

FUNDED SPACE ACT AGREEMENT  
BETWEEN  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
AND  
KGS LLC  
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 KGS LLC, located at 1800 S Bell Street, Arlington, VA 22202 (hereinafter referred to as "KGS" or "Participant"). NASA and Participant may be individually referred to as a “Party” and collectively referred to as the “Parties.” This agreement will be implemented by NASA at the John H. Glenn Research Center located at 21000 Brookpark Road, Cleveland, OH 44135.

ARTICLE 2. PURPOSE

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

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

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

ARTICLE 3. RESPONSIBILITIES

- A. KGS 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](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.pmdt.state.gov/ddtc\\_public?id=ddtc\\_kb\\_article\\_page&sys\\_id=7188dac6db3cd30044f9ff621f961914](https://www.pmdt.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

David Baum, Sr. Business Contracts Mgr  
KGS LLC  
1800 S Bell Street  
Arlington, VA 22202  
Phone: 703-887-3012  
Email: xbaumda@amazon.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

Rebecca Cervoni, Principal Program Manager  
1800 S Bell Street  
Arlington, VA 22202  
Phone: 240-383-0049  
Email: starbecc@amazon.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

KGS LLC

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

BY:  \_\_\_\_\_  
Paul Thomas  
President, KGS LLC

DATE: \_\_\_\_\_

DATE: April 13, 2022 \_\_\_\_\_

## APPENDIX A: EXECUTIVE SUMMARY

### FUNDED SPACE ACT AGREEMENT BETWEEN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND KGS LLC FOR COMMUNICATIONS SERVICES PROJECT (CSP) DEMONSTRATION

NASA and Amazon have entered into a Funded Space Act Agreement (FSAA) to conduct an initial capability development and demonstration phase of the Communications Services Project (CSP) established at the John H. Glenn Research Center (GRC) as part of the Space Communications and Navigation (SCaN) Program. The effort will be led by Kuiper Government Solutions (KGS LLC), an Amazon subsidiary offering secure, resilient satellite broadband services to U.S. and allied government customers.

Project Kuiper aims to provide high-speed, low-latency broadband services to a wide range of customers, including individual households, schools, hospitals, businesses, government agencies, disaster relief operations, mobile operators, and other organizations working in places without reliable internet connectivity. Amazon is designing and developing the space and ground system in-house, combining a constellation of advanced low Earth orbit (LEO) satellites with small, affordable customer terminals and a secure, resilient, ground-based communications network.

Through this agreement, Amazon aims to demonstrate and validate Project Kuiper's commercial satellite communications capabilities for potential NASA missions utilizing space-to-space communications. The demonstration will showcase how resilient, flexible, cost-effective, and state-of-the-art data relay services can support space-based users in near-Earth orbit, including NASA science missions and a wide range of commercial customers.

The scope of this Amazon/NASA FSAA involves the development and operation of an end-to-end satellite communications service demonstration with a near-Earth orbiting spacecraft, Project Kuiper commercial spacecraft, and a NASA Mission Operations Center (MOC). The FSAA includes four phases: 1) modeling and simulation of Project Kuiper space relay performance for spacecraft and mission data; 2) preparation for on-orbit demonstration of optical inter-satellite links (OISLs) and Ka-band communications capabilities; 3) end-to-end demonstration using up to three Project Kuiper commercial spacecraft to transmit representative mission data to a government or commercial MOC; and 4) integration, launch, and operation of a third-party satellite to demonstrate Project Kuiper network connectivity to a third-party LEO satellite. During the final phase, NASA and Amazon will also define an approach for transitioning the demonstration into operational commercial service.

APPENDIX B: PERFORMANCE MILESTONES AND SUCCESS CRITERIA

**Milestone 1: Kickoff meeting (Phase 2.1)**

Cost: \$100,000/Date: 1 Month After Award (MAA)

Purpose: Subsequent to Funded Space Act Agreement execution and initiation of the CSP project, Kuiper Government Solutions (KGS) shall host a kickoff meeting to describe the plan for the KGS' program implementation, which includes management planning for Architecture maturation, planned approach to Design, Development, Testing, & Evaluation (DDT&E), top level integrated schedule, financing, supplier engagement, risks and anticipated mitigations.

KGS will provide a briefing of the program implementation plan, along with a hard copy of the presentation materials, and responses to any questions that the NASA Team might have concerning KGS's plan.

