditions, and/or cost/price within a reasonable time, or the proposer fails to provide requested additional information in a timely manner. 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 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. Proposals and Awards**

Proposers shall prepare full proposals to address Phase 1 and a ROM for Phases 2 and 3 plus the potential follow-on effort in accordance with the proposal format instructions detailed under Section IV. Track A performers should ensure that their proposals take into account all deliverables listed under Part II Section I.D and Section I.F of this BAA, and Track B performers should ensure that their proposals take into account all deliverables listed under Part II Section I.D and Section I.E of this BAA.

Prior to PDR during Phase 1, the Government will request Phase 1 Track A and B performers to update and expand their ROM proposals into a full proposal for Phase 2. Track A performers will be provided Track B Spacecraft Bus interface design details and will be encouraged to address the revised interface in their updated system design. It is anticipated that proposals will be due by the PDR timeframe and that the PDR technical data will be part of the technical evaluation. The proposal will also include detailed system development plans, costs and schedules. It is anticipated that detailed proposal guidance will be provided two months prior

to PDR. Additionally, prior to the end of Phase 2, the Government will request Phase 2 Track A and B performers to update and expand their ROM proposals into a full proposal for Phase 3.

Submission of updated full proposals for future phases is optional and associated proposal preparation costs will not be reimbursed under Phase 1 awards. Performers who choose not to submit an updated full proposal for future phases will not be considered for future awards. The decision to continue the program beyond the Phase 1 contract is the prerogative of the Government and will be based upon availability of funds, the determination that performers have made sufficient progress towards meeting program performance objectives, maturing the required technologies and addressing risks, and scientific review of the proposals. Evaluations of updated full proposals for future phases will be based on evaluation criteria to be specified in the proposal request and will include consideration of Phase 1 performance.

### **C. 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 BAA, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research and does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this BAA. Notwithstanding this statement of expectation, the Government is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as fundamental research under the foregoing definition, still meet the BAA criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, the Government will either work with the proposer to modify the proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award.

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 select award instrument type and to negotiate all instrument terms and conditions with selectees. Appropriate clauses will be included in resultant awards for non-fundamental research to prescribe publication requirements and other restrictions, as appropriate. This clause 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 being performed by the awardee is restricted research, a subawardee may be conducting fundamental research. In those cases, it is the awardee’s responsibility to explain in their proposal why its subawardee’s effort is 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 BAA 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 citing the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and their compliance with the associated FFRDC sponsor agreement's terms and conditions. This information is required for FFRDCs proposing to be awardees or subawardees.

All proposers are expected to address transition; transition is part of the evaluation criteria in Section V.A. However, given their special status, FFRDCs should describe how and when a proposed technology/system will transition to which Non-FFRDC organization(s).

##### **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.

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.

##### **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. Non-U.S. Organizations and/or Individuals**

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.

### 3. **Classified Proposals**

For classified proposals, applicants will ensure all industrial, personnel, and information systems processing security requirements are in place and at the appropriate level (e.g., Facility Clearance Level (FCL), Personnel Clearance Level (PCL), Automated Information Security (AIS), Certification and Accreditation (C&A)) and any Foreign Ownership Control and Influence (FOCI) issues are mitigated prior to submission. Additional information on these subjects can be found at <http://www.dss.mil>.

#### **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 BAA. 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 BAA 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, including its appendices, contains all information required to submit a proposal. See the section below for instructions on requesting the classified appendix (Appendix A). Appendix A is not required to submit a bid, it only provides supplemental information on possible payloads. No additional information is available, except as provided at FBO.gov, nor will a formal Request for Proposal (RFP) or additional solicitation regarding this announcement be issued. Requests for the same will be disregarded.

The Bidder's Library (Appendix A) contains information that is ITAR restricted and classified up to the Top Secret level. Appendix A can be requested via e-mail to [HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil). Email must have the subject "Company Name: Appendix A request". Requests for the classified Appendix A should include, at a minimum, the organization name, technical POC name and phone number, Facility Security Officer (FSO) name and phone number, CAGE code, statement of facility clearance and safeguarding capability, and a valid address for receiving classified material at the appropriate level. DARPA will verify the facility clearance and the clearance of the recipient before mailing the classified material. Companies requesting the Bidder's library should first request the SCG per instructions found in IV.B.3.b.2.a.

