

FUNDED SPACE ACT AGREEMENT
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SES GOVERNMENT SOLUTIONS, INC.
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 SES Government Solutions, Inc., located at 11790 Sunrise Valley Drive, Suite 300, Reston, VA 20191 (hereinafter referred to as "SES GS" 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:

- [X] Assured Data Delivery
- [X] File Delivery and Networking
- [X] Additional Proposed Capability(ies)
 - [X] Additional Capability 1: Management and Control of NASA surrogate spacecraft
 - [X] Additional Capability 2: Low latency high throughput delivery of space relay data
 - [X] Additional Capability 3: Integration of commercial sector use of relay infrastructure

ARTICLE 3. RESPONSIBILITIES

- A. SES GS 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

Stacey Elwood, Vice President, Contracts
SES Government Solutions, Inc.
11790 Sunrise Valley Dr., Suite 300, Reston VA
Phone: 703-610-0941
Email: Stacey.Elwood@ses-gs.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

Eric Gunzelman, Senior Director, Corporate Dev
SES Government Solutions, Inc.
11790 Sunrise Valley Dr., Ste 300, Reston VA
Phone: 703-610-0951
Email: Eric.Gunzelman@ses-gs.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

SES GOVERNMENT SOLUTIONS, INC.

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

BY:  _____
Stacey Elwood
Vice President, Contracts

DATE: _____

DATE: April 13, 2022

APPENDIX A: EXECUTIVE SUMMARY

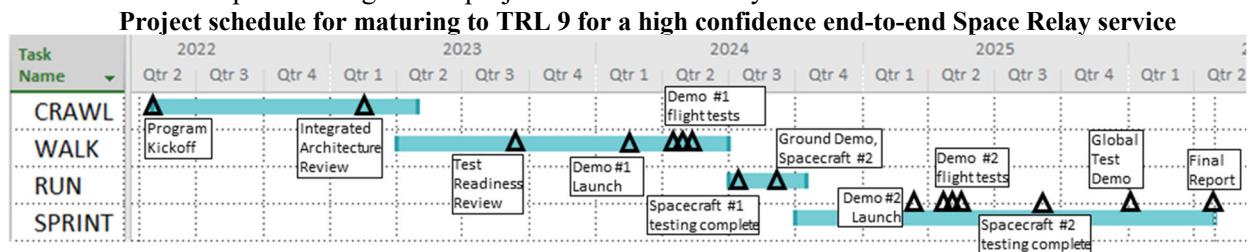
Team SES Government Solutions (SES GS) will develop and demonstrate flexible, cost-effective, state-of-the-art Satellite Communications (SATCOM) services to space-based users in near-Earth orbit while promoting a diverse and growing commercial SATCOM industry for satellite-to-satellite(s) relay links for U.S. Government (USG) and private sector customers. Team SES GS combines the capabilities of SES, the world’s largest satellite owner/operator with that of Planet, the world’s leading commercial imaging company, to create the world’s first commercial space relay service.

The demonstration and follow-on operational service will use SES’ O3b mPOWER Medium Earth Orbit (MEO) satellite constellation for high data rate, low latency Ka-band data relay communications, mainly for file delivery to/from a near-Earth orbit NASA satellite, and C-band communications through an SES Geosynchronous Earth Orbit (GEO) satellite for Telemetry, Tracking and Command (TT&C) and assured data access, lower rate communications. We will use these data links to connect our proxy Mission Operations Center (MOC) with a notional NASA Principal Investigator (PI).

SES GS teamed with Planet to incrementally mature increasing capability in a four-phase demonstration sequence—crawl, walk, run, and sprint as described below:

1. Crawl (2022): Ground lab test to ensure the CSP terminal/transceiver adjusts for “Doppler Shift” and can communicate when integrated into a Low Earth Orbit (LEO) spacecraft.
2. Walk (2023): Ground test of the CSP Transceiver Flight Hardware, ensuring it can transmit Forward & Return data via O3b mPOWER satellites and C-band assured data access through an SES GEO satellite.
3. Run (2024): On-orbit end-to-end demonstration of the CSP transceivers on a LEO spacecraft. In-orbit relay services demonstrated between representative terminal-equipped body-steered LEO user spacecraft to a MEO (Ka-band)/GEO (C-band) relay spacecraft, forward and return between MEO/GEO and gateway ground terminal with terrestrial connectivity to the proxy MOC/PI.
4. Sprint (2025): On-orbit demos of relay services between representative terminal-equipped user spacecraft with an electronically-steered Ka-band receive/transmit array, MEO/GEO relay spacecraft, and finally, to a ground terminal with terrestrial connectivity to the proxy MOC/PI. Final capstone testing includes a global test campaign demonstrating performance across range of environmental conditions.

