

FUNDED SPACE ACT AGREEMENT
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SPACE EXPLORATION TECHNOLOGIES CORP.
FOR
COMMUNICATIONS SERVICES PROJECT (CSP) DEMONSTRATION

BACKGROUND

- A. NASA has established the CSP at the John H. Glenn Research Center (GRC) in Cleveland Ohio as part of the Space Communications and Navigation (SCaN) Program. The objectives of CSP are to:
- Establish public-private partnerships (“PPPs”) with multiple providers that may eventually be able to offer commercial SATCOM services to multiple customers, including NASA;
 - Demonstrate and validate commercial satellite communication (SATCOM) capabilities and evaluate feasibility for potential future mission needs;
 - Stimulate the U.S. commercial communications industry in order to adapt existing terrestrial communication technologies into space-based communication systems; and
 - Create a market for commercial SATCOM services that will be available to both Government and private-sector customers.
- B. This Space Act Agreement represents the Participant and NASA’s commitment to conducting the initial capability development and demonstration phase of the Communications Services Project (CSP), with the Participant meeting the goals of the project as described in Appendix B to this Agreement.

ARTICLE 1. AUTHORITY AND PARTIES

In accordance with the National Aeronautics and Space Act (51 U.S.C. § 20113(e)), this Agreement is entered into by the National Aeronautics and Space Administration, located at 4th and E Streets, SW, Washington, D.C. (hereinafter referred to as "NASA" or “Government”), and Space Exploration Technologies Corp., located at 1 Rocket Road, Hawthorne, California (hereinafter referred to as "SpaceX" or "Participant"). NASA and Participant may be individually referred to as a “Party” and collectively referred to as the “Parties.” This agreement will be implemented by NASA at the John H. Glenn Research Center located at 21000 Brookpark Road, Cleveland, OH 44135.

ARTICLE 2. PURPOSE

The purpose of this Agreement is to conduct the initial development and demonstration phase of the Communications Services Project (CSP). These demonstrations shall involve the development and operation of an end-to-end space system of communications services including all stages of a demonstration mission. The capability demonstrations will culminate in a communications mission to and from a near-Earth testbed for the orbital phase of the mission, with a representative mission operations center, to meet the capability objectives of the mission.

Under this Agreement, the Participant will receive milestone payments from NASA to develop and demonstrate the following capabilities:

- Assured Data Delivery
- File Delivery and Networking
- Additional Proposed Capability(ies)
 - Additional Capability 1:
 - Additional Capability 2:
 - Additional Capability 3:

ARTICLE 3. RESPONSIBILITIES

- A. SpaceX shall use reasonable efforts to:
 - 1. Conduct end to end demonstration of commercial SATCOM capabilities according to the milestones identified in Appendix B (Performance Milestones).
 - 2. Coordinate and conduct milestone reviews with NASA.
 - 3. Provide NASA with access and appropriate data to demonstrate that Milestone entrance and success criteria have been met.
 - 4. Provide access to any other relevant data and facilities as requested by NASA.

- B. NASA shall use reasonable efforts to:
 - 1. Provide milestone payments to Participant upon successful completion of each milestone in accordance with Article 5.
 - 2. Attend and observe Participant milestones, at NASA's discretion and after coordination with Participant.
 - 3. Review milestone data provided by Participant to determine that entrance and success criteria have been met.
 - 4. Request access to any other relevant data and facilities needed to evaluate feasibility of the service for potential future mission needs.

ARTICLE 4. SCHEDULE AND MILESTONES

The planned major milestones for the activities defined in the "Responsibilities" Article are as follows:

The scheduled milestones, acceptance criteria, and payments for each milestone in furtherance of CSP demonstrations are identified in Appendix B to this Agreement.

ARTICLE 5. FINANCIAL OBLIGATIONS

- A. Obligation
 - (1) The Government's liability to make payments to the Participant is limited to only those funds obligated annually under this Agreement or by amendment to the Agreement. NASA may obligate funds to the Agreement incrementally.

- B. Acceptance and Payment for Milestones
 - (1) Participant shall notify the NASA principal points of contact, listed in Article 19 at least 30 calendar days prior to the completion of any milestone to arrange for the NASA Technical Contact or designee to witness the event or accept delivery of documents. NASA shall have 30 calendar days to

determine whether the milestone event meets its corresponding acceptance criteria as described in Appendix B of this Agreement and shall notify Participant of NASA's acceptance or non-acceptance. Any disagreement about the successful accomplishment of a milestone shall be deemed a Dispute and resolved in accordance with Article 20 of this Agreement.

(2) Participant shall submit a written invoice requesting payment from NASA upon notification of acceptance by NASA of each milestone, as identified and described in Appendix B of this Agreement. Participant shall submit all invoices utilizing Treasury's Invoice Processing Platform (IPP). For instructions on submitting invoices through IPP reference: <https://www.nssc.nasa.gov/vendorpayment>. After receipt and review of the invoice, the NASA Administrative Contact will prepare a written determination of milestone completion and authorize payment.

(3) The following information shall be included on each Participant invoice to NASA:

- (a) Agreement Number;
- (b) Invoice Number;
- (c) A description of milestone event;
- (d) Terms of Payment;
- (e) Payment Office; and
- (f) Amount of the fixed contribution claimed.

(4) Financial Records and Reports: Except as otherwise provided in this Agreement, the Participant's relevant financial records associated with this Agreement shall not be subject to examination or audit by NASA.

(5) Comptroller General Access to Records: The Comptroller General, at its discretion and pursuant to applicable regulations and policies, shall have access to and the right to examine records of any Party to the Agreement or any entity that participates in the performance of this Agreement that directly pertain to and involve transactions relating to the Agreement for a period of three (3) years after the Government makes the final milestone payment under this Agreement. This paragraph only applies to any record that is created or maintained in the ordinary course of business or pursuant to a provision of law. The terms of this paragraph shall be included in any subcontracts or other arrangements in excess of \$5,000,000.00, which the Participant has or may enter into related to the execution of the milestone events in this Agreement.

(6) Notwithstanding any other provision of this Agreement, all activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

ARTICLE 6. PRIORITY OF USE

Any schedule or milestone in this Agreement is estimated based upon the Parties' current understanding of the projected availability of NASA goods, services, facilities, or equipment. In the event that NASA's projected availability changes, Participant shall be given reasonable notice of that change, so that the schedule and milestones may be adjusted accordingly. The Parties agree that NASA's use of the goods, services, facilities, or equipment shall have priority over the use planned in this Agreement. Should a conflict arise, NASA in its sole discretion shall determine whether to exercise that priority. Likewise, should a conflict arise as between two or more non-NASA partners, NASA, in its sole discretion, shall determine the priority as between those partners. This Agreement does not obligate NASA to seek alternative Government property or services under the jurisdiction of NASA at other locations.

ARTICLE 7. NONEXCLUSIVITY

This Agreement is not exclusive; accordingly, NASA may enter into similar agreements for the same or similar purpose with other U.S. private or public entities.

ARTICLE 8. LIABILITY AND RISK OF LOSS

A. The objective of this Article is to establish a cross-waiver of liability in the interest of encouraging participation in the exploration, exploitation, and use of outer space. The Parties intend that the cross-waiver of liability be broadly construed to achieve this objective.

B. For purposes of this Article:

1. The term “Damage” means:

- a. Bodily injury to, or other impairment of health of, or death of, any person;
- b. Damage to, loss of, or loss of use of any property;
- c. Loss of revenue or profits; or
- d. Other direct, indirect, or consequential Damage.

2. The term “Launch Vehicle” means an object, or any part thereof, intended for launch, launched from Earth, or returning to Earth which carries Payloads, persons, or both.

3. The term “Payload” means all property to be flown or used on or in a Launch Vehicle.

4. The term “Protected Space Operations” means all Launch Vehicle or Transfer Vehicle activities and Payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of an agreement for launch services. Protected Space Operations begins at the signature of this Agreement and ends when all activities done in implementation of this Agreement are completed. It includes, but is not limited to:

- a. Research, design, development, test, manufacture, assembly, integration, operation, or use of Launch Vehicles or Transfer Vehicles, Payloads, or instruments, as well as related support equipment and facilities and services; and
- b. All activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services.

“Protected Space Operations” excludes activities on Earth that are conducted on return from space to develop further a Payload’s product or process for use other than for the activities within the scope of an agreement for launch services.

5. The term “Related Entity” means:

- a. A contractor or subcontractor of a Party at any tier;
- b. A user or customer of a Party at any tier; or
- c. A contractor or subcontractor of a user or customer of a Party at any tier.

The terms “contractor” and “subcontractor” include suppliers of any kind.

The term “Related Entity” may also apply to a State, or an agency or institution of a State, having the same relationship to a Party as described in paragraphs B.5.a. through B.5.c. of this Article, or otherwise engaged in the implementation of Protected Space Operations as defined in paragraph

B.4. above.

6. The term “Transfer Vehicle” means any vehicle that operates in space and transfers Payloads or persons or both between two different space objects, between two different locations on the same space object, or between a space object and the surface of a celestial body. A Transfer Vehicle also includes a vehicle that departs from and returns to the same location on a space object.

C. Cross-waiver of liability:

1. Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in paragraphs C.1.a. through C.1.d. of this Article based on Damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for Damage, whatever the legal basis for such claims, against:

- a. The other Party;
- b. A party to another NASA agreement that includes flight on the same Launch Vehicle;
- c. A Related Entity of any entity identified in paragraphs C.1.a. or C.1.b. of this Article; or
- d. The employees of any of the entities identified in paragraphs C.1.a. through C.1.c. of this Article.

2. In addition, each Party shall extend the cross-waiver of liability, as set forth in paragraph C.1. of this Article, to its own Related Entities by requiring them, by contract or otherwise, to:

- a. Waive all claims against the entities or persons identified in paragraphs C.1.a. through C.1.d. of this Article; and
- b. Require that their Related Entities waive all claims against the entities or persons identified in paragraphs C.1.a. through C.1.d. of this Article.