Proposers should allow at least five (5) business days for processing requests for the classified appendix plus time for delivery. Requests for this information will not be accepted after April 27, 2018.

##### **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 proposal. Abstracts should follow the same general format as described for proposals (see Section IV.B.2, "Proposal Format") but include ONLY Section I (without the Official Transmittal Letter) and Section II-A of Volume I, Technical and Management Proposal. The cover sheet should be clearly marked "ABSTRACT," and the total length should not exceed two pages, excluding the cover page in Volume I, Technical and Management Proposal, Section I. Proposers may submit multiple abstracts if desired to represent multiple Track A (Payloads), but DARPA strongly suggests that no more than a total of five abstracts combined for Track A and Track B be

submitted and that the proposers focus on their technology areas that have a high probability of being ready to integrate into a space vehicle on an aggressive schedule.

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

## 2. Proposal Format

All proposals must be in the format given below. All complete proposal packages must include the parts listed below. The following templates, which contain proposal content descriptions and instructions, have been provided as attachments to the BAA posted at [www.fbo.gov](http://www.fbo.gov). Use of these templates is mandatory for all proposal submissions to this BAA (they do not count in the page count limit for Volume I). 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.~~

- Attachment 1 – SCG Request Form
- Attachment 2 – Cost Summary Spreadsheet
- Attachment 3 – Administrative and National Policy Requirements
- Attachment 4 – Summary Slides

Proposals shall consist of two volumes: 1) Volume I, Technical and Management Proposal (composed of three parts), and 2) Volume II, Cost Proposal. **The maximum page limit for Volume I is 50 pages, however, bidders proposing multiple payloads and/or bus concepts may add 10 additional pages in Volume I per additional proposed payload and/or bus up to a max total of 5 payloads and/or buses with a maximum of 90 total pages.** If proposing multiple payloads, bidders should specify the applicability of supporting information to each proposed payload. Up to four pages may be used for letters of support and do not count to the 50 page limit. Recommended page counts for individual elements of the proposal are shown in braces { } below.

The proposal shall include the following sections, each starting on a new page (where a "page" is 8-1/2 by 11 inches with type not smaller than 12-point (figures, tables, and charts may use 8- or 10-point font), margins not smaller than 1 inch, and line spacing not smaller than single spaced. Fold-outs up to 11 by 17 inches may be used but will be counted as two pages. All submissions must be in English.

Ensure that each section provides the detailed discussion of the proposed work necessary to enable an in-depth review of the specific technical and managerial issues. Specific attention must be given to addressing both risk and payoff of the proposed work that make it desirable to DARPA.

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

a) **Volume I, Technical and Management Proposal**

Section I: Administrative

- A. {No page limit, Does not count against Volume 1 Page count limit} Cover Sheet to include:
- (1) BAA number (HR001118S0032);
  - (2) Technical area – Track A and/or Track B (each concept proposed must be separable and severable);
  - (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. {1} Official transmittal letter

Section II: Summary of Proposal

- A. {2} Executive-level summary of technical rationale, technical approach, and constructive plan for accomplishment of technical goals in support of innovative claims and deliverable creation. (In the proposal, this section should be supplemented by a more detailed plan in Section III of the Technical and Management Proposal.) The summary should also include a top-level schedule that outlines the proposer’s overall approach to executing proposed system development through demonstration testing.
- B. {1} 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. {2} Deliverables associated with the proposed research and the plans and capability to accomplish technology transition and commercialization.

- a. Technical deliverables, such as reports, technical design reviews, hardware deliveries, etc.
- b. Technology Transition deliverables, such as business case, value stream map, and transition story.

Proposers responding to this BAA must submit a separate list of all technical data or computer software that will be furnished to the Government with other than unlimited rights. The Government will assume unlimited rights if proposers fail to identify any intellectual property restrictions in their proposals. 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.h of this BAA. There will be no page limit for the listed forms.

- D. {3} 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 responsibilities of team members; (4) the teaming strategy among the team members; and (5) the key personnel along with the amount of effort to be expended by each person during each year. DARPA requires key personnel identified in the proposal to be assigned as proposed, and the resulting contract/agreement will indicate no substitution shall be made without prior approval of the Government. If multiple payloads are proposed, a separate organization chart and program team should be provided for each payload.

