ONR BAA 14-006 Electronic Warfare Technology

Amendment 0004

The purpose of this Amendment is to provide questions and answers and to amend the BAA. Questions are grouped by topic (FTP, White Paper, Proposal, and Technical Questions) and source of question (Industry Day or email).

1. FTP QUESTIONS (from Industry Day). The following questions and answers are provided:

a) Question 1: If a company wants to submit three separate White Papers with different team structures will that company have three separate accounts?

Answer 1: No. The Company will be provided a single account. Separate folders may be established, with access rights for subcontractors determined by the prime.

b) Question 2: If a company has multiple papers in the same technical area how do you manage that?

Answer 2: Each White Paper will have a unique file name that conforms to the file name convention.

c) Question 3: Will all users within the same company share the same userid and Password?

Answer 3: No. Each person will have their own userid and password.

2. WHITE PAPER QUESTIONS (from Industry Day). The following questions and answers are provided:

a) Question 1: The BAA lists a page limit for the White Paper. If you have multiple partners collaborating on a single paper will each partner have their own number of pages or is the entire White Paper limited to six total pages?

Answer 1: The White Paper will be limited to six pages total irrespective of the number of companies or partners on the team.

b) Question 2: Are you interested in manufacturing or MRL levels of components with respect to affordability?

Answer 2: The BAA focus is not MRL or manufacturability. While White Papers and Full Proposals that lend themselves toward a manufacturing solution may be evaluated more favorably under Factor 2 with respect to transition potential, Discovery and Invention is about advancing technology. The Government seeks to improve its capability for EW, so manufacturing and MRL level is not a priority under this BAA.

c) Question 3: If the leveraged technology is currently in a compartment would you entertain notions of creating a likewise compartmented component?

Answer 3: The preference is for unclassified technologies but if the technology warrants dealing at a higher classification level the Government will consider proposals on a case by case basis.

d) Question 4: If the way of demonstrating that a team is being formed is based on a letter of intent would that be counted against the six page limit for the White Paper?

Answer 4: Letters of intent would be acceptable and will not count against page limitations. See paragraph 7 below.

e) Question 5: Is it possible for contractors to team with government agencies or FFRDCs and if so, is it whoever the prime is that dictates which BAA you submit to?

Answer 5: Yes. The listing of prior technologies is a mix of government and commercial entities. We will encourage team making across those disciplines if that's warranted. If the Prime is an entity eligible under BAA 14-006, than White Papers should be submitted under the BAA.

f) Question 6: Are ITAR restrictions determined by the proposer or the area of the BAA?

Answer 6: The offeror is responsible for compliance with ITAR.

g) Question 7: Please provide guidance on the font size used in graphics.

Answer 7: See page 17 of the BAA for all restrictions related to font size. There is no limit on font size within graphics, however, graphics that are not legible should be avoided.

h) Question 8: Can "headers" and "footers" (such as page numbers) fall into the 1" margin?

Answer 8: Yes. Header and Footer information should not provide technical content of the white paper.

i) Question 9: Our Company proposed a STAR approach last year and we have continued to work on it since. Will the ONR organizational memory be negative against us?

Answer 9: No.

j) Question 10: If a program costs $X, can (our Company) invest in a percentage of this amount?

Answer 10: The Government interprets this question to mean that the company investment would be in the form of internal research and development (IRAD) funding. See FAQ's

#1 provided as part of the registration materials for Industry Day and posted (question #1 under IRAD & DATA RIGHTS) on the ONR website.

3. FULL PROPOSAL QUESTIONS (from Industry Day). The following questions and answers are provided:

a) Question 1: How many proposals will be requested per number of anticipated awards?

Answer 1: ONR intends to request (Full) Proposals from all the performers that we plan on awarding based on the best case scenario for FY15 funding. With the uncertainty of budget fluctuations, it may be the case (as in FY14) that we cannot fund all the efforts for which proposals were requested.

4. TECHNICAL QUESTIONS (from Industry Day). The following questions and answers are provided:

a) Question 1: In area 2, the 3-300 MHz antennas, are solutions that are going to be used only for ES or EA alone acceptable or do you want an aperture that can be used for ES and EA simultaneously?