3. For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the Convention on International Liability for Damage Caused by Space Objects, which entered into force on September 1, 1972, where the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

4. Notwithstanding the other provisions of this Article, this cross-waiver of liability shall not be applicable to:

- a. Claims between a Party and its own Related Entity or between its own Related Entities;
- b. Claims made by a natural person, his/her estate, survivors, or subrogees (except when a subrogee is a Party to this Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of, such person;
- c. Claims for Damage caused by willful misconduct;
- d. Intellectual property claims;
- e. Claims for Damage resulting from a failure of a Party to extend the cross-waiver of liability to its Related Entities, pursuant to paragraph C.2. of this Article; or
- f. Claims by a Party arising out of or relating to another Party’s failure to perform its obligations under this Agreement.

5. Nothing in this Article shall be construed to create the basis for a claim or suit where none would

otherwise exist.

D. To the extent that activities under this Agreement are not within the definition of “Protected Space Operations,” defined above, the following unilateral waiver of claims applies to activities under this Agreement.

1. Participant hereby waives any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA’s related entities for any injury to, or death of, Participant employees or the employees of Participant’s related entities, or for damage to, or loss of, Participant’s property or the property of its related entities arising from or related to activities conducted under this Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct.

2. Participant further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA, its related entities, and employees of NASA and employees of NASA’s related entities for injury, death, damage, or loss arising from or related to activities conducted under this Agreement.

ARTICLE 9. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. General

1. “Related Entity” as used in this Data Rights Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Participant that is assigned, tasked, or contracted with to perform activities under this Agreement.

2. “Data” means recorded information, regardless of form, the media on which it is recorded, or the method of recording.

3. “Proprietary Data” means Data embodying trade secrets or commercial or financial information that is privileged or confidential, and that includes a restrictive notice, unless the Data is:

- a. known or available from other sources without restriction;
- b. known, possessed, or developed independently, and without reference to the Proprietary Data;
- c. made available by the owners to others without restriction; or
- d. required by law or court order to be disclosed.

4. “Practical Application,” as used in this Data Rights Article, means to:

- a. manufacture, in the case of a composition or product;
- b. practice, in the case of a process or method; or
- c. operate, in case of a machine or system;

and, in each case, under conditions establishing the invention, hardware, software, or service is being used, and its benefits are publicly available on reasonable terms, as permitted by law.

5. Data exchanged between NASA and Participant under this Agreement will be exchanged without restriction except as otherwise provided herein.

6. Notwithstanding any restrictions provided in this Article, the Parties are not restricted in the use, disclosure, or reproduction of Data provided under this Agreement that meets one of the exceptions in 3., above. If a Party believes that any exceptions apply, it shall notify the other Party before any unrestricted use, disclosure, or reproduction of the Data.

7. The Parties will not exchange preexisting Proprietary Data under this Agreement unless

authorized herein or in writing by the owner.

8. If the Parties exchange Data having a notice that the Receiving Party deems is ambiguous or unauthorized, the Receiving Party shall tell the Providing Party. If the notice indicates a restriction, the Receiving Party shall protect the Data under this Article unless otherwise directed in writing by the Providing Party.

9. The Data rights herein apply to the employees and Related Entities of Participant. Participant shall ensure that its employees and Related Entity employees know about and are bound by the obligations under this Article.

10. Disclaimer of Liability: NASA is not restricted in, nor liable for, the use, disclosure, or reproduction of Data without a restrictive notice, or for Data Participant gives, or is required to give, the U.S. Government without restriction.

11. Participant may use the following or a similar restrictive notice:

Proprietary Data Notice

The data herein include Proprietary Data and are restricted under the Data Rights provisions of Space Act Agreement [provide applicable identifying information].

Participant should also mark each page containing Proprietary Data with the following or a similar legend: "Proprietary Data – Use And Disclose Only Under the Notice on the Title or Cover Page."

B. Data First Produced by Participant under this Agreement

- (1) If Data first produced by Participant or its Related Entities under this Agreement is given to NASA, and the Data is Proprietary Data, and it includes a restrictive notice, NASA will use reasonable efforts to protect it. Participant shall furnish such Data to NASA upon request and NASA may disclose and use such Data (under suitable protective conditions) only for evaluating Participant's performance of its milestones and validating the objectives of CSP.
- (2) Upon a successful completion by Participant of all milestones under this Agreement, NASA shall not assert rights in such Data or use such Data for any purpose except that NASA retains the right to: (1) maintain a copy of such Data for archival purposes; (2) use or disclose such archived data within the Government for continued validating and updating of the objectives of CSP; and (3) may use or disclose such archived Data by or on behalf of NASA for Government purposes in the event the NASA determines that:
 - (a) Such action is necessary because Participant, its assignee, or other successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, software, or service related to such Data;
 - (b) Such action is necessary because Participant, its assignee, or other successor, having achieved practical application of inventions, hardware, software, or service related to such Data, has failed to maintain practical application;
 - (c) Such action is necessary because Participant, its assignee, or other

successor has discontinued making the benefits of inventions, hardware, software, or service related to such Data available to the public or to the Federal Government;

- (d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by Participant, its assignee, or other successor; or
- (e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by Participant, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)-(e) above exists, NASA shall provide written notification to the Participant's Administrative Point of Contact. Upon mailing of such determination, Participant shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that Participant does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

- (3) In the event NASA terminates this Agreement in accordance with Article 16.B, Termination for Failure to Perform, NASA may in its sole discretion have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by Participant in carrying out Participant's responsibilities under this Agreement by or on behalf of NASA for Government purposes. The parties will negotiate rights in Data in the event of termination for any other reason.

C. Data First Produced by NASA under this Agreement

- (1) As to Data first produced by NASA in carrying out NASA responsibilities under this Agreement that would be Proprietary Data if it had been obtained from Participant, such Data will be appropriately marked with a restrictive notice and NASA will use reasonable efforts to maintain it in confidence for five years after its development, with the express understanding that during the aforesaid restricted period such marked Data may be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) only for carrying out NASA's responsibilities under this Agreement, and thereafter for any purpose. Partner will use reasonable efforts not to disclose the Data without NASA's written approval during the restricted period. The restrictions placed on NASA do not apply to Data disclosing a NASA owned invention for which patent protection is being considered.
- (2) Upon a successful completion by Participant of all milestones under this Agreement, NASA shall not assert rights in such Data or use such Data for any purpose except that NASA retains the right to: (1) maintain a copy of such Data for archival purposes; (2) use or disclose such archived data within the Government for continued validating and updating of the objectives of CSP; and (3) may use or disclose such archived Data by or on behalf of NASA for Government purposes in the event the NASA determines that:

- (a) Such action is necessary because Participant, its assignee, or other

- successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, software, or service related to such Data;
- (b) Such action is necessary because Participant, its assignee, or other successor, having achieved practical application of inventions, hardware, software, or service related to such Data, has failed to maintain practical application;
 - (c) Such action is necessary because Participant, its assignee, or other successor has discontinued making the benefits of inventions, hardware, software, or service related to such Data available to the public or to the Federal Government;
 - (d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by Participant, its assignee, or other successor; or
 - (e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by Participant, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)-(e) above exists, NASA shall provide written notification to the Participant's Administrative Point of Contact. Upon mailing of such determination, Participant shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that Participant does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

- (3) In the event NASA terminates this Agreement in accordance with Article 16.B, Termination for Failure to Perform, NASA may in its sole discretion have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by NASA in carrying out NASA's responsibilities under this Agreement by or on behalf of NASA for Government purposes during any remaining portion of the restricted period, and thereafter for any purpose. The parties will negotiate rights in Data in the event of termination for any other reason.

D. Publication of Results

The National Aeronautics and Space Act (51 U.S.C. § 20112) requires NASA to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof. As such, NASA may publish unclassified and non-Proprietary Data resulting from work performed under this Agreement. The Parties will coordinate publication of results allowing a reasonable time to review and comment.

E. Data Disclosing an Invention

If the Parties exchange Data disclosing an invention for which patent protection is being considered, and the furnishing Party identifies the Data as such when providing it to the Receiving Party, the Receiving Party shall withhold it from public disclosure for a reasonable time (one (1) year unless otherwise agreed or the Data is restricted for a longer period herein).

F. Copyright

Data exchanged with a copyright notice and with no restrictive notice is presumed to be published. The following royalty-free licenses apply.

1. If indicated on the Data that it was produced outside of this Agreement, it may be reproduced, distributed, and used to prepare derivative works only for carrying out the Receiving Party's responsibilities under this Agreement.
2. Data without the indication of F.1. is presumed to be first produced under this Agreement. Except as otherwise provided in paragraph E. of this Article, and in the Invention and Patent Rights Article of this Agreement for protection of reported inventions, the Data may be reproduced, distributed, and used to prepare derivative works for any purpose.

G. Data Subject to Export Control

Whether or not marked, technical data subject to the export laws and regulations of the United States provided to Participant under this Agreement must not be given to foreign persons or transmitted outside the United States without proper U.S. Government authorization.

H. Handling of Background, Third Party Proprietary, and Controlled Government Data

1. NASA or Participant (as Disclosing Party) may provide the other Party or its Related Entities (as Receiving Party):
 - a. Proprietary Data developed at Disclosing Party's expense outside of this Agreement (referred to as Background Data);
 - b. Proprietary Data of third parties that Disclosing Party has agreed to protect, or is required to protect under the Trade Secrets Act (18 U.S.C. § 1905) (referred to as Third Party Proprietary Data); and
 - c. U.S. Government Data, including software and related Data, Disclosing Party intends to control (referred to as Controlled Government Data).
2. All Background, Third Party Proprietary, and Controlled Government Data provided by Disclosing Party to Receiving Party shall be marked by Disclosing Party with a restrictive notice and protected by Receiving Party in accordance with this Article.
3. Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data.
 - a. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate document.
 - b. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate document.
 - c. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate document.
 - d. Notwithstanding H.4., NASA software and related Data will be provided to Participant under a separate Software Usage Agreement (SUA). Participant shall use and protect the related

Data in accordance with this Article. Unless the SUA authorizes retention, or Participant enters into a license under 37 C.F.R. Part 404, the related Data shall be disposed of as NASA directs:

[None]

4. For such Data identified with a restrictive notice pursuant to H.2., Receiving Party shall:
 - a. Use, disclose, or reproduce such Data only as necessary under this Agreement;
 - b. Safeguard such Data from unauthorized use and disclosure;
 - c. Allow access to such Data only to its employees and any Related Entity requiring access under this Agreement;
 - d. Except as otherwise indicated in 4.c., preclude disclosure outside Receiving Party's organization;
 - e. Notify its employees with access about their obligations under this Article and ensure their compliance, and notify any Related Entity with access about their obligations under this Article; and
 - f. Dispose of such Data as Disclosing Party directs.

