



Microsystems Technology Office  
Broad Agency Announcement  
Millimeter-Wave Digital Arrays (MIDAS)  
HR001118S0020  
January 23, 2018

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ATTACHMENT 1: Cost Volume Proposer Checklist  
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## PART I: OVERVIEW INFORMATION

- **Federal Agency Name:** Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office (MTO)
- **Funding Opportunity Title:** Millimeter-Wave Digital Arrays (MIDAS)
- **Announcement Type:** Initial Announcement
- **Funding Opportunity Number:** HR001118S0020
- **Catalog of Federal Domestic Assistance Numbers (CFDA):** 12.910 Research and Technology Development
- **Dates:** (All times listed herein are Eastern Time)
  - Posting Date: January 23, 2018
  - Proposers Day: January 26, 2018
  - FAQ Submission Deadline: March 12, 2018
  - Proposal Due Date: March 26, 2018
  - Estimated period of performance start: July 2018
- **Concise description of the funding opportunity:** DARPA seeks innovative proposals for the development of element-level digital beamforming array technology at millimeter wave frequencies. The primary goal of the program is to develop and demonstrate a tile building block sub-array (>16 elements) that supports scaling to large arrays (100's-10,000+) in the 18-50 GHz band. It is expected that this will be enabling hardware for multi-function, multi-beam phased array applications and emerging massive multiple-input-multiple-output (MIMO) techniques in communication and sensing.
- **Anticipated Funding Available for Award:** It is anticipated that \$64.5M of total funding will be awarded across all technical areas, approximately partitioned as follows:
  - \$30-40M for Technical Area 1 (TA1), two phases, 36 months, 6.3 funding;
  - \$20-30M for Technical Area 2 (TA2), three phases, 48 months, 6.3 funding.
  - <\$5M for Technical Area 3 (TA3), two phases, 36 months, 6.1/6.2 funding.
- **Anticipated individual awards:** Multiple awards are anticipated.
- **Anticipated funding type:** See “Anticipated Funding Available for Award” above.
- **Types of instruments that may be awarded:** Procurement contract, grant, cooperative agreement or other transaction.
- **Agency contact:**
  - Dr. Timothy M. Hancock, Program Manager  
BAA Coordinator: HR001118S0020@darpa.mil  
DARPA/MTO  
ATTN: HR001118S0020  
675 North Randolph Street  
Arlington, VA 22203-2114

## **PART II: FULL TEXT OF ANNOUNCEMENT**

### **I. Funding Opportunity Description**

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

DARPA BAAs are posted on the Federal Business Opportunities (FedBizOpps) website, <http://www.fbo.gov/>, and, as applicable, the Grants.gov website at <http://www.grants.gov/>. The following information is for those wishing to respond to the BAA.

The Microsystems Technology Office at DARPA seeks innovative proposals that explore the extent to which multi-beam systems can be employed at millimeter wave over extremely wide ranges of frequencies, which necessitates digitization within the array itself. A reduction in size and power of digital transceivers at millimeter wave is expected and will likely involve innovative sampling and frequency conversion schemes to meet the linearity requirements. The primary goal of the program is to develop and demonstrate a tile building block sub-array (>16 elements) that supports scaling to large arrays (100's-10,000+) in the 18-50 GHz band and does not eliminate spatial degrees of freedom within the sub-array. It is expected that this will be enabling hardware for multi-function, multi-beam phased array applications and emerging massive multiple-input-multiple-output (MIMO) techniques in communication and sensing.

#### **A. Background**

Directional antennas have been used for over 130 years to increase the effective radiated energy density of a transmitter and increase the sensitivity of a receiver. Only a short time after the use of reflector antennas became common-place, the use of multiple antennas to create an array and achieve directional radiation was reduced to practice. As RF electronics technology matured, methods to dynamically control the phase and amplitude weights of antenna elements emerged to steer an electromagnetic beam. Immediately these arrays offered the unique capability to scan a narrow beam over a wide field of view faster than mechanical steering, quickly finding applications in early ballistic missile defense (BMD). These were passive electronically steered arrays with a single transmitter and receiver for many antenna elements. As transistor technology improved, it became possible to put a transmit amplifier and receive amplifier at every radiating element. This was enabling technology to overcome the high losses associated with the passive array feed. Much of this work was done at lower frequencies in the UHF and L-band where the electronic technology had better performance and led to physically large arrays, which was acceptable for fixed radar installations.

As is well understood in phased-array design, the antenna elements are placed at approximately half-wavelength spacing which was less of a manufacturing challenge for the early arrays at UHF

and L-band where the spacing could be around 6-12 inches. However, as threats changed and technology adapted, there was a desire to put phased arrays on mobile platforms, first ships and eventually airborne platforms. This required a reduction in the size of the array. However, to maintain a narrow beam width, the frequency had to be increased requiring smaller electronics operating at higher frequency. The 1980s through the 2000s saw the development of much of the enabling advanced electronics that pushed phased array technology up through X- and Ku-band.

Much of the first fifty years of phased array design was dominated by radar applications with less emphasis placed on communications and this was for good reason. The use of directional antennas makes the most sense when you know where to point the beam. In the case of radar, the transmitter and receiver beam is pointed in the direction that you want to sense. However, for communication applications, where to point is less clear because the direction of the other node in the communication link is not always known. Directional antennas are typically only used for communication when the link geometry is known such as for satellite communications and point-to-point links where the geometry is pre-arranged and does not change much.

Enabled by two key technologies, this paradigm is shifting and we are entering a new era where phased-arrays are poised to change how we communicate and network our mobile platforms. The first technology is element level digital phased arrays. Around the late 2000s, a shift toward digital radio technology began and by the 2010s, this was being applied to phased arrays to implement element-level digital beamforming at low frequencies. This is a powerful technology that can not only improve array performance and reduce application development time, but digital beamforming is enabling for emerging multi-beam communications, massive MIMO and directional sensing of the electromagnetic environment. Element level digital beamforming will allow a receiving node to stare in all possible directions with high gain antenna beams and determine when and where there are other nodes that want to join the network and subsequently estimate the optimal adaptive beamformer for communication. This greatly simplifies the networking protocol and mitigates the challenging spatial scan-on-scan problem in networked directional communications that to date we have only addressed with brute force spatial scanning.

A second key enabler is the use of millimeter wave technology. From the 1970s through the 2000s the frequency of operation of phased arrays increased to allow for smaller sizes that enabled the use of arrays on mobile platforms. Platforms have continued to shrink yet much of our phased array technology development is still limited to S- through Ku-band. The lesser used frequencies above 18 GHz present an opportunity to further shrink array technology to reduce size, weight and power (SWaP), but also allow the use of directional antenna systems on small emerging platforms. The use of higher frequencies also presents a unique trade-off due to the atmospheric scattering and absorption that occurs at millimeter wave frequencies. For applications at short ranges where a high degree of frequency re-use may be desired or for enhanced physical security, larger atmospheric absorption is an advantage allowing the radiated energy to attenuate quickly beyond the desired range. There are many emerging applications in the 18-50 GHz range and while some of the necessary electronic technology exists, achieving good performance and fitting a millimeter wave element level digital transceiver system within a 3-mm lattice spacing or smaller will prove to be challenging. The development of this element-level digital radio technology and demonstration of the packaging and array scaling will be the focus of this program.