**Entrance Criteria**

- Agenda and Slide package provided to NASA 5 business days prior to meeting
- Kuiper's budget for the following Fiscal Year (FY) has been internally approved
- Products ready for review:
  - o Management planning for Architecture maturation
  - o Planned approach to Design, Development, Testing, & Evaluation (DDT&E)
  - o Top level integrated schedule
  - o Internal Financing strategy
  - o Supplier engagement
  - o Risks and anticipated mitigations
  - o Initial Modeling/Simulation priorities

Note: Meeting materials will be provided a minimum of 5 days ahead of time. For meeting materials, especially materials that could take extensive time to review, every effort will be made to provide sooner where possible.

**Success Criteria**

- The Kickoff meeting is completed per KGS internal process.
- Complete initial schedule, provide technical objectives, identify modeling/simulation priorities.
- To Be Determined (TBD) and To Be Resolved (TBR) items are clearly identified with plans and schedules for their disposition.
- Kuiper budget allocations for the following 12 months are approved, per Amazon budgeting cycle processes and recurring annual approval timeline.

**Milestone 2: Requirement Review – 1 (Phase 2.1)**

Cost: \$900,000/Date: 3 MAA

Purpose: KGS shall conduct a Requirements Review

**Entrance Criteria**

- Preliminary agenda, success criteria and presentation provided to NASA for review 5 business days prior to meeting
- Top Program Risks with corresponding mitigation strategies have been identified for Mission Operations Center (MOC) and Modeling and simulation plan.
- Initial Modeling and Simulation approach provided to NASA
- Initial MOC Products available for NASA review:
  - o Top level requirements (Comm payload/ground/network)
  - o MOC to Remote Principle investigator (PI) Interface Control Document (ICD) requirements
  - o MOC to Kuiper Ground ICD requirements
  - o Initial MOC design planning products provided to NASA for review:
  - o Initial MOC design and API development
  - o Plan for MOC fit-up and connectivity to Kuiper Ground and Remote PIs
  - o Radio Frequency (RF) terminal approach and initial system level Concept of Operations (CONOPS) for Ka-band connection from user satellite or launch vehicles to commercial Kuiper gateways systems, covering links to both satellite gateways and ground gateways.
- Updated plan on how KGS commercial SATCOM capabilities will be offered as a service for future spacecraft users in near-Earth orbit provided to NASA.
- Updated plan on Kuiper spectrum (radio frequency) authorization, including space to space requests.

**Success Criteria**

- The program requirements address critical needs and goals as identified in the objectives
- Evidence is provided that the program formulation activities are complete and implementation plans are credible to meet mission success
- Preliminary approaches have been determined for requirement verification and validation.
- Program implementation plans are credible to achieve Modeling/Simulation and MOC set up success.
- Software plan in place to meet the success criteria.
- The program risks have been identified and mitigation strategies appear reasonable
- TBD and TBR items are clearly identified with plans and schedules for their disposition

**Milestone 3: Program Management Review (PMR) (Phase 2.1)**

Cost: \$500,000/Date: 4 MAA

Purpose: *KGS shall conduct a PMR. The purpose of this PMR is to provide initial simulation results and interface requirements.*

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- Agenda and Slide package provided to NASA for review 5 business days prior to meeting</li> <li>- The following products will be available for NASA review:               <ul style="list-style-type: none"> <li>o Initial simulation results for User mission spacecraft/Kuiper relay performance</li> <li>o Initial simulation results of dynamic allocation of Optical Intersatellite links (OISLs) for the CSP demonstration.</li> <li>o Initial Interface Requirements Documents (IRDs), Interface Control Documents (ICDs), and/or user guides for the following interfaces: (1) communication user terminal to the spacecraft, (2) the spacecraft to the relay/ground network, and (3) the relay/ground network to the MOC.</li> <li>o Initial plan outlining approach to integrate a Kuiper OISL onto a 3<sup>rd</sup> party bus</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Modeling objectives are clearly defined and stated</li> <li>- TBD and TBR items are clearly identified with plans and schedules for their disposition</li> <li>- Initial draft of ICDs are available</li> <li>- Plan to integrate a Kuiper OISL onto a 3<sup>rd</sup> party bus is available</li> </ul>

**Milestone 4: On-Orbit Prototype Evaluation Kickoff (PMR) (Phase 2.2)**

Cost: \$100,000/Date: 5 MAA

Purpose: *KGS shall conduct a Kickoff for Phase 2.2*

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- Agenda and Slide package provided to NASA for review 5 business days prior to meeting</li> <li>- The following products will be available for NASA review:               <ul style="list-style-type: none"> <li>o Updated plan on how KGS commercial SATCOM capabilities will be offered as a service for future spacecraft users in near-Earth orbit</li> <li>o Updated plan on Kuiper spectrum (radio frequency) authorization, including space to space requests NASA invited to gain insight into how KGS will leverage Kuiper's initial satellites to demonstrate preliminary CSP objectives</li> <li>o Documentation on known deltas between initial demonstration capability and anticipated initial fully operational capability</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- The initial schedule has been completed.</li> <li>- Technical objectives have been defined.</li> <li>- Demonstration priorities have been identified.</li> <li>- The reviewed plans have been finalized.</li> <li>- TBD and TBR items are clearly identified with plans and schedules for their disposition.</li> </ul>

