Call 002 – Point-to-Point Rocket Demonstrations

Rocket Experimentation for Global Agile Logistics (REGAL)

Proposal Due Date and Time: Proposals will be accepted any time after 8:00am Dayton, OH local time on 7 June 2021 and before 4:00pm Dayton, OH local time on 1 Jul 2027.

Anticipated Award Date: Variable, depending on proposal submission date. See below, Section 4 Schedule / Period of Performance

Anticipated Number of Awards: Estimate 2-3 awards.

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

Advanced Research Announcement: FA8650-21-S-9307

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

A. Background/Scope:

Consistent with the overall approach for establishing point-to-point (PTP) space transportation for DoD logistics using commercial rockets as described in Advanced Research Announcement (ARA) FA8650-21-S-9307, this Call seeks innovative launch experiments to assess technical and operational feasibility of large commercial rockets for PTP operations. In this dynamic period of commercial rocket development and nascent phase of PTP space transportation, it is important to assess commercial rocket solutions as they are developed in order to leverage launch test opportunities for PTP rocket experimentation. In addition, it is anticipated that commercial rocket solutions will mature at different rates and launch test opportunities will have uncertainty in schedule, especially beyond a three-month time horizon. It is in the interest of the Department of the Air Force (DAF) to assess multiple commercial rocket capabilities, such that the DoD is positioned to reach agreements with multiple space launch providers for PTP space logistics to achieve operational flexibility, availability, and affordability, similar to current commercial service agreements with U.S. Transportation Command (USTC) for air, land, rail, and sea cargo. Thus, the DAF wishes to conduct experiments with multiple launch providers to determine the feasibility of large commercial rockets to perform a relevant PTP mission profile, including demonstrations of launch, flight, and landing, and characterization of the associated environments.

Multiple approaches to assess rocket feasibility for PTP operations may be responsive to this call. One potentially viable approach already under consideration is to use a combination of ground testing and analysis. This approach is expected to be assessed through activities in Call 001 under this ARA, and should not be proposed in response to this Call. A second potentially

viable approach to assess rocket feasibility for PTP operations is successful demonstration of the rocket launch, flight, and landing in a single launch experiment. A third potentially viable approach is to demonstrate the PTP rocket launch, flight, and landing operations separately in multiple launch experiments. This third approach is expected to show feasibility and traceability to an end-to-end PTP capability. Demonstrations of rapid ground operations and integration with the broader DoD logistics train are expected to be the subject of future Calls under this ARA, and should not be proposed in response to this Call.

The Government's interest in conducting launch experiments with commercial rockets to determine feasibility for PTP space transportation is illustrated by the following two use cases.

Use Case 1: 2-Way Global Logistics Between Launch Pads

The DoD global logistics train currently leverages commercial services to transfer cargo across the globe, including land, sea, and air transportation between established sites with existing logistics infrastructure. Similarly, a future PTP space transportation capability would leverage large reusable commercial rockets to deliver cargo between established launch pads anywhere in the world within one hour. For this use case, the Government seeks to leverage commercial launch experiments to determine PTP feasibility of commercial rockets between established CONUS or OCONUS launch pads. Also of interest are options for establishing launch pads optimized for DoD-unique locations and optimized for low cost and lower usage rates.

Use Case 2: 1-Way Rapid Resupply or Disaster Response

Urgent DoD logistics requirements may necessitate cargo delivery to locations without an established landing pad, including rapid resupply missions to restore loss of mission capability or for Humanitarian Assistance / Disaster Relief (HA/DR). In these scenarios, a commercial rocket would launch from an established launch pad (similar to Use Case 1) and land at a remote site with limited logistics infrastructure. In an austere location, the cargo would be unloaded without ground support, either autonomously or with personnel and equipment transported on the rocket. After unloading cargo, the rocket could be refueled and relaunched, or else returned by other transport modes to a launch pad. For this use case, the Government seeks to leverage commercial launch experiments to determine PTP feasibility of commercial rockets between established launch pads and remote landing locations, including potentially unimproved surfaces.

The use cases described above are for illustrative purposes only. Novel, innovative approaches to demonstrate commercial rockets for PTP space transportation are highly 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 in Section 11 of this Call, prior to developing a full proposal.

For both use cases, the commercial rocket should be capable of delivering cargo equivalent to a C-17 capacity, or approximately 30 to 100 metric tons of payload. The DAF primary goals are cost and speed – with both measured at the full end-to-end system level. Offerors are free to consider any rockets, trajectories or reusability options needed to achieve the cost and speed objectives. Global reach within 60 minutes is a fundamental requirement of the final PTP capability, so an exoatmospheric trajectory and atmospheric reentry is expected (albeit not required). Offerors are encouraged to suggest locations for their proposed experiments, and the ability to deliver residual enduring capability (e.g., launch pads at key locations). In addition, offerors are expected to address and discuss all major operational issues such as launch permits, overflight, safety regulations, environmental impacts, and range safety for both launch experimentation and the eventual operational system.