I. Oral and visual information

If Participant discloses Proprietary Data orally or visually, NASA will have no duty to restrict, or liability for disclosure or use, unless Participant:

1. Orally informs NASA before initial disclosure that the Data is Proprietary Data, and
2. Reduces the Data to tangible form with a restrictive notice and gives it to NASA within ten (10) calendar days after disclosure.

ARTICLE 10. INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS

A. Definitions

1. "Administrator," means the Administrator of the National Aeronautics and Space Administration (NASA) or duly authorized representative.
2. "Patent Representative" means the NASA Glenn Research Center Patent Counsel.

Correspondence with the Patent Representative under this clause will be sent to:

Patent Counsel
Mail Stop 142-7
Office of the Chief Counsel
NASA Glenn Research Center
21000 Brookpark Rd.
Cleveland, OH 44135

3. "Invention," means any invention or discovery that is or may be patentable or otherwise protectable under title 35 of the U.S.C.
4. "Made," in relation to any invention, means the conception or first actual reduction to practice.
5. "Practical Application," means to:
 - a. manufacture, in the case of a composition or product;
 - b. practice, in the case of a process or method; or
 - c. operate, in case of a machine or system;

and, in each case, under conditions establishing the invention is being used, and its benefits are publicly available on reasonable terms, as permitted by law.

6. “Related Entity” as used in this Invention and Patent Rights Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Participant assigned, tasked, or contracted with to perform activities under this Agreement.

7. “Manufactured substantially in the United States” means over fifty percent (50%) of a product’s components are manufactured in the United States. This requirement is met if the cost to Participant of the components mined, produced, or manufactured in the United States exceeds fifty percent (50%) percent of the cost of all components (considering only the product and its components). This includes transportation costs to the place of incorporation into the product and any applicable duty (whether or not a duty-free entry certificate is issued). Components of foreign origin of the same class or kind for which determinations under Federal Acquisition Regulation 25.103(a) and (b) exist, are treated as domestic. Scrap generated, collected, and prepared for processing in the United States is considered domestic.

B. Allocation of principal rights

1. *Presumption of NASA title in Participant inventions*

a. Participant inventions under this Agreement are presumed made as specified in subparagraphs (A) or (B) of 51 U.S.C. § 20135(b)(1). The above presumption is conclusive unless Participant’s invention disclosure to the Patent Representative includes a written statement with supporting details, demonstrating that the invention was not made as specified above.

b. Regardless of whether title to such an invention is subject to an advance waiver or a petition for individual waiver, Participant may still file the statement in B.1.a.. The Administrator (or Administrator’s designee) will review the information from Participant and any other related information and will notify Participant of his or her determination.

2. *NASA Property rights in Participant inventions*

Inventions made under this Agreement where the presumption of paragraph B.1.a. of this Article is conclusive or when a determination exists that it was made under subparagraphs (A) or (B) of 51 U.S.C. § 20135(b)(1) are the exclusive property of the United States as represented by NASA. The Administrator may waive all or any part of the United States’ rights to Participant, as provided in paragraph B.3. of this Article.

3. *Waiver of property rights by NASA*

a. NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, use Presidential Memorandum on Government Patent Policy of February 18, 1983 as guidance in processing petitions for waiver of rights under 51 U.S.C. § 20135(g) for any invention or class of inventions made or that may be made under subparagraphs (A) or (B) of 51 U.S.C. § 20135(b)(1).

b. NASA has determined that to stimulate and support the capability of a United States SATCOM communication services to the public and the Federal Government, the interest of the United States would be served by waiving to Participant, in accordance with 51 U.S.C. § 20135(g) and the provisions of 14 C.F.R. Part 1245, Subpart 1, rights to any inventions or class of inventions made by Participant in the performance of work under this Agreement. Therefore, as provided in 14 C.F.R. Part 1245, Subpart 1, Participant may petition, prior to execution of the Agreement or within thirty (30) days after execution, for advance waiver of any such inventions Participant may make under this Agreement, and

any such properly filed petition will be granted. If no petition is submitted, or if a petition is denied, Participant (or an employee inventor of Participant) may still petition for waiver of rights to an identified subject invention within eight (8) months after disclosure under paragraph E.2. of this Article, or within such longer period if authorized under 14 C.F.R. § 1245.105, and such properly filed petition will be granted. See paragraph J. of this Article for procedures.

4. *NASA inventions*

- a. No invention or patent rights in NASA or its Related Entity's inventions are exchanged or granted under this Agreement except as provided herein.
- b. Upon request, NASA will use reasonable efforts to grant Participant a negotiated license, under 37 C.F.R. Part 404, to any NASA invention made under this Agreement.
- c. Upon request, NASA will use reasonable efforts to grant Participant a negotiated license, under 37 C.F.R. Part 404, to any invention made under this Agreement by employees of a NASA Related Entity, or jointly between NASA and NASA Related Entity employees, where NASA has title.

C. Minimum rights reserved by the Government

1. For Participant inventions subject to a NASA waiver of rights under 14 C.F.R. Part 1245, Subpart 1, the Government reserves:
 - a. an irrevocable, royalty-free license to practice the invention throughout the world by or on behalf of the United States or any foreign government under any treaty or agreement with the United States; and
 - b. other rights as stated in 14 C.F.R. § 1245.107.
2. Nothing in this paragraph grants to the Government any rights in inventions not made under this Agreement.
3. Upon a successful completion by Participant of all milestones under this Agreement, NASA will refrain from exercising its Government Purpose License reserved in paragraph C.1.a. above for a period of five years following the expiration of this Agreement.
4. Nothing contained in this paragraph shall be considered to grant to the Government any rights with respect to any invention other than an invention made under this Agreement.

D. Minimum rights to Participant

1. Participant is granted a revocable, nonexclusive, royalty-free license in each patent application or patent in any country on an invention made by Participant under this Agreement where the Government has title, unless Participant fails to disclose the invention within the time limits in paragraph E.2. of this Article. Participant's license extends to its domestic subsidiaries and affiliates within its corporate structure. It includes the right to grant sublicenses of the same scope if Participant was legally obligated to do so at the time of this Agreement. The license is transferable only with approval of the Administrator except to a successor of that part of Participant's business to which the invention pertains.
2. Participant's domestic license may be revoked or modified by the Administrator but only if necessary to achieve expeditious practical application of the invention where a third party applies for an exclusive license under 37 C.F.R. Part 404. The license will not be revoked in any field of use or geographic area where Participant has achieved practical application and

continues to make the benefits of the invention reasonably accessible to the public. A license in any foreign country may be revoked or modified at the discretion of the Administrator if Participant, its licensees, or its domestic subsidiaries or affiliates fail to achieve practical application in that country.

3. Before revocation or modification, Participant will receive written notice of the Administrator's intentions. Participant has thirty (30) days (or such other time as authorized by the Administrator) to show cause why the license should not be revoked or modified. Participant may appeal under 14 C.F.R. § 1245.112.

E. Invention disclosures and reports

1. Participant shall establish procedures assuring that inventions made under this Agreement are internally reported within six (6) months of conception or first actual reduction to practice, whichever occurs first. These procedures shall include the maintenance of laboratory notebooks or equivalent records, other records reasonably necessary to document the conception or the first actual reduction to practice of inventions, and records showing that the procedures were followed. Upon request, Participant shall give the Patent Representative a description of such procedures for evaluation.

2. Participant shall disclose an invention to the Patent Representative within two (2) months after the inventor discloses it in writing internally or, if earlier, within six (6) months after Participant becomes aware of the invention. In any event, disclosure must be before any sale, or public use, or publication known to Participant. Participant shall use the NASA New Technology Reporting system at <http://ntr.ndc.nasa.gov/>. Invention disclosures shall identify this Agreement and be sufficiently complete in technical detail to convey a clear understanding of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, or sale, or public use of the invention, and whether a manuscript describing the invention was submitted or accepted for publication. After disclosure, Participant shall promptly notify

NASA of the acceptance for publication of any manuscript describing an invention, or of any sale or public use planned by Participant.

3. Participant shall give NASA Patent Representative:

a. Interim reports every twelve (12) months (or longer period if specified by Patent Representative) from the date of this Agreement, listing inventions made under this Agreement during that period, and certifying that all inventions were disclosed (or there were no such inventions) and that the procedures of paragraph E.1. of this Article were followed.

b. A final report, within three (3) months after completion of this Agreement, listing all inventions made or certifying there were none, and listing all subcontracts or other agreements with a Related Entity containing a Patent and Invention Rights Article (as required under paragraph G of this Article) or certifying there were none.

c. Interim and final reports shall be submitted at <http://ntr.ndc.nasa.gov/>.

4. Participant shall provide available additional technical and other information to the NASA Patent Representative for the preparation and prosecution of a patent application on any invention made under this Agreement where the Government retains title. Participant shall execute all papers necessary to file patent applications and establish the Government's rights.

5. Protection of reported inventions. NASA will withhold disclosures under this Article from public access for a reasonable time (1 year unless otherwise agreed or unless restricted longer herein) to facilitate establishment of patent rights.

6. The contact information for the NASA Patent Representatives is provided at http://prod.nais.nasa.gov/portals/pl/new_tech_pocs.html.