**Milestone 5: Mission Concept Review- (Phase 2.3)**

Cost: \$400,000/Date: 5 MAA

Purpose: KGS shall conduct a KGS Demo Sat Mission Concept Review to present to NASA the approaches KGS will use to move up to three Kuiper commercial pre-production satellite to new, non-Kuiper, low earth orbits and orphan them from the overall Kuiper network services so that they can be used to validate 3rd party satellite communication protocols at both the physical and network layers.

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"><li>- MCR agenda, success criteria and presentation provided to NASA for review 5 business days prior to meeting</li><li>- Top Program Risks with corresponding mitigation strategies have been identified</li><li>- The following primary technical products for hardware and software, elements are available for review by cognizant participants prior to the review:<ul style="list-style-type: none"><li>o Defined architecture, including major tradeoffs and options ready to be baselined after review comments are incorporated.</li><li>o Allocation of requirements to next lower level is ready to be baselined after review comments are incorporated.</li><li>o Measures of Performance (MOPs), Technical Performance Measure (TPM), and other key driving requirement ready to be approved.</li><li>o Status of technical performance related to leading indicators, margins, TPMs, and resolution of the previous review discrepancies addressing effectiveness of technical achievement and communicating the overall risk to the project</li></ul></li></ul>	<ul style="list-style-type: none"><li>- The proposed mission/system architecture is credible and responsive to program requirements and constraints, including resources.</li><li>- The cost and schedule estimates are credible and sufficient resources are available.</li><li>- Major risks are documented with appropriate mitigation strategies.</li><li>- The project's mission/system definition and associated plans are sufficiently mature.</li><li>- Software plan in place to meet the success criteria.</li><li>- Preliminary approaches for verification and validation of the lower level requirements has been identified.</li><li>- TBD and TBR items are clearly identified with plans and schedules for their disposition.</li></ul>

**Milestone 6: Flight Readiness Review (FRR) (Phase 2.2)**

Cost: \$500,000/Date: 7 MAA

Purpose: KGS shall conduct a Protoflight Flight Readiness Review (NASA funding will be used to ensure planning for appropriate connections to MOC is in place and demonstration capabilities are planned to demonstrate initial capability to meet future customer CONOPS, which would include NASA specific CSP CONOPS.)

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"><li>- Documents are provided to NASA for review 5 business days prior to meeting</li><li>- The following products will be available for NASA review:<ul style="list-style-type: none"><li>o Kuiper final certification for Protoflight Satellite flight/use</li><li>o Baselined V&amp;V results</li><li>o Updated flight schedule</li><li>o Outline of contracting approach for integration of a Kuiper OISL onto a 3<sup>rd</sup> party bus</li></ul></li></ul>	<ul style="list-style-type: none"><li>- The flight system is ready for flight/mission operations.</li><li>- Flight and ground software elements are ready to support launch and flight operations.</li><li>- Interfaces have been checked and demonstrated to be functional.</li><li>- Open items and waivers have been examined and residual risk from these is deemed to be acceptable.</li><li>- The contracting approach for integration of a Kuiper OISL onto a 3<sup>rd</sup> party bus is credible and responsive to program requirements and constraints.</li></ul>

**Milestone 7: Test Readiness Review (TRR) (Phase 2.2)**

Cost: \$4,000,000/Date: 9 MAA

Purpose: KGS shall conduct a TRR for Phase 2.2 to cover CSP specific demonstrations and tests which will be run using Kuiper pre-production satellites.

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- Documents are provided to NASA for review 5 business days prior to meeting</li> <li>- The following products will be available for NASA review:               <ul style="list-style-type: none"> <li>o TRR agenda</li> <li>o Presentation package</li> <li>o CSP Test plans, objectives, resources and success criteria</li> <li>o Details on MOC operation and how it will tie to Kuiper ground station during Phase 2.2 demonstration</li> <li>o Updated plan on how KGS commercial SATCOM capabilities will be offered as a service for future spacecraft users in near-Earth orbit</li> <li>o Updated plan on Kuiper spectrum (radio frequency) authorization, including space to space requests</li> </ul> </li> <li>- Notice of Launch provided to NASA</li> </ul>	<ul style="list-style-type: none"> <li>- Adequate test plans are completed and approved for the CSP specific demonstrations to be run using Kuiper prototype satellites.</li> <li>- Adequate identification and coordination of required test resources are completed</li> <li>- TBD and TBR items are clearly identified with plans and schedule for their disposition</li> <li>- Risks have been identified, credibly assessed, and appropriately mitigated</li> <li>- Launch of initial prototype Satellites (2)</li> <li>- Initial on-orbit checkout of prototype satellites (2)</li> </ul>

**Milestone 8: Ka-Band Mobility Regulatory Filing (Phase 2.3)**

Cost: \$1,000,000/Date: 11 MAA

Purpose: This milestone evaluates Amazon's Kuiper Ka-Band Mobility Regulatory filing in support of experimental demonstrations.