B. Technical Objectives: The Government seeks innovative rocket launch experimentation to meet the following technical objectives:

   a. Launch a commercial rocket on a PTP trajectory (may be longer than 60 minutes for early proof-of-concept experimentation) that includes atmospheric reentry, and demonstrate the ability to land at a planned location based on Use Case 1 or Use Case 2. The commercial rocket should be capable of delivering 30 -100 metric tons of cargo, however, actual specific cargo does not need to be included in the launch experiment. Parameters of interest that should be considered in the experimentation include:

      (i) (Use Case 1) Demonstrate launch and landing between CONUS or OCONUS sites; may include rapid ground operations with cargo load/unload.
      (ii) (Use Case 2) Demonstrate landing at a remote or unimproved site (e.g. not an established landing pad); may include rapid ground operations with cargo load/unload.
      (iii) Versatility, including the ability to affordably and effectively perform PTP rocket operations from potential future launch pads and rocket landings for both Use Case 1 and Use Case 2.

   b. Measure performance parameters and characterize commercial rocket environments in PTP space launch, flight, and landing. Parameters of interest that should be quantitatively measured include:

      (i) Characterize the steps, measure durations, and determine a timeline of ground operations leading up to launch, such as propellant loading.
      (ii) Measurement and characterization of the PTP rocket trajectory from launch to landing.
      (iii) Measurement and characterization of the external rocket plume environment at launch and landing locations, including acoustics, heat, and ground surface interactions.

(iv) Measurement and characterization of environments within the rocket cargo bay, including acoustics, heat, and gravitational load

Proposals that address Use Case 1, Use Case 2, or both are responsive to this Call. Commercial rockets that are capable of both Use Cases 1 and 2 are desired for an operational PTP space transportation capability for global DoD logistics.

2. Deliverable Items

A. Data Items: Negotiable, but may include: test data for rocket operations and environments, logistics operations, cargo interfaces.

B. Software: Not anticipated.

C. Hardware: Negotiable, but may include: used rocket stage for loadmaster training, ground logistics systems.

D. Other: Not anticipated.

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 rocket systems in this program, more restrictive data rights are anticipated and 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 ability of the Government to experiment with commercial rockets for PTP space transportation is dependent on the commercial rocket development and test schedule. As such, the Government is flexible on the start date and duration of awards under this solicitation in order to maximize the probability of success of each individual effort. Although start date is a secondary consideration, the technical period of performance for any individual effort under this solicitation is estimated to be approximately 15-30 months. 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 18-33 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.

The following dates represent desired limits on the earliest start date and latest end date for technical efforts under this Call.

Project Kickoff: No earlier than October 2021

End of Technical PoP: No later than December 2027

5. Government Furnished Property/Equipment

The Government anticipates there may be base support and test range support to facilitate commercial launch experiments for PTP space transportation. Potential support will be determined by contract or agreement. Anticipated support includes, but is not limited to, access to DoD-unique logistics and landing locations, additional sensors, and support for range safety to accommodate effective experimentation.

The locations at which this support and 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. Offerors should note in their proposal the anticipated timeframe when access to Government base support or test range support will be desired.

6. Cost Objective/Funding Constraint

The government anticipates multiple awards (2-3), each with a cap on value of approximately $10M. However, this does not mean each award will be valued at $10M. The value of the award will reflect the scope of work proposed, and deviations from this estimate are possible if in the best interest of the Government.

7. 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:

   a. Must comply with all federal, state, local, and DAF safety and environmental regulations.
   b. 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: Activities under this Call are **expected to be unclassified**, however classified activities may be possible, and will be addressed accordingly. If a DD254 is applicable, offerors must verify their Cognizant Security Office information is current with the Defense Counterintelligence and Security Agency (DCSA) at www.dcsa.mil.

8. Proposal Submission

Content and Form of Proposal Submission: In accordance with the ARA, FA8650-21-S-9307, please adhere to the following delivery instructions.

Delivery Instructions: Due to COVID 19, the DAF requests electronic proposals be submitted using BOTH DoD SAFE (primary method) and email (backup method) to the following addresses:

AFRL.RS.RocketCargo@us.af.mil

The maximum email file size the Government can receive is 20 MB.

If the contractor needs a DoD SAFE drop-off invite from the DAF, please send the request to AFRL.RS.RocketCargo@us.af.mil no later than 7 days prior to the due date of proposals to ensure a drop off code is provided in a timely manner.

NOTE: Any proposal received at the Government Office designated in this ARA or subsequent Calls after the exact time specified for receipt of offers is "late" and will not be considered except at the discretion of the Government. Early proposal submissions are encouraged.

The technical proposal is limited to 25 pages. This page limitation does not apply to the Statement of Work (SOW). The SOW has no page limitation. All other required information regarding the proposal submission requirement is captured in the ARA. After receipt, proposals will be reviewed in accordance with the award criteria in this call.

9. Proposal Review Information

A. Proposal Peer or Scientific Review Criteria: Proposals will be reviewed against the criteria listed below. The technical aspect is ranked as the first order of priority.

a. Technical: The technical aspect shall be reviewed based on the following criteria that are of equal importance.

(1) Unique and innovative approach proposed to accomplish the technical objectives. New and creative solutions and/or advances in knowledge, understanding, technology, and the state of the art.

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

(3) 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.

(4) The potential to transition the research and development deliverables to future Government needs. Any proposed restriction on technical data or computer software will be considered.

b. 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).

B. **Review and Selection Process**

a. Categories: 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

(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.

b. No other criteria will be used.

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

10. Award Administration Information

A. Award Notices: Offerors will be notified whether their proposal is recommended for award on or about 30 working days from date of proposal submission. 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 the ARA.

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

11. Agency Contact for this Call

Address questions to: AFRL.RS.RocketCargo@us.af.mil