# Call 004 – Multi-Band, Directional SATCOM Antennas
# 9 JAN 2024

## Advanced Research Announcement (ARA) with Calls - FA8650-17-S-9300
## Defense Experimentation Using Commercial Space Internet (DEUCSI)

**Federal Agency Name:** Air Force Research Laboratory (AFRL) - Integrated Capabilities Directorate

**Proposal Due Date and Time**: Proposals are due by 4:00pm Dayton, OH local time on 15 March 2024.

**Anticipated Award Date:** May 2024

**Anticipated Number of Awards:** Estimate 1-3 Other Transaction Agreements and/or Contracts

**Anticipated Funding:** See below, Section 6 Cost Objective/Funding Constraint

**Agreement/Contract Number:** TBD (FA2385-24-X-XXXX)

## 1. Statement of Objectives (SOO)/Description of Technical Areas:

Background/Scope:

Consistent with the overall approach for establishing path agnostic communications using the commercial space internet described in the overarching Advanced Research Announcement (ARA) FA8650-17-S-9300, this Call seeks multi-band, satellite communications antennas capable of use on military aircraft. These antennas must be capable of communications with multiple commercial space internet (CSI) constellations in various orbital regimes while interfacing with modems and transceivers being matured as a result of contracts/agreements awarded under DEUCSI Call 3. An important aspect of using CSI capabilities effectively and affordably for defense purposes is the ability to switch between space internet providers as operational and business needs change. This includes using spacecraft constellations in different orbit regimes, such as low-, medium-, and geosynchronous earth orbits (LEO, MEO, GEO) to access favorable geometry and/or performance characteristics for particular situations. It also includes quickly and effectively switching among commercial space internet services in different frequency bands to access favorable spectrum and/or to failover between constellations when one becomes unavailable. In some cases, it may be beneficial to utilize common hardware elements to communicate with both commercial space internet constellations as well as military communications systems in order to provide even greater flexibility in communications paths while minimizing deployment of constellation-specific hardware. The Department of the Air Force (DAF) wishes to conduct experiments in vendor flexibility across multiple bands and

orbits to understand methods by which the government may position itself to affordably and efficiently leverage multiple providers of space internet services.

This Call seeks antennas (also known as apertures) to enable communications through multiple CSI constellations while accommodating both the dynamic motion and size, weight, and power constraints of military aircraft. Antennas delivered under this Call must be capable of accessing satellite constellations in LEO, MEO, and GEO orbits across the Ku and Ka frequency bands. Solutions that are capable of operation on a single satellite constellation are NOT of interest under this Call. Antennas that operate in a single frequency band are also NOT of interest under this call.

The government's interest in flexibly applying multi-vendor hardware elements to utilize CSI on military platforms is illustrated by the following use cases. Proposals that address one or both use case(s) are responsive to this call.

Use Case 1: Specially-constrained, low-volume aircraft

The Government requires versatile antennas capable of communicating with satellite constellations in LEO, MEO, and GEO orbits across both Ku and Ka bands (not simultaneously) while meeting challenging electromagnetic compatibility constraints of specialized aircraft. Typical aircraft in this category can accommodate antennas 18-23" in diameter and up to 4-6" in height. Antennas may be either liquid-cooled or passively cooled. Antennas in this category should be suitable for transition to low-volume fleets with production rates of tens of antennas per year. Recurring costs are of interest but are of secondary importance to meeting the electromagnetic compatibility requirements of specially-constrained aircraft.

Use Case 2: Low-SWAP antennas for high-volume aircraft

The government requires versatile antennas capable of communicating with satellite constellations in LEO, MEO, and GEO orbits across both Ku and Ka bands (not simultaneously) while minimizing size, weight, and power (SWAP) for broad applicability to many aircraft types. Typical antenna accommodations (e.g. size constraints) are identical to those of Use Case 1, however this use case does not require the strict electromagnetic compatibility constraints of Use Case 1. Antennas meeting this use case should be suitable for fielding on large fleets of aircraft and should therefore be compatible with production rates of several hundred antennas per year, although such production rates do not necessarily need to be established as part of this Call. For this high-volume use case, recurring cost is a high priority and offerors should describe anticipated costs or pricing for antennas produced at high volume.