## B. Program Description

While millimeter wave arrays are an active area of research being pursued by the emerging 5G cellular market, it is expected that this commercial technology alone will not meet the needs of the DoD and therefore a DARPA investment is needed. Commercial 5G applications are primarily solving the “last-mile” problem where consumers are demanding more bandwidth for high throughput applications over relatively short ranges. In these commercial applications, the frequencies are predetermined and allow for a narrow band technology solution. Also, the pointing problem is less challenging because the base stations are not mobile and the mobile user handsets will only use a few antennas elements with broad antenna beams, both of which relax the pointing and mobile user discovery requirements. For these reasons, it is expected that for the foreseeable future, the solution in the emerging 5G market will be analog phased arrays at fixed, narrowband, pre-planned frequency ranges as the technology of choice due to cost and technology maturity.

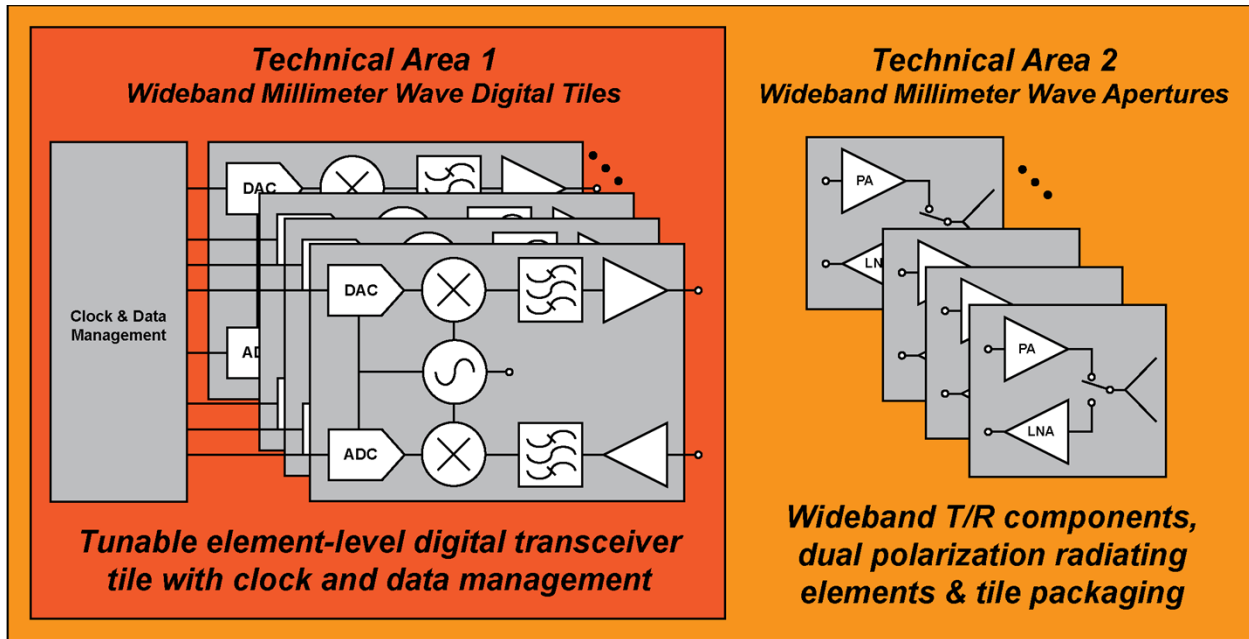
The Millimeter-Wave Digital Arrays (MIDAS) program intends to develop the digital array technology that will enable next generation DoD millimeter wave systems. It is not uncommon to have DoD platforms separated by 100s of nautical miles with a need to communicate at data rates of a few megabits per second. While the link budget for a communication channel of this nature can be easily mitigated with a larger transmit and receive aperture, the increased antenna gain compounds the challenging pointing problem. This is especially true when considering both platforms are likely moving in three dimensions with unknown orientation. Because of this challenging adaptive beamforming problem, MIDAS will focus on element level digital array hardware as an enabling technology for these multi-beam directional communication applications.

A reduction in the size and power of digital transceivers at millimeter wave is core to this goal and will need to be researched and developed within this program. Areas of expected research will be innovative sampling and frequency conversion schemes with high linearity for receive and transmit, distributed LO/clock generation and synchronization for each element, wideband/efficient transmit/receive amplifiers, radiating apertures and novel manufacturing to realize the integration and packaging all of these components into a scalable tile building block. **The use of analog beamforming techniques that eliminate spatial degrees of freedom at the sub-array level are an evolutionary approach to millimeter wave phased arrays and will be considered non-responsive to this BAA.**

## C. Program Structure

To bring digital radio technology to millimeter wave arrays, MIDAS will focus on the development of a common tile integrated circuit that will drive a small subarray of at least 4x4 elements. This size is large enough to demonstrate basic array functionality, while being small enough that overall yield of a tile will be acceptably high and require no special processing or material handling. If sized for 50 GHz operation, this tile will be approximately 12 x 12 mm<sup>2</sup>, well within the size of a typical integrated circuit. Each element will require support for dual-polarization, transmit and receive functionality and through the use of analog, mixed signal or digital tuning be able to support operation over at least 18-50 GHz with a moderate instantaneous bandwidth of about 10% or less.