Answer 1: As long as you specify the limitations within the proposal (White Paper). Ideally we would like technology that addresses both but we understand that there are different characteristics of those. We tried to indicate that there are power levels we would want to address so, if it is specific to only ES or EA you need to state that in the White Paper.

b) Question 2: In area 2, with respect to time multiplex solutions that target different frequency bands do you want to have access to the entire bandwidth simultaneously or are time multiplex solutions acceptable.

Answer 2: Simultaneously. We don't want to be in a position where we're missing a signal because we weren't looking for it at the time.

c) Question 3: Regarding TRL levels, should our effort start at level 3 and end at 6 or can it end at 3?

Answer 3: Not necessarily. It depends upon the area. Area 1 is asking for demonstrations so it is geared more toward TRL level 6 (or 5). Areas 2, 3 and 4 could be at a much lower TRL level. The fundamental requirement is to demonstrate that the technology is possible.

d) Question 4: In area 1-b, regarding simultaneous transmit and receive (STAR), is there any guidance on power level on the transmit side?

Answer 4: See Question 4 in the section entitled TECHNICAL QUESTIONS (from Emails) in this document.

e) Question 5: Is the simultaneous transmit and receive implied at the same frequency?

Answer 5: For the co-channel it does. Co-channel means they are the same frequency Both co-channel and adjacent channel are discussed in that BAA area.

f) Question 6: What is the higher priority, the co-channel or adjacent channel?

Answer 6: The adjacent channel should cover the full band. The co-channel will be scalable to be tunable across the band.

g) Question 7: Related to area 1-b, is there some description of the aperture or things I would be concerned about or a distance the aperture is from the electronics and how things like multipath should be addressed.

Answer 7: The Government is not targeting a specific platform under this BAA. Offerors should address their antenna solution in the White Paper, and are expected to address those common environmental effects like near field multipath. State your assumptions and what you're trying to achieve in the White Paper. If there are limitations in what you're proposing you need to spell those out in the paper.

h) Question 8: Regarding area 1-a, the specifications are very clear for sensing, thresholds and objective with the exception of the DF which is probably the hardest part of 1-a. It just says precise DF with a spec of one second. Can you be more specific about what you are looking for with respect to "precise" DF?

Answer 8: No. The offeror should describe what and how well they can achieve this. The Government would like to get it as good as you can provide it.

i) Question 9: In area 1 you are encouraging us to leverage previous work. Are the previous awardees mandated to provide us the status of their programs so we can determine the maturity of it so we can determine if it would fit within what we want to propose or is there a website?

Answer 9: No, they are not.

j) Question 10: In area 1 is there the expectation of spending additional funds on component development or is it more about demonstrating components in an EW system?

Answer 10: Some of the budget may be required to advance some of those technologies because the prior work may have only resulted in TRL levels of 3 or 4 and those levels of technology may not be sufficient to demonstrate EW system functionality.

k) Question 11: In area 3 the BAA mentions system analysis, cooling requirements and different components of the system. Is the focus mostly on the amplifier component and then the analysis and other system components are required to make sure there is no deal breaker where other requirements are concerned or are you interested in complete systems?

Answer 11: Yes, the emphasis is on the power amplifier. The purpose of the end-to-end analysis is to show that the power you are able to achieve with that power amplifier can be translated to an actual ERP or other capability and that you're not creating something where a choke point is going to prevent you from achieving all the gains you put into the power amplifier development.

l) Question 12: For area 3 are there any requirements for the directivity of the aperture, i.e. how wide is the field of view?

Answer 12: Aperture is a consideration in terms of a system concept. Tell us in the White Paper what you propose to provide. There are trades involving power and beamwidth that need to be considered. We are not specifying that in the BAA so you tell us what you can provide in the White Paper.

m) Question 13: Regarding area 1-a, you gave some requirements in terms of detection power levels that you wanted to achieve. Achieving that sensitivity is going to be a function of the RF bandwidth you're trying to detect so I want to understand if there is a target bandwidth you've associated with those detection thresholds or not?