For each use case described above, the Government seeks maximum compatibility between antennas delivered under this Call and transceivers/modems/radios being implemented under previous DEUCSI contracts. Therefore, awardees under this Call will be expected to work cooperatively with DEUCSI Call 3 performers to refine

and test antenna interfaces to ensure that antennas delivered under this solicitation can be used in conjunction with transceivers and associated hardware being developed under Call 3. Such collaboration may be implemented via Associate Contractor Agreements or similar mechanisms.

As of 9 January 2024, Call 3 contract awardees are L3Harris, Northrop Grumman, SES-SD, and Intelsat-General. If additional information is needed, contact the Technical POC.

To satisfy initial experimentation needs, including both ground and flight test, offerors should propose a minimum of 6 antennas as part of their base proposal. To the extent practical, offerors are encouraged to propose additional quantities of antennas that may be procured as future contract/agreement options. Such additional quantities may enable expansion of experimental activities to additional aircraft types later in the contract/agreement period but are not mandatory.

The use cases described above illustrate particular applications of interest to the Government, but they are not all-inclusive. Novel, innovative approaches for achieving multi-band, multi-orbit communications flexibility across a range of government platforms are responsive to this call. Offerors with approaches that do not fit the use cases described herein are encouraged to discuss the idea with the Technical Point of Contact (TPOC) found at 9.d. of this Call, prior to developing a full proposal. Please note, open communication with the TPOC is both allowed and encouraged until submission of proposals.

For both use cases, the government is soliciting hardware and experiments that implement multi-band, multi-constellation satellite communications antennas in militarily relevant environments. For the purpose of this Call, militarily-relevant means that antennas should be tested while installed on military aircraft operating in their intended environment (e.g. in flight). Proposals that culminate in laboratory tests of components or systems are not responsive to this Call. In implementing antennas on aircraft for experimental purposes, an offeror under this Call is not required to perform the actual physical integration onto an aircraft as that function may be completed by a third-party aircraft integrator under a separate government contract including, in some cases, a performer under another DEUCSI contract/agreement. All offerors under this Call will, however, be required to provide the necessary data packages, interface documents, environmental qualification test or analysis results, and similar information to assist a third party in integration of the offeror's antennas onto Government-specified aircraft.

A supplementary data package containing additional details on the nature of the electromagnetic constraints for Use Case 1, estimated antenna performance objectives, and required antenna interfaces is available to Qualified US Contractors, as defined by DoDD 5230.25. Interested offerors who wish to receive the supplementary package may request it by contacting the Technical and Contracting POCs listed in this Call and providing a copy of their valid DD Form 2345, Militarily Critical Technical Data Agreement.

Technical Objectives:

The Government seeks innovative experimentation, including the requisite hardware, software, and documentation, to meet the following technical objectives, which apply to both Use Case 1 and Use Case 2:

A. Experimentally characterize suitability for use on maneuverable aircraft while communicating with LEO, MEO, and GEO satellite constellations in the Ku and Ka bands. See the available supplementary data package for additional information on desired performance.

B. Establish the ability to switch between satellite constellations in Ku and Ka bands in a timely manner (seconds), when commanded by an external transceiver (e.g. a multi-constellation radio from DEUCSI Call 3).

C. Demonstrate adherence to mutually-agreed interfaces to maximize compatibility with radio hardware from third-party vendors, including but not limited to performers on DEUCSI Call 3 contracts/agreements. See the available supplementary data package for additional information on expected interfaces.