The table below depicts the high-level project schedule with key milestones.



Team SES GS has teamed with NASA is roughly a 50/50 cost share on this program using existing, proven on-orbit assets and technologies. All major system components start between Technical Readiness Levels (TRL) 7 to 9.

APPENDIX B: PERFORMANCE MILESTONES AND SUCCESS CRITERIA

In general, Appendix G of NASA System Engineering Process and Requirements (i.e. NASA Procedural Requirements (NPR) 7123.1C) has been used as a guide with respect to entrance and success criteria for program events such as System Requirement Review (SRR), Mission Concept Review (MCR), LEO Spacecraft & Payload Preliminary Design Review (PDR), Low Earth Orbit (LEO) Spacecraft & Payload Critical Design Review (CDR), System Integration Readiness Review, System Test Readiness Reviews (TRR), System Acceptance Reviews, Operations/Mission/Integration/Pre-Ship Readiness Review, In-Orbit Test Readiness Review, and In-Orbit Test Data Review. Reviews will be scheduled prior to and after each major demonstration event in concert with our incremental maturity model (Crawl, Walk, Run, Sprint sequence). Note that NASA is funding the execution of a demonstration program – not hardware. Consequently, the scope of the entrance, exit and success criteria may be modified compared to a typical hardware procurement program. The purpose of this table is to link quarterly billing milestones with program events. SES GS does not build space vehicles but our vendors do (i.e. Boeing on O3b mPOWER satellites and Planet on this program building the NASA LEO surrogate spacecraft), and our vendors follow these standard systems engineering practices.

Note that not all program events are included below as billing milestones. A schedule detailing all planned reviews/events will be presented at the kickoff. The “Date” and “Payment Schedule (ATP+mos)” columns shown below are approximate.

Throughout this program (and in the billing milestone chart below) references to "satellites" will refer to the MEO O3b mPOWER space vehicles while references to "spacecraft" refer to the LEO space vehicles.

Per our processes, SES GS senior management will review progress (at least quarterly, and as required at the milestones) on major development/demonstration activities to verify key milestones are being met; risks are tracked, addressed and resolved/mitigated; and that cost discipline is maintained. SES GS senior management, and our Planet partner, will be involved in every major review and, at a minimum, each of these payment milestone reviews. Team SES GS looks forward to working with NASA on this program in a collaborative way and as such, believes there is room for flexibility to mutual tailor these milestones after contract award as we demonstrate the capabilities towards an operational space relay service.

Program Kickoff	
Cost: \$2,364,295/Date: ATP+2 mos	
<u>Purpose:</u> SES GS will conduct a Program Kickoff and present the Project Management Plan.	
Entrance Criteria	Success Criteria
<p>FSAA Award Contract is fully signed and executed</p> <p>Program Plan, Integrated Master Schedule (IMS), and Mission Concept drafted and approved by SES GS senior management as the Program Management Plan</p> <p>Partnership Memorandum Of Understanding (MOU) (or commercial equivalent) signed</p> <p>Note: per the SES GS Systems Engineering and Program Management Processes, SES GS senior management must review key program management documents and give their concurrence that this payment milestone has been met</p>	<p>Successful completion of the Kickoff meeting</p> <p>Program Plan and Integrated Master Schedule (IMS) drafted; they will be baselined and formally approved in the next milestone</p> <p>Evidence provided that the partnership teams are committed to the effort, which includes an approved approach for information sharing and an initial schedule for the meeting cadence</p> <p>Evidence provided of a time-phased financial plan, with funding allocated, to meet the performance milestones by fiscal year</p> <p>Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met</p>

LEO Architecture Preliminary Design Review (PDR)

Cost: \$2,977,061/Date: ATP+4 mos

Purpose: SES GS will conduct a Preliminary Design Review (PDR) that demonstrates that the preliminary LEO architecture design meets all system of interest requirements, and the Planet Labs architecture and mission planning software interfaces are defined, with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design.