Answer 13: No, the stated sensitivity goals (-90 dBm or better threshold, -105 dBm or better objective) should be independent of RF signal bandwidth. However, this is a system level goal and not just a detector goal. System sensitivity is a combination of detector sensitivity, aperture gain and processing gain. The relative contributions of each can vary with RF signal bandwidth, but the combination should achieve the stated goals over the full range of bandwidth.

n) Question 14: Related to STAR for isolation, was that in reference to a common aperture or would any spatial isolation be part of that budget as well or added on to that 120 (dB)?

Answer 14: Spatial isolation is allowed. The BAA states the desire for "… a common front-end with a limited number of power amplifiers and apertures" and not necessarily the same aperture. However, the BAA also states that Offerors "… shall use technologies that are conducive to minimizing SWAP…" so a solution that requires a 20 foot separation between apertures (for example) would not be desirable for that reason.

o) Question 15: It is specified in area 1-a that less than full bandwidth demonstration may be acceptable, may not be preferred but acceptable if a path to full band is shown. Is there any preference given in your band plan to higher frequencies over lower frequencies for that?

Answer 15: The Government interprets this question to be whether preference might be given to millimeter wave (mmW) for instance? No. Offerors would need to show that achieving performance in one area (e.g. mmW) is not going to be a technical challenge that would need to be addressed with another technology effort. It needs to be something that could be done using known techniques or known technology. The Government does not intend to set up step-wise progression (of multiple proposals and contracts) toward the final goal. Offerors need to show that it would not require another whole new D&I program to get to that full up capability.

p) Question 16: Is there a preference given in area 1-a to the use of RF components such as LNAs over a solution that does not use LNAs?

Answer 16: No. Just because a traditional EW system architecture includes things like LNAs and mixers doesn't restrict the solution to those components. The proposal must show, however, that the science is there (i.e., that we're not changing the laws of physics or trying to invent new science).

q) Question 17: For Area 2, if multiple narrower band antennas are a viable solution is the size limit per antenna or combined antenna?

Answer 17: If multiple antennas are used, the size limit is applied to the combined antenna elements.

r) Question 18: For Area 3, is there a preference for solid state technology over vacuum electronics?

Answer 18: There is no preference.

s) Question 19: (Regarding) your answer to the gentlemen's question about spatial isolation, in the case where you're doing distributed arrays: Is that a possibility in this case because among other things you do call for direction finding in the 1-a category?

Answer 19: Yes, that's true. I think it comes down to the idea of simultaneous transmit and receive. What we're trying to achieve is the ability for an EA and ES system to work together and not be limited by application. So, when we're talking about simultaneous transmit and receive and what the limitations are and what the characteristics should be, the fundamental limitation that we're going to be looking at is how well you can implement it on a platform. I agree that (one) of the things we've talked about is that you can actually get improvements by distributing the capability. I wasn't really anticipating that as being ES on one platform and EA on another because of the latency involved with transmitting the information between those two points. STAR is all about trying to address the timeline of the adversary and so anything that limits your response in terms of transmitting over a link or something like that is less interesting to us. But whatever you do lay it out in the White Paper and explain to us what you can or cannot do with what you're proposing.

t) Question 20: But the question was directly addressing 1-a and direction finding. Can you achieve the small SWAP in a distributed sense?

Answer 20: Yes, as long as each individual component of that distributed sense has reduced its SWAP. That's what we're talking about. Not the aggregate SWAP.

u) Question 21: We get points for leveraging past government programs. Do we get an equal number of points for non-ONR programs?

Answer 21: Yes.

v) Question 22: Regarding area 1 and the SSDs and the final government-witnessed demonstration in a tactically relevant real or simulated environment and also tied to the timeline: On your slide you said that could be negotiated through the course of the effort. What does that mean and is it acceptable to have a place holder to pay for efforts associated with that final test and any interim tests if there's no legally binding agreement with the Navy lab or other plans for that test?

Answer 22: The White Paper must show that you have reached out to those organizations and at least tentatively determined that using that test range or test site is a possibility. It should also include an estimate of what impact that will have on your budget. I agree that it doesn't make sense to negotiate a hard number and schedule three years in advance of actually doing the demonstration but if it's important to your project that it be demonstrated on a certain range in a certain way then you need to convince us that the contact has been made with that range and organization so that we have confidence that it will be allowed in the future.

w) Question 23: If you will need the test facilities of a Navy lab or government facility for your effort is that lab or government facility now considered part of the team under a prime agreement or is that a service for hire that's to be negotiated downstream once an award is made?