D. Measure technical performance parameters to quantify the performance of delivered antennas during communication with CSI constellations in LEO, MEO, GEO orbits. Example measurements of interest include, but are not limited to:

    a. Signal-to-noise ratio
    b. Data rates (per constellation)
    c. Dynamic limits for proper operation with relevant constellations (e.g. maximum bank limit, maximum bank rate, etc.)
    d. Any anomalous, undesirable, or limiting characteristics that may impede robust use in operational military scenarios

E. Measure and properly document performance parameters, environmental test/analysis results, and electromagnetic interference compliance. At a minimum, performers will be responsible for measurements and documentation to satisfy the following DoD standards and processes:
    a. MIL-STD-810H and/or DO-160 (Environmental Qualification)
    b. MIL-STD-461 (Electromagnetic Interference)
    c. MIL-STD-464 (Electromagnetic Environmental Effects)
        i. Note: MIL-STD-464 is applicable to a subset of the aircraft of interest. Tailoring of MIL-STD-464 is possible, and offerors should note any areas of MIL-STD-464 that would need to be tailored for a particular antenna solution.
    d. DD-1494 (Application for Equipment Frequency Allocation)

i. Contracts/agreements issued under DEUCSI Call 4 are expected to result in at least a Stage 3 application and resulting J/F-12 (Joint Frequency Equipment Allocation).

**2. Deliverable Items:**

a. Data Items: Test data for airborne or ground-based communications experiments, interface control document(s), operator's manual, DD-1494 for Stage III certification, environmental test or analysis data satisfying MIL-STD-810H and/or DO-160, electromagnetic compatibility test or analysis data satisfying MIL-STD-461 and/or MIL-STD-464, monthly status reports, SF-424 reports. Depending on the value and structure of a resulting award, financial status reports may also be required.
b. Software: Not required but may be applicable depending on an offeror's selected technical approach.
c. Hardware: A minimum of 6 antennas for interfacing with commercial space internet spacecraft in multiple orbits.
d. Other: N/A
e. Final Report and Technical reports describing test results.

**3. Data Rights Desired:**

The government desires Unlimited Rights for all technical data, non-commercial software (NCS), and NCS documentation developed using government funds, however due to the desired use of commercially-developed space internet technologies in this program more restrictive data rights will be considered where appropriate. The desired, but negotiable, data rights are:

(1) Technical Data: Unlimited Rights
(2) Non-Commercial Software (NCS): Unlimited Rights
(3) NCS Documentation: Unlimited Rights
(4) Commercial Computer Software Rights: Customary License

**4. Schedule/Period of Performance:**

The Government is interested in using the antennas solicited under this Call in conjunction with terminal elements (radios, modems, and transceivers) that will be delivered under contracts/agreements issued in response to DEUCSI Call 3. Therefore, antennas delivered in response to this Call that can be available for test within 24 months of contract/agreement award are preferred. The technical period of performance for any individual effort under this solicitation is estimated to be approximately 18-36 months, including ground and flight testing. An additional three (3) months are allocated for preparation and review of the final report, resulting in an overall estimated period of performance of approximately 21-39 months. This period of performance is provided as an estimate only. Offerors should propose a schedule that is executable and maximizes the probability of

achieving the technical objectives of this Call, with the understanding that antennas delivered within 24 months are preferable.

**5. Government Furnished Property/Equipment:**

The Government does not anticipate transferring Government Furnished Property/Equipment to awardees under this call. However, the use of Government Furnished Property may be considered on a case-by-case basis and offerors should note any such requests in their proposal.

While not considered Government Furnished Property, the Government will make available, at no cost to the offeror, the following items:

A. One or more aircraft: The government will provide operation of one or more test aircraft (or rotorcraft) for experimentation with commercial space internet constellations. The specific aircraft selected will be at the Government's discretion, but will have the ability to integrate an offeror's antenna(s) in a sky-facing orientation. Mounting approaches and locations may vary based on aircraft type and will be collaboratively determined with awardees under this Call in conjunction with representatives of the selected military aircraft types.

The locations at which these items will be available, and the durations for which they will be available, will be determined based on availability, government discretion, and the offeror's request. Note that all Government platforms will be operated by Government personnel, and possession of the platforms will not be transferred to the Offeror. Therefore, these items will **not** be denoted as Government Furnished Equipment in contracts/agreements resulting from this Call.

**6. Cost Objective/Funding Constraint:**

The government anticipates awarding multiple (1-3) agreements/contracts, each with a value of approximately $10-30M, although deviations from this range are possible if in the best interest of the government.

