S²MARTS Project: Hypersonics Advanced Capabilities for Weapon System Improvements
Request For Solutions (RFS) Question & Answer | Date: March 22, 2022

1. Question: Would orbital or suborbital, carrier-launchable PNT alternatives to GPS be considered responsive to this solicitation?

Answer: Propose as deemed appropriate for answering the request for solutions (RFS). NSWC Crane does not intend to drive to specific solutions but seeks proposals for alt-PNT solutions deemed appropriate.

2. Question: Can you say who the lead POC is at NSWC Crane on this topic?

Answer: All communications should be routed through NSTXL.

3. Question: The text states "Each technology will be utilized in naval applications and needs to be suitable for shipboard and submarine use." I assume that is pre-launch, and that after/during launch the system needs to tolerate launch conditions/loading and hypersonic conditions including exoatmospheric

Answer: Correct that the naval applications is pre-launch. The hypersonic conditions are respective to the hypersonic platform.

4. Question: Will this effort include the use of Autonomous Flight Termination Systems?

Answer: No, this solicitation does not include Autonomous Flight Termination Systems.

5. Question: The list of technologies seems extremely specific. Which vendors' specifications were consulted when determining to list battery modules and high temperature RF apertures in this announcement?

Answer: The list of technologies are exclusive to each other and solicitations are requested to each individual prototype project opportunity. No specific vendor’s product specifications were consulted.

6. Question: Would the USG be willing to sponsor or initiate clearances for this effort? Astrobotic currently builds non-GPS nav solutions for NASA missions, including working with the Mars Perseverance team and testing our solutions aboard rocket systems.

Answer: The OTA will be executed unclassified.

7. Question: Since the solicitation indicates that the EDU will be delivered to vehicle integration team, can we assume that we do not have to budget for a "developmental test flight." Should we budget for some support hours for the integration and test, or will that be a follow-on effort to the proposed prototype development effort?

Answer: Correct, the developmental test flight is a government-held annual test event. The proposer must plan to support the milestone reviews (6 total) and prototype delivery for demonstration onboard the developmental test flight.

8. Question: Is the intent of this opportunity to be the 5G Test Bed Infrastructure or will this be aligned like other OUSD 5G efforts of an opportunity for 5G Test Bed Infrastructure Prototype and 5G Applications and Enhancements?

Answer: No, this effort is separate from that OTA.

9. Question: Is the Government looking for a single proposal for all three areas of interest, or separate proposals for each area?

Answer: NSWC Crane desires separate proposals for each area.

10. Question: ALTERNATIVE PNT Question: what is the expected max flight time for the vehicle; also can you further define submarine use (i.e stored in an internal compartment)?

Answer: Please reference publicly available data for planning purposes.

11. Question: HIGH TEMPERATURE APERTURES Question: Proposed solution is a aperture that would be installed in deflate and would be permanently attached. Heat mitigation is thermal conductivity with the vehicle body. would this be an acceptable approach?

Answer: Propose solutions deemed respondent to the RFS.

12. Question: If we propose a star tracker, is there a window to look out of or must we include that in our solution?

Answer: Partial solutions are acceptable.

13. Question: Will the hardware be classified from the beginning of development or will it become classified near the end of the development?

Answer: This OTA will be executed unclassified.

14. Question: Will Dr. Armstrong flow down DD254?

Answer: This OTA will be executed unclassified.

15. Question: Are temperatures over 3000 deg C preferred?

Answer: Propose solutions deemed respondent to the RFS.

16. Question: How large a RF window?

Answer: Propose solutions deemed respondent to the RFS.

17. Question: Any preferred frequency range?

Answer: Propose solutions deemed respondent to the RFS. NSWC Crane seeks to demonstrate a high temperature aperture in a hypersonic environment. The initial prototype frequency is not as crucial.

18. Question: Is the $14,000,000 project budget to be awarded to one party or is it to be split among multiple projects?

Answer: The OTA budget will be split among multiple prototype awards.

19. Question: What are the environmental requirements for the battery? For example: shock, vibe, environmental temperature?

Answer: Propose as deemed respondent to the RFS. Further environments will be provided upon project award.

20. Question: Are there threshold or target size and weight for the battery?

Answer: Propose a solution respondent to the battery module criteria. NSWC Crane seeks industry proposals for achieving size and weight while meeting the identified criteria.

21. Question: Will the battery need to supply high power pulses or just a steady state 25kW?

Answer: Steady state.

22. Question: What is the desired voltage for the battery?

Answer: Propose a solution respondent to the battery module criteria.

23. Question: The temperature survivability requirements for the RFS if any

Answer: Propose solutions deemed respondent to the RFS. NSWC Crane seeks responses that communicate temperature survivability goals.

24. Question: The temperature survivability ranges in an eventual hypersonic missile system

Answer: Propose solutions deemed respondent to the RFS. NSWC Crane seeks responses that communicate temperature survivability goals.