Entrance Criteria	Success Criteria
<p>A preliminary PDR agenda, success criteria, and instructions to the review board have been agreed upon prior to the PDR. Systems Requirements Review (SRR) complete & requirements well understood – including spectrum requirement. Draft of architecture requirements available. Long lead demo bus parts on order; ground demo test plans drafted.</p> <p>Long Lead Demonstration bus parts are ordered.</p> <p>The SRR has been completed and all actions have been completed.</p> <p>The following products are made available for NASA a minimum of 5 days prior to the meeting:</p> <ul style="list-style-type: none"> • Draft SRR requirements, including spectrum requirement(s), Defined Product Requirements and Specs; and Defined Product Requirements and Specifications. • Draft Technical Interface Control Documents (ICDs) • Updated risk assessment and mitigations • Preliminary Verification and Validation (V&V) methods identified for each requirement • Software requirements defined, reviewed and accepted • Draft ground demo test plans • Draft Concept of Operations (CONOPs) for demonstration satellites • Draft of electronic information protection plan available if required by NASA 	<p>Evidence is provided that the program formulation activities are complete, implementation plans are built and credible to meet mission success, and risks are identified, and where known, mitigation actions also identified.</p> <p>The top-level requirements for the LEO payload—including mission success criteria, are agreed upon, finalized, stated clearly, and consistent with the preliminary design.</p> <p>Completed items:</p> <ul style="list-style-type: none"> • Defined Product Requirements and Specs • Requirements Baselined • Schedule estimates baselined, are credible and within constraints • Relative to the IMS and Program Plan, project risks are well understood and have been credibly assessed and preliminary risk mitigation plans built, and there is a process and resources available to effectively manage them • Program Plan and IMS baselined and approved by SES GS senior management; and then placed under configuration control per SES processes • Adequate technical and programmatic margins and resources exist to complete the project within budget, schedule and known risks • System interfaces with external entities and between major internal elements have been identified and incorporated in ICDs • Draft Technical ICDs released for comment • Validation & Verification (V&V) plan drafted • Cybersecurity plan drafted (REQ-001, -002 & -003) • Draft Cyber resiliency posture management plan (REQ-006) • Draft CONOPS for demonstration satellite • If required by NASA, electronic information protection plan in place <p>To Be Determined (TBD) and To Be Required (TBR) items are clearly identified with acceptable plans and schedules for their disposition.</p> <p>Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.</p>

Quarterly Report (QR) #3

Cost: \$3,099,607/Date: ATP+8 mos

Purpose: Update the actions from the LEO Architecture PDR.

Entrance Criteria

Completed outstanding actions from last QR and status on completion of actions from this quarter.

The following documents have been submitted a minimum of 5 days before the due date:

- PDR action Item List
- PDR Action Item Closures

Success Criteria

Presentation has been completed with NASA in attendance

Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.

- Validation & Verification (V&V) plan baselined
- Cybersecurity plan baselined (REQ-001, -002 & -003), to include mapping compliance to Federal Information Security Management Act (FISMA) 2014 and National Institute of Standards & Technology (NIST) 800-53 (REQ-002)
 - Show how solution will protect electronic information from unauthorized modification, disclosure or destruction consistent with FISMA, 2014 and NIST 800-53 versions 4 & 5 (REQ-002)
- Cyber resiliency posture management plan baselined (REQ-006)
- Technical Interface Control Documents (ICD) baselined

Architecture Critical Design Review (CDR)

Cost: \$725,126/Date: ATP+9 mos

Purpose: SES GS will conduct a CDR that demonstrates that the maturity of the design is appropriate to proceed with fabrication, assembly, integration, and test. The CDR determines that the functional and performance requirements have been met within the identified cost and schedule constraints at an acceptable risk.

Entrance Criteria

Ka-band terminal ground testing complete
 A preliminary CDR agenda, success criteria, and instructions have been agreed upon prior to the CDR.

The following products are made available for NASA a minimum of 5 days prior to the meeting:

- Ka-band terminal ground test report
- CDR hardware and software technical work products (as applicable)
- Updated CONOPs
- Updated V&V plans
- Updated Risk Assessment and Mitigations
- Updated ICDs
- Baselined schedule
- SES GS security approach
- Fabrication, Assembly, Integration and test plans are being developed and are ready to be baselined after review comments are incorporated