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- A copy of the planned Federal Communications Commission regulatory filing for Ka-Band Mobility provided for NASA review.</li> <li>- Kuiper's budget for the following FY has been internally approved</li> </ul>	<ul style="list-style-type: none"> <li>- Federal Communications Commission regulatory filing for Ka-Band Mobility space to space submitted</li> <li>- Kuiper budget allocations for the following 12 months are approved, per Amazon budgeting cycle processes and recurring annual approval timeline.</li> </ul>

**Milestone 9: Close out Review (Phase 2.1)**

Cost: \$5,500,000/Date: 12 MAA

Purpose: KGS shall conduct a close out review for Phase 2.1

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- The following updated Interface Requirements Documents (IRDs), Interface Control Documents (ICDs), and/or User Guides for the following interfaces are provided a minimum of 5 days prior:               <ul style="list-style-type: none"> <li>o Ground terminal to the spacecraft,</li> <li>o The spacecraft to the relay/ground network</li> <li>o The relay/ground network to the MOC</li> </ul> </li> <li>- A closeout summary report has been prepared and made available a minimum of 5 days prior to the review. The report summarizes the effort, and the intended operational service including:               <ul style="list-style-type: none"> <li>o The final as performed cost and schedule for CSP efforts are provided (to this point).</li> <li>o The remaining effort to reach the operationalization phase of the service are documented.</li> <li>o The acquisition and business models are updated, along with the SLA for the service.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrate that KGS commercial SATCOM capabilities can be offered as a service for future spacecraft users in near-Earth orbit provided to NASA</li> <li>- Results available for CSP Phase 3 flight planning and NASA CSP Initial Demonstration Reporting</li> </ul>

**Milestone 10: Delta Design Review (Phase 2.3)**

Cost: \$2,000,000/Date: 14 MAA

Purpose: KGS shall conduct a KGS Demo Sat Delta Design Review. This review will focus on the design elements necessary to support using the Kuiper Pre-Production satellites as surrogate NASA 3rd Party satellites and Ka-band terminals to connect NASA satellites to Kuiper commercial gateways.

**Entrance Criteria**

- A preliminary Delta Design Review agenda, success criteria, documentation, plans and presentation package delivered to NASA for review 5 business days prior to meeting.
- A baselined delta design that can be shown to meet all technical requirements and performance measures or has waivers
- Updated plan on how KGS commercial SATCOM capabilities will be offered as a service for future spacecraft users in near-Earth orbit provided to NASA
- Provide NASA with update on Kuiper cybersecurity assessment and approach
- Updated plan on Kuiper spectrum (radio frequency) authorization, including space to space requests

**Success Criteria**

- The delta design is expected to meet the requirements with adequate margins.
- Interface control documents are sufficiently mature to proceed with fabrication, assembly, integration, and test, and plans are in place to manage any open items.
- TBD and TBR items are clearly identified with plans and schedule for their disposition.
- Engineering test units, life test units, and/or modeling and simulations have been developed and tested per plan.
- Progress towards compliant demonstration meeting NASA CSP needs for assured data and file delivery CONOPS has been demonstrated
- Have afforded NASA the opportunity to conduct cybersecurity assessments and penetration tests on the end-to-end Space Communications service

**Milestone 11: Mission Concept Review (3rd party satellite) (Phase 2.4)**

Cost: \$4,000,000/Date: 15 MAA

Purpose: KGS shall conduct a MCR demonstrating to NASA how a Kuiper OISL would be integrated with a 3rd party satellite

**Entrance Criteria**

- A preliminary MCR agenda, success criteria have been provided to NASA for review 5 business days prior to meeting
- The following primary products are ready for review:
  - o Expectations have been defined and are ready to be baselined after review comments are considered.
  - o The concept has been developed to a sufficient level of detail to demonstrate a technically feasible solution to the project needs and is ready to be baselined after review comments are incorporated.
  - o Mission success criteria have been defined.
  - o Technical products (as applicable) for hardware, and software have been made available to the cognizant participants prior to the review.
  - o Project goals and objectives are ready to be baselined after review comments are incorporated.
  - o Alternative concepts that have been analyzed and are ready to be discussed.
  - o Initial risk-informed cost and schedule estimates for implementation.
  - o A preliminary assessment performed by the team of top technical, cost, schedule, and safety risks with developed associated risk management and mitigation strategies and options.
  - o Preliminary approach to verification and validation for the selected concept.
  - o Technology Development Plan is ready to be baselined after review comments are incorporated.
- Initial technology readiness that has been assessed and documented with technology assets, heritage products, and gaps identified.
- Single Point Failure/Fault Tolerance stated.
- Preliminary engineering development assessment and technical plans to achieve what needs to be accomplished in the next phase.
- Software criteria and products identified.