### Section III: Detailed Proposal Information

- A. {12} Detailed technical approach and plan for accomplishing the Blackjack program objectives and to provide the basis for the Statement of Work, IMS, and Cost Volumes. This should include identification of critical technologies and system attributes that constitute the major technical and system integration risks on the program; identify major risk reduction activities and demonstrations required to validate the ability to achieve component and system level performance goals; description of key test activities for the Base and future phases including test rationale, objectives, facilities, and metrics; and an assessment of the technical maturity level at the end of the Base period.
- B. {5} Provide a management plan that describes the proposed system development processes and management approach to support successful Blackjack program execution.

Provide an overview of the system development processes to be used along with the organizational responsibilities and authority for the development effort. Describe the development approach to facilitate the final bus and/or payload design and ensure that it meets program objectives. Describe how key system knowledge acquired during the program will be captured, as well as describe the use of key tracking measures to enable efficient assessment of program progress. Describe ongoing design update activities, including integration of risk reduction activities, test results, bus/payload interfaces, and support to the bus/payload integrator.

Identify the team structure and plan for coordination with a system integrator to ensure that the system design accounts for Blackjack system constraints. This should include considerations for regular interchange meetings and the data products required to facilitate bus and/or payload integration and launch integration. Describe how activities will be managed and integrated across geographically and/or organizationally separate team elements. Describe the proposed approach to subcontractor management, quality control, safety, and security. Describe the proposed level of Government interaction to facilitate efficient interactions and streamlined decision making.

Include in the management plan, the proposed programmatic approach to cost, schedule, and risk management. Although formal Earned-Value Management (EVM) is not required for the program, the proposer is expected to meet the intent and describe how they will provide ongoing assessment of technical and programmatic progress against the program plan, critical path, schedule and cost. Define the content of technical and financial progress reports to enable efficient program monitoring, tracking, and reporting. Program management tools should be the same tools used internally to manage the program. No additional unique information for the Government is desired or required.

- C. {No page limit, Does not count against Volume 1 Page count limit} Statement of Work (SOW) – In plain English, clearly define the Phase 1 technical tasks/subtasks to be performed, their durations, and dependencies among them. The proposer shall employ a common work breakdown structure (WBS) for numbering all activities in the SOW, IMS, and cost proposal. Major hardware and software component development and test activities shall be detailed to Level 4 or below such that there is a direct correlation between material purchases and individual items, understanding of individual test composition and cost, etc. A less detailed WBS breakdown is acceptable for level-of-effort type tasks such as program management, program control, etc. 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.

**Do not include any proprietary information in the SOW.**

- D. {no page limit, does not count against Volume 1 Page count limit} Include an Integrated Master Schedule in MS Project format that details all of the proposed program activities. The IMS shall detail the specific tasks to be accomplished, their interrelationship, and

time sequencing. The IMS should be provided at the same or lower level of detail as the SOW.

- E. Design Review Content and Data Package Development {no page limit, does not count against Volume 1 Page count limit}: Describe the content of the SRR, PDR and CDR and any other proposed design reviews. Provide a complete list of the content, proposed entrance and exit criteria for each of these reviews and identify which deliverables (see Table 1) will contain the expected content. For PDR, also identify a list of anticipated subsystems that will be addressed by this review. Describe how technology maturation and risk reduction results that occur outside of the design review cycle will be documented and delivered. Identify how all deliverables will be initially developed and updated for subsequent reviews, including planned completion dates as captured in the IMS. Provide an overview of the capture, documentation, and design control processes and tools used for, including but not limited to, requirements management, configuration management, technical documentation and drawings, design data packages, and test reports.
- F. {4} 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.h of this BAA, "Intellectual Property".
- G. {4} Comparison with other ongoing research indicating advantages and disadvantages of the proposed effort.
- H. {4} Discussion of proposer's previous accomplishments and work in closely related research areas.
- I. {2} Description of Security Management architecture and/or approach for the proposed effort. Detail unique additional security requirements regarding 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.
- J. {2} Description of the facilities that would be used for the proposed effort.
- K. {4} Detail support enhancing that of Summary of Proposal, including formal teaming agreements which are required to execute this program.
- L. {4} Provide description of milestone cost and accomplishments, including estimates of cost for each task in each year of the effort delineated by the primes and major subcontractors, total cost, and any company cost share. (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 that could reasonably be partitioned for purposes of funding, these should be identified as

options with separate cost estimates for each. 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.