Success Criteria

The detailed system design is expected to meet the requirements.
 High confidence exists in the product baseline, and adequate documentation exists or will exist in a timely manner to allow proceeding with fabrication, assembly, integration, and test.
 Risks to mission success are understood and credibly assessed.
 The ability to coordinate regulatory and spectrum management issues by Federal Communication Commission (FCC) application are demonstrated. Status meets regulatory and spectrum management. (REQ-016)
 The CONOPS has been finalized.
 Updates to IMS, Risk Tracker V&V plan, ICDs and cybersecurity are completed as required.
 Planning and documentation for system assembly, integration, test and operations is sufficient to progress into the next phase
 Plan for cyber resiliency posture management available (REQ-006).
 The approach to meet the Demonstration Goals and Plan Timeline and Program review of success criteria including closure of the actions reviewed by SES GS senior management.
 Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.
 TBD and TBR items are clearly identified with acceptable plans and schedules for their dispositions.

Integration Readiness Review (IRR)	
Cost: \$4,024,952/Date: ATP+13 mos	
Purpose: SES GS will conduct an IRR to ensure segments, components, and subsystems are on schedule to be integrated into the system of interest. Integration facilities, support personnel, and integration plans and procedures are on schedule to support integration.	
Entrance Criteria	Success Criteria
<p>Architecture CDR complete and Mission Planning software validation complete A preliminary IRR agenda, success criteria, and instructions have been agreed upon prior to the IRR.</p> <p>Interface requirements necessary to start system integration have been verified in accordance with the interface control documentation and plans.</p> <p>The following products have been delivered a minimum of 5 days prior to the review:</p> <ul style="list-style-type: none"> • Demonstration Architecture Definition Document • Mission Planning Software description and validation results • Integration plans updated • Initial Verification & Validation (V&V) results from any lower tier products that have been verified • Launch site operations approach plan drafted • Plan for cybersecurity hygiene practices and management of supply chain risks (REQ-003) • Plan for service planning tools and functions to support the demo spacecraft readiness (REQ-008) 	<p>Demonstration Spacecraft hardware ready for Integration. Mission Planning software validation complete against Architecture elements. Demonstration of service planning tools and functions as will be deployed on the demonstration spacecraft.</p> <p>TBD and TBR items are clearly identified with acceptable plans and schedules for their dispositions.</p> <p>Demonstration Spacecraft Hardware ready for Integration particularly key elements like the radios with the spacecraft bus.</p> <p>Mission Planning software validation complete against Architecture elements.</p> <p>Demonstration of service planning tools and functions as will be deployed completed on demo spacecraft.</p> <p>IRR demonstrated cybersecurity hygiene practices and management of supply chain risks (REQ-003).</p> <p>IRR demonstrated service planning tools and functions to support the demo Spacecraft (REQ-008).</p> <p>Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.</p>

Test Readiness Review (TRR)

Cost: \$3,083,350/Date: ATP+15 mos

Purpose: SES GS will conduct a TRR to validate demonstration spacecraft workmanship and flight readiness.

Entrance Criteria

All prior reviews complete; LEO spacecraft components built & integrated
A preliminary TRR agenda, success criteria, and instructions to the review board have been agreed upon prior to the TRR and sent to NASA 5 days prior to the milestone review.
The objectives of the testing have been clearly defined and documented.
Approved test plans, test procedures, test environment, and configuration of the test item(s) that support test objectives are complete.

The following products have been made available a minimum of 5 days prior to the review:

- The test plans for the test procedures, test objectives and required resources
- Demonstrate penetration testing (REQ-004); coordinated with contractor.
- NASA conducts penetration testing as needed (REQ-005) and coordinated with contractor to agreed activities and expected outcomes.
- NASA granted on-site access as needed (REQ-007).
- Demonstrate flow of communication and data through the interfaces (REQ-009).
- Demonstrate readiness of spacecraft and satellites and associated ground support equipment (Interfaces) for testing (REQ-010).

Success Criteria

Ready for Integrated Test Review
Adequate test plans are completed and approved for the system under test.
Adequate identification and coordination of required test resources are completed.
The objectives of the testing have been clearly defined and documented, and the review provides a reasonable expectation that the objectives will be met.
Following requirements have been addressed:

1. Demo of penetration testing (REQ-004).
2. NASA conducted penetration testing if needed (REQ-005).
3. NASA granted on-site access as needed (REQ-007).
4. Demonstrated information/data flow (REQ-009).
5. Demonstrated readiness of spacecraft and ground support equipment for testing (REQ-010).
6. Demonstrated spacecraft ready for environmental testing.

TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition.
Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.