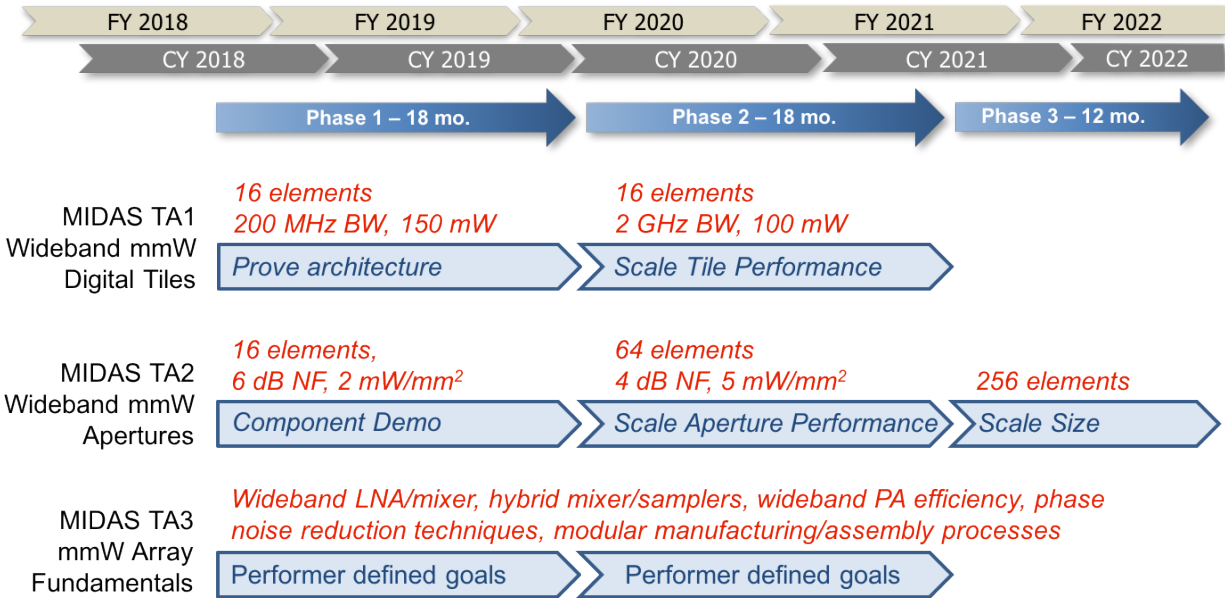




**Figure 1: MIDAS Block Diagram**

To support this level of integration, silicon CMOS technology is expected to be a key enabler for the core of the tile implementation. This focus will be **Technical Area 1: Wideband Millimeter Wave Digital Tiles**. Beyond the development of this core building block in TA1, a full system will require the addition of transmit and receive components such as low-noise amplifiers (LNA), power amplifiers (PA), transmit/receive (T/R) switches and radiating elements while also providing a packaging and thermal management infrastructure and potentially some compute resources for digital beamforming to support demonstrating a >256 element demonstration system by the end of the program. This work will leverage the tile developed by the performer's team in TA1 and will be **Technical Area 2: Wideband Millimeter Wave Apertures**. A single proposal may address only TA1 or TA1 and TA2. *Stand-alone responses to only TA2 will not be accepted.* Responders to both TA1 and TA2 must meet both sets of technical metrics (see tables below). Additionally, to address fundamental technical innovation in digital and hybrid beamforming, there will be a third related **Technical Area 3: Millimeter Wave Array Fundamentals**. Responses to TA3 are independent from TA1/TA2 and require their own separate proposals.





**Figure 2: MIDAS Program Structure**

#### D. Technical Areas

##### Technical Area 1: Wideband Millimeter Wave Digital Tiles, 36 months.

There are many DoD applications that would benefit from millimeter wave phased arrays. These include a wide variety of short-range, high-data rate and long-range, low-data rate communication links for air-to-air and air-to-ground scenarios. The ability to support legacy commercial and military satellite communication bands to geosynchronous satellites is also important. Additionally, there is growing interest in the use of Ka- through V-band for low-earth orbit satellite constellations to provide connectivity to ground users. When taken as a whole, there is an incentive to develop a common tile that can support the frequency band of at least 18-50 GHz and bring digital radio technology to the millimeter wave band. While there is a need to support multiple communication bands that cover 18-50 GHz, being able to support multiple widely separated frequency bands simultaneously from the same tile is not a requirement in MIDAS. If an application requires simultaneous multiband support it is expected that time multiplexing or aperture segmentation would be acceptable solutions. For this reason, only a moderate instantaneous fractional bandwidth of approximately 10% or less will be pursued in MIDAS.

*Phase 1* – In TA1, the goal of Phase 1 is to develop the architecture, manage the integration complexity, design and ultimately demonstrate a millimeter wave digital transceiver tile successfully (Figure 1). To facilitate this goal, the instantaneous bandwidth is somewhat relaxed to allow considerable effort to be placed on the system design of a scalable architecture that is consistent with the size and power constraints rather than the individual performance of any one component. Narrowband frequency selectivity over nearly a 3:1 bandwidth will likely be an important aspect of the design and a combination of mixing, RF sampling and digital processing may be warranted.

*Phase 2* – In TA1 the goal of Phase 2 is to refine the tile design and sharply increase the tile performance. While Phase 1 is expected to be about the architecture choices and front-end components of a transceiver channel, Phase 2 is more about the back-end of the channel. This is mostly reflected in the instantaneous bandwidth and dynamic range, as well as a commensurate increase in beam-bandwidth product, while striving to further reduce the power consumption. The tile developed in TA1 will typically not be used alone but rather combined with multiple copies of the tile. This will be the goal of Phase 2 in TA2. If there are features that will be added to the common tile design to ease data aggregation in TA2 (clock, data sharing, etc.), this should be described in the TA1 portion of the proposal.

The metrics for Phase 1 and Phase 2 of TA1 are listed below in Table 1 with clarifying notes following the table.

TA1 Metric	Phase 1	Phase 2	Notes
Frequency of operation	18 – 50 GHz		1
Element pitch	$\leq \lambda/2$ at $\lambda_{\text{high}}$		2
Transmit & receive functionality	Yes		3
Polarization	Dual		3
Number of elements (2D array)	$\geq 16$		4
Noise Figure	$\leq 10$ dB		5
Transmit Power	$\geq 0.1$ mW/mm <sup>2</sup>		6
Instantaneous Bandwidth	$\geq 200$ MHz	$\geq 2$ GHz	7
Receiver IIP3	$\geq 10$ dBm	$\geq 15$ dBm	8
Transmitter OIP3	$\geq 15$ dBm	$\geq 20$ dBm	8
Beam-bandwidth product	$\geq 400$ MHz	$\geq 3.2$ GHz	9
Power consumption per channel	$\leq 150$ mW	$\leq 100$ mW	10

**Table 1: TA1: Wideband Millimeter Wave Digital Tiles, Program Metrics**

**Table 1 Notes:**

- 1) The minimum required frequency band to cover is 18-50 GHz, supporting additional bandwidth below or above this band is also acceptable.
- 2) It is expected that in a tile configuration, to minimize grating lobes, while meeting the desired scan performance as outlined in TA2, it will be necessary that each dual-polarized element be spaced on grid at a half of a free space wavelength or less at the highest frequency, i.e.  $\leq 3$  mm at 50 GHz.
- 3) It is required to implement two polarization channels on both transmit and receive to support emerging MIMO coding schemes, active polarimetric sensing or polarization calibration over scan angle as well as legacy linear, left and right hand circular polarizations.
- 4) Number of elements  $\geq 16$  corresponds to the minimum number of spatial channels. This implies  $\geq 32$  transceiver channels to support dual polarization operation.

- 5) The noise figure is to be measured de-embedded to the RF pads of the tile integrated circuit. This will include the noise figure of the entire receive chain from RF to bits and may contain the effects of any switches, amplifiers, mixers, analog-to-digital converters (ADCs), or digital signal processing (DSP) decimation strategies.
- 6) The transmit power is to be measured de-embedded to the RF pads of the tile integrated circuit. This is specified as a frequency independent number that assumes the radiators will be on a regular grid in an array. For example, if the tile is designed to support 18-50 GHz and the pitch is chosen to be 3 mm, then the power per element would be  $0.1 \text{ mW/mm}^2 \times 9 \text{ mm}^2 = 0.9 \text{ mW}$  or  $-0.5 \text{ dBm}$ . If instead, the design, was chosen to support 18-100 GHz, then the pitch of each element must shrink to 1.5 mm, but the power per element is also reduced by a factor of 4x or 6 dB, making the required power per element only  $-6.5 \text{ dBm}$ , which produces the same power density at all frequencies.
- 7) Instantaneous bandwidth is the digitized bandwidth after any frequency conversion, sampling, filtering or decimation. This is the bandwidth that will be post/pre-processed by any Rx/Tx beamformer.
- 8) It is expected the harmonically related intermodulation distortion will be the dominate source of non-linearity for the receiver and transmitter, especially after digital beamforming and therefore the IIP3 and OIP3 is specified for the receiver and transmitter respectively. In the case of both the IIP3 and OIP3, these are in-band measurements.
- 9) Beam-bandwidth product is chosen to allow a range of potential performance trade-offs depending on the application. At one extreme is 1-2 beams at the full element bandwidth however the other extreme would be to provide many spatial degrees of freedom at a reduced bandwidth for signal search and link acquisition applications. For example, with 16 spatial degrees of freedom and single polarization, 25 MHz of bandwidth per beam should be achievable in Phase 1 with a 400 MHz beam-bandwidth product. Likewise, in Phase 2, 200 MHz of bandwidth should be achievable for 16 beams. Beamforming strategies will be left to performers to propose. Some strategies may warrant DSP hardware intimately integrated within transceivers in the tile building block, while other strategies may be best addressed with package level DSP implemented under TA2 after data is moved off of the tile. The purpose of specifying the beam-bandwidth product is to guide proposers with respect to the required I/O throughput.
- 10) This is the total power consumption when in transmit or receive mode. It is not expected that a tile will need to transmit and receive simultaneously (STAR), so only the transmitter or receiver will be in use at any given time. If the tile is designed to support 16 elements, or 32 channels, then this number is the total power consumption of the tile (in Tx or Rx mode) divided by 32. This metric should be met in both transmit or receive mode.