F. Examination of records relating to inventions

1. The Patent Representative or designee may examine any books (including laboratory notebooks), records, and documents of Participant relating to the conception or first actual reduction to practice of inventions in the same field of technology as the work under this Agreement to determine whether:
 - a. Any inventions were made under this Agreement;
 - b. Participant established the procedures in paragraph E.1. of this Article; and
 - c. Participant and its inventors complied with the procedures.
2. If the Patent Representative learns of an unreported Participant invention he or she believes was made under this Agreement, he or she may require disclosure to determine ownership rights.
3. Examinations under this paragraph are subject to appropriate conditions to protect the confidentiality of information.

G. Subcontracts or Other Agreements

1. a. Unless otherwise directed by Patent Representative, Participant shall include this Invention and Patent Rights Article (modified to identify the parties) in any subcontract or other agreement with a Related Entity (regardless of tier) for the performance of experimental, developmental, or research work.
 - b. For subcontracts or other agreements at any tier, NASA, the Related Entity, and Participant agree that the mutual obligations created herein constitute privity of contract between the Related Entity and NASA with respect to matters covered by this Article.
2. If a prospective Related Entity refuses to accept the Article, Participant:
 - a. shall promptly notify Patent Representative in writing of the prospective Related Entity's reasons for refusal and other information supporting disposition of the matter; and
 - b. shall not proceed without Patent Representative's written authorization.
3. Participant shall promptly notify Patent Representative in writing of any subcontract or other agreement with a Related Entity (at any tier) containing an Invention and Patent Rights Article. The notice shall identify:
 - a. the Related Entity;
 - b. the applicable Invention and Patent Rights Article;
 - c. the work to be performed; and
 - d. the dates of award and estimated completion.

Upon request, Participant shall give a copy of the subcontract or other agreement to Patent Representative.

4. In any subcontract or other agreement with Participant, a Related Entity retains the same rights provided Participant in this Article. Participant shall not require any Related Entity to assign its rights in inventions made under this Agreement to Participant as consideration for awarding a subcontract or other agreement.
5. Notwithstanding paragraph G.4., in recognition of Participant's substantial contribution of funds, facilities or equipment under this Agreement, Participant may, subject to the NASA's rights in this Article:
 - a. acquire by negotiation rights to inventions made under this Agreement by a Related Entity that Participant deems necessary to obtaining and maintaining private support; and

b. if unable to reach agreement under paragraph G.5.a. of this Article, request from Patent Representative that NASA provide Participant such rights as an additional reservation in any waiver NASA grants the Related Entity under NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1. Participant should advise the Related Entity that unless it requests a waiver, NASA acquires title to all inventions made under this Agreement. If a waiver is not requested, or is not granted, Participant may then request a license from NASA under 37 C.F.R. Part 404. A Related Entity requesting waiver must follow the procedures in paragraph J. of this Article.

H. Preference for United States manufacture

Products embodying inventions made under this Agreement or produced using the inventions shall be manufactured substantially in the United States. Patent Representative may waive this requirement if domestic manufacture is not commercially feasible.

I. March-in rights

For inventions made under this Agreement where Participant has acquired title, NASA has the right under 37 C.F.R. § 401.6, to require Participant, or an assignee or exclusive licensee of the invention, to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to responsible applicant(s), upon reasonable terms. If Participant, assignee or exclusive licensee refuses, NASA may grant the license itself, if necessary:

1. because Participant, assignee, or exclusive licensee has not, or is not expected within a reasonable time, to achieve practical application in the field of use;
2. to alleviate health or safety needs not being reasonably satisfied by Participant, assignee, or exclusive licensee;
3. to meet requirements for public use specified by Federal regulations being not reasonably satisfied by Participant, assignee, or exclusive licensee; or
4. because the requirement in paragraph H of this Article was not waived, and Participant, assignee, or exclusive licensee of the invention in the United States is in breach of the requirement.

J. Requests for Waiver of Rights

1. Under NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, an advance waiver may be requested prior to execution of this Agreement, or within thirty (30) days afterwards. Waiver of an identified invention made and reported under this Agreement may still be requested, even if a request for an advance waiver was not made or was not granted.
2. Each request for waiver is by petition to the Administrator and shall include:
 - a. an identification of the petitioner, its place of business and address;
 - b. if petitioner is represented by counsel, the name, address, and telephone number of counsel;
 - c. the signature of the petitioner or authorized representative; and
 - d. the date of signature.
3. No specific form is required, but the petition should also contain:
 - a. a statement that waiver of rights is requested under the NASA Patent Waiver Regulations;
 - b. a clear indication of whether the petition is an advance waiver or a waiver of an individual identified invention;
 - c. whether foreign rights are also requested and for which countries;

- d. a citation of the specific section(s) of the regulations under which are requested;
 - e. whether the petitioner is an entity of or under the control of a foreign government; and
 - f. the name, address, and telephone number of the petitioner's point-of-contact.
4. Submit petitions for waiver to the Patent Representative for forwarding to the Inventions and Contributions Board. If the Board makes findings to support the waiver, it recommends to the Administrator that waiver be granted. The Board also informs Patent Representative if there is insufficient time or information to process a petition for an advance waiver without unduly delaying the execution of the Agreement. Patent Representative will notify petitioner of this information. Once a petition is acted on, the Board notifies petitioner. If waiver is granted, any conditions, reservations, and obligations are included in the Instrument of Waiver. Petitioner may request reconsideration of Board recommendations adverse to its request.

ARTICLE 11. USE OF NASA NAME AND EMBLEMS

A. NASA Name and Initials

Participant shall not use "National Aeronautics and Space Administration" or "NASA" in a way that creates the impression that a product or service has the authorization, support, sponsorship, or endorsement of NASA, which does not, in fact, exist. Except for releases under the "Release of General Information to the Public and Media" Article, Participant must submit any proposed public use of the NASA name or initials (including press releases and all promotional and advertising use) to the NASA Associate Administrator for the Office of Communications or designee ("NASA Communications") for review and approval. Approval by NASA Office of Communications shall be based on applicable law and policy governing the use of the NASA name and initials.

B. NASA Emblems

Use of NASA emblems (i.e., NASA Seal, NASA Insignia, NASA logotype, NASA Program Identifiers, and the NASA Flag) is governed by 14 C.F.R. Part 1221. Participant must submit any proposed use of the emblems to NASA Communications for review and approval.

ARTICLE 12. RELEASE OF GENERAL INFORMATION TO THE PUBLIC AND MEDIA

NASA or Participant may, consistent with Federal law and this Agreement, release general information regarding its own participation in this Agreement as desired.

Pursuant to Section 841(d) of the NASA Transition Authorization Act of 2017, Public Law 115-10 (the "NTAA"), NASA is obligated to publicly disclose copies of all agreements conducted pursuant to NASA's 51 U.S.C. §20113(e) authority in a searchable format on the NASA website within 60 days after the agreement is signed by the Parties. The Parties acknowledge that a copy of this Agreement will be disclosed, without redactions, in accordance with the NTAA.

ARTICLE 13. DISCLAIMER OF WARRANTY

Goods, services, facilities, or equipment provided by NASA under this Agreement are provided "as is." NASA makes no express or implied warranty as to the condition of any such goods, services, facilities, or equipment, or as to the condition of any research or information generated under this Agreement, or as to any products made or developed under or as a result of this Agreement including as a result of the use of

information generated hereunder, or as to the merchantability or fitness for a particular purpose of such research, information, or resulting product, or that the goods, services, facilities or equipment provided will accomplish the intended results or are safe for any purpose including the intended purpose, or that any of the above will not interfere with privately-owned rights of others. Neither the Government nor its contractors shall be liable for special, consequential or incidental damages attributed to such equipment, facilities, technical information, or services provided under this Agreement or such research, information, or resulting products made or developed under or as a result of this Agreement.

ARTICLE 14. DISCLAIMER OF ENDORSEMENT

NASA does not endorse or sponsor any commercial product, service, or activity. NASA's participation in this Agreement or provision of goods, services, facilities or equipment under this Agreement does not constitute endorsement by NASA. Participant agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of Participant resulting from activities conducted under this Agreement, regardless of the fact that such product or service may employ NASA-developed technology.

ARTICLE 15. COMPLIANCE WITH LAWS AND REGULATIONS

A. Access by a Participant to NASA facilities or property, or to a NASA Information Technology (IT) system or application, is contingent upon compliance with NASA security and safety policies and guidelines including, but not limited to, standards on badging, credentials, and facility and IT system/application access. The Parties shall comply with all applicable laws and regulations including, but not limited to, safety; security; export control; environmental; and suspension and debarment laws and regulations and establishing an Interconnection Security Agreement when applicable.

B. With respect to any export control requirements:

1. The Parties will comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 C.F.R. Parts 120 through 130, and the Export Administration Regulations (EAR), 15 C.F.R. Parts 730 through 799, in performing work under this Agreement or any Annex to this Agreement. In the absence of available license exemptions or exceptions, the Participant shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data and software, or for the provision of technical assistance.

2. The Participant shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of work under this Agreement or any Annex under this Agreement, including instances where the work is to be performed on-site at NASA and where the foreign person will have access to export-controlled technical data or software.

3. The Participant will be responsible for all regulatory record-keeping requirements associated with the use of licenses and license exemptions or exceptions.

4. The Participant will be responsible for ensuring that the provisions of this Article apply to its Related Entities.

C. With respect to suspension and debarment requirements:

1. The Participant hereby certifies, to the best of its knowledge and belief, that it has complied, and shall comply, with 2 C.F.R. Part 180, Subpart C, as supplemented by 2 C.F.R. Part 1880, Subpart C.

2. The Participant shall include language and requirements equivalent to those set forth in subparagraph C.1., above, in any lower-tier covered transaction entered into under this Agreement.