Pre-Shipment Readiness Review (PSRR) 01

Cost: \$2,087,196/Date: ATP+19 mos

Purpose: SES GS will conduct a PSRR to validate that all systems are ready for launch site activity.

Entrance Criteria

Test Readiness Review Complete
A preliminary PSRR agenda, success criteria, and instructions to the review board have been agreed upon prior to the PSRR and have been sent 5 days prior to PSRR
The system and support elements are ready and have been properly configured for flight/mission operations.
System and support element interfaces have been demonstrated to function as expected.
All requisite spectrum authorizations are in place.

The following primary products are ready for review 5 days prior to the review:

- Final validation for flight/use
- Baselined V&V results
- Updated operations procedures
- Updated cost and schedule
- Updated risk assessment and mitigation plans
- Draft test summary report assessing the demonstration of performance metrics (REQ- 011)

Success Criteria

Demonstration Spacecraft #1 is ready for shipment to the launch site.
Demonstration Spacecraft #1 successfully completed environmental qualification and functional testing.
Flight and ground software elements ready to support.
Interfaces have been checked and demonstrated to be functional & liens dispositioned.
Operations procedures successfully demonstrated, and operations plans in place.
Required tests and analyses are complete.
All open safety and mission risk items have been addressed and the residual risk is deemed acceptable.
Concurrence that all necessary spectrum authorization applications have been submitted and/or obtained.
Final summary report assessing the demonstration performance metrics approved (REQ-011).
Operations procedures successfully demonstrated and operations plans in place.
Provisioning of service quality metrics demonstrated.
TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition.
Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.

**Electronically Steered Array (ESA) Terminal
Ground Demonstration Complete**

Cost: \$456,878/Date: ATP+22 mos

Purpose: SES GS will conduct a ground demonstration to verify the performance of the Ka-band user terminal through the O3b mPOWER Constellation.

Entrance Criteria

Dry Run Test Plans complete; O3b mPOWER meets Operational Service Date
 A preliminary TRR agenda, success criteria, and instructions to the review board have been agreed upon prior to the TRR.
 Approved test plans, test procedures, test environment, and configuration of the test item(s) that support test objectives are complete.
 The following primary products are made available 5 days prior to the review:

- Agenda, success criteria, and instructions to the review board
- Test plans, test procedures, test results

Success Criteria

Successful Ka-band ESA connection at 20 - 40 Mbps rates achieved with <1% packet loss over 6 hours. Ground test complete with data showing performance of integrated prototype system with space relays satellites. Updated projections for performance of space terminal available.
 The review has shown that the terminal has successfully completed testing.
 The following items were met:

- Successful Ka-band ESA connection at 20 - 40 Mbps rates achieved with <1% packet loss over multiple sessions totaling 6 hours.
- Ground test complete with data showing performance of integrated prototype system with space relays satellites.
- Updated projections for performance of space terminal available.

Update draft Service Level Agreement (SLA) documentation based on test results and analyses.
 Anomalies have been documented and impact on operations assessed. Anomalies are properly dispositioned and impact on future mission operations has been assessed and documented.
 TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition.
 Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.

Quarterly Report #9	
Cost: \$1,465,233/Date: ATP+26 mos	
<u>Purpose:</u> SES GS will conduct a Milestone review which updates the progress of the Demonstration.	
Entrance Criteria	Success Criteria
<p>Completed outstanding actions from last QR and status on completion of actions from this quarter.</p> <p>An agenda and presentation package has been made available a minimum of 5 days prior to the Milestone date.</p> <p>The following products have been made available:</p> <ul style="list-style-type: none"> • Updated action list, • Updated cost and schedule, • Updated risk and mitigation status, • Updated operational service planning. 	<p>Presentation has been completed with NASA in attendance.</p> <p>Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.</p> <p>Updated project approved time-phased financial plan with funding allocated, to meet the performance milestones by fiscal year</p>

Interim Design Review (IDR)	
Cost: \$3,331,646/Date: ATP+28 mos	
<u>Purpose:</u> SES GS will conduct an Interim Design Review before conducting the testing of the ground end-to-end service prior to launch.	
Entrance Criteria	Success Criteria
<p>All prior reviews complete; LEO Demonstration spacecraft #2 components built & integrated.</p> <p>An agenda and presentation package has been made available a minimum of 5 days prior to the Milestone date.</p> <p>The following products have been made available:</p> <ul style="list-style-type: none"> • Ground end-to-end service design report, • ESA and Global Demonstration Plan, • User Terminal Specifications, • Updated Service Projections. 	<p>The review has shown that the ground service design is ready for Integrated Test Review</p> <p>The following items were met:</p> <ul style="list-style-type: none"> • Updated planning for ESA demonstration and global demonstration complete; • Updated specifications on user terminal complete; • Updated projections on provided service complete; • Demonstration spacecraft #2 integration status up to date. <p>TBD and TBR items are clearly identified with acceptable plans and schedules for their disposition.</p> <p>All open mission safety and mission risk items addressed, and residual risk deemed acceptable.</p> <p>Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.</p>