There are many aspects of an RF system design that are far too complex to fully specify in this solicitation. The specifications in Table 1 are intended to guide the proposers and bound the design problem. A successful proposal will present a plausible analysis of a proposed architecture that addresses the subtle aspects of the design to include, but are not limited to, out-of-band spurious emissions on transmit, out-of-band response on receive, mixer/ADC/DAC image management, phase-noise, phase coherence between elements, phase coherence between tiles, phase coherence between receive and transmit, phase repeatability or calibration upon startup, switching time between receive and transmit and any potential calibration or built-in self-test schemes.

**Technical Area 2: Wideband Millimeter Wave Apertures, 48 Months.**

The work to be done under TA1 is only part of the challenge of implementing a fully functional and compact millimeter wave array for DoD applications. Lower noise figure and higher transmit power, beyond the performance metrics of the common tile in TA1 will be required along with a compelling integration strategy and this will be the focus of TA2. TA2 will develop the necessary wideband T/R components (HPA, LNA, switch, etc.) along with the radiating aperture and packaging strategy (Figure 1). It is expected that this will only be achievable with the use of SiGe, InP, GaN or comparable technology married to the common tile design through a combination of heterogeneous integration and/or co-packaging.

A common tile architecture using a single piece of silicon is very reasonable for TA1 where yield is high and there may be a need to share signals between elements. However, for the T/R components it is recognized that a single semiconductor chip to support  $\geq 16$  elements of dual polarized signal path may not be feasible when considering chip size, yield, thermal management, cost or other material handling and packaging constraints. The conceptually simplest approach of chip stacking or wafer/chip scale integration is of strong interest but may not be feasible. Hybrid approaches that use a combination of tile and brick strategies to solve this challenging packaging and integration problem should all be considered.

*Phase 1* – There are three goals in Phase 1 of TA2 that a successful proposal will bring together, 1) the electromagnetic design of a wideband radiating element and array, 2) wideband T/R components and 3) a packaging strategy that integrates the radiator, T/R components, thermal management and the silicon tile developed in TA1. It is expected that in Phase 1, the tile from TA1 may not be sufficiently mature for integration in TA2. Therefore, a successful proposal will outline a compelling testing and/or simulation strategy to verify Phase 1 performance *without a tile from TA1*. It is expected that at the end of Phase 1, the noise figure and transmit power will be measured to include all packaging losses and antenna inefficiencies that may include measuring single elements, and/or using fixed passive beamforming test structures to verify array performance.

*Phase 2* – The focus of Phase 2 will be to further improve the T/R component performance by reducing the system noise figure and increasing the transmit power. Also, it is expected that at least 4 tiles from TA1 will be integrated with a TA2 aperture to demonstrate a larger array. This will be the first demonstration of tiling the TA1 tile with TA2 T/R components and aperture and will be an important milestone. The details of data aggregation between the tiles should be addressed as part of TA2. If there are features that will be included in the tile design in TA1 to simplify data aggregation and/or synchronization, this should be described in the TA1 portion of the proposal.

*Phase 3* – This is the only technical area that will advance to a Phase 3. This is explicitly because Phase 3 is not about further performance improvement or chip design, but rather about scaling the size of the array to an operationally relevant demonstration size. In addition to increasing the size by 4x beyond Phase 2, it is expected that there will be significant time investment in the requisite firmware and software to enable a compelling demonstration of multi-beam transmit and receive capability in the context of a performer defined communication or remote sensing demonstration.

The metrics for Phase 1, Phase 2 and Phase 3 of TA2 are listed below in Table 2 with clarifying notes following the table.

TA2 Metric	Phase 1	Phase 2	Phase 3	Notes
Frequency of operation	18 – 50 GHz			1
Element pitch	$\leq \lambda/2$ at $\lambda_{\text{high}}$			2
Transmit & receive functionality	Yes			3
Polarization	Dual			3
Scan Performance	$\pm 70^\circ$			4
Number of elements (2D array)	$\geq 16$	$\geq 64$	$\geq 256$	5
System noise figure	$\leq 6$ dB	$\leq 4$ dB	$\leq 4$ dB	6
Transmit Power	$\geq 2$ mW/mm <sup>2</sup>	$\geq 5$ mW/mm <sup>2</sup>	$\geq 5$ mW/mm <sup>2</sup>	7
Target Power Amplifier Efficiency	$\geq 35\%$	$\geq 45\%$	$\geq 45\%$	8

**Table 2: TA2: Wideband Millimeter Wave Apertures, Program Metrics**

**Table 2 Notes:**

- 1) The minimum required frequency band to cover is 18-50 GHz, supporting additional bandwidth below or above this band is also acceptable.
- 2) It is expected that in a tile configuration, to minimize grating lobes while meeting the desired scan performance as outlined in TA2, it will be necessary that each dual-polarized transceiver element will need to be spaced on grid at a half of a free space wavelength or less at the highest frequency, i.e.  $\leq 3$  mm at 50 GHz.
- 3) It is required to implement two polarization channels on both transmit and receive to support emerging MIMO coding schemes, active polarimetric sensing or polarization calibration over scan angle as well as legacy linear, left and right hand circular polarizations.
- 4) A scan performance of  $\pm 70^\circ$  is desired that is free of grating lobes and scan blindness in the horizontal, vertical and diagonal scan planes.
- 5) Number of elements  $\geq 16$  in Phase 1 corresponds to the minimum number of spatial channels and is chosen to align with the performance metrics in TA1. It is expected that in Phase 1, the focus will be on T/R component development, antenna design and packaging strategies. As the program progresses, Phase 2 is expected to double the size in two dimensions and integrate 4 tiles from TA1. Phase 2 will also address how the tiles will interact with each other, for example clock distribution, data aggregation, beamforming/networking approach, etc. For Phase 3, TA2 will demonstrate scalability and use 16 tiles to implement a  $\geq 256$  element array and refine any necessary firmware or software to implement a successful multi-beam demonstration that takes advantage of the element level digital beamforming at millimeter wave frequencies with a strong path toward technology transition.
- 6) In Phase 1, the noise figure is to be measured assuming the simulated performance of the tile implementation from TA1. This should include any interconnect loss, or any

degradation due to antenna efficiency. In Phase 2 and Phase 3, these should be complete antenna to bits measured results.