**Success Criteria**

- Mission objectives are clearly defined and stated and are unambiguous and internally consistent.
- The concept evaluation criteria to be used in candidate systems evaluation have been identified and prioritized.
- The need for the mission has been clearly identified.
- The cost and schedule estimates are credible and sufficient resources are available for project formulation.
- The program/project has demonstrated compliance with applicable Kuiper commercial requirements, standards, processes, and procedures.
- TBD and TBR items are clearly identified with plans and schedule for their disposition.
- Alternative concepts have adequately considered the use of existing assets or products that could satisfy the mission or parts of the mission.
- Technical planning is sufficient to proceed and includes planning for hardware, software, human systems, and data deliverables.
- Risk and mitigation strategies have been identified.

**Milestone 12: Optical Intersatellite Link Production Readiness Review (Phase 2.3)**

Cost: \$2,500,000/Date: 17 MAA

Purpose: *This review determines the readiness of the system developers to efficiently produce the required number of optical intersatellite link subsystems. It ensures that the production plans, fabrication, assembly, integration enabling products, operational support, and personnel are in place and ready to begin production. Relevant documents will be provided to NASA for review 5 business days prior to meeting.*

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- A preliminary Production Readiness Review agenda, success criteria, documentation, plans and presentation package delivered to NASA for review 5 business days prior to meeting.</li> <li>- The design documentation needed to support production is available.</li> <li>- The production plans (including but not limited to critical process controls, control limits, and procedures) and preparation to begin fabrication are developed.</li> <li>- Raw materials are approved and certified.</li> <li>- Resources are available, have been allocated, and are ready to support end product production.</li> <li>- The bill of materials is available and critical parts identified.</li> <li>- Delivery schedules are available.</li> <li>- In-process and end-item inspections and tests have been identified and planned.</li> </ul>	<ul style="list-style-type: none"> <li>- Adequate resources are in place to support production.</li> <li>- Design-for-manufacturing considerations have been incorporated to ensure ease and efficiency of production and assembly.</li> <li>- Required facilities and tools are sufficient for end-product production.</li> <li>- Specified special tools and test equipment are available in proper quantities.</li> <li>- Production and support staff are qualified.</li> <li>- Drawings and/or production models are approved/certified.</li> <li>- Qualified suppliers are available for materials that are to be procured.</li> </ul>

**Milestone 13: Program Management Review (PMR) (Phase 2.2)**

Cost: \$2,000,000/Date: 19 MAA

Purpose: *KGS shall conduct a PMR to present Orbital Demonstration Results to NASA CSP team and provide update on types of commercial service anticipated.*

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- A preliminary Program Management Review agenda, success criteria, documentation, plans and presentation package delivered to NASA for review 5 business days prior to meeting. The following products will be provided:             <ul style="list-style-type: none"> <li>o Report with details for two types of service assessment:                 <ul style="list-style-type: none"> <li>- Real-time network status and</li> <li>- Non-real-time accounting.</li> </ul> </li> <li>o Updated plan on how KGS commercial SATCOM capabilities will be offered as a service for future spacecraft users in near-Earth orbit provided to NASA</li> <li>o Updated plan on Kuiper spectrum (radio frequency) authorization, including space to space requests</li> <li>o Progress update regarding integration of a Kuiper OISL onto a 3<sup>rd</sup> party bus to include progress forward from MCR at 15 MAA</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Progress towards demonstration meeting CSP capability goals for assured data and file delivery CONOPS has been demonstrated.</li> <li>- The assured data delivery goals that have been met are documented, with appropriate evidence supplied.</li> <li>- Forward progress documented for integration of a Kuiper OISL onto a 3<sup>rd</sup> party bus, path to TRR at 23 MAA is provided.</li> </ul>

**Milestone 14: Launch Contract signed (Business MS)**

Cost: \$1,500,000/Date: 20 MAA

Purpose: *This milestone demonstrates that Kuiper has signed a contract for Launch of satellites of sufficient capacity to offer initial operational capability.*