Pre-Shipment Readiness Review (PSRR) 02	
Cost: \$610,178/Date: ATP+31 mos	
<u>Purpose:</u> SES GS will conduct a Pre-Shipment Readiness Review (PSRR) for conducting On-Air Flight Testing	
Entrance Criteria	Success Criteria
<p>Test Readiness Review Complete A preliminary PSRR agenda, success criteria, package and instructions to the review board have been agreed upon prior to the PSRR. The system and support elements are ready and have been properly configured for flight/mission operations. System and support element interfaces have been demonstrated to function as expected. All requisite spectrum authorizations are in place.</p> <p>The following primary products are ready for review 5 days prior to the review:</p> <ul style="list-style-type: none"> • Agenda, success criteria, and instructions to the review board • Validation of test results • Baselined V&V results • Updated operations procedures • Preliminary report assessing performance metrics (REQ-011) tested to date and service assessment. 	<p>Demonstration Spacecraft #2 is ready for shipment to the launch site, with the configuration verified and validated. Demonstration Spacecraft #2 successfully completed environmental qualification and functional testing. Operations procedures successfully demonstrated and operations plans in place . Operations planning tools ready to support CONOPS and test plans. Provisioning of service quality metrics demonstrated. TBD and TBR items are clearly identified with acceptable plans and schedule for their disposition. Concurrence that all necessary spectrum authorization applications have been submitted and/or obtained. All open mission safety and mission risk items addressed, and residual risk deemed acceptable. Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.</p>

Quarterly Report #12	
Cost: \$633,288/Date: ATP+36 mos	
<u>Purpose:</u> SES GS will conduct a Milestone review which updates the progress of the Demonstration.	
Entrance Criteria	Success Criteria
<p>Completed outstanding actions from last QR and status on completion of actions from this quarter. An agenda and presentation package has been made available a minimum of 5 days prior to the Milestone date.</p> <p>The following products have been made available:</p> <ul style="list-style-type: none"> • Updated action list, • Updated cost and schedule, • Updated risk and mitigation status, • Updated operational service planning. 	<p>Presentation has been completed with NASA in attendance. Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.</p>

Quarterly Report #13

Cost: \$813,791/Date: ATP+39 mos

Purpose: SES GS will conduct a Milestone review which updates the system performance against projections.

Entrance Criteria

Team SES GS has completed C Band, Ka Band characterization of ESA and Forward link in flight performance including all handover types.
An agenda and presentation package has been made available a minimum of 5 days prior to the Milestone date.

The following products have been made available:

- Report describing completed C Band and Ka Band characterization of ESA and Forward link in flight performance including all handover types.
- Updated action list,
- Updated cost and schedule,
- Updated risk and mitigation status,
- Updated operational service planning

Success Criteria

C-band characterization complete, Ka-band characterization complete, automated scheduling working, statistics available on demonstrated function
The review has shown that the characterization has successfully completed testing.
Review successfully addresses how the performance of the demo meets the associated operational requirements from section 3.3 of AFP and the capability goals (Compliance matrix).
Validation that the demo met CONOPS and cybersecurity CSP Program Operational Requirements.
The following items were met:

- C band characterization complete
- Ka Band characterization complete
- Automated scheduling working
- Statistics available on demonstrated function and any projections made on what the derived long term function could be based on that statistical analysis

Baseline the next steps to reach the operational phases of the service.
TBD and TBR items are clearly identified with acceptable plans and schedules for their disposition.
Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.

Quarterly Report #14

Cost: \$1,235,176/Date: ATP+43 mos

Purpose: SES GS will conduct a Milestone review which updates the progress of the Demonstration.

Entrance Criteria

Completed outstanding actions from last QR and status on completion of actions from this quarter

An agenda and presentation package has been made available a minimum of 5 days prior to the Milestone date.