- 7) The transmit power is to be characterized to include interconnect losses and antenna efficiency and shall be measured with the transmit amplifier in saturation. This is specified as a frequency independent number that assumes the radiators will be on a regular grid in an array. For example, if the tile is designed to support 18-50 GHz then the pitch is chosen to be 3-mm, then the power per element would be  $5 \text{ mW/mm}^2 \times 9 \text{ mm}^2 = 45 \text{ mW}$  or 16.5 dBm. If instead, the design, was chosen to support 18-100 GHz, then the pitch of each element must shrink to 1.5 mm, but the power per element is also reduced by a factor of 4x or 6 dB, making the required power per element only 10.5 dBm, which produces the same power density at all frequencies.
- 8) The target efficiency at the end of the program is chosen such that the power amplifier consumes the same amount of power as a transmit or receive channel in Phase 2 of TA1. Note that  $45 \text{ mW} / 0.45 = 100 \text{ mW}$ . This is specifically so that neither the tile power consumption nor the PA power consumption grossly dominate the total system power consumption. This is a very aggressive goal when considering the wide bandwidth, interconnect losses and antenna efficiency but is something that should be strived for in the design.

### **Technical Area 3: Millimeter Wave Array Fundamentals, 36 Months.**

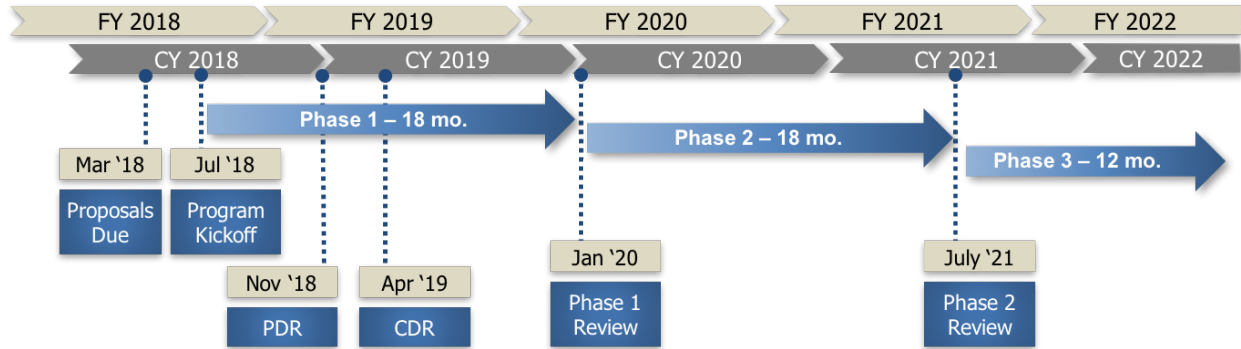
The work to be done under TA1 and TA2 is intended to develop the next generation of millimeter wave arrays for insertion into DoD systems. However, it is recognized that there may be fundamental technical innovation that applies to millimeter wave array technology but does not directly align with meeting all of the metrics in TA1 or TA2. **TA3 should be considered completely separate from TA1 and TA2 and requires its own proposal. If a performer wishes to propose to TA3 and other Technical Areas, this must be done with two separate proposals.**

While TA1 and TA2 are large and will develop a complete array solution, TA3 is much smaller and is not expected to develop a complete array. TA3 is expected to support individual performers or small teams to explore innovative concepts that will focus on what will likely be the most challenging aspects of TA1/TA2. Examples of TA3 fundamentals are ultra-low power wide-band data converters, potential hybrid combinations of mixing and sub-sampling transceiver architectures, tunable and frequency selective RF front-ends and streaming digital beamforming processing. A successful proposal will describe the substantial innovation in the context of the broader goals of the program and clearly identify an aspect of the TA1/TA2 metrics that will be the focus of the proposed TA3 work.

### **E. Schedule/Milestones**

MIDAS is a 48-month program consisting of three phases. Phase 1 (base) will be 18 months in duration and focus on the development of the architecture and core technology to meet the goals in TA1/TA2. Phase 2 (option) will also be 18 months and will improve upon the performance metrics of the digital tile in TA1 while TA2 will bring together multiple tiles to form a larger array. Phase 3 (option) will be 12 months and will only be for TA2 performers where the focus will be on further scaling and a system demonstration. TA3 will also be awarded as an 18-month Phase 1 (base) and 18-month Phase 2 (option).





**Figure 3: MIDAS Program Schedule**

Program kickoff and review sessions are mandatory and represent an opportunity to interact with the Government on planned work, specifics of the technical approach, and any technical or programmatic items of concern. The end of phase reviews will be scheduled approximately two months before the end of the corresponding program phase. In addition to the review sessions, there will be:

- For TA1 and TA1/TA2 performers only, a preliminary project design review (PDR) approximately four months after the kickoff date. The review will be held between the Performer and the Government to review in detail the MIDAS approach and to discuss any potential risks to meeting program metrics going forward. To this end, it is expected that the Performer will have completed necessary diligence in validating the considered approach, such as simulations, operational environments, assumptions, and risks/mitigation strategies for completing all phases of the program.
- For TA1 and TA1/TA2 performers only, a detailed mid-phase project review (CDR) to be held approximately nine months after the kickoff date as part of a program wide meeting. It is expected that any issues arising from earlier reviews will be resolved in sufficient detail by the mid-phase review to proceed to construction of hardware and demonstration of Phase 1 metrics.
- Technical reports and teleconferences bi-monthly.
- Monthly financial reports.
- Occasional site visits by Government staff.

## F. Deliverables

For all technical areas, expected deliverables include bi-monthly technical and monthly financial update reports. Upon the completion of each phase, Performers in all technical areas must provide to the Government reports covering, a) a description of the MIDAS system, b) component lab and field test results, and c) charts and explanations of how well the system meets, exceeds, or falls short of specified program goals (as described in this BAA). Additionally, TA1 and TA2 will require hardware deliverables aligned to the technical goals of the program as defined below in Table 3. Sufficient documentation and support for testing at a government lab (AFRL, etc.) is expected.



Technical Area	Phase 1	Phase 2	Phase 3
MIDAS TA1	3 copies of tile	3 copies of tile	N/A
MIDAS TA2	1 copy of aperture prototype (TA1 tile not necessarily included)	1 copy of integrated TA1/TA2 aperture	1 copy of scaled aperture
MIDAS TA3	Not required		N/A

**Table 3: Hardware Deliverables**

### **G. Government Furnished Equipment/Property/Information**

No Government Furnished Equipment, Property, or Information will be provided.

### **H. Intellectual Property**

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

## **II. Award Information**

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

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

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

Awards under this BAA will be made to proposers on the basis of the evaluation criteria listed below (see section labeled “Application Review Information,” Sec. V.), and program balance to provide overall value to the Government. The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. Such additional information may include but is not limited to Representations and Certifications (see Section VI.B.4., “Representations and Certifications”). The Government reserves the right to remove proposers from award consideration should the parties fail to reach agreement on award

terms, conditions and cost/price within a reasonable time or the proposer fails to timely provide requested additional information. Proposals identified for negotiation may result in a procurement contract, grant, cooperative agreement, 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. 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 (primarily TA3) and proposers not intending to perform fundamental research or the proposed research may present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Based on the nature of the performer and the nature of the work, the Government anticipates that some awards will include restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program.