**b) Volume II, Cost Proposal {no page limit}**

All proposers, including FFRDCs, must submit the following:

Completed Attachment 2.

Cover sheet to include:

- (1) BAA number (HR001118S0032);
- (2) Technical area – Track A or Track B (each concept proposed must be separable and severable);
- (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) or Other Transaction;
- (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) DUNS number;
- (17) TIN number;
- (18) CAGE Code;
- (19) Sub-awardee Information; and
- (20) Proposal validity period.

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. The Government strongly encourages that tables included in the cost proposal also be provided in an editable (e.g., MS Excel) format with calculation formulas intact to allow traceability of the cost proposal numbers across the prime and subcontractors.

## 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 Base or future phases.
- 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.

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 are not required if the proposer proposes an award instrument other than a procurement contract (e.g., other transaction.)

### a. Subawardee Proposals

The awardee is responsible for compiling and providing all subawardee proposals for the Procuring Contracting Officer (PCO)/Agreements Officer (AO), as applicable. Subawardee proposals should include Interdivisional Work Transfer Agreements (ITWA) or similar

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

All proprietary subawardee proposal documentation, prepared at the same level of detail as that required of the awardee's proposal and that cannot be uploaded with the proposed awardee's proposal, shall be provided to the Government either by the awardee or by the subawardee organization when the proposal is submitted. Unclassified subawardee proposals submitted to the Government by the proposed **subawardee** should be submitted via DARPA's BAA Website (<https://baa.darpa.mil>) by the subawardee. See Section IV.B.4.b. of this BAA for proposal submission information. The subawardee must provide the same number of copies to the PCO/AO as is required of the awardee.

#### b. Other Transaction Requests

The Government may award either a Federal Acquisition Regulation (FAR) based contract or an Other Transaction for Prototype (OT) agreement for prototype system development.

All proposers requesting an OT must include a detailed list of milestones. Each milestone must include the following:

- milestone description,
- completion criteria,
- due date, and
- payment/funding schedule (to include, if cost share is proposed, awardee and Government share amounts).

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.

### 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

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) Classified Submissions

## (a) Classified Proposal Markings

At this time, DARPA anticipates that proposals submitted in response to this BAA may generate or involve access to classified information. Classified submissions shall be transmitted and marked in accordance with the following guidance. Security classification guidance via a Security Classification Guide (SCG) and/or DARPA DD Form 254, "DoD Contract Security Classification Specification," can be requested via e-mailing a completed Attachment 1 to [HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil), subject of e-mail must be "Company Name: SCG Request".

If a submission contains Classified National Security Information or the suspicion of such, as defined by Executive Order 13526, the information must be appropriately and conspicuously marked with the proposed classification level and declassification date. Submissions requiring DARPA to make a final classification determination shall be marked as follows:

"CLASSIFICATION DETERMINATION PENDING. Protect as though classified \_\_\_\_\_ (insert the recommended classification level, e.g., Top Secret, Secret or Confidential)"

NOTE: Classified submissions must indicate the classification level of not only the submitted materials, but also the classification level of the anticipated award.

## (b) Classified Submission Requirements and Procedures

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). Additional information on the subjects discussed in this section may be found at <http://www.dss.mil>.

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 [HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil) as notification that there is a classified portion to the proposal. When submitting a hard copy of the classified portion according to the instructions outlined below, 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.

To Request Security classification guidance and guidance on the DD Form 254, "DoD Contract Security Classification Specification," e-mail completed Attachment 1 to [HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil), subject of e-mail must be "Company Name: SCG Request".

### **Confidential, Secret, and Top 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, Secret, and/or Top Secret classified information.

### **Confidential and Secret**

Confidential and Secret classified information may be submitted via ONE of the two following methods to the mailing address listed in the contact information in Part I of this BAA:

- Hand-carried by an appropriately cleared and authorized courier to the DARPA Classified Document Registry (CDR). Prior to traveling, the courier shall contact the DARPA 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. Senders should mail to the mailing address listed in the contact information herein.

The inner envelope shall be addressed to Defense Advanced Research Projects Agency, ATTN: DARPA/TTO, Mr. Paul Thomas, with a reference to the BAA number (HR001118S0032).

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.