Answer 23: The offeror is responsible for determining the best arrangement with respect to that.

x) Question 24: There is only a limited amount of time to get a team together to work up a paper for submission. Non-disclosure agreements between companies can take weeks to secure. Will we be allowed in the White Paper to tell you the technologies we are considering or the previous programs we are in discussion with in our White Paper and then, if we are selected for the oral presentation and we don't have more detail, you can penalize us?

Answer 24: Offerors must provide a credible indication that they have had discussion with those other people. That's why on the list of previous programs I'm asking for information I didn't provide such as contract numbers and government sponsors in some cases. That will let me know that you haven't just done some data mining on the internet or repeated what I've said I want in the BAA. A Letter of Intent could serve as detail in the

event a legally binding agreement is not possible to achieve prior to submission of the White Paper.

5. TECHNICAL QUESTIONS (from Emails)

a) Question 1: In Area 1-a, is the designated 500 MHz – 110 GHz the instantaneous frequency range that the Subsystem Demonstrator (SSD) receiver should cover? In other words, is it expected that the SSD receiver should cover the entire 50 MHz – 110 GHz at all times concurrently?

Answer 1: Yes. Note the BAA says "A demonstration of this SDD over a smaller portion of the spectrum will be permitted if a clear and reasonable approach to scaling the concept to the full bandwidth is provided."

b) Question 2: In Area 1-a, should an antenna be included as part of the solution, or is this effort only focused on the receiver (without the antenna)? In either case, what is the assumption about the antenna? Should the SSD receiver assume a single antenna that covers the entire range or multiple antennas each covering a portion of this frequency range?

Answer 2: The antenna configuration, which could be a single or multiple apertures, is intended to be part of the SSD and should be addressed in your response.

c) Question 3: In Area 1-a, it is mentioned that "… when information from multiple receivers are networked together". Is demonstration of networked operation of multiple receivers a part of this effort?

Answer 3: A networked operation demonstration is not required but the SDD should not be designed to prevent network operation or demonstration.

d) Question 4: In Area 1-b, what is the highest transmitted signal level that should be assumed?

Answer 4: This is intentionally not defined. It is understood that as you increase the transmit (TX) power levels it is more difficult to maintain receive (RX) isolation. You should address what power levels your proposed solution could provide with full, partial, or no TX/RX isolation.

e) Question 5: In Area 1-b, the BAA states that "The SSD shall provide up to 120 dB of isolation in adjacent transmit and receive (TX/RX) channels". Given that the isolation is a function of TX and RX channel spacing, what should be assumed about the frequency spacing between adjacent TX and RX channels?

Answer 5: The objective would be to have the TX and RX channels right next to each other with a minimal guard band (2% or less of the signal occupancy bandwidth).

f) Question 6: In Area 1-b, what is the isolation requirement for the co-channel Simultaneous Transmit and Receive (STAR) operation? What is the minimum frequency spacing between TX and RX signals for the co-channel STAR operation?

Answer 6: The isolation in the co-channel STAR is intentionally not defined but it should be sufficient for doing simultaneous functions (for example receiving a communications waveform while also jamming that frequency). For co-channel STAR, it is assumed the TX and RX signals overlap in frequency (fully or partially).

g) Question 7: In Area 1-b, the BAA states "A layered approach … digital pre and post filtering … is envisioned to meet the required metrics", can it be assumed that the SDD has access to the baseband information at TX and/or RX?

Answer 7: Yes

h) Question 8: In Area 1-b can it be assumed that, for the STAR operation, the TX and RX share the same antenna or utilize different antennas?

Answer 8: Address your antenna configuration in your response. Note the BAA states the SSD should use "limited number of power amplifiers and apertures."

i) Question 9: In Area 1-b, can it be assumed that various TX signals share the same antenna? In other words, for each antenna, will there be more than one transmitted signal at any given time? If so, what is the isolation requirement between TX ports (e.g., to protect a given TX from other TX signals)?

