

SPACE ACT AGREEMENT 34008
BETWEEN
NASA OFFICE OF JPL MANAGEMENT AND OVERSIGHT
AND
NORTHEASTERN UNIVERSITY
FOR
DEVELOPMENT OF TRANSMITTERS AND RECEIVERS FOR THZ COMMUNICATIONS

ARTICLE 1. AUTHORITY

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 the Jet Propulsion Laboratory (hereinafter referred to as "NASA") and Northeastern University located at 360 Huntington Ave., Boston, MA 02115-5005 (hereinafter referred to as "Partner" or "NU"). NASA and Partner may be individually referred to as a "Party" and collectively referred to as the "Parties."

"Related Entity" as used herein, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or Partner that is assigned, tasked, or contracted with to perform specified NASA or Partner activities under this Agreement.

"Data" as used herein, means recorded information, regardless of form, the media on which it may be recorded, or the method of recording. The term includes, but is not limited to, data of a scientific or technical nature, computer software and documentation thereof, and data comprising commercial and financial information.

"Proprietary Data" as used herein, means Data embodying trade secrets or comprising commercial or financial information that is privileged or confidential and is marked with a suitable 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.

"Scientific and Technical Articles" as used herein, means scientific and technical articles based on or containing Data first produced by the California Institute of Technology (Caltech) under the NASA/Caltech contract to operate the Jet Propulsion Laboratory (JPL) and published in academic, technical or professional journals, symposia proceedings or similar works.

"Protected Computer Software" as used herein, means copyrighted or patented Data embodied in source or object code or software documentation first produced by Caltech under the

NASA/Caltech contract to operate JPL. Protected Computer Software is the property of Caltech and any use of such Protected Computer Software other than as authorized herein must be negotiated with the Office of Technology Transfer & Corporate Partnerships at Caltech. "Related Invention" as used herein, means an invention related to the subject matter of this Agreement, but not made as a result of activities performed under this Agreement, that is covered by a patent application or patent owned by NASA, a NASA Related Entity, or Partner.

ARTICLE 2. PURPOSE

The objective of the proposed partnership is to design, implement and experimentally demonstrate a multi-node multi-Gbps (greater than 10 Gbps) link in the 240 GHz range (and beyond) to eventually enable high speed connectivity in rural areas in the US. The proposed system will be based on a world-record greater than 2 Gbps terahertz communications system recently demonstrated at JPL. NASA will also explore higher power/frequency configurations using new chip designs, array systems to enable MIMO communications, and I-Q Tx/Rx schemes for enhanced data rates. NASA and NU will assemble and perform tests of the system at JPL and NU to demonstrate that THz systems can be used to offer high-speed wireless connectivity using different modulation schemes.

ARTICLE 3. RESPONSIBILITIES

NASA will use reasonable efforts to:

1. Investigate the optimum architecture for a 3-node transceiver system in the 210-230 GHz range for terahertz communications.
2. Design, implement and characterize a 3-node transmitting and receiving system in the 210-230 GHz range with transmitted power greater than 50 mW, mixer noise temperature (DSB) less than 2500K DSB and IF bandwidth of up to 15 GHz. The receivers will interface with the NU systems by means of a modulation injection port located either at the dc bias connection (using the last stage multiplier as a mixer) or through E-band mixer.
3. Perform some preliminary analyses for the potential development of phased-arrayed transmitters using the phase change of the diodes with voltage. This consists of the characterization of amplitude/phase response of JPL Schottky multipliers as a function of dc bias voltage (NU will send JPL a NU-funded grad student to help with these tests).
4. Develop two I/Q 210-230 GHz mixer units to be used at Northeastern University to characterize and demonstrate advanced communication links at 230 GHz using I/Q modulations.
5. Develop a 270-300 GHz high power (greater than 50 mW) tripler and one 270-300 GHz mixer for Northeastern University to evaluate communication links at higher frequencies.

6. Conduct field tests of the overall 230 GHz communication system at Northeastern University and its proximities (2 trips – 1 week/trip).
7. Prepare a follow-on Task Plan, if requested, subject to JPL approval.
8. Prepare bi-annual status reports, including programmatic, technical, and financial status.
9. Prepare a final report.