D. Participant shall annually certify the following to the NASA Administrative Contact to this Agreement:

1. Neither Participant nor any of its subcontractors nor partners are presently debarred, suspended, proposed for debarment, or otherwise declared ineligible for award of funding by any Federal agency;
2. Neither Participant nor any of its subcontractors nor partners have been convicted or had a civil judgment rendered against them within the last three (3) years for fraud in obtaining, attempting to obtain, or performing a Government contract;
3. Participant and any of its subcontractors or partners receiving \$100,000 or more in NASA funding for work performed under this Agreement must have not used any appropriated funds for lobbying purposes prohibited by 31 U.S.C. § 1352; and
4. Participant is an eligible Participant as defined as follows: An entity organized under the laws of the United States or of a State, which is:

A. More than 50 percent owned by United States nationals; or

B. A subsidiary of a foreign company and the Secretary of Transportation finds that –

(i) Such subsidiary has in the past evidenced a substantial commitment to the United States market through –

- a. Investments in the United States in long-term research, development, and manufacturing (including the manufacture of major components and subassemblies); and
- b. Significant contributions to employment in the United States; and

(ii) The country or countries in which such foreign company is incorporated or organized, and, if appropriate, in which it principally conducts its business, affords reciprocal treatment to companies described in subparagraph A comparable to that afforded to such foreign company's subsidiary in the United States, as evidenced by –

- a. Providing comparable opportunities for companies described in subparagraph A. to participate in Government sponsored research and development similar to that authorized under Title 51 U.S.C. Chapter 501 (Space Commerce).
- b. Providing no barriers, to companies described in subparagraph A. with respect to local investment opportunities, that are not provided to foreign companies in the United States; and
- c. Providing adequate and effective protection for the intellectual property rights of companies described in subparagraph A.

To the extent a Participant proposes government funding of any part of a commercial launch, the entity providing those launch services must meet the above eligibility requirements. In accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

It is not anticipated that the capability demonstrations contemplated by this Agreement will involve any research. NASA conducts research with foreign entities only on a cooperative, no-exchange-of funds basis. Although foreign individuals employed by a Participant in support of this FSAA may receive NASA funds, NASA funding may not support research efforts, including travel, by non-U.S.

organizations, including sub-Participants, at any level. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by the Participant is permitted.

E. Pursuant to The Department of Defense and Full-Year Appropriation Act, Public Law 112-10, Section 1340(a); The Consolidated and Further Continuing Appropriation Act of 2012, Public Law 112-55, Section 539; and future-year appropriations (hereinafter, "the Acts"), NASA is restricted from using funds appropriated in the Acts to enter into or fund any agreement of any kind to participate, collaborate, or coordinate bilaterally with China or any Chinese-owned company, at the prime recipient level or at any subrecipient level, whether the bilateral involvement is funded or performed under a no-exchange of funds arrangement. Participant hereby certifies that it is not China or a Chinese-owned company, and that the Participant will not participate, collaborate, or coordinate bilaterally with China or any Chinese-owned company, at the prime recipient level or at any subrecipient level, whether the bilateral involvement is funded or performed under a no-exchange of funds arrangement.

(a) Definition: "China or Chinese-owned Company" means the People's Republic of China, any company owned by the People's Republic of China, or any company incorporated under the laws of the People's Republic of China.

(b) The restrictions in the Acts do not apply to commercial items of supply needed to perform this agreement. However, Participant shall disclose to NASA if it anticipates making any award, including those for the procurement of commercial items, to China or a Chinese-owned entity.

(c) Subawards – The Participant shall include the substance of this provision in all subawards made hereunder.

In addition to the above certification, Participant shall immediately disclose to the NASA Administrative Contact, for any individual involved in this NASA-funded activity, any current or pending professional and educational affiliations or commitments to China or a Chinese-owned company, including Chinese universities.

F. Participant shall comply with the Iran, North Korea, and Syria Nonproliferation Act (P.L. 106-178, amended by P.L. 107-228, P.L. 109-112, P.L. 109-353, P.L. 110-329, P.L. 112-273, P.L. 116-94; 50 U.S.C. 1701 note) (INKSNA) and all other applicable sanctions laws (including but not limited to the Chemical and Biological Weapons Control and Warfare Elimination Act of 1991, 22 U.S.C. § 5601 et seq.; Countering America's Adversaries Through Sanctions Act, P.L. 115 – 44 (Aug 2, 2017); and the International Emergency Economic Powers Act, 50 U.S.C. § 1701 et seq) in performing work under this Agreement or any Annex to this Agreement. Participant shall disclose to NASA if it intends to rely upon Russian entities for its CSP demonstration. Participant shall not subcontract to Russian entities without first receiving written approval from NASA.

(a) Definitions: In this provision:

(1) The term "Russian entities" means:

(A) Russian persons, or

(B) Entities created under Russian law or owned, in whole or in part, by Russian persons or companies including, but not limited to, the following:

(i) The Russian Federal Space Agency (Roscosmos),

(ii) Any organization or entity under the jurisdiction or control of Roscosmos, or

(iii) Any other organization, entity or element of the Government of the Russian Federation.

(2) The term “extraordinary payments” means payments in cash or in kind made or to be made by the United States Government prior to December 31, 2025, for work to be performed or services to be rendered prior to that date necessary to meet United States obligations under the Agreement Concerning Cooperation on the Civil International Space Station, with annex, signed at Washington January 29, 1998, and entered into force March 27, 2001, or any protocol, agreement, memorandum of understanding, or contract related thereto.

(b) This clause implements the reporting requirement in section 6(i) of the Iran, North Korea, and Syria Nonproliferation Act. The provisions of this clause are without prejudice to the question of whether the Participant or its subcontractor(s) are making extraordinary payments under section 6(a) or fall within the exceptions in section 7(1)(B) of the Act. NASA has applied the restrictions in the Act to include funding of Russian entities via U.S. Contractors (Awardees).

(c) (1) The Participant shall not subcontract with Russian entities without first receiving written approval from the NASA Administrative Contact. In order to obtain this written approval to subcontract with any Russian entity as defined in paragraphs (a), the Participant shall provide the NASA Administrative Contact with the following information related to each planned new subcontract and any change to an existing subcontract with entities that fit the description in paragraph (a):

(A) A detailed description of the subcontracting entity, including its name, address, and a point of contact, as well as a detailed description of the proposed subcontract including the specific purpose of payments that will be made under the subcontract.

(B) The Participant shall provide certification that the subcontracting entity is not, at the date of the subcontract approval request, on any of the lists of proscribed denied parties, specially designated nationals and entities of concern found at:

BIS's Listing of Entities of Concern

(see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/entity-list>)

BIS's List of Denied Parties

(see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/denied-persons-list>)

OFAC's List of Specially Designated Nationals

(see <http://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx>)

List of Unverified Persons in Foreign Countries

(see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/unverified-list>)

State Department's List of Parties Statutorily Debarred for Arms Export Control Act Convictions

(see https://www.pmddtc.state.gov/ddtc_public?id=ddtc_kb_article_page&sys_id=7188dac6db3cd30044f9ff621f961914)

State Department's Lists of Proliferating Entities

(see <http://www.state.gov/t/isn/c15231.htm>)

(2) Unless relief is granted by the NASA Administrative Contact, the information necessary to obtain approval to subcontract shall be provided to the NASA Administrative Contact 30 business days prior to executing any planned subcontract with entities defined in paragraph (a).

(d) After receiving approval to subcontract, the Participant shall provide the NASA Administrative Contact with a report every six months that documents the individual payments made to an entity in paragraph (a). The reports are due on July 15th and January 15th. The July 15th report shall document all of the individual payments made from the previous January through June. The January 15th report shall document all of the individual payments made from the previous July through December. The content of the report shall provide the following information for each time a payment is made to an entity in paragraph (a):

- (1) The name of the entity
- (2) The subcontract number
- (3) The amount of the payment
- (4) The date of the payment

(e) The NASA Administrative Contact may direct the Participant to provide additional information for any other prospective or existing subcontract at any tier. The NASA Administrative Contact may direct the Participant to terminate for the convenience of the Government any subcontract at any tier with an entity described in paragraph (a), subject to an equitable adjustment.

(f) On or after December 31, 2025, the Participant shall be responsible to make payments to entities defined in paragraph (a) of this provision. Any subcontract with entities defined in paragraph (a), therefore, shall be completed in sufficient time to permit the U.S. Government to make extraordinary payments on subcontracts with Russian entities on or before December 31, 2025.

(g) The Participant shall include the substance of this clause in all its subcontracts, and shall require such inclusion in all other subcontracts of any tier. The Participant shall be responsible to obtain written approval from the NASA Administrative Contact to enter into any tier subcontract that involves entities defined in paragraph (a).

G. During Agreement performance, Participant shall identify any "covered telecommunications equipment or services" as defined in Section 889(f)(3) of the National Defense Authorization Act of 2019, used as a substantial or essential component of any system, or as critical technology as part of any system, or if Participant is notified of such by a subcontractor at any tier or by any other source, the Participant shall report this in writing to the NASA Administrative Contact in the Agreement, within one business day from the date of such identification or notification.

ARTICLE 16. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or five (5) years from the Effective Date, whichever comes first.

ARTICLE 17. RIGHT TO TERMINATE

A. Termination by Mutual Consent.

This Agreement may be terminated at any time upon mutual written consent of both Parties.

B. Termination for Failure to Perform

(1) At its discretion, NASA may terminate this Agreement 30 days after issuance of a written notification that Participant has failed to perform under this Agreement, by failure to meet a scheduled milestone as identified and described in Appendix B. Before making such a notification, NASA shall consult with Participant to ascertain the cause of the failure and determine whether additional efforts are in the best interest of the Parties. Upon such a notification and determination, NASA will take all rights identified in Articles 9 and 10 of this Agreement.

(2) Participant shall not be entitled to any additional payments from the Government due to a termination for failure to meet a milestone. NASA and Participant will negotiate in good faith any other outstanding issues between the Parties. Failure of the Parties to agree will be resolved pursuant to Article 20, Dispute Resolution. Participant shall retain without liability or obligation of repayment all NASA payments made and received as of the date of termination.

C. Unilateral Termination by NASA:

(1) NASA may unilaterally terminate this Agreement upon written notice as follows. NASA's obligations under this Agreement may be terminated, in whole or in part, (a) upon a declaration of war by the Congress of the United States; or (b) upon a declaration of a national emergency by the President of the United States; or (c) upon a NASA determination, in writing, that NASA is required to terminate for reasons beyond its control. For purposes of this Article, reasons beyond NASA's control include, but are not limited to, acts of God or of the public enemy, acts of the U.S. Government other than NASA, in either its sovereign or contractual capacity (to include failure of Congress to appropriate sufficient funding), fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or unusually severe weather.