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to 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.

##### **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.

##### **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.

### 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>.

### **D. Other Eligibility Criteria**

#### **1. Collaborative Efforts**

Collaborative efforts/teaming are strongly encouraged. As the program emphasizes multidisciplinary approaches, a successful proposal must demonstrate sufficient expertise in all requisite technical specialties. At a minimum, excellent credentials must be demonstrated in:

- RF system design, RF and mixed-signal circuit design in advanced CMOS processes.
- RF transmit and receive component development in compound semiconductor processes. Advanced packaging and manufacturing techniques to include electromagnetic design of wideband antenna arrays and thermal design considerations.
- Phased-array testing and calibration experience.

Additional areas of expertise may be required depending on the specifics of the proposed technical approach. In all cases, complete and self-sufficient teams are required to support the full scope of the effort, since partial solutions will not be accepted for TA1 or TA1/TA2 proposals.

## **IV. Application and Submission Information**

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

### **A. Address to Request Application Package**

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

## **B. Content and Form of Application Submission**

### **1. Full Proposal Format**

All full proposals must be in the format given below. Proposals shall consist of two volumes: Volume I – Technical and Management Proposal (3 sections), and Volume II – Cost Proposal (4 sections). The submission of other supporting materials along with the proposals is strongly discouraged and will not be considered for review. All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. Smaller font may be used for figures, tables and charts. The page limitation for full proposals includes all figures, tables, and charts.

Section II of Volume I, Technical and Management Proposal, shall not exceed 20 pages for at TA1 proposal or 30 pages for a combined TA1 and TA2 proposal. A TA3 proposal shall not exceed 10 pages. There is no page limit for Volume II, Cost Proposal. All full proposals must be written in English.

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

**Proposals combining TA1 and TA2 MUST be easily separable in case the Government chooses to make a partial selection and fund only TA1. (TA2 will not be funded without a complementary TA1 and standalone proposals for TA2 will not be accepted.) Therefore, such proposals must:**

- **Contain a separate and independent Statement of Work for TA1 in addition to the combined TA1+TA2 Statement of Work.**
- **Contain separate stand alone cost estimates for TA1 by Phase. (NOTE: This estimate is in addition to the full cost proposal for a combined TA1+TA2 that includes any cost savings to the government realized by funding both technical areas in a single proposal.)**

**TA3 proposals are completely independent from TA1 or TA/TA2 submissions and proposers who wish to submit to TA3 and other Technical Areas must submit two separate full proposals.**

#### **a. Volume I, Technical and Management Proposal**

##### **Section I. Administrative**

A. Cover sheet to include:

- (1) BAA number (HR001118S0020);
- (2) Technical area(s);
- (3) Lead Organization submitting proposal;
- (4) Type of organization, selected among the following categories:

- Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
- (5) Proposer's internal 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 (+4), telephone, fax (if available), electronic mail;
  - (9) Administrative point of contact to include:
    - Salutation, last name, first name, street address, city, state, zip code (+4), telephone, fax (if available), electronic mail;
  - (10) Total funds requested from DARPA, and the amount of cost share (if any); AND
  - (11) Date proposal was submitted.

**B. Official transmittal letter.**

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

**Section II. Detailed Proposal Information**

**A. Executive Summary**

A one-page executive summary outlining the proposed effort. The executive summary must contain:

1. A high-level overview of the proposed work;
2. Any proposer defined critical metrics used to define success;
3. Milestones (both DARPA-mandated and proposer-defined);
4. Operational scenarios relevant to the proposed approach; AND
5. Innovations made by the proposed work.

**B. Technical Approach**

A detailed description of the technical approach, technical rationale, and constructive plan for accomplishment of technical goals in support of the innovative claims and deliverables. This section is the centerpiece of the proposal and should succinctly describe the uniqueness and benefits of the proposed approach. Proposers must include adequate detail and justification for any performer-defined metrics and goals. The proposal must provide a detailed analysis of how the proposed approach will meet the DARPA metrics and goals. Regarding TA1 and TA1/2, **proposals must address a complete solution; partial solutions will not be considered.**

**C. Statement of Work (SOW)**

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

1. A general description of the objective (for each defined task/activity);
2. A detailed description of the approach to be taken to accomplish each defined task/activity;



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

*Note: Each Phase of the program must be separately defined in the SOW. Include a SOW for each subcontractor and/or consultant in the **Cost Proposal Volume**. Do not include any proprietary information in the SOW(s). See also Section IV.B.1. Full Proposal Format.*

#### **D. Schedules and Measurable Milestones**

Schedules and measurable milestones for the proposed research. (Note: measurable milestones should capture key development points in tasks and should be clearly articulated and defined in time relative to the start of the effort.) 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. This section should be no more than 2-pages long.

#### **E. Deliverables**

For all technical areas, expected deliverables include quarterly technical reports, monthly financial reports and a final report at the end of each phase (see Part I, F for further details).

#### **F. Risk Mitigation Plan**

A plan detailing risks and proposed activities to mitigate or respond to these risks. The risk plan should include a metric showing the probability of the risk occurring and another metric to capture the impact to the program. The impact of risks should be tied to the overall program objectives. This section should be no more than 1-page long.

#### **G. Previous Accomplishments**

Discussion of proposer's previous accomplishments and work in closely related research areas relevant to MIDAS. This section should be no more than 2-pages long.

#### **H. Facilities**

Description of the facilities that would be used for the proposed effort. This section should be no more than 1-page long.

#### **I. Teaming**

Detailed information about how teams will be formed and managed in order to execute the program plan. This section should be no more than 1-page long. Formal teaming agreements can be added to the end of this section titled "Teaming Appendix" and will not count against the total number pages for this section.

**J. Summary Slide**

One PowerPoint slide summarizing the proposed effort. A template PowerPoint slide shall be provided on FedBizOpps.gov and Grants.gov as an attachment. Submit the PowerPoint file in addition to Volume I and Volume II of your full proposal. This summary slide does not count towards the total page count. Only editable PowerPoint files will be accepted. PDF file format is not acceptable.

**Section III. Additional Information**

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

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

All proposers, including FFRDCs, must submit the following:

**Section I. Administrative**

Cover sheet to include:

- (1) BAA number (HR001118S0020);
- (2) Technical area(s);
- (3) Lead Organization submitting proposal;
- (4) Type of organization, selected among the following categories:  
Large Organization, Small Disadvantaged Organization, Other Small Organization, HBCU, MI, Other Educational, Other Nonprofit;
- (5) Proposer's internal 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 (+4), 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 (+4), 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*), Grant, Cooperative Agreement, or Other Transaction;
- (11) Place(s) and period(s) of performance;
- (12) Total proposed cost separated by basic award and option(s), if any, by calendar year and by performer fiscal year;
- (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) Subcontractor Information;
- (20) Proposal validity period (120 days is recommended); AND
- (21) Any Forward Pricing Rate Agreement, other such approved rate information, or such documentation that may assist in expediting negotiations (if available).