NU will use reasonable efforts to:

1. Provide one (1) active frequency multiplier (AMC) unit per node working at least in the 7080 GHz range with greater than 500 mW Output power no later than six (6) months after contract starts.
2. Provide one (1) low noise amplifier (LNA) per node with the IF bandwidth required by NU for the experiments (typically 1-15 GHz) no later than nine (9) months after contract starts.
3. Provide one (1) compact frequency synthesizer per node, compatible with the AMC multiplication factor chosen by NU, If NU will use top bench synthesizers for the tests, this might not needed since JPL can use also top bench synthesizers for testing up to 40 GHz no later than nine (9) months after contract starts.
4. Provide up to two (2) diagonal horn or horn-lens antennas per node (transmit and receive) operating at 210-240 GHz (typically WR-4 interface) no later than 12 months after contract starts.
5. Provide one (1) active frequency multiplier (AMC) unit per node working at least in the 90100 GHz range with ~500 mW Output power no later than 12 months after contract starts.

ARTICLE 4. SCHEDULE AND MILESTONES

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

3-node transceiver system in the 210-230 GHz range	Due 12 months after contract start date
Evaluation of arrayed transmitting and receiving systems in the 240 GHz range	Due 21 months after contract start date
Proof-of-concept components for enhanced terahertz communication systems	Due 18 months after contract start date

Fabrication of Schottky diode devices at MDL to support tasks 1 to 3	Due 12 months after contract start date
Field test support at Northeastern University	Due 24 months after contract start date

ARTICLE 5. FINANCIAL OBLIGATIONS

A. Partner agrees to reimburse NASA a not to exceed cost of \$200,000 for NASA to carry out its responsibilities under this Agreement. In no event will NASA transfer any U.S. Government funds to Partner under this Agreement. Payment must be made by Partner in advance of initiation of NASA's efforts on behalf of the Partner.

Initial payment authorized to proceed \$84,672
Incremental funds 9 Months after contract start date \$99,885
Incremental funds 21 Months after contract start date \$15,443
TOTAL \$200,000

B. Payment shall be payable to the National Aeronautics and Space Administration through the NASA Shared Services Center (NSSC) (choose one form of payment):

- (1) U.S. Treasury FEDWIRE Deposit System, Federal Reserve Wire Network Deposit System;
- (2) pay.gov at www.nssc.nasa.gov/customerservice (select "Pay NASA" from the Quick Links to the left of the page); or
- (3) check. A check should be payable to NASA and sent to:

NASA Shared Services Center
FMD – Accounts Receivable For the Accounts of: Jet Propulsion Laboratory
Building 1111,
Jerry Hlass Rd.,
Stennis Space Center, MS 39529

Payment by electronic transfer (#1 or #2, above), is strongly encouraged, and payment by check is to be used only if circumstances preclude the use of electronic transfer. All payments and other communications regarding this Agreement shall reference the Center name, title, date, and number of this Agreement.

C. NASA will not provide services or incur costs beyond the existing payment. Although NASA has made a good faith effort to accurately estimate its costs, it is understood that NASA provides no assurance that the proposed effort under this Agreement will be accomplished for the above estimated amount. Should the effort cost more than the estimate, Partner will be advised by NASA as soon as possible. In no event will NASA incur costs beyond the amount

currently obligated. Partner shall pay all costs incurred and has the option of canceling the remaining effort, or providing additional funding in order to continue the proposed effort under the revised estimate. Should this Agreement be terminated, or the effort completed at a cost less than the agreed-to estimated cost, NASA shall account for any unspent funds after completion of all effort under this Agreement, and promptly thereafter return any unspent funds to Partner.

D. 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, Partner 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 nonNASA 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 private or public entities.

ARTICLE 8. LIABILITY AND RISK OF LOSS

A. Partner 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, Partner employees or the employees of Partner's related entities, or for damage to, or loss of, Partner'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.