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- Evidence of Launch contract for 500-800 Kuiper Production satellites provided to NASA for review</li> </ul>	<ul style="list-style-type: none"> <li>- Contract signed between launch provider and Kuiper</li> </ul>

**Milestone 15: Program Management Review (PMR) (Phase 2.3)**

Cost: \$500,000/Date: 22 MAA

Purpose: *KGS shall conduct a PMR that covers how the KGS Demo Sats tie into the Kuiper Pre-Production Satellites*

<b>Entrance Criteria</b>	<b>Success Criteria</b>
<ul style="list-style-type: none"><li>- A preliminary Program Management Review agenda, success criteria, documentation, plans and presentation package delivered to NASA for review 5 business days prior to meeting. The following products will be provided:<ul style="list-style-type: none"><li>o Updated plan on how KGS commercial SATCOM capabilities will be offered as a service for future spacecraft users in near-Earth orbit provided to NASA</li><li>o Updated plan on Kuiper spectrum (radio frequency) authorization, including space to space requests</li></ul></li></ul>	<ul style="list-style-type: none"><li>- Progress towards demonstration meeting CSP capability goals for assured data and file delivery CONOPS has been demonstrated.</li></ul>

**Milestone 16: Launch of Kuiper Pre-Production satellites and PMR (Phase 2.3)**

Cost: \$1,000,000/Date: 23 MAA

Purpose: *KGS shall conduct a PMR after the Launch of Kuiper Pre-Production satellites (which after initial LEOPS will be transitioned to KGS to use to demonstrate NASA CSP objectives)*

<b>Entrance Criteria</b>	<b>Success Criteria</b>
<ul style="list-style-type: none"><li>- The following documents will be made available to NASA 15 days prior to launch:<ul style="list-style-type: none"><li>o Notice of intent to launch, to include preliminary launch date, location</li><li>o List of relevant on-orbit checkout plans and timeline</li><li>o Updated User Guide</li><li>o Approach to network security</li></ul></li><li>- Kuiper's budget for the following FY has been internally approved</li></ul>	<ul style="list-style-type: none"><li>- Launch of Kuiper Pre-Production satellites (minimum of two)</li><li>- NASA invited to gain insight by receiving updates on initial Kuiper Pre-Production on orbit progress.</li><li>- Initial on-orbit checkout of Kuiper Pre-Production satellites provided to NASA for review</li><li>- Kuiper budget allocations for the following 12 months are approved, per Amazon budgeting cycle processes and recurring annual approval timeline</li></ul>

**Milestone 17: Test Readiness Review (TRR) (3rd party satellite) (Phase 2.4)**

Cost: \$6,000,000/Date: 23 MAA

Purpose: KGS shall conduct a TRR for Hardware in the loop (HWIL) testing of Kuiper components required to be integrated on 3rd party satellite to close Optical communication link with Kuiper Network on orbit.

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"> <li>- A preliminary TRR agenda and success criteria, have been provided to NASA for review 5 business days prior to meeting</li> <li>- The objectives of the testing have been clearly defined and documented.</li> <li>- KGS approved test plans, test procedures, test environment, and configuration of the test item(s) that support test objectives are available for review.</li> <li>- All test interfaces have been placed under configuration control or have been defined in accordance with an agreed to plan, and version description document(s) for both test and support systems have been made available to TRR participants prior to the review.</li> <li>- All known system discrepancies have been identified and dispositioned in accordance with an agreed-upon plan.</li> <li>- All required test resources—people (including a designated test director), facilities, test articles, test instrumentation, and other test-enabling products—have been identified and are available to support required tests.</li> <li>- Roles and responsibilities of all test participants are defined.</li> <li>- Test safety planning has been accomplished, and all personnel have been trained.</li> <li>- Documentation defining the configuration of the item under test are released and under configuration control.</li> </ul>	<ul style="list-style-type: none"> <li>- Test plans are completed and approved, by KGS technical representative, for the system under test.</li> <li>- Identification and coordination of required test resources are completed.</li> <li>- The program/project has demonstrated compliance with applicable Kuiper commercial requirements, standards, processes, and procedures.</li> <li>- TBD and TBR items are clearly identified with plans and schedule for their disposition.</li> <li>- Risks have been identified, credibly assessed, and mitigation approaches are documented.</li> <li>- Residual risk is accepted by KGS leadership.</li> <li>- Plans to capture any lessons learned from the test program are documented.</li> <li>- The objectives of the testing have been clearly defined and documented, and the review of all the test plans, as well as the procedures, environment, and configuration of the test item, provides a reasonable expectation that the objectives will be met.</li> <li>- The test cases have been analyzed and are consistent with the test plans and objectives.</li> <li>- Test personnel have received appropriate training in test operation and health and medical safety procedures.</li> </ul>

**Milestone 18: 100-unit Optical Intersatellite Link Production (Phase 2.3)**

Cost: \$500,000/Date: 24 MAA

Purpose: This milestone demonstrates high-rate production of the Kuiper Optical Intersatellite Link subsystem and verifies that no fewer than 20 Kuiper production satellites have launched.