A sample funding profile, per award, is shown below. Note that deviations from this example profile are anticipated and acceptable. Offerors should propose desired funding profiles that best meet the solicitation objectives.

| FY24 | FY25 | FY26 | TOTAL |
|---|---|---|---|
| $8,000,000 | $12,000,000 | $5,000,000 | $25,000,000 |

**Please Note: This funding profile is an estimate only and not a contractual obligation for funding. All funding is subject to change due to Government discretion and funding availability. Potential offerors should be aware that due to unanticipated budget fluctuations funding in any or all areas may change with little or no notice.*

## 7. Management Objective:

The Government desires to allow the selected awardees flexibility to manage cost, schedule, and performance of this effort, while ensuring common interfaces between antennas and modems/transceivers developed by associate contractors.

## 8. OPSEC/Safety/Classification:

a. OPSEC: General Operations Security (OPSEC) procedures, policies and awareness are required in an effort to reduce program vulnerability from successful adversary collection and exploitation of critical information. OPSEC will be applied throughout the life cycle of any award resulting from this solicitation.

b. SAFETY**:** The following requirements must be incorporated into all contracts and agreements resulting from this Call:

1. Must comply with all federal, state, local, and Air Force safety and environmental regulations.
2. Must comply with system safety requirements contained in MIL-STD 882E, Section 4 "General Requirements" for any deliverable systems or hardware. Must identify safety-critical components of those systems or hardware, and software interfaces with those components. Must test and verify the safety-critical hardware and software for safety acceptance.

c. PROGRAM SECURITY CLASSIFICATION: Contracts/agreements satisfying Use Case 1 will require classified activities and an appropriate DD-254 will be issued. Please see the supplementary data package for additional information. Contracts/agreements satisfying Use Case 2 are anticipated to be unclassified, although classified agreements are possible if needed to accommodate an offeror's proposed approach.

## 9. Proposal Submission:

a. Content and Form of Proposal Submission: Reference ARA with Calls, FA8650-17-S-9300.

b. General Instructions:
Number of Proposal Copies: Offerors must submit one (1) electronic copy of their proposal. One electronic version of your technical proposal, SOW, and cost proposal must be submitted. The electronic version of your technical proposal and SOW must be submitted in Microsoft WORD. It is recommended that the electronic version of your cost proposal be submitted in Microsoft EXCEL. The electronic version of all proposal elements shall be submitted to the contracting and technical POCs listed below via the DoD SAFE secure file transfer system, which can be accessed at: https:safe.apps.mil. If needed, an invitation to submit files via DoD SAFE may be obtained by requesting one from the contracting POC listed below.

**Do not** submit classified information via the above instructions. Offerors wishing to submit classified information as part of their proposal must contact the Technical POC identified below for instructions.

c. Technical/Management Proposal:
Page Limitations: The technical proposal shall not exceed a total of **25 pages**, inclusive of all text, tables, charts, illustrations, flowcharts, drawings, diagrams, indices, photographs, foldouts, appendices, attachments, resumes, etc. The technical proposal should be formatted in accordance to overarching ARA with Calls instructions. The cost proposal has no page limitation.

At the offeror's discretion, a portion of the technical proposal (not to exceed **15 pages**) may be submitted as a classified addendum. Any classified portion of the technical proposal will be counted against the 25-page limit. For example, if an offeror submits a 13-page classified section, the unclassified portion of the proposal would need to be limited to 12 pages.

Submission of classified proposals is not required, but is available as an option to offerors wishing to do so.

d. Technical and Contracting Points of Contact:

**Address technical questions to:**
Dr. Brian Beal, AFRL/RS
Phone: (937) 656-1805
Email: brian.beal.1@us.af.mil

Dr. Greg Spanjers, AFRL/RS
Phone: (937) 656-1893
Email: gregory.spanjers@us.af.mil

**Address contracting questions to:**
Mrs. Amanda Morris, AFRL/PZLDB (Primary)
Email: Amanda.Morris.8@us.af.mil

Ms. Laura Pottner, AFRL/PZLDB (Secondary)
Email: Laura.Pottner@us.af.mil

## 10. Proposal Review Information:

### a. Evaluation Criteria:

**Technical**:
The four elements of technical criteria are of equal importance and rank as first in order of priority.
(1) Soundness of the offeror's technical approach including whether the proposal identifies major technical risks, clearly defines feasible mitigation efforts, and demonstrates related experience and

qualifications of technical personnel. Soundness of the offeror's technical approach includes the offeror's understanding of the commercial space internet marketplace, technologies, and trends influencing the viability of the proposed approach.