(2) Upon receipt of written notification that the Government is unilaterally terminating this Agreement, Participant shall immediately stop work under this Agreement and shall immediately cause any and all of its partners and suppliers to cease work, except to the extent that the Participant wishes to pursue these demonstrations exclusively using its own funding. Upon such a termination, NASA and the Participant agree to negotiate in good faith a final settlement payment to be made by NASA. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone of this Agreement that has not yet been completed, and only that such milestone, and is subject to the provisions of Article 5. Participant shall retain without liability or obligation of repayment all NASA payments made and received as of the date of termination. Failure of the parties to agree will be resolved pursuant to Article 20, Dispute Resolution.

D. Limitation on Damages.

In the event of any termination by NASA, neither NASA nor the Participant shall be liable for any loss of profits, revenue, or any indirect or consequential damages incurred by the other Party, its contractors, subcontractors, or customers as a result of any termination of this Agreement. A Party's liability for any damages under this Agreement is limited solely to direct damages, incurred by the other Party, as a result of any termination of this Agreement subject to mitigation of such damages by the complaining party. However, in no instance shall NASA's liability for termination exceed the total amount due under the next milestone that has not yet been completed under this Agreement.

E. Rights in Property

Participant will have title to property acquired or developed by the Participant and its contractors/partners with Government funding, in whole or in part to conduct the work specified under this Agreement. In the event of termination of this Agreement for any reason, NASA may purchase such property as provided in Article 27. Upon any termination under this Article, NASA may immediately exercise all rights identified in Articles 9 and 10.

ARTICLE 18. CONTINUING OBLIGATIONS

The rights and obligations of the Parties that, by their nature, would continue beyond the expiration or termination of this Agreement, e.g., "Liability and Risk of Loss" and "Intellectual Property Rights"-related clauses shall survive such expiration or termination of this Agreement.

ARTICLE 19. PRINCIPAL POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Agreement.

NASA Administrative Contact

Tyler R. Braden, Agreements Officer
Glenn Research Center
21000 Brookpark Road
Cleveland, OH 44135
Phone: 216-433-5150
E-mail: tyler.r.braden@nasa.gov

Participant Administrative Contact

Julie Jiru, Counsel & Sr. Contracts Officer
1 Rocket Road
Hawthorne, CA 90250
Phone: +1 (310) 363-6848
Email: julie.jiru@spacex.com

NASA Technical Contact
Thomas J. Kacpura, Project Executive
Glenn Research Center
21000 Brookpark Road
Cleveland, OH 44135
Phone: 216-433-6830
E-mail: thomas.j.kacpura@nasa.gov

Participant Technical Contact
Bernt Powell, Program Manager
1 Rocket Road
Hawthorne, CA 90250
Phone: +1 (310) 682-3290
Email: bernt.powell@spacex.com

ARTICLE 20. DISPUTE RESOLUTION

Except as otherwise provided in the Article entitled “Intellectual Property Rights – Invention and Patent Rights” (for those activities governed by 37 C.F.R. Part 404), and those situations where a pre-existing statutory or regulatory system exists (e.g., under the Freedom of Information Act, 5 U.S.C. § 552), all disputes concerning questions of fact or law arising under this Agreement shall be referred by the claimant in writing to the appropriate person identified in this Agreement as the “Points of Contact.” The persons identified as the “Points of Contact” for NASA and the Participant will consult and attempt to resolve all issues arising from the implementation of this Agreement. If they are unable to come to agreement on any issue, the dispute will be referred to the signatories to this Agreement, or their designees, for joint resolution. If the Parties remain unable to resolve the dispute, then the NASA signatory or that person’s designee, as applicable, will issue a written decision that will be the final agency decision for the purpose of judicial review. Nothing in this Article limits or prevents either Party from pursuing any other right or remedy available by law upon the issuance of the final agency decision.

ARTICLE 21. INVESTIGATIONS OF MISHAPS AND CLOSE CALLS

In the case of a close call, mishap or mission failure, the Parties agree to provide assistance to each other in the conduct of any investigation. For all NASA mishaps or close calls, Participant agrees to comply with NPR 8621.1, "NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping" and GLSBU 8621.1, “Mishap Preparedness and Contingency Plan for Glenn Research Center”.

ARTICLE 22. MODIFICATIONS

Any modification to this Agreement shall be executed, in writing, and signed by an authorized representative of NASA and the Participant.

ARTICLE 23. ASSIGNMENT

Neither this Agreement nor any interest arising under it will be assigned by either Party without the express written consent of the officials executing, or successors, or higher- level officials possessing original or delegated authority to execute this Agreement.

ARTICLE 24. APPLICABLE LAW

U.S. Federal law governs this Agreement for all purposes, including, but not limited to, determining the validity of this Agreement, the meaning of its provisions, and the rights, obligations and remedies of the Parties.

ARTICLE 25. INDEPENDENT RELATIONSHIP

This Agreement is not intended to constitute, create, give effect to or otherwise recognize a joint venture, partnership, or formal business organization, or agency agreement of any kind, and the rights and obligations of the Parties shall be only those expressly set forth herein.

ARTICLE 26. LOAN OF GOVERNMENT PROPERTY

The Parties shall enter into a NASA Form 893, Loan of NASA Equipment, for NASA equipment loaned to Participant.

ARTICLE 27. TITLE AND RIGHTS IN REAL AND PERSONAL PROPERTY

Participant will have title to property acquired or developed by Participant under this Agreement, including developed or acquired by the Participant for CSP demonstrations. In the event of termination of this Agreement for any reason under Article 17, NASA will have the right to purchase any such property additional to NASA's immediately exercised rights identified in Articles 9 and 10. The Parties will negotiate in good faith purchase prices for specific items of property. The negotiated prices will be based on the Participant's actual costs for purchase or development of the specific item(s), or fair market value, whichever is less. This price will then be discounted by a percentage that reflects the ratio of Government funding provided under the Agreement versus the amount of Participant funding used to develop the specific item(s) of property. ($\$2$ of Government funds v. $\$1$ of Participant funds = $2/3 = 66.6\%$ discount.).

ARTICLE 28. NASA FURNISHED INFORMATION AND SERVICES

A. NASA may, at its sole discretion and on terms to be negotiated between the Parties, provide Participant additional NASA services, technical expertise, or Government Property. Additional NASA services, technical expertise, or Government Property may be provided on a fully-reimbursable basis, except for de minimis requests as defined in section 4.8 of the AFP. Specific services and property will be identified in modifications to this Agreement. Unless NASA specifically requires Participant to use NASA furnished services, technical expertise or Government Property to fulfill its obligations under this Agreement, any decision by Participant to use NASA furnished services, technical expertise or Government Property shall be at Participant's option and sole discretion. Participant shall remain solely responsible for completion of its milestones under this Agreement regardless of the availability or use of such optional NASA services, technical expertise, or Government Property.

B. There is no Government Furnished Property or Services furnished under this Agreement except for those that may be provided in Article 28.A. However, Participant has the ability to enter into separate

Space Act agreements with NASA Centers to use NASA resources in performance of this Agreement. The terms and conditions of other Space Act agreements will govern the use of NASA resources not being provided under this Agreement. With each of its subcontractors or partners, including NASA Centers, Participant will be responsible for ensuring timely, accurate work, and replacing such subcontractors or partners, where necessary and appropriate and at the discretion of Participant, in order to meet milestones.

ARTICLE 29. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION

SPACE EXPLORATIONS TECHNOLOGIES
CORP.

BY: _____
Kathryn L. Lueders
Associate Administrator, Space Operations
Mission Directorate

BY:  _____
Julie Jiru
Counsel and Sr. Contracts Officer

DATE: _____

DATE: 15 Apr 2022 _____

APPENDIX A: EXECUTIVE SUMMARY

Over a decade of successful partnership between the National Aeronautics and Space Administration (NASA) and SpaceX has yielded remarkable outcomes in launch and human spaceflight. Now, as the largest satellite operator in the world and as a leader in satellite broadband services, SpaceX is eager to partner with NASA to advance revolutionary communications capabilities that will enable breakthroughs in science, enhance global security, stimulate the US commercial satellite communications industry and support a rapidly growing commercial space economy. As a part of the Communications Services Project Phase 2, SpaceX will demonstrate high throughput, low latency, end-to-end data relay service. The relay service will employ a fully routable resilient mesh network of satellites connected through space via high-speed laser communication links. Ultimately, the goal is to leverage our proven Starlink laser technology to provide users, such as NASA, with remarkable improvements in connectivity and throughput at an exceptional value compared to legacy communications systems. Throughout the period of performance, SpaceX will exercise critical interfaces and perform successive system-level validations with operationally relevant satellites and users. The milestone plan will follow SpaceX's progress through multiple concurrent efforts to identify and mitigate risk associated with fielding the operational service, and provide NASA insight along the way. Further, SpaceX will execute multiple risk reduction activities, including on-orbit laser communication hardware validation, ground segment and user interface validation, and full end-to-end data relay between a SpaceX laser-equipped asset, and the relay constellation. Over the course of the contract, SpaceX will also define key components of the operational service offering such as, Service Level Agreements (SLA), customer hardware and network interfaces, and the approach to cybersecurity. More details of contract milestones can be found in Appendix B.

APPENDIX B: PERFORMANCE MILESTONES AND SUCCESS CRITERIA

Any changes to milestone timing will be coordinated with NASA as soon as possible.