Entrance Criteria	Success Criteria
<p>-An agenda, presentation package, success criteria and the following documents will be made available to NASA 5 days prior to review:</p> <ul style="list-style-type: none"> <li>o OISL User Integration Kit documentation</li> <li>o Quality assurance and Verification and Validation (V&amp;V) records</li> <li>o On-Orbit Checkout results</li> <li>o Documentation to show a minimum of 100 Kuiper optical intersatellite link subsystems have been produced.</li> <li>o Resolution of production non-conformances or anomalies</li> <li>o Resolution plan for any outstanding safety or quality assurance issues</li> </ul>	<ul style="list-style-type: none"> <li>- At least 100 Kuiper optical intersatellite link subsystems available for integration on Kuiper or 3rd Party Satellites</li> <li>- Quality assurance and build V&amp;V records for 100 optical intersatellite link subsystems</li> <li>- Verify that 20 or more Kuiper Production satellite have launched and completed initial on-orbit checkout process.</li> </ul>

**Milestone 19: KGS Demo Sat CSP Test Readiness Review (Phase 2.3)**

Cost: \$1,000,000/Date: 26 MAA

**Purpose:** *KGS shall conduct a TRR for KGS Demo Sat CSP testing*

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"><li>- An agenda, presentation package, success criteria and the following documents will be made available to NASA 5 days prior to review:<ul style="list-style-type: none"><li>o KGS Demo Sat CSP Test plan (complete)</li><li>o CSP Test objectives (defined)</li><li>o Anticipated test resources (ex: KGS Demo Sats, Mission Operations Center, and Kuiper network systems)</li><li>o Documentation showing a minimum of 20 Kuiper production satellites have launched.</li><li>o Progress update regarding integration of a Kuiper OISL onto a 3<sup>rd</sup> party bus to include progress towards Flight Readiness Review and initial results from HWIL testing of Kuiper components required for integration.</li></ul></li></ul>	<ul style="list-style-type: none"><li>- KGS approval of test plans and objectives for KGS Demo Sat</li><li>- Adequate test resources identified and ready for testing</li><li>- Risks have been identified, credibly assessed, and appropriately mitigated</li><li>- Path towards Flight Readiness Review specific to integration of a Kuiper OISL onto a 3<sup>rd</sup> party bus provided.</li><li>- Initial results from HWIL testing of Kuiper components required for 3<sup>rd</sup> party integration provided.</li></ul>

**Milestone 20: Mission Readiness Review for KGS Demo Sat (Phase 2.3)**

Cost: \$4,000,000/Date: 29 MAA

**Purpose:** *KGS shall conduct a KGS Demo Sat CSP Mission Readiness Review to discuss with NASA the plan for shifting Kuiper Pre-Production satellites to KGS to be used for NASA related demonstrations.*

Entrance Criteria	Success Criteria
<ul style="list-style-type: none"><li>- An agenda, presentation package, success criteria and the following documents will be made available to NASA 5 days prior to review:<ul style="list-style-type: none"><li>o Baselined V&amp;V results.</li><li>o Updated schedule.</li><li>o Updated User Guide</li><li>o Updated operations procedures</li></ul></li><li>- The system and support elements are ready and have been properly configured for flight/mission operations.</li><li>- System and support element interfaces have been demonstrated to function as expected.</li><li>- The system state supports a launch “go” decision based on the established go/no-go criteria.</li><li>- Failures and anomalies from previously completed flights, tests, and reviews have been resolved</li><li>- All requisite spectrum (radio frequency) authorizations are in place.</li></ul>	<ul style="list-style-type: none"><li>- The flight system is ready for flight/mission operations.</li><li>- Flight and ground software elements are ready to support launch and flight operations.</li><li>- Interfaces have been checked and demonstrated to be functional.</li></ul>

**Milestone 21: Flight Readiness Review (FRR) (3rd party satellite) (Phase 2.4)**

Cost: \$8,000,000/Date: 30 MAA

*Purpose: KGS shall conduct a FRR with NASA to demonstrate ability to launch 3rd party satellite which will demonstrate OISL connection to Kuiper network in orbit.*