### **Top Secret Information**

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 Program Security Officer (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 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: All proposals containing Special Access Program (SAP) information must be processed on a SAP information technology (SAP IT) system that has received an Approval-to-Operate (ATO) from the DARPA Technology Office PSO or other applicable DARPA SAP IT Authorizing Official. The SAP IT system ATO will be based upon the Risk Management Framework (RMF) process outlined in the Joint Special Access Program Implementation Guide (JSIG), current version (or successor document). (Note: A SAP IT system is any SAP IT system that requires an ATO. It can range from a single laptop/tablet up to a local and wide area networks.)*

*The Department of Defense mandates the use of a component's SAP enterprise system unless a compelling reason exists to use a non-enterprise system. The DARPA Chief Information Officer (CIO) must approve any performer proposal to acquire, build, and*

*operate a non-enterprise SAP IT system during the awarded period of performance. Use of the DARPA SAP enterprise system, SAVANNAH, does not require CIO approval.*

*SAP IT disposition procedures must be approved by the DARPA Senior Authorizing Official, or SAPCO, IAW the OSD SAPCO Memorandum, "Disposition of DoD Special Access Program Information Technology Devices," July 27, 2017.*

(3) Both Classified and Unclassified Submissions

For a proposal that includes both classified and unclassified information, the proposal may be separated into an unclassified portion and a classified portion. The proposal should include as much information as possible in the unclassified portion and use the classified portion ONLY for classified information. The unclassified portion can be submitted through the DARPA BAA Website, per the instructions in Section IV.B.4.b. The classified portion must be provided separately, according to the instructions outlined in the 'Classified Submission Requirements and Procedures' section above.

**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://doi.org/10.6028/NIST.SP.800-171r1>) that are in effect at the time the BAA 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) Human Research Subjects/Animal Use**

Proposers that anticipate involving Human Research Subjects or Animal Use must comply with the approval procedures detailed at <http://www.darpa.mil/work-with-us/additional-baa>.

**e) 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 contract must complete an 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.

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

**g) 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.

**h) 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.

**(1) For Procurement Contracts**

Proposers responding to this BAA requesting procurement contracts will need to complete the certifications at 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	Summary of Intended Use in the Conduct of the Research	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
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Furnished With Restrictions				
(LIST)	(NARRATIVE)	(LIST)	(LIST)	(LIST)

(2) 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 (1) above. If no restrictions are intended, then the proposer should state “NONE.”

All proposers responding to this BAA must submit a separate list of all contract deliverables, including technical data or computer software that will be furnished to the Government with other than unlimited rights. The Government will assume unlimited rights if proposers fail to identify any intellectual property restrictions in their proposals. 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.

**i) 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 BAA. See <http://www.darpa.mil/work-with-us/additional-baa> for further information.

**4. Submission Information**

All times listed herein are in Eastern Time. Proposers are warned that submission deadlines as outlined herein are strictly enforced. When planning their response to this solicitation, proposers should take into account that some parts of the submission process may take from one business day to one month to complete (e.g., registering for a DUNS number or TIN).

When utilizing the DARPA BAA Submission website (<https://baa.darpa.mil/>), as described below in Section IV.B.4.b, a control number will be provided at the conclusion of the submission process. This control number should be used in all further correspondence regarding your proposal submission. DARPA will acknowledge receipt of all submissions. If no confirmation is received within two business days, please contact the BAA Administrator at [HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil) to verify receipt. DARPA intends to use electronic mail correspondence regarding this Broad Agency Announcement. 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.

Note: Proposers submitting a proposal via the DARPA BAA Submission site MUST click the “Finalize” button with sufficient time for the upload to complete prior to the deadline. Failure to do so will result in a late submission.

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

The proposal must be received via the DARPA BAA Submission website or at DARPA/TTO, 675 North Randolph Street, Arlington, VA 22203-2114 (Attn.: HR001118S0032) on or before, the date and time listed in Part I., Overview Information and stated below 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 days) from date of posting on FedBizOpps (<https://www.fbo.gov>). The ability to review and select proposals submitted after the initial round deadline specified in the BAA or due date otherwise specified by DARPA will be contingent on availability of funds. Proposers are warned that the likelihood of available funding is greatly reduced for proposals submitted after the initial closing date deadline.

#### **a) Abstract Submission**

Proposers are strongly encouraged to submit an abstract in advance of a proposal. This procedure is intended to minimize unnecessary effort in proposal preparation and review. The time and date for submission of abstracts is specified in Part I., Overview Information. DARPA will acknowledge receipt of the submission and assign a control number that should be used in all further correspondence regarding the abstract.