<p>Milestone 1: Kickoff/Concept Overview <i>Subsequent to Funded Space Act Agreement (FSAA) execution and initiation of the Communications Service Project (CSP), Participant shall host a kickoff meeting to describe the plan for the Participant’s program implementation. The goal of this meeting will be to introduce the SpaceX and NASA teams as well as affirm the ultimate service objectives and evaluate the concept for reducing risk associated with those objectives as part of the CSP demonstration phase, including the end-to-end flight demonstration of the service. The associated operational requirement REQ_ID 016 (from section 3.3 of Announcement for Proposals (AFP)) will be addressed.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>The FSAA is signed by both parties.</i> • <i>Participant readiness to present to NASA (Anticipated to be within 60 days of agreement being signed by both Parties.)</i> • <i>High level risk assessment is complete.</i> <p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>Successful completion of the Program Kickoff.</i> • <i>Participant outlines overall plan and timeline of CSP Phase 2 contract and associated demonstrations in the context of the overarching capability development plan.</i> • <i>The objectives for phases of the demonstrations have been identified.</i> • <i>The demonstration concepts have been defined, for the service demonstration and the end-to-end demonstration, and are technically and logistically feasible, and links the milestone progress to the proposed operational service.</i> • <i>The participant describes how each demonstration will meet the requirement for the ability to coordinate regulatory/spectrum management issues to enable provisioning of future communication services. (REQ_ID 016).</i> • <i>The need for the service has been identified.</i> • <i>The top business and financial risks associated with the capability development and the demonstration are identified.</i> 	<p>Amount: \$686,000 Date: award date +2 months</p>
<p>Milestone 2: Optical Communications Package Risk Reduction Technical Interchange Meeting (TIM) <i>SpaceX will integrate, launch, and operate the optical communications hardware for on-orbit risk reduction testing. Pointing, acquisition, and tracking of optical links between the spacecraft and laser-equipped SpaceX satellites will be attempted with learning as the primary goal. This largely internally funded demonstration of the optical communications hardware functionality will have minimal expectations for requirements, oversight, and success.</i></p>	<p>Amount: \$980,000 Date: award date +6 months</p>

SpaceX offers this TIM to provide insight into the ongoing internal demonstrations, as risk reduction for the end-to-end demonstration and future optical data relay service offering under NASA's CSP.

Entrance Criteria

- *Demonstration concept is drafted for on-orbit risk reduction testing of the optical communications hardware.*
- *Demonstration concept of operations (CONOPS) are drafted including how the pointing, acquisition, and tracking of optical links between the spacecraft and laser equipped SpaceX satellites will be demonstrated and how network planning and scheduling will occur.*
- *Demonstration data flows are documented in a data flow diagram.*
- *Demonstration timeline is stated.*
- *Required hardware is defined.*
- *SpaceX's desired outcomes for the risk-reduction demonstration are stated.*
- *Expectations for success of the demo are stated.*
- *High-risk demo areas are identified*
- *Areas of risk reduction for the CSP data relay service are stated.*
- *Draft presentation is made available 5 days in advance of Optical Communications Package Risk Reduction TIM.*

Success Criteria:

- *The review is successfully completed and the demonstration objectives are defined.*
- *How demonstration objectives relate to the proposed service are explained.*
- *Any items remaining to be resolved prior to the demonstration are identified along with the approach to address each item.*
- *A concept has been identified that is technically and logistically consistent with the stated risk posture of the demonstration and consistent with learning as the primary objective of the demonstration.*
- *Risks to the risk reduction effort are identified. How the risks relate to the data relay service are explained.*
- *Differences between risk reduction testing and the end-to-end demonstration are identified.*

Milestone 3: Optical Communications Package TIM

SpaceX will host a TIM to present SpaceX's optical communications package to be used during the end-to-end demonstration. This meeting will give NASA the opportunity to ask questions about the design, user spacecraft assumptions, and acquisition of service CONOPS, interfaces, etc., as well as to provide input. The associated operational requirements (from section 3.3 of AFP) that will be addressed are REQ_ID 008, REQ_ID 009, and REQ_ID 015. Insight will be provided regarding how this optical communications hardware will interface with a SpaceX asset for the end-to-end demonstration.

Amount: \$882,000
Date: award date +9 months

<p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>Draft presentation made available a minimum of 30 days prior to the TIM.</i> • <i>Participant defines initial user-vehicle size, weight, and power (SWaP) requirements for hosting the optical communications package.</i> • <i>Initial optical communications hardware design criteria are stated.</i> • <i>Host spacecraft assumptions are stated.</i> • <i>Confirmation provided that NASA is prepared to give feedback during the TIM.</i> <p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>The review is successfully completed.</i> • <i>Package reflects a reasonable approach to achieving the demonstration for CSP with an acceptable level of risk.</i> 	
<p>Milestone 4: Optical Communications Risk Reduction Debrief TIM</p> <p><i>SpaceX will integrate, launch, and operate optical communications assembly for on-orbit risk reduction testing of the hardware. Pointing, acquisition, and tracking of optical links between the spacecraft and laser- equipped SpaceX satellites will be attempted with learning as the primary goal. This largely internally funded demonstration of the hardware’s functionality will have minimal expectations for requirements, oversight, and success.</i></p> <p><i>SpaceX offers this TIM milestone to provide insight into the results of these ongoing internal demonstrations. The associated operational requirements (from section 3.3 of AFP) that will be addressed are REQ_ID 014 and REQ_ID 015.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>Draft presentation summarizing on-orbit risk reduction activity and outcomes made available a minimum of 5 days prior to the optical communications Risk Reduction Debrief TIM.</i> • <i>Optical communications on-orbit risk reduction testing was completed.</i> • <i>Lessons learned from the on-orbit risk reduction test are compiled.</i> • <i>Applicable risks retired are compiled.</i> <p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>The review is successfully completed.</i> • <i>Demonstration outcomes were addressed including, specifically, key learnings from the activity.</i> • <i>How the demonstration retires risk for the proposed service is explained and any new risks uncovered are identified.</i> • <i>The participant describes how the demonstration user terminal tested relates to the user terminal proposed for the operational service offering.</i> 	<p>Amount: \$980,000 Date: award date +12 months</p>

<ul style="list-style-type: none"> • <i>Improvements, if applicable, to be made to the hardware for the end-to-end demonstration will be identified.</i> 	
<p>Milestone 5: As-A-Service Strategy TIM</p> <p><i>SpaceX will host a TIM aimed at soliciting NASA input and feedback on the As-a-Service procurement approach. This meeting will be a review of Service Level Agreement (SLA) development held by SpaceX's finance and sales team focused on discussion of SLAs, potential terms and conditions of the service, and analysis of commercial data relay market.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>Draft presentation made available a minimum of 5 days prior to the As-A-Service Strategy TIM.</i> • <i>Analysis of commercial data relay market is prepared.</i> <p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>The review is successfully completed and addresses how the SLA and potential terms and conditions of the service align with the analysis of commercial data relay market.</i> • <i>Path to final pricing model is identified.</i> 	<p>Amount: \$882,000 Date: award date +15 months</p>
<p>Milestone 6: High-Rate Data Relay Demonstration Plan TIM</p> <p><i>SpaceX will host a TIM to discuss the plan for accomplishing the high-rate data relay end-to-end demonstration of service. This will include the expected CONOPs of the demonstration, the hardware and software required, and the detailed timeline of the demonstration.</i></p> <p><i>During this TIM, SpaceX will address how the operational service is expected to perform against the GOAL(s) 1.001, 1.002, 1.003, 1.004, 1.005, 1.007, 1.008, 1.009, 2.001, 2.002, 2.003, 2.004, 2.006, and 2.007 from the AFP, specifically with respect to the high-rate space-to-space use case. This will include detailed optical link availability analysis to users at various altitudes and inclinations (per AFP goals), data throughput assessments, data latency simulations, and analysis of user availability for make-before-break connectivity.</i></p> <p><i>SpaceX will identify how the on-orbit demonstration will validate inputs to the aforementioned analyses and simulations. For example, during the demonstration, SpaceX will measure achieved link acquisition time—an input to availability analysis—to inform future predictions of service performance.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>Detailed demonstration plan is defined.</i> • <i>Demonstration CONOPS are drafted.</i> • <i>The hardware and software required for the demonstration are identified and available to support the end-to-end demonstration.</i> • <i>The detailed timeline for the demonstration is stated.</i> • <i>SpaceX's desired outcomes are stated.</i> 	<p>Amount: \$20,051,991 Date: award date +18 months</p>

<ul style="list-style-type: none"> • <i>SpaceX's key measures of performance for the demonstration are stated.</i> • <i>Expectations for success of demo are stated.</i> • <i>High-risk demo areas are identified and rated according to SpaceX's internal risk processes.</i> • <i>Areas of risk reduction for the CSP data relay service are stated.</i> • <i>Any known differences between this demonstration and the operational service to be offered to NASA under CSP are identified.</i> • <i>Analysis/strategy describing how the operational service is expected to perform against the AFP GOAL(s) 1.001, 1.002, 1.003, 1.004, 1.005, 1.007, 1.008, 1.009, 2.001, 2.002, 2.003, 2.004, 2.006, and 2.007 is made available.</i> • <i>Draft presentation is made available 5 days in advance of the High Data Rate Relay Demonstration Plan TIM.</i> <p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>The review addresses how the CONOPS of the demonstration meets applicable operational requirements and goals of the AFP and advances SpaceX's broader risk reduction objectives toward development of the operational relay service.</i> • <i>The review is successfully completed, the demonstration objectives are defined, and how they relate to the proposed service is explained.</i> • <i>Any items remaining to be resolved prior to the demonstration are identified along with the approach to address each item.</i> • <i>Risks to the risk reduction effort are identified. How the risks relate to the data relay service are explained.</i> • <i>Analysis/strategy showing how the operational service performs against AFP GOAL(s) 1.001, 1.002, 1.003, 1.004, 1.005, 1.007, 1.008, 1.009, 2.001, 2.002, 2.003, 2.004, 2.006, and 2.007 is presented.</i> 	
<p>Milestone 7: Service Level Agreement (SLA) Coordination TIM</p> <p><i>SpaceX will create a draft of the SLA and Terms and Conditions (T's & C's) to be agreed to by customers at point of purchase. This milestone envelopes the effort involved in drafting SLAs, T's & C's, and Key Performance Indicators (KPIs) specific to the NASA CSP program. This meeting will provide an opportunity to present SpaceX's approach and solicit NASA input and feedback on SpaceX's agreements that will be used for the service offering. It is anticipated that agreements and KPIs may be updated after discussion and input from the NASA team. The associated operational requirement REQ_ID 012 (from section 3.3 of AFP) will be addressed.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>T's & C's of the SLA are defined at a draft level and provided to NASA 30 days in advance.</i> • <i>KPIs of the service are defined at a draft level and provided to NASA 30 days in advance.</i> 	<p>Amount: \$882,000 Date: award date +24 months</p>