Answer 9: Address your antenna configuration in your response. Note the BAA states the SSD should use "limited number of power amplifiers and apertures"

j) Question 10: In Area 1-b, we assume some sort of calibration is needed to meet the stringent requirements (e.g., TX-RX isolation): (a) What is the expected speed of environmental variations (e.g., that can affect the antenna impedance, TX-RX isolation, etc.)? (b) Can it be assumed that there are (regular) times, where SSD is inactive, and thus calibration routines are performed?

Answer 10: (a) No specific integration platform or environment is being considered at this time but your solution should address common environmental variations. (b) Possibly. Address your collaboration process and requirements in your response.

k) Question 11: For ONR BAA 14-006 Area 2, Compact Efficient EW Antennas Covering HF to VHF (3-300 MHz), we believe the objective of unity gain at the low end of the band is not achievable.

Answer 11: The Area 2 description lists unity gain or better as an objective (desired), not a threshold (required). In the part of the spectrum where you believe this objective is not achievable, indicate the gain that you propose to achieve or provide an alternative

approach that is ideally scalable so that a designer could trade-off size verses gain.

l) Question 12: For area 3 (W-Band Millimeter Wave (mmW) High Power Transmitters), what is the reasonable antenna gain to be used for estimating power amplifier's output power, say for a TX of 1-4 kW ERP?

Answer 12: For Area 3 the BAA states: "Proposed system concepts should include a detailed end-to-end system analysis, with such considerations as input power needs, power distribution, cooling, component placement, isolation, aperture architecture, and beam-forming." Any assumptions made about antenna gain and other system considerations need to be stated as part of the detailed analysis, along with the planned technology solutions that will support that performance claim. If you are relying on additional antenna gain or a unique antenna configuration to reach the ERP then please address this in your White Paper. There is not a single application in mind so solutions that are dependent on highly directional antennas are less desirable.

6. GENERAL QUESTIONS (from Emails)

a) Question 1: On page 11 of BAAONR14-006, second paragraph, "At the same time this BAA is posted, the government will send out a parallel solicitation to government labs and other parties that are barred from proposing." Will this parallel solicitation post on grants.gov as well?

Answer 1: No. This solicitation will not be posted but will be sent to known EW performers at the Navy Warfare Centers and other government laboratories. It will be sent to other interested parties upon request to the TPOCs (Peter Craig and Kevin Rudd). See page 8 of the BAA for their contact information.

b) Question 2: Due to the last paragraph of the eligibility section of this BAA I would like to confirm that foreign institutions may submit proposals to this BAA.

Answer 2: Offerors proposing on export controlled technologies and topics must meet requirements of ITAR regulations. See page 12 of the BAA.

c) Question 3: Will NATO allied industry be allowed to participate?

Answer 3: See Answer 6.b above.

7. The BAA is hereby amended as follows (changes in **bold**):

IV. APPLICATION AND SUBMISSION INFORMATION
B. Content and Format of White Papers/Full Proposals
a. WHITE PAPERS

White Paper Format

- Paper Size - 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing - single spaced
- Font - Times New Roman, 12 point
- Max. Number of Pages permitted: 6 pages (excluding cover page, resumes, bibliographies, table of contents, **Letters of Intent** and Attachment 2)
- Copies - One (1) electronic copy in Adobe PDF or Microsoft Word 2007 compatible file formats uploaded to the secure (encrypted) FTP site (as discussed under the White Paper submission guidance in Section IV.A of this BAA).

IV. APPLICATION AND SUBMISSION INFORMATION
B. Content and Format of White Papers/Full Proposals
b. FULL PROPOSALS
ii. INSTRUCTIONS FOR GRANTS

Full Proposal Format - Volume 1 - Technical Proposal and Volume 2 - Cost Proposal

- Paper Size - 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing - single-spaced
- Font - Times New Roman, 12 point
- Number of Pages - Volume (Vol. 1) is limited to no more than 20 pages. Limitations within sections of the proposal, if any, are indicated in the individual descriptions shown below. The cover page, table of contents, **Letters of Intent**, resumes and current and pending project and proposal submissions information are excluded from the page limitations. Full Proposals exceeding the page limit may not be evaluated. There are no page limitations to Volume 2.

Copies - the full proposal should be submitted electronically at http://www.grants.gov as delineated in paragraph 5 below.