25. Question: Are there any requirements or needs for human factors with the effort to develop a hypersonic advanced capability prototype (i.e., operator considerations to human-computer interaction, user interface, visualization, etc.)?

Answer: This OTA is intended to rapidly demonstrate prototypes in the three identified topic areas.

26. Question: Does the Task Description Document (TDD) count against the 10-page limit for the technical section?

Answer: Yes, the task descriptions will be included in the technical response

27. Question: : Will the inertial data from the GNC IMU be available for use by the alternative PNT system?

Answer: Inertial data may be available for post-processing of Alternative PNT data following the developmental test flight. Identify what dependencies the alternative PNT system requires.

28. Question: Will the vehicle hosting the alternative PNT system have a non-zero induced spin rate?

Answer: Assume a non-zero spin rate. Identify what dependencies the alternative PNT system requires.

29. Question: Could you please clarify starting and ending TRL levels for this requirement? The requirement reads that solution TRL should range from 3 to 5, but it does not specify if these are entry or exit TRLs.

Answer: Minimum TRL at project award is TRL 3. Prototypes will achieve a TRL 6 following a successful demonstration on the developmental test flight.

30. Question: Could you please clarify if fully priced cost packages or ROM estimates are desired for initial submissions? With the time provided (<1 month), fully priced proposals will present schedule challenges for supply chain management of potential partners and internal approvals.

Answer: Fully priced cost packages are desired

31. Question: What are the antenna types/functions contemplated? Communications/EW/Navigation/Telemetry or?

Answer: Propose antenna types deemed respondent to the RFS.

32. Question: What are the RF specifications for the antennas contemplated? – Polarization – Frequency range – Bandwidth, VSWR, and gain – Pattern coverage/beam width o Is the RF Performance is for an installed sensor or multiple sensors?

Answer: Propose RF specifications achievable with prototype being proposed.

33. Question: Will NSWC share high temperature material information or material test results?

Answer: NSWC Crane will share the data from the developmental test flight back to the prototype developer following the developmental test flight.

34. Question: Can NSWC lab support material test of RAS (?) design?

Answer: Unclear on RAS test request.

35. Question: What is the maximum antenna envelope allowed?

Answer: Propose required antenna envelope for prototype to be respondent to the RFS.

36. Question: What is the thermal load profile and duration of exposure?

Answer: Further developmental test flight data will be provided upon project award.

37. Question: What is the platform curvature and surface material type?

Answer: Further platform data will be provided upon project award.

38. Question: What is the platform internal temperature that the sensor sees?

Answer: Further platform data will be provided upon project award.

39. Question: Can the radome or antenna aperture protrude above the platform surface?

Answer: Propose required envelope for the prototype solution respondent to the RFS.

40. Question: What are the shock & vibration requirements?

Answer: Further environmental data will be provided upon project award.

41. Question: Will a single prototype go thru both the lab test and the flight demonstration?

Answer: Propose the number of prototypes to be produced to be respondent to the RFS.

42. Question: How many prototypes are being requested to be manufactured and tested?

Answer: Propose the number of prototypes required for appropriate testing and demonstration.

43. Question: What is the desired Distribution Statement for submitted proposals? Will Distro F content be allowed with permission of government sponsors?

Answer: Proposals may be Controlled Unclassified Information up to and including Distribution Statement F.

44. Question: Can proposals be submitted with Controlled Unclassified Information?

Answer: Yes

45. Question: Will the government accept a ROM RFS given the level of detail still needed to be defined?

Answer: Fully priced cost packages are desired

46. Question: Does a high temperature aperture response need to address survivability as well operability? Operability in the sense that plasma mitigation techniques should be included?

Answer: See Section 3: Desired End-State & Success Criteria in the RFS

47. Question: Given the updated security requirement will the deadline be updated to allow for the preparation of proposals from previously ineligible companies?

Answer: No, the deadline will not be extended

48. Question: Can a company submit multiple proposals with different teaming arrangements?

Answer: Yes

49. Question: What level of flexibility exists on tasks and pricing provided with a submission? Can a ROM estimate be provided for proposed milestones and then be further refined with the government customer after selection?

Answer: Fully priced cost packages are desired

50. Question: Would a cost-plus fixed fee proposal be deemed non-compliant with this solicitation.

Answer: Fully priced cost packages are desired

51. Question: Global extent is mentioned. Can we rely on global to mean must have ALT-PNT anywhere across the planet? And is this with equal precision?

Answer: Global means across the planet. Propose what accuracy is achievable with the prototype.

52. Question: Precision/accuracy is mentioned. A commercial reference is given, Garmin 50 ft presumably horizontal error. For this application can you give us categorical minimally acceptable horizontal and vertical error values in meters? Can you provide a confidence limit (e.g., 70% or 95%) on each?

Answer: Propose what accuracy is achievable with the prototype.

53. Question: The RFI cites a commercial Garmin receiver on page 3. The cite states 50 feet (about 16 meters) of that product's horizontal error in a static or quasi-static, low movement context. Should we interpret this to mean that the vehicle must be within this level of accuracy? Could you provide a 2D accuracy specification across all intended levels of flight attitude, elevation, velocity, skin temperature constraints or conditions?