B. Partner 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. Data exchanged under this Agreement is exchanged without restriction except as otherwise provided herein.
2. Notwithstanding any restrictions provided in the Authority and Definitions Article of this Agreement, the Parties are not restricted in the use, disclosure, or reproduction of Data provided under this Agreement that is not Proprietary Data as defined in the Authority and Definitions Article of this Agreement. If a Party believes that Data is not Proprietary Data because any of the listed exceptions apply, it shall notify the other Party before any unrestricted use, disclosure, or reproduction of the Data.
3. The Parties will not exchange preexisting Proprietary Data under this Agreement unless authorized herein or in writing by the owner.
4. 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.
5. The Data rights herein apply to the employees and Related Entities of Partner. Partner shall ensure that its employees and Related Entity employees know about and are bound by the obligations under this Article.
6. Disclaimer of Liability: NASA is not restricted in, or liable for, the use, disclosure, or reproduction of Data without a restrictive notice, or for Data Partner gives, or is required to give, the U.S. Government without restriction.
7. Partner may use the following or a similar restrictive:

Proprietary Data Notice

The data herein include Proprietary Data and are restricted under the Data Rights provisions of Space Act Agreement 34008.

Partner 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 Partner Under this Agreement

If Data first produced by Partner 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. The Data will be disclosed and used (under suitable protective conditions) only for U.S. Government purposes.

C. Data First Produced by NASA Under this Agreement

1. Typically, all Data produced under this Agreement on behalf of NASA will be produced by Caltech under the NASA/Caltech contract to operate JPL. As such, any Data rights or protection not specifically provided to Partner under this Agreement must be negotiated under a separate agreement with the Office of Technology Transfer & Corporate Partnerships at Caltech through the Office of Contracts Management at JPL.
2. Protected Computer Software and Scientific and Technical Articles developed pursuant to this Agreement are the property of Caltech and any use of such Protected Computer Software or Scientific and Technical Articles other than as authorized by paragraph F. of this Article, or in the Invention and Patent Rights Article of this Agreement, must be negotiated with the Office of Technology Transfer & Corporate Partnerships at Caltech through the Office of Contracts Management at JPL.

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, either Party may publish unclassified and non-Proprietary Data resulting from work performed under this Agreement. As such, subject to applicable U.S. Export Control laws, either Party shall have the right to publish the unclassified and nonProprietary Data resulting from work performed under this Agreement. In accordance with the Invention and Patent Rights Article of this Agreement, reasonable precautions will be taken to safeguard against disclosure of potentially patentable inventions. NASA shall provide partner a copy of proposed publications no later than simultaneously with release for publication.

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 in order for patent application filing to be made.

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 Inventions 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.

3. If the Data is produced by Caltech under this Agreement and is funded in part or in whole by Partner, Partner shall receive a royalty-free, non-exclusive, non-commercial, internal use license on behalf of the U.S. Government under the NASA/Caltech contract to operate JPL. Sublicenses shall not be permitted by Partner. Inquiries regarding commercial or exclusive licenses should be directed to Caltech's Office of Technology Transfer & Corporate Partnerships through the Office of Contracts Management at JPL.

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 Partner 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, Controlled Government Data, and Protected Computer Software

1. NASA or Partner (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).
 - d. Protected Computer Software as defined in the Authority and Definitions Article of this Agreement.
2. All Background, Third Party Proprietary, Controlled Government Data, and Protected Computer Software 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 technical document.
 - b. Third Party Proprietary Data:

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

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

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

The Disclosing Party's Related Inventions, if any, will be identified in a separate technical document.

e. Protected Computer Software may be provided under a separate license agreement between Caltech and Partner with the express understanding that Partner will use and protect such Protected Computer Software only in accordance with this Article. The Parties agree that the following Protected Computer Software may be provided to Partner; the list may not be comprehensive and is subject to change during the course of the work done under the Agreement and is not meant to supersede any restrictive markings which may be on Data provided: The Disclosing Party's Protected Computer Software, if any, will be identified in a separate technical document.

4. For such Data identified with a restrictive notice pursuant to H.2. or such Data identified in this Article, 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 researchers, 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 Partner discloses Proprietary Data orally or visually, NASA will have no duty to restrict, or liability for disclosure or use, unless Partner:

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

ARTICLE 10. INTELLECTUAL PROPERTY RIGHTS - INVENTION AND PATENT RIGHTS

A. General

1. NASA has determined that 51 U.S.C. § 20135(b) does not apply to this Agreement. Therefore, title to inventions made (conceived or first actually reduced to practice) under this Agreement remain with the respective inventing party(ies). No invention or patent rights are exchanged or granted under this Agreement, except as provided herein.