<b>Entrance Criteria</b>	<b>Success Criteria</b>
<ul style="list-style-type: none"> <li>- The system and support elements are ready and have been properly configured for flight operations.</li> <li>- System and support element interfaces have been demonstrated to function as expected.</li> <li>- The system state supports a launch “go” decision based on the established go/no-go criteria.</li> <li>- Programmatic products are ready for review at the maturity levels expected by KGS management.</li> <li>- Baselined V&amp;V results are ready for review</li> </ul>	<ul style="list-style-type: none"> <li>- The flight vehicle/system is ready for flight and mission operations.</li> <li>- The hardware is deemed acceptably safe for flight/mission operations, by industry standard.</li> <li>- Certification that flight operations can safely proceed with acceptable risk has been determined by KGS technical representatives</li> <li>- Flight and ground software elements are ready to support launch and flight operations.</li> <li>- Interfaces have been checked and demonstrated to be functional.</li> <li>- TBD and TBR items are resolved.</li> <li>- The flight and recovery environmental factors are within constraints.</li> <li>- All open safety and mission risk items have been addressed, and the residual risk is deemed acceptable by KGS technical representatives.</li> <li>- Supporting organizations are ready to support flight/mission operations.</li> <li>- Software components meet the success criteria as defined by the team</li> </ul>

**Milestone 22: Critical Event Readiness Review (Orbit shift of Pre-Production Satellites) (Phase 2.3)**

Cost: \$1,000,000/Date: 31 MAA

*Purpose: KGS shall conduct a Critical Event Readiness Review in preparation for maneuvering the Kuiper Pre-Production satellites to non-Kuiper low-earth orbits to simulate relevant future customer mission connecting to the Kuiper network.*

<b>Entrance Criteria</b>	<b>Success Criteria</b>
<ul style="list-style-type: none"> <li>- An agenda, presentation package, success criteria will be made available to NASA 5 days prior to review.</li> <li>- Critical event/activity requirements and constraints have been identified, including spectrum considerations.</li> <li>- Critical event/activity design and implementation are complete.</li> <li>- Critical event/activity operations planning, including contingencies, is complete.</li> <li>- Operations personnel training for the critical event/activity has been conducted.</li> <li>- Critical event/activity sequence verification and validation is complete.</li> <li>- Flight system is healthy and capable of performing the critical event/activity.</li> </ul>	<ul style="list-style-type: none"> <li>- The critical activity design complies with requirements. The preparation for the critical activity, including the verification and validation, is thorough.</li> <li>- The systems, supporting services, and documentation is ready to support the activity.</li> <li>- The requirements for the successful execution of the critical event(s) are complete and understood and have flowed down to the appropriate levels for implementation.</li> </ul>

**Milestone 23: Program Closeout Review (Phase 2.3)**

Cost: \$4,000,000/Date: 35 MAA

Purpose: *KGS shall conduct a Program Close out review which summarizes the demonstration performance to the CSP team for evaluation prior to closeout.*

<b>Entrance Criteria</b>	<b>Success Criteria</b>
<ul style="list-style-type: none"><li>- Program Closeout agenda and presentation provided to NASA for review a minimum of 5 business days prior to meeting</li><li>- Documentation provided on known deltas between demonstration completed to this point and anticipated initial fully operational Kuiper capability</li></ul>	<ul style="list-style-type: none"><li>- Completion of the NASA CSP Demonstrator and FSAA.</li><li>- Formal archival of project documents and data</li><li>- NASA CSP Final Report and Results Delivery to NASA. Final report shall include<ul style="list-style-type: none"><li>o Details on a minimum of two types of service assessment: (1) real-time network status and (2) non-real-time accounting.</li><li>o Final ICDs for (1) communication terminal to the spacecraft, (2) the spacecraft to the relay/ground network, and (3) the relay/ground network to the user MOC</li><li>o Final Summary of Mod/Sim work done in Phase 2.1</li><li>o Final Summary of CSP specific demonstrations in Phase 2.2 and 2.3</li><li>o Details of a service level agreement, detailing how a future user would acquire the service using the Kuiper Commercial network</li></ul></li><li>- Main next steps to reach the operationalization phase of the service are documented.</li><li>- Updated pricing for operational service.</li></ul>

**Milestone 24: Completion of CSP Dress Rehearsal with 3rd Party Satellite (Phase 2.4)**

Cost: \$16,000,000/Date: 35 MAA

Purpose: *KGS shall conduct review with NASA to demonstrate on-orbit performance of 3rd party satellite equipped with Kuiper OISL connecting to the Kuiper network in orbit.*

<b>Entrance Criteria</b>	<b>Success Criteria</b>
<ul style="list-style-type: none"><li>- Documentation provide to NASA illustrating on-orbit performance of 3rd party satellite equipped with Kuiper OISL connecting to the Kuiper network in orbit.</li></ul>	<ul style="list-style-type: none"><li>- Injection of CSP relevant information to the Kuiper network from 3rd party satellite via OISL.</li></ul>