Classified abstracts, after being properly coordinated, will need to provide an original, six (6) hard copies of the abstract and two (2) electronic copies of the abstract [in PDF (preferred)] on a CD-ROM shall be submitted.

Unclassified abstracts sent in response to this BAA may be submitted via DARPA's BAA Website (<https://baa.darpa.mil>). Please refer to the Proposal Submission section below for additional details. 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.

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 proposals sent in response to this BAA may be submitted 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; proposers should start this process as early as possible.

All unclassified concepts submitted electronically through DARPA's BAA Website must be uploaded as zip files (.zip or .zipx extension). The final zip file should be no greater than 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.

Classified submissions 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.

Technical support for DARPA's BAA Website may be reached at [BAAT\\_Support@darpa.mil](mailto:BAAT_Support@darpa.mil), and is typically available during regular business hours, Eastern Time.

For a proposal that includes both classified and unclassified information, the proposal may be separated into an unclassified portion and a classified portion. The proposal should use the unclassified portion to the maximum extent reasonable. The unclassified portion can be submitted through the DARPA BAA Website, per the instructions above. The classified portion must be mailed separately, according to the instructions outlined in the "Security Information" section above. If a classified proposal may not be partitioned into classified and unclassified portions, then submit according to the instructions outlined in the "Security Information" section above.

When a proposal includes a classified portion, and when able according to security guidelines, we ask that proposers send an e-mail to [HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil) as notification that there is a classified portion to the proposal. When sending the classified portion via mail according to the instructions outlined in the "Security Information" section above, proposers

should submit an original and 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 HR001118S0032, proposer organization, proposal title (short title recommended), and Copy \_ of \_.

- (2) For Proposers Requesting Procurement Contracts or OTs and Submitting Hard Copies (Only for entirely classified submissions)

Proposers may submit hard copies of their proposal. Proposers opting to submit hard copies must submit an original and 6, but no more than nine (9) of the proposal and two (2) electronic copies of the proposal [in PDF (preferred)] on a CD-ROM. Each copy must be clearly labeled with HR001118S0032, proposer organization, proposal title (short title recommended), and Copy \_ of 2. All hard copies must be on 8 ½ by 11 paper.

5. **Funding Restrictions**

Not Applicable.

6. **Other Submission Requirements**

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 HR001118S0032 summary will be a link to the FAQ. Submit your question/s by e-mail to HR001118S0032@darpa.mil. Questions must be received by the FAQ/Questions due date listed in Part I, Overview Information.

## **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.

For all proposals, DARPA will evaluate the extent to which proposed solutions will support the government's program vision and primary objectives described in Section A. Bus and Payload solutions will be evaluated based on their ability to minimize factory recurring integration and testing required with minimal or no launch site processing and integration required. For Track A proposals, DARPA will evaluate the extent to which proposed payloads meet the Key Payload Parameters, Payload Envelope, and Design Parameters along with the bulleted design considerations described in Section I.F with fully substantiated claims consistent with an initial conceptual design. DARPA will also evaluate the extent to which the proposed payload design is bus platform agnostic; the potential compatibility with commoditized buses that are not optimized for military payload missions and therefore have higher than typical interference levels in areas such as mechanical jitter (e.g. EO/IR) and Electromagnetic Interference/Electromagnetic Compatibility (EMI/EMC) (e.g. RF collection); and the development approach to establishing and maintaining compatibility as the bus and Pit Boss designs mature. DARPA will assess the ability of the payload mission to be performed using only on-board processing to deliver mission data to tactical users with no requirement for ground processing, exploitation, or dissemination of payload data.

DARPA will evaluate the extent to which the Payload Phase 1 technical and systems engineering approach fully explores the mission effectiveness trade space, and credibly addresses the major program reviews, deliverables, and management approach described in Section I.D to develop comprehensive system requirements and a robust and effective system level design. DARPA will evaluate the extent to which the management approach integrates activities of the system integrators and Track B performers; and the extent to which the Phase 1 Statement of Work and Integrated Master Schedule are credible, executable, and address the Phase 1 objectives, deliverables and success metrics.