2. The invention and patent rights herein apply to employees and Related Entities of Partner. Partner shall ensure that its employees and Related Entity employees know about and are bound by the obligations under this Article.

B. NASA Inventions

NASA will use reasonable efforts to report inventions made under this Agreement by its employees. Upon request, NASA will use reasonable efforts to grant Partner, under 37 C.F.R. Part 404, a negotiated license to any NASA invention made under this Agreement. This license is subject to paragraph E.1. of this Article.

C. NASA Related Entity Inventions

1. NASA will use reasonable efforts to report inventions made under this Agreement by its Related Entity employees, or jointly between NASA and Related Entity employees, where NASA has the right to acquire title. Upon request, NASA will use reasonable efforts to grant Partner, under 37 C.F.R. Part 404, a negotiated license to any of these inventions where NASA has acquired title. This license is subject to paragraph E.2. of this Article.

2. For inventions made as a result of activities performed under this Agreement, elected upon by Caltech under the NASA/Caltech contract to operate JPL, and funded in part or in whole by the

Partner, reasonable efforts will be made to report such inventions to Partner. Partner shall receive a royalty-free, non-exclusive, non-commercial, internal use license to such inventions. Sublicenses shall not be permitted by Partner. Caltech shall consider and, if appropriate under the current Caltech policy, may grant the Partner greater license rights or an option to greater license rights than those provided herein under mutually agreeable terms and conditions. Such terms and conditions shall be negotiated by Partner and Caltech Office of Technology Transfer &

Corporate Partnerships through the Commercial Program Office at JPL at (818) 354-3821.

D. Joint Inventions With Partner

The Parties will use reasonable efforts to report, and cooperate in obtaining patent protection on, inventions made jointly between NASA employees, Partner employees, and employees of either Party's Related Entities. Upon timely request, NASA may, at its sole discretion and subject to paragraph E. of this Article:

1. refrain from exercising its undivided interest inconsistently with Partner's commercial business; or
2. use reasonable efforts to grant Partner, under 37 C.F.R. Part 404, an exclusive or partially exclusive negotiated license.
3. For inventions made jointly between Partner and Caltech under the NASA/Caltech contract to operate JPL, Caltech may provide a license as described in paragraph C.2 of this Article.

E. Rights to be Reserved in Partner's License

Any license granted Partner under paragraphs B., C., or D. of this Article is subject to the following:

1. For inventions made solely or jointly by NASA employees, NASA reserves the irrevocable, royalty-free right of the U.S. Government to practice the invention or have it practiced on behalf of the United States or on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.
2. For inventions made solely or jointly by employees of a NASA Related Entity, NASA reserves the rights in 1. above, and a revocable, nonexclusive, royalty-free license retained by the Related Entity under 14 C.F.R. § 1245.108 or 37 C.F.R. § 401.14 (e).
3. For inventions made solely or jointly by employees of Caltech and elected upon by Caltech under the NASA/Caltech contract to operate JPL, Caltech retains ownership rights, subject to the rights reserved by NASA set forth in paragraph E.2. of this Article.

F. Protection of Reported Inventions

For inventions reported under this Article, the Receiving Party shall withhold all invention reports or disclosures from public access for a reasonable time (1 year unless otherwise agreed or unless restricted longer herein) to facilitate establishment of patent rights.

G. Patent Filing Responsibilities and Costs

1. The invention and patent rights herein apply to any patent application or patents covering an invention made under this Agreement. Each Party is responsible for its own costs of obtaining and maintaining patents covering sole inventions of its employees. The Parties may agree otherwise, upon the reporting of any invention (sole or joint) or in any license granted.
2. Partner shall include the following in patent applications for an invention made jointly between NASA employees and/or its Related Entity employees and Partner employees:

The invention described herein may be manufactured and used by or for the U.S. Government for U.S. Government purposes without the payment of royalties thereon or therefore.