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

## **Section II. Detailed Cost Information (Prime and Subcontractors)**

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

Total program cost broken down by major cost items:

### **A. Direct Labor**

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

### **B. Indirect Costs**

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

### **C. Travel**

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

### **D. Other Direct Costs**

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

### **E. Material/Equipment**

(i) For IT and equipment purchases, include a letter stating why the proposer cannot provide the requested resources from its own funding.

(ii) A priced Bill-of-Material (BOM) clearly identifying, for each item proposed, the quantity, unit price, the source of the unit price (i.e., vendor quote, engineering estimate, etc.), the type of property (i.e., material, equipment, special test equipment, information technology, etc.), and a cross-reference to the Statement of Work (SOW) task/s that require the item/s. At time of proposal submission, any item that exceeds \$1,000 must be supported with basis-of-estimate (BOE) documentation such as a copy of catalog price lists, vendor quotes or a written engineering estimate (additional documentation may be required during negotiations, if selected).

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

#### **F. Consultants**

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

#### **G. Subcontracts**

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

All proprietary subcontractor proposal documentation, prepared at the same level of detail as that required of the prime, which cannot be uploaded to the DARPA BAA website (<https://baa.darpa.mil>, BAAT) or Grants.gov as part of the proposer's submission, shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the proposer or by the subcontractor organization. This does not relieve the proposer from the requirement to include, as part of their submission (via BAAT or Grants.gov, as applicable), subcontract proposals that do not include proprietary pricing information (rates, factors, etc.).

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

#### **H. Cost-Sharing**

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

#### **I. Fundamental Research**

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

Note 1:

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

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

(c) Per Section 873 of the FY2018 National Defense Authorization Act (Pub L. 114-92), “Pilot Program For Streamlining Awards For Innovative Technology Projects,” small businesses and nontraditional defense contractors (as defined therein) are alleviated from submission of certified cost and pricing data for new contract awards valued at less than \$7,500,000. In such instances where this “waiver” applies, proposers seeking a FAR-based contract shall submit information other than certified cost or pricing data to the extent necessary for the Government to determine price reasonableness and cost realism; and certified cost or pricing data from subcontractors that are not small businesses or nontraditional defense contractors when such subcontract proposals exceed the cost and pricing data threshold at FAR 15.403-4(a)(1).

(d) “Cost or pricing data” are not required if the proposer proposes an award instrument other than a procurement contract (i.e., cooperative agreement, grant, or other transaction).

Note 2:

Proposers are required to provide the aforementioned cost breakdown as an editable MS Excel spreadsheet, inclusive of calculations formulae, with tabs (material, travel, ODC’s) provided as necessary. The Government also requests that the Cost Proposal include MS Excel file(s) that provide traceability between the Bases of Estimate (BOEs) and the proposed costs across all

elements and phases. This includes the calculations and adjustments that are utilized to generate the Summary Costs from the source labor hours, labor costs, material costs, etc. input data. It is requested that the costs and Subcontractor proposals be readily traceable to the Prime Cost Proposal in the provided MS Excel file(s) – although this is not a requirement, providing information in this manner will assist the Government in understanding what is being proposed both technically and in terms of cost realism. NOTE: If the PDF submission differs from the Excel submission, the PDF will take precedence.

### **Section III. Other Transaction Request, if applicable**

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

- Milestone description
- Completion criteria
- Due date
- 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.

### **Section IV. Other Cost Information**

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

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

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

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

## **2. Proprietary Information**

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





When a proposal includes a classified portion, and when able according to security guidelines, we ask that proposers send an e-mail to HR001118S0020@darpa.mil as notification that there is a classified portion to the proposal. When sending the classified portion via mail according to the instructions, proposers should submit six (6) hard copies of the classified portion of their proposal and two (2) CD-ROMs containing the classified portion of the proposal as a single searchable Adobe PDF file. Please ensure that all CDs are well-marked. Each copy of the classified portion must be clearly labeled with HR001118S0020, proposer organization, proposal title (short title recommended), and Copy \_ of \_.

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.

### **Confidential and Secret Information**

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

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

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

OR

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

The inner envelope shall be addressed to:

Defense Advanced Research Projects Agency  
ATTN: Program Security Officer, MTO  
Reference: HR001118S0020  
675 North Randolph Street  
Arlington, VA 22203-2114

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

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

### **Top Secret Information**

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

### **Sensitive Compartmented Information (SCI)**

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

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

### **Special Access Program (SAP) Information**

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

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

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

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

#### **4. 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, or as authorized by the Contracting Officer, not later than December 31, 2017.

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.

#### **5. 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>.

#### **6. Approved Cost Accounting System Documentation**

Proposers that do not have a Cost Accounting Standards (CAS) complaint accounting system considered adequate for determining accurate costs that are negotiating a cost- type procurement contract must complete an SF 1408. For more information on CAS compliance, see <http://www.dcaa.mil/cas.html>. To facilitate this process, proposers should complete the SF 1408 found at <http://www.gsa.gov/portal/forms/download/115778> and submit the completed form with the proposal. To complete the form, check the boxes on the second page, then provide a narrative explanation of your accounting system to supplement the checklist on page one. For more information, see ([http://www.dcaa.mil/preaward\\_accounting\\_system\\_adequacy\\_checklist.html](http://www.dcaa.mil/preaward_accounting_system_adequacy_checklist.html)).

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

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

## 8. Grant Abstract

Per Section 8123 of the Department of Defense Appropriations Act, 2015 (Pub. L. 113-235), all grant awards must be posted on a public website in a searchable format. To comply with this requirement, proposers requesting grant awards must submit a maximum one (1) page abstract that may be publicly posted and explains the program or project to the public. The proposer should sign the bottom of the abstract confirming the information in the abstract is approved for public release. Proposers are advised to provide both a signed PDF copy, as well as an editable (e.g., Microsoft word) copy. Abstracts contained in grant proposals that are not selected for award will not be publicly posted.

## 9. Small Business Subcontracting Plan

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. § 637(d)) and FAR 19.702(a)(1), each proposer who 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.

## 10. Intellectual Property

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

### a. For Procurement Contracts

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

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

### b. For All Non-Procurement Contracts

Proposers responding to this BAA requesting a Grant, Cooperative Agreement, Technology Investment Agreement, or Other Transaction for Prototypes shall follow the applicable rules and

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

### **11. Patents**

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

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

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

### **13. Funding Restrictions**

Not applicable.

### **C. Submission Information**

DARPA will acknowledge receipt of all submissions and assign an identifying control number that should be used in all further correspondence regarding the submission. DARPA intends to use electronic mail correspondence regarding HR001118S0020. Submissions may not be submitted by fax or e-mail; any so sent will be disregarded.

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

All administrative correspondence and questions on this solicitation, including requests for clarifying information on how to submit a full proposal to this BAA should be directed to HR001118S0020@darpa.mil. DARPA intends to use electronic mail for correspondence regarding HR001118S0020. Proposals may not be submitted by fax or e-mail; any so sent will be disregarded. DARPA encourages use of the Internet for retrieving the BAA and any other related information that may subsequently be provided.