For Track B proposals, DARPA will evaluate the extent to which proposed commoditized buses meet the Key Bus Parameters and bulletized additional considerations such

as a generic standardized bus platform that is compatible with various types of military payloads as described in Section I.E with substantiated claims consistent with an initial conceptual design. DARPA will evaluate the extent to which the Bus Phase 1 technical and systems engineering approach credibly addresses the major program reviews, deliverables, and management approach described in Section I.D. DARPA will evaluate the extent to which the management approach integrates activities of the system integrators and Track A performers; and the extent to which the Phase 1 Statement of Work and Integrated Master Schedule are credible, executable, and address the Phase 1 objectives, deliverables and success metrics. DARPA will evaluate the ability of the interfacing commercial satellite network to provide low cost, high bandwidth data connectivity among Blackjack satellite nodes and between a Blackjack satellite and a commercial user terminal.

For both Track A and Track B proposals the recurring cost of each unit for current and future contract quantities from the initial 2 flight units, through the 20 satellites demo, and up to the full constellation quantity (expected to be on the order of 100 satellites) will be evaluated. This will ensure the DOD can expand the constellation within the lower cost, ‘good enough’ envelope of the Blackjack architecture. Note Attachment 2 Cost Summary has a special tab called ‘Example Constellation Cost’ to provide this key information in an easy to read format.

## **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.

## **3. Plans and Capability to Accomplish Technology Transition**

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. The proposer must clearly define IP rights while ensuring that Government purpose rights are provided for all payload to bus and bus to payload interface control data. The same goes for Blackjack nodes that are in special orbits and need government purpose rights for interfaces with commercial mesh networks (both space to space and space to ground).

The proposed objective systems (payload or bus) once expanded to a full constellation will provide a high value, highly autonomous, mission for national defense and enable low latency mission effects and mission data to be delivered to users without the need for ground system interaction. The demonstration system will have a spiral development path that extends to the objective and to fully operational systems that can be transitioned to a program of record without major redesign.

## **4. 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

## **5. Proposer's Capabilities and/or Related Experience**

The proposer's prior experience in similar efforts clearly demonstrates an ability to deliver products that meet the proposed technical performance within the proposed budget and schedule. The proposed team has the expertise to manage the cost and schedule. Similar efforts completed/ongoing by the proposer in this area are fully described including identification of other Government sponsors.

### **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 BAA; 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 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 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

As soon as the evaluation of a abstract is complete, the proposer will be notified that (1) DARPA does recommend the proposer submit a full proposal, or (2) DARPA does not recommend the proposer submit a full proposal. These official notifications will be sent via e-mail to the Technical POC and/or Administrative POC identified on the proposal coversheet. If DARPA does not recommend the proposer submit a full proposal, DARPA will provide feedback to the proposer regarding the rationale for this recommendation. Regardless of DARPA's response to an abstract, proposers may submit a full proposal. DARPA will review all full proposals submitted 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 e-mail to the Technical 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 **Technical and Management** Meetings and periodic site visits at the Program Manager's discretion.

#### 2. FAR and DFARS Clauses

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) on Non-DoD Information Systems

Further information on Controlled Unclassified Information on Non-DoD Information Systems is incorporated herein can be found at <http://www.darpa.mil/work-with-us/additional-baa>.

#### 4. Representations and Certifications

If a procurement contract is contemplated, prospective awardees will need to be registered in the SAM database prior to award and complete electronic annual representations and certifications consistent with FAR guidance at 4.1102 and 4.1201; the representations and

certifications can be found at [www.sam.gov](http://www.sam.gov). Supplementary representations and certifications 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 as 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. 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. At least one copy of each report will be delivered to DARPA and not merely placed on a SharePoint site.

### **D. Electronic Systems**

#### **1. Wide Area Work Flow (WAWF)**

Performers will be required to submit invoices for payment directly to <https://wawf.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>).

## **VII. Agency Contacts**

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

Administrative, technical, or contractual questions should be sent via e-mail to [HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil). All requests must include the name, e-mail address, and phone number of a point of contact.

The BAA Coordinator may be reached at:

[HR001118S0032@darpa.mil](mailto:HR001118S0032@darpa.mil)

DARPA/TTO

ATTN: HR001118S0032

675 North Randolph Street

Arlington, VA 22203-2114

## **VIII. Other Information**

Collaborative efforts/teaming are encouraged. Interested parties should submit a one-page profile with their contact information, a brief description of their technical capabilities, and the desired expertise from other teams, as applicable.