H. Related Inventions

1. No preexisting Related Inventions will be exchanged between the parties under this Agreement unless specifically authorized in this Article or in writing by the owner of the Related Inventions.
2. To the extent NASA Related Invention(s) are known, and to the extent such Related Inventions are available for licensing, NASA may enter into negotiations with Partner for a license to such Related Invention(s) consistent with the requirements of 37 C.F.R. Part 404.
3. For Related Inventions owned by Partner, Partner grants to NASA and NASA Related Entities a non-exclusive, royalty-free license to use the Related Inventions in order to perform under this Agreement. If Partner Related Inventions can be separated from inventions produced

under this Agreement, upon completion of activities under this Agreement, such Partner Related Inventions will be returned to Partner and the license to use the Related Inventions herein will expire. If such Partner Related Inventions cannot be separated from inventions produced under this Agreement, the parties and any Related Entities with an ownership right in such inventions agree to negotiate appropriate licenses for the continued use of Partner Related Inventions.

4. For Related Inventions owned by Caltech, Caltech agrees to consider and, if appropriate under the current Caltech policy, may grant Partner a license to Related Inventions under mutually agreeable terms and conditions. Such terms and conditions shall be negotiated by the Caltech Office of Technology Transfer & Corporate Partnerships and Partner pursuant to a separate agreement.
5. The parties agree that the following inventions are Related Inventions which may be used in performance of this Agreement. This list may not be comprehensive and is subject to change during the course of work under this Agreement:

The Disclosing Party's Related Inventions, if any, will be identified in a separate technical document.

ARTICLE 11. USE OF NASA NAME AND NASA EMBLEMS

A. NASA Name and Initials

Partner 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, Partner 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. Partner must submit any proposed use of the emblems to NASA Communications for review and approval.

C. Caltech and Related Entity Names, Initials and Emblems

Partner shall similarly not use the names, initials, or emblems of Caltech (including the "California Institute of Technology") or of a NASA Related Entity in any of the ways restricted in paragraph A. of this Article. Prior approval for any such use must be requested from Caltech or the appropriate Related Entity.

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

NASA or Partner 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 11510 (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. Partner agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of Partner 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. 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. Access by a Partner 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.

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

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 two years from the Effective Date, whichever comes first.

ARTICLE 17. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Agreement by providing thirty (30) calendar days written notice to the other Party. In the event of such termination, Partner will be obligated to reimburse NASA for all costs for which the Partner was responsible and that have been incurred in support of this Agreement up to the date the termination notice is received by NASA.. Where Partner terminates this Agreement, Partner will also be responsible for termination costs (such as costs associated with non-cancellable commitments).

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", "Intellectual Property Rights"-related clauses, and "Financial Obligations" shall survive such expiration or termination of this Agreement.

ARTICLE 19. POINTS OF CONTACT

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

Management Points of Contact

NASA Jet Propulsion Laboratory

Jose Siles
Task Manager
Mail Stop: 168-214
4800 Oak Grove Drive
Pasadena, CA 91109
Phone: 818-354-4006
Jose.V.Siles@jpl.nasa.gov

Northeastern University

Josep Jornet
Associate Professor, Electrical and Computer
Engineering
360 Huntington Ave.
Boston , MA 02115-5005
Phone: 617-373-5719
j.jornet@northeastern.edu

Business/Administrative Points of Contact

NASA

Nar Nazari
Contracting Officer
Mail Suite: 180-802L
4800 Oak Grove Drive
Pasadena, CA 91109
Phone: 818-354-5619
nar.r.nazari@nasa.gov

Northeastern University

Richard Alves
Contracts Manager
360 Huntington Ave.
Boston, MA 02115
5005
Phone: 617-373-6594

r.alves@northeastern.edu,
with cc to nu-
res@northeastern.edu

ARTICLE 20. DISPUTE RESOLUTION

Except as otherwise provided in the Article entitled "Priority of Use," 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 Partner 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. MODIFICATIONS

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

ARTICLE 22. ASSIGNMENT

Neither this Agreement nor any interest arising under it will be assigned by the Partner or NASA 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 23. APPLICABLE LAW

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

ARTICLE 24. 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 25. LOAN OF GOVERNMENT PROPERTY

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

ARTICLE 26. SIGNATORY AUTHORITY

The signatories to this Agreement covenant and warrant that they have authority to execute this Agreement. By signing below, the undersigned agrees to the above terms and conditions.

NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION

NORTHEASTERN UNIVERSITY

BY: _____
Nar R. Nazari
Contracting Officer, NOJMO

BY: _____
Eva Pasadas
Director, Grants & Contracts

DATE: _____

DATE: 11/16/21