Answer: Propose what accuracy is achievable with the prototype.

54. Question: Global extent is mentioned. Can we rely on global to mean must have ALT-PNT anywhere across the planet? And is this with equal precision?

Answer: Global means across the planet. Propose what accuracy is achievable with the prototype.

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57. Question: Typically dilution of vertical precision is greater for the same signal availability and geometry by roughly a factor of 2X. If horizontal error is 10 or 100meters, then vertical error will be 20m or 200m error for the same navigation signal observability based on GPS. Is this framework also acceptable for 3D accuracy for the ALT-PNT demonstration technology?

Answer: Propose what accuracy is achievable with the prototype.

58. Question: . Vehicle altitude and velocity vs on-board PNT accuracy: We assume the greatest accuracy for munitions is at the point of impact but at that moment may have a velocity is likely less than at other points along the trajectory of motion. Could we obtain a vehicle velocity versus ALT-PNT accuracy specification even if this is still being finalized using provisional values?

Answer: Propose what accuracy is achievable with the prototype.

59. Question: Maximum number of signal reception points on hypersonic vehicle surface – Is there a strict constraint on the number of physically distinct antenna aperture points on the vehicle above minimally one?

Answer: No, there is not a strict constraint for prototype demonstration. Propose the number of aperture points required to demonstrate the technology.

60. Question: Combinational positioning and navigation: The vehicle likely has a robust inertial sensing platform, could we obtain technical information on its accuracy, precision to cross inform the ALT-PNT and inertial systems to combine their performance and function optimally? Could we understand the interface requirements?

Answer: Identified prototype demonstration dependencies in the proposal. Further information will be provided upon project award.

61. Question: High temperature RF aperture testing: Can DON disclose the RF frequency range at least broadly including the expected attenuation at the carrier frequencies of interest and at the speeds and altitudes of interest?

Answer: No, further information will be provided upon project award.

62. Question: Will the Navy be supplying the Hypersonic Vehicle, Ground test hypersonic facilities (wind tunnel/arcjet) as zero-cost government furnished facilities?

Answer: Identify testing and dependencies for maturing and demonstrating the prototype in the proposal.

63. Question: modeling and simulation, will the Navy provide hypersonic plasma models/Aero environment models, RF models, etc. as a function of altitude and speed for the reference hypersonic vehicle. Will modeling and Simulation have to be done in a Secret environment?

Answer: This project will be executed in a Controlled Unclassified Information environment. Identify dependencies for prototype maturation and demonstration in the proposal.

64. Question: For PNT system testing and demonstration, can the Bidder utilize Navy resources such as military bases for positioning of its test/demonstration equipment at zero cost to the Bidder? Will this testing be considered classified at any time?

Answer: Following successful development and demonstration of a prototype technology, subsequent efforts may become classified. This project will be executed in a Controlled Unclassified Information environment. Identify development and demonstration dependencies in the proposal.

65. Question: Is the intent to test the system in an actual hypersonic vehicle or to do ground based testing in a hypersonic test chamber such as wind tunnel or arcjet test system.

Answer: The intent is to actually fly the prototype to demonstrate the prototype in a relevant environment.

66. Question: Is redundancy required in the Alt-PNT system?

Answer: Redundancy is not required for demonstrating a technology prototype.

67. Question: Will design data, test data, reports, design reviews, technical meetings, and other meetings be handled in a CUI environment?

Answer: Yes

68. Question: Can you further define the type of Analysis or simulation appropriate to the “approaching that of GPS at high altitude”? We would like more clarity on accuracy standards per questions 4, 5 and others above.

Answer: Further information will be provided upon project award.

69. Question: What are the typical limitations of SWAP that we should expect for a hypersonic vehicle regarding aperture and electronics?

Answer: Propose SWaP required to demonstrate the technology prototype.

70. Question: Development of the prototype is key and will be integrated into a developmental flight test campaign demonstration. There is reference to "meet the annual developmental test flight integration schedule. "Can the customer provide any insight to the type of flight test vehicle potentially being used? How is the funding of these flight tests being handled?

Answer: Further developmental flight test vehicle information will be provided upon project award. The flight tests utilized are a government program.

71. Question: It appears that the $14M budget –"subject to change and is being provided for planning purposes only" - will potentially cover all three topics (Battery, PNT, and High temp apertures). But responders are encouraged to clearly explain how much of their solution can be developed for the advertised amount, and if project phases require additional funding beyond the project budget must be identified as such. So if a prototype development can meet the RFS objectives, perhaps for example, at a lower TRL, there may be a path for additional funding later to move said TRL to higher level?

Answer: Correct that the budget covers all three topics. See Section 3: Desired End-State & Success Criteria of the RFS. The objective of this effort is to develop capability prototypes and demonstrate them onboard a developmental flight test. TRLs at or above 3 are required at project award.