(2) Relevance and impact of the proposed technical effort on the overall goals and objectives stated in the ARA with Calls.

(3) The offeror's understanding of the scope of the technical effort.

(4) The potential to transition the results of the technical effort to future Government needs.

**Cost/Price**: The cost evaluation includes the realism of the proposed cost. Cost/Price is a substantial factor, but ranked as the second order of priority. (If an offeror proposes the use of GFP other than any GFP identified in the ARA, and that proposed GFP provides the offeror an unfair competitive advantage, then FAR 45.202 requires rental equivalent be applied to the Cost Factor for evaluation purposes only).

This Call is expected to meet the definition of Adequate Price Competition in accordance with FAR 15.403-1.

**b. Review and Selection Process:**

Based on the Peer or Scientific Review, proposals will be categorized as Selectable or Not Selectable (see definitions below). The selection of one or more sources for award will be based on the Peer or Scientific Review, as well as importance to agency programs and funding availability.

(1) **Selectable:** Proposals are recommended for acceptance if sufficient funding is available. May require additional development.

(2) **Not Selectable:** Even if sufficient funding existed, the proposal should not be funded.

Note: The Government reserves the right to award some, all, or none of proposals. When the Government elects to award only a part of a proposal, the selected part may be categorized as Selectable, though the proposal as a whole may not merit such a categorization.

No other evaluation criteria will be used.

Prior to award of a potentially successful offer, the Contracting Officer will make a determination regarding price reasonableness.

## 11. Award Administration Information

a. Award Notices: Offerors will be notified whether their proposal is recommended for award on or about 30 working days from the proposal due

date. The notification is not to be construed to mean the award is assured, as availability of funds and successful negotiations are prerequisites to any award.

b. Administrative and National Policy Requirements: Refer to Section 12.

c. Reporting: For reporting requirements and frequency, refer to Section 2.

**12. Additional Information:**

a. Export Control: Information involved in this effort is subject to Export Control (International Traffic in Arms Regulation (ITAR) 22 CFR 120-131, or Export Administration Regulations (EAR) 15 CFR 710-774). A Certified DD Form 2345, Militarily Critical Technical Data Agreement, is required to be submitted with proposal.

b. Export-Controlled Items: As prescribed by DFARS 225.7901-4, DFARS 252.225-7048, "Export-Controlled Item (JUN 2013)" is contained in this solicitation. This clause shall be contained in ALL resulting contracts. Any resulting agreement will include a term and condition to address the same.

c. Foreign Participation: Foreign participation is not authorized. Foreign Nationals (FNs) can be employed by the US Prime Contractor or Sub-Contractor; however, FNs will be limited to Public Domain information unless the contractor has obtained the proper License or Technical Assistance Agreement that authorizes disclosure of CMI and/or CUI to foreign entities pursuant to the Department of State's ITAR or Department of Commerce's EAR. Public Domain information is defined as information that is releasable to the general public and sometimes referred to as open source material. Examples include but are not limited to newspapers, magazines and information posted on the internet. Any proprietary information will have to be appropriately protected.

d. Post-Award Small Business Program Rerepresentation: As prescribed by FAR 19.309(c)(1), FAR 52.219-28, "Post-Award Small Business Program Rerepresentation (SEP 2023)", is contained in this solicitation. This clause will be contained in any contracts resulting from this solicitation. This clause requires a contractor to rerepresent its size status when certain conditions apply. The clause provides detail on when the rerepresentation must be complete and what the contractor must do when a re-representation is required.

e. Intergovernmental Review: N/A

f. Funding Restrictions: N/A