<ul style="list-style-type: none"> • Confirmation provided that NASA is prepared to give feedback on the T's & C's and the KPIs during the SLA Coordination TIM. • The expected pricing of the data relay service is drafted, along with supporting assumptions. • The expected pricing of the optical communications package assemblies is stated, along with supporting assumptions. • Draft presentation made available a minimum of 5 days prior to the SLA Coordination TIM. <p>Success Criteria:</p> <ul style="list-style-type: none"> • The review is successfully completed and addresses how the SLA and potential terms and conditions of the service align with the analysis of commercial data relay market. • Path to final SLA template is identified. • The participant describes how KPIs are supported by testing and/or risk reduction efforts. 	
<p>Milestone 8: High-Rate Data Relay Demonstration TIM SpaceX will demonstrate the use of the data relay service between a SpaceX asset and the constellation in an end-to-end manner. This demonstration will attempt to fully validate a user acquiring the service, accessing SpaceX ground interfaces, transferring data, and gauging performance of the service. The associated operational requirements (from section 3.3 of AFP) that will be addressed are REQ_ID 008, REQ_ID 009, REQ_ID 010, REQ_ID 011, REQ_ID 013, REQ_ID 014, REQ_ID 015, and REQ_ID 016.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> • SpaceX is ready to perform demonstration of service. • Hardware/assets required to complete the demonstration are ready and available. • Draft presentation of demo logistics is made available 5 days in advance of demonstration. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Participant offers NASA an opportunity to witness the demonstration. • Data is relayed from one SpaceX asset to the service constellation and to the ground. 	Amount: \$24,062,389 Date: award date +30 months
<p>Milestone 9: High-Rate Data Relay Demonstration Debrief TIM After completion of the demonstration, SpaceX will host a TIM where the results of the demonstration will be summarized. During this meeting, SpaceX will display the performance witnessed during the demonstration and identify the differences between this demonstration and the final data relay service (if applicable). The associated operational requirements (from section 3.3 of AFP) that will be addressed are REQ_ID 011 and REQ_ID 015.</p>	Amount: \$16,041,593 Date: award date +32 months

<p><i>SpaceX will update analysis parameters based on on-orbit performance measured during the flight demonstration to inform how the operational service will perform against relevant GOAL(s) 1.001, 1.002, 1.003, 1.004, 1.005, 1.007, 1.008, 1.009, 2.001, 2.002, 2.003, 2.004, 2.006, and 2.007.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>The demonstration was completed.</i> • <i>Summary of data review provided, along with the compiled results of the demonstration.</i> • <i>Analyses are updated with as-measured performance parameters to inform how the operational service is expected to perform against GOALs outlined in the AFP, for the high-rate space-to-space use case.</i> • <i>A closeout summary Final Report has been prepared that summarizes the effort, applicable risks retired from the demo, and how it represents the intended operational service.</i> <p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>The review successfully addresses demonstration outcomes, specifically how the performance of the demonstration addresses the associated operational requirements and goals of the AFP.</i> • <i>Key learnings from the demonstration are addressed.</i> • <i>Next steps to reach the operationalization phase of the service are documented.</i> • <i>How the demonstration retires risk for the proposed service is explained and any new risks uncovered are identified, along with plans to reduce or retire them.</i> • <i>Lessons learned that will be applied to the services interfaces demonstration are identified.</i> • <i>Analysis results with updated as-measured performance parameters informing how the operational service will perform against AFP goals are presented.</i> 	
<p>Milestone 10: Cybersecurity Approach TIM</p> <p><i>This TIM will provide an opportunity for SpaceX to walk through the cybersecurity architecture and block diagram in place for the service constellation. In addition, NASA is encouraged to participate in SpaceX's crowdsourced cybersecurity efforts at https://bugcrowd.com/spacex. The associated operational requirements (from section 3.3 of AFP) that will be addressed are REQ_ID 001, REQ_ID 002, REQ_ID 003, REQ_ID 004, REQ_ID 005, and REQ_ID 006.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>Draft presentation made available a minimum of 5 days prior to the Cybersecurity Approach TIM.</i> • <i>Cybersecurity approach document for the proposed service with a block diagram of the Architecture. The document will include approach for the demonstration, and any differences identified.</i> 	<p>Amount: \$784,000 Date: award date +30 months</p>

<p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>The review is successfully completed and the cybersecurity architecture is described.</i> • <i>The review addresses how the cybersecurity architecture addresses SpaceX, NASA, and other key users' security needs and requirements, including description of cryptographic protections, Information Assurance controls for space and ground systems, and continuous efforts to maintain a robust cybersecurity posture.</i> 	
<p>Milestone 11: Ground Interfaces/Application Programming Interface (API) TIM</p> <p><i>SpaceX will host a TIM to discuss the ground interfaces and the APIs to access the data relay service. This will give NASA the opportunity to familiarize itself with the service interface and to provide feedback to SpaceX's engineering team. The associated operational requirement REQ_ID 009 (from section 3.3 of AFP) will be addressed.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>Expected acquisition of service CONOPs are defined.</i> • <i>User-facing API is described to NASA team.</i> • <i>Expected service performance is defined.</i> • <i>Draft presentation made available a minimum of 5 days prior to the Ground Interfaces/API TIM.</i> <p><i>Success Criteria:</i></p> <ul style="list-style-type: none"> • <i>Review is successfully completed.</i> • <i>Path to final service API is identified.</i> 	<p>Amount: \$784,000 Date: award date +33 months</p>
<p>Milestone 12: Service Interface Demonstration Plan TIM</p> <p><i>SpaceX will host a TIM to discuss the plan for accomplishing the demonstration of ground service interfaces. This will include the expected CONOPS of the ground demonstration, the hardware and software required, and the timeline of the demonstration. The associated operational requirements (from section 3.3 of AFP) addressed are: REQ_ID 008, REQ_ID 010, REQ_ID 011, REQ_ID 012, and REQ_ID 016. The service interface will be demonstrated using multiple SpaceX satellites within the constellation. The service interface will be exercised between the SpaceX service constellation and a SpaceX asset outside the service constellation during the end-to-end demonstration in milestone 8.</i></p> <p><i>Entrance Criteria:</i></p> <ul style="list-style-type: none"> • <i>Ground interface demonstration plan is defined.</i> • <i>Service interface demonstration CONOPS are drafted.</i> • <i>The hardware and software required for the interface demonstration are identified.</i> • <i>The timeline for the demonstration is stated.</i> • <i>SpaceX's desired outcomes are stated.</i> • <i>Expectations for success of demo are stated.</i> • <i>High-risk demo areas are identified.</i> 	<p>Amount: \$980,000 Date: award date +36 months</p>

<ul style="list-style-type: none"> • Areas of risk reduction for the CSP data relay service are stated. • Draft presentation is made available 5 days in advance of the Service Demonstration Plan TIM. • Differences between services interfaces exercised in this demonstration versus the demonstration in Milestone 8 are identified. <p>Success Criteria:</p> <ul style="list-style-type: none"> • The review addresses how the CONOPS of the demonstration meets applicable operational requirements and goals of the AFP and advances SpaceX's broader risk reduction objectives. • The review is successfully completed, and the demonstration objectives are defined, and how they relate to the proposed service is explained. • Any items remaining to be resolved prior to the demonstration are identified along with the approach to address each item. • Risks to the risk reduction effort are identified. How the risks relate to the data relay service are explained. 	
<p>Milestone 13: Service Interface Demonstration</p> <p>SpaceX will demonstrate the use of the data relay service across multiple SpaceX assets/satellites. This demonstration will consist of a SpaceX user performing the steps of requesting use of the service, accessing the user interface and physically interacting with a "client" spacecraft through SpaceX's optical mesh network in space. The associated operational requirements (from section 3.3 of AFP) that will be addressed are REQ_ID 007, REQ_ID 009, REQ_ID 013, and REQ_ID 014.</p> <p>Entrance Criteria:</p> <ul style="list-style-type: none"> • SpaceX is ready to perform demonstration of service interfaces. • Hardware/assets required to complete the interface demonstration are ready and available. • Draft presentation of demonstration logistics is made available 5 days in advance of demonstration. <p>Success Criteria:</p> <ul style="list-style-type: none"> • Participant offers NASA an opportunity to witness the demonstration. • Service interface demonstration is conducted. 	<p>Amount: \$980,000 Date: award date +39 months</p>
<p>Milestone 14: Service Demonstration Debrief TIM</p> <p>After completion of the service interfaces demonstration, SpaceX will host a TIM where the results of the demonstration will be summarized. During this meeting, SpaceX will display the performance witnessed during the demonstration and identify the differences between this demonstration and the final data relay service. The associated operational requirements (from section 3.3 of AFP) that will be addressed are REQ_ID 011 and, if applicable, REQ_ID 015.</p>	<p>Amount: \$980,000 Date: award date +42 months</p>

Entrance Criteria:

- *The demonstration was completed.*
- *Summary of data review provided, along with the compiled results of the demonstration.*
- *A closeout summary Final Report has been prepared that summarizes the effort, applicable risks retired from the demo, and the intended operational service.*
- *The remaining effort(s) to reach the operationalization phase of the service are documented.*
- *The acquisition and business models are updated, along with the SLA for the service.*

Success Criteria:

- *The review successfully addresses demonstration outcomes, specifically how the performance of the demonstration addresses the associated operational requirements and goals of the AFP.*
- *Key learnings from the demonstration are addressed.*
- *Next steps to reach the operationalization phase of the service are documented.*
- *Successful completion of the CSP Demonstration through the FSAA.*
- *How the demonstration retires risk for the proposed service is explained and any new risks uncovered are identified.*