## **1. Submission Dates and Times**

### **a. Full Proposal Due Date**

The full proposal must be submitted via the DARPA BAA website on or before 1:00 p.m., EST 26 March 2018 in order to be considered during the initial round of selections; however, proposals received after this deadline may be received and evaluated up to five months (150 days) from date of posting on FedBizOpps. Full proposals submitted after the due date specified in the BAA or due date otherwise specified by DARPA after review of proposal abstracts may be selected contingent upon the availability of funds. Proposers are warned that the likelihood of available funding is greatly reduced for proposals submitted after the initial closing date deadline. Failure to comply with the submission procedures may result in the submission not being evaluated.

### **b. Frequently Asked Questions (FAQ)**

DARPA will post a consolidated Question and Answer (FAQ) document on a regular basis. To access the posting go to: <http://www.darpa.mil/work-with-us/opportunities>. Under the HR001118S0020 summary will be a link to the FAQ. Submit your question/s by e-mail to [HR001118S0020@darpa.mil](mailto:HR001118S0020@darpa.mil). In order to receive a response sufficiently in advance of the proposal due date, send your question/s on or before 5:00 PM, Eastern Time, 12 March 2018.

## **2. Proposal Submission Information**

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

### **a. For Proposers Requesting Grants or Cooperative Agreements:**

Proposers requesting grants or cooperative agreements may submit proposals through one of the following methods: (1) hard copy mailed directly to DARPA; or (2) electronic upload per the instructions at <http://www.grants.gov/applicants/apply-for-grants.html>. Grant or cooperative agreement proposals may not be submitted through any other means. If proposers intend to use Grants.gov as their means of submission, then they must submit their entire proposal through Grants.gov; applications cannot be submitted in part to Grants.gov and in part as a hard-copy. Proposers using the Grants.gov do not submit paper proposals in addition to the Grants.gov electronic submission.

Grants.gov requires proposers to complete a one-time registration process before a proposal can be electronically submitted. If proposers have not previously registered, this process can take between three business days and four weeks. For more information about registering for Grants.gov, see [www.darpa.mil/work-with-us/additional-baa](http://www.darpa.mil/work-with-us/additional-baa). See the Grants.gov registration checklist at <http://www.grants.gov/web/grants/register.html> for registration requirements and instructions.

Once Grants.gov has received a proposal submission, Grants.gov will send two email messages to advise proposers as to whether or not their proposals have been validated or rejected by the system; IT MAY TAKE UP TO TWO DAYS TO RECEIVE THESE EMAILS. The first email will confirm receipt of the proposal by the Grants.gov system; this email only confirms receipt, not acceptance, of the proposal. The second will indicate that the application has been successfully validated by the system prior to transmission to the grantor agency or has been rejected due to errors. If the proposal is validated, then the proposer has successfully submitted their proposal. If the proposal is rejected, the proposed must be corrected and resubmitted before DARPA can retrieve it. If the solicitation is no longer open, the rejected proposal cannot be resubmitted. Once the proposal is retrieved by DARPA, the proposer will receive a third email from Grants.gov. To avoid missing deadlines, proposers should submit their proposals in advance of the final proposal due date with sufficient time to receive confirmations and correct any errors in the submission process through Grants.gov. For more information on submitting proposals to Grants.gov, visit the Grants.gov submissions page at:  
<http://www.grants.gov/web/grants/applicants/apply-for-grants.html>.

Proposers electing to submit grant or cooperative agreement proposals as hard copies must complete the SF 424 R&R form (Application for Federal Assistance, Research and Related) available on the Grants.gov website [http://apply07.grants.gov/apply/forms/sample/RR\\_SF424\\_2\\_0-V2.0.pdf](http://apply07.grants.gov/apply/forms/sample/RR_SF424_2_0-V2.0.pdf). Technical support for Grants.gov submissions may be reached at 1-800-518-4726 or [support@grants.gov](mailto:support@grants.gov).

#### **b. For Proposers Requesting Contracts or Other Transaction Agreements**

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

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

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



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

Please note that the DoD-issued certificate associated with the BAA website is not recognized by all commercial certificate authorities, resulting in untrusted connection errors/messages. You can either bypass the warning (possibly by adding <https://baa.darpa.mil> to your listed of trusted sites, or darpa.mil as a trusted domain), or visit DISA's site to download the Root Certificate Authority (CA): <http://dodpki.c3pki.chamb.disa.mil/rootca.html>.

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 (9:00 AM - 5:00 PM EST, Monday - Friday).

### **c. Classified Submission Information**

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

### **3. Other Submission Requirements**

Not applicable.

## **V. Application Review Information**

### **A. Evaluation Criteria**

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

#### **1. Overall Scientific and Technical Merit**

The proposed technical approach is innovative, feasible, achievable, and complete.

Task descriptions and associated technical elements provided are complete and in a logical sequence with all proposed deliverables clearly defined such that a final outcome that achieves the goal can be expected as a result of award. The proposal identifies major technical risks and planned mitigation efforts are clearly defined and feasible. The evaluation will also 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.

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

The proposed technical team has the expertise and experience to accomplish the proposed tasks. 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. Collaborative efforts/teaming are strongly encouraged. As the program emphasizes multidisciplinary approaches, a successful proposal must demonstrate sufficient expertise in all requisite technical specialties. At a minimum, excellent credentials must be demonstrated in:

- RF system design, RF and mixed-signal circuit design in advanced CMOS processes.
- RF transmit and receive component development in compound semiconductor processes.
- Advanced packaging and manufacturing techniques to include electromagnetic design of wideband antenna arrays and thermal design considerations.
- Phased-array testing and calibration experience.
- Demonstrated capability to transition the technology to the research, industrial, and/or operational military communities in such a way as to enhance U.S. defense.

Additional areas of expertise may be required depending on the specifics of the proposed technical approach.

### **3. 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.

### **4. Cost Realism**

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

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

## **B. Review and Selection Process**

### **1. Review Process**

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

DARPA will conduct a scientific/technical review of each conforming proposal. Conforming proposals comply with all requirements detailed in this 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, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort.

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

### **2. Handling of Source Selection Information**

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

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

### **3. Federal Awardee Performance and Integrity Information (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**

#### **1. Proposals**

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

### **B. Administrative and National Policy Requirements**

#### **1. Meeting and Travel Requirements**

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

#### **2. 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 [www.darpa.mil/work-with-us/additional-baa](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 [www.darpa.mil/work-with-us/additional-baa](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>.

## 5. Terms and Conditions

A link to the DoD General Research Terms and Conditions for Grants and Cooperative Agreements and supplemental agency terms and conditions can be found at <http://www.darpa.mil/work-with-us/contract-management#GrantsCooperativeAgreements>.

### C. Reporting

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

### D. Electronic Systems

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

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

#### 2. i-Edison

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

## VII. Agency Contacts

Administrative, technical or contractual questions should be sent via e-mail to [HR001118S0020@darpa.mil](mailto:HR001118S0020@darpa.mil). All requests must include the name, email address, and phone number of a point of contact. The technical POC for this effort is:

Dr. Timothy M. Hancock  
DARPA/MTO  
ATTN: HR001118S0020  
675 North Randolph Street  
Arlington, VA 22203-2114

## **VIII. Other Information**

### **A. Proposers Day**

The MIDAS Proposers Day will be held on 26 January 2018 in Arlington, Virginia. Advance registration is required. See DARPA-SN-18-20 posted at [www.fbo.gov](http://www.fbo.gov) for all details. Attendance at the MIDAS Proposers Day is not required to propose to this solicitation.

### **B. Protesting**

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