The following products have been made available:

- Updated action list
- Updated cost and schedule
- Updated risk and mitigation status
- Updated operational service planning/procedures
- Draft commissioning plan with user interfaces defined
- Drafts started on operations documentation (TBD)
- Update on as-built hardware and software documentation
- Copy of all requisite radio frequency authorizations in place at this point in time
- Update on cybersecurity plan and cybersecurity management posture
- Draft preliminary SLA
- Acquisition and business models defined in alignment with the preliminary SLA for the service
- Drafted now then updated and finalized 5 months after with the Final report

Success Criteria

Presentation has been completed with NASA in attendance

Framework developed and plans drafted for:

- Service payment methods(s) to be used (e.g. pay per pass duration, pay per volume, and/or pay per priority of service) (REQ-013)
- Full end-to-end service via use of a complete SATCOM user terminal integrated into a user spacecraft in all aspects of operation expected for the operational service (REQ-014)
- Coordinating regulatory / spectrum management issues to enable provisioning of future communication service (REQ-016)
- Preliminary SLA documentation (REQ-012)

Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.

Global Test (GT)	
Cost: \$1,203,575/Date: ATP+44 mos	
<u>Purpose:</u> SES GS will conduct a milestone review which updates how our global end-to-end demonstration validated operational service processes.	
Entrance Criteria	Success Criteria
<p>GT Test Readiness Review (TRR) Complete An agenda and presentation package has been made available a minimum of 5 days prior to the Milestone date.</p> <p>The following products have been made available:</p> <ul style="list-style-type: none"> • Global end-to-end service validation report • Updated cost and schedule • Updated risk and mitigation status • Draft structure for future SLA after capability demonstrations (REQ-012) 	<p>Global end-to-end service via demonstration proven, report delivered, conduct global test campaign to demonstrate performance of user terminal across range of environmental characteristics</p> <p>The review has shown that the demonstration has validated the technical and business approach for the Global end-to-end service.</p> <p>Conducted global test campaign and demonstrate performance of</p> <ul style="list-style-type: none"> • End-to-end system • User terminal across range of environmental characteristics. • Demonstrate service payment methods (e.g. pay per pass duration, pay per volume, and/or pay per priority of service) (REQ-013) • Demonstrate a full end-to-end service via use of a complete SATCOM user terminal integrated into a user spacecraft in all aspects of operation expected for the operational service (REQ-014) • Demonstrate the ability to coordinate regulatory / spectrum management issues to enable provisioning of future communication service (REQ-016) <p>Update draft SLA documentation based on test results and analyses (REQ-012)</p> <p>Program review of success criteria and closure of the actions reviewed by the SES GS senior management to achieve concurrence that this payment milestone has been met.</p>

Final Report

Cost: \$852,440/Date: ATP+48 mos

Purpose: Finalize results and conclusions of Demonstration Program and show path for immediate transition to operational capability.

Entrance Criteria

Draft Final Report complete and sent to NASA for approval; report shows test objectives completed and includes operational market transition steps.
An agenda, draft Final Report and presentation package has been made available a minimum of 5 days prior to the Milestone date.
A closeout summary report has been prepared that summarizes the effort, and the intended operational service.

- The full FSAA effort is summarized in a Final Report
- Remaining efforts to reach the operationalization phase of the service are documented (QR14 reports updated and finalized and folded into final report)
- Acquisition and business models are updated, along with the service SLA
- Final as-performed cost and schedule are provided
- Full report completed and made available a minimum of 5 days prior to review

Success Criteria

Final report delivered to NASA that summarizes the results of the CSP demonstration program and shows the delivery structure for SLAs and the operational services.

- Successful completion of the CSP Demonstration through the FSAA.
- Show demonstration and delivery structure for SLAs support leading to an operational service (REQ-012) (SLA should show how a future user would acquire the service from SES GS)
- Main next steps to reach the operationalization phase of the service are documented.
- Updated pricing for the operational service
- Validation to use full end-to-end services with user terminals
- Service Provisioning established for use during operational phase
- Formal archival of project documents and data
- Complete plan describing how demonstration user terminal relates to the user terminal proposed for the operational service offering if the demonstration terminal is not the same as the operational service terminal. Plan shall address user terminal considerations for space flight, which includes Size, Weight and Power (SWaP), space flight qualification, integration, operations, and lifetime (REQ-015)

Program review of success criteria, final report summary and closure of the remaining actions have been reviewed and concurred to by the SES GS senior management.