

JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION (JOFOC)
(In accordance with Federal Acquisition Regulation (FAR) 6.3 – Other than Full and Open Competition)

1. This document is a justification for other than full and open competition prepared by NASA's Goddard Space Flight Center (NASA's GSFC):

NASA/GSFC has a requirement to demonstrate optical communications relay services between geosynchronous orbit and Earth over an extended period, and gain knowledge and experience that will enable NASA to design, procure, and operate cost-effective future optical communications systems and relay networks. To support this effort, the Government requires a space-qualified Controller Electronics (CE) unit. Moog Broad Reach, Tempe, AZ, a large business, is the only responsible source that can satisfy Agency requirements. This document justifies the determination for using other than full and open competition.

2. The nature and/or description of the action being approved:

NASA/GSFC is managing the Laser Communications Relay Demonstration (LCRD) Mission for NASA's Office of the Chief Technologist (OCT) and NASA's Space Communications and Navigation Office (SCaN). LCRD leverages optical communications technology previously developed at considerable cost over the past 5 years for NASA and the Department of Defense (DoD) by the Massachusetts Institute of Technology Lincoln Laboratory (MIT/LL). MIT/LL is a Federally Funded Research and Development Center (FFRDC), created in 1951, for the purposes of applying science and advanced technology, including space communications technology, to address critical problems of national security. MIT/LL is the only U.S. organization with actual high-speed optical communications in-space experience. The LCRD program will also procure a related optical module system and related components that implement the NASA/DoD heritage design from industry. Specifically, the project will procure the CE unit developed at considerable cost over the past 5 years by MIT/LL and industry sources for NASA and DoD.

MIT/LL, through their contract with the United States Air Force Electronic Systems Command (USAF/ESC), was directed by the USAF to procure the CE unit designed jointly for NASA and DoD. This CE was originally designed for NASA's Lunar Laser Communications Demonstration (LLCD) project for a lunar orbit. The CE unit has more recently been updated to accommodate a geosynchronous earth orbit. It is the intent of LCRD to procure the geosynchronous CE unit. The baseline LCRD architecture reuses the LLCD optical terminals. This particular CE unit design is required to meet the LCRD performance specifications and to ensure interoperability across the United States Government.

3. Description of the supplies or services required, including an estimated value:

NASA/GSFC requires the development of a space-qualified CE unit. The CE unit's primary function is to interface with external sensors and loads through hardware and digital control loops in the CE. The CE will receive commands and configuration updates, and supply telemetry via a MIL-STD-1553B and up to two (2) SpaceWire ports. For the LCRD Mission, Moog Broad Reach will provide the labor, materials, and facilities to fabricate, assemble, and test one Engineering Unit and two Flight Units. In addition,

Moog Broad Reach will deliver to GSFC all of the hardware drivers and software necessary to operate all functionality within the CE unit.

The Government intends to issue a Firm-Fixed-Price contract with a 20-month delivery schedule. The vendor shall design, procure materials, build, and deliver a total of one (1) CE Engineering Design Unit (EDU) that will be utilized in non-flight testbed along with a complete Board Support Package. The vendor shall also provide two (2) Flight Units along with any updates to the Board Support Package. The first Flight Unit shall be subject to protoflight test, which is defined as Qualification levels at the Acceptance test durations. The second Flight Unit shall be tested to the Acceptance test levels and durations. The total estimated value of this procurement is \$4,200,000.

4. Statutory authority permitting other than full and open competition:

The statutory authority for this procurement is 10 U.S.C. 2304 (c) (1), Only One Responsible Source.

5. A demonstration that the proposed contractor's unique qualifications or the nature of the acquisition requires use of the authority cited:

The CE unit is a portion of the optical communication telescope pointing and tracking system. The LCRD architecture leverages the entire system from the MIT/LL design. Through its contract with MIT/LL, Moog Broad Reach is uniquely qualified to deliver the required units to LCRD within schedule because of the knowledge gained from working on the MIT/LL programs and possessing the developed Field-Programmable Gate Array (FPGA) and driver software. Additionally, Moog Broad Reach has already delivered flight CE units to MIT/LL for use in the LLCDD and are under contract for follow-on deliveries for a Geosynchronous (GEO) mission. Moog Broad Reach possesses all the hardware, FPGA firmware, software driver package, test procedures, and test equipment to support the LCRD mission, whose requirements are very similar to the MIT/LL GEO program. Any deviations from this existing design increases the risk to other portions of the Pointing, Acquisition and Tracking (PAT) system, such as interfacing to the optical module and/or flight software.

In their work with these units, MIT/LL is still encountering technical challenges with its design and the testing of that design, and determining how best to overcome them. MIT/LL has delivered the CE units for the LLCDD mission and is currently working on seven units for a geosynchronous orbit mission for MIT/LL, which includes a Qualification Unit and the six Flight units. A new qualification unit was required because there were some design changes and improvements. As these challenges are overcome, the knowledge is passed directly from MIT/LL, which has decades of experience, to the current vendors, making these vendors experts in assembly and test of their respective fields. Utilizing the existing expertise of MIT/LL in optical communications in general is an absolute necessity for ensuring that the LCRD CE meets technical performance (specifically the closed loop nature of telescope pointing and tracking), schedule, and cost requirements. The only way to ensure maintenance of this expertise is to procure the CE unit from the same vendor working with MIT/LL. Using any vendor other than Moog Broad Reach would add significant risk to the LCRD project.

The schedule for the LCRD project is being directed by the OCT and the SCan Office, based in part on a future use need for the Tracking and Data Relay Satellite System (TDRSS). Any delays to the procurement schedule from using a new vendor (due to facilities upgrades, learning the design, or

troubleshooting problems already overcome by MIT/LL's vendor), would delay the LCRD schedule and adversely impact the technology roadmap laid out by OCT and SCA_N, which requires that LCRD launch by the end of 2017. If GSFC works with a vendor who is unfamiliar with the design (including firmware and software replacement), assembly, and test of the CE unit, there will be essentially no chance of meeting the dates for first unit delivery (early 2014) or Flight unit deliveries (mid 2015). Those unit delivery dates are required in order to meet the 2017 launch date. Thus, the Government would face an unacceptable delay in fulfilling its requirements.

6. Description of the efforts made to ensure that offers are solicited from as many potential sources as practicable, including whether a notice was or will be publicized as required by Federal Acquisition Regulation (FAR) 5.2:

In accordance with FAR Part 5.2, this procurement was synopsisized on NASA's Acquisition Internet Services (NAIS) Business Opportunities web site on February 5, 2013. The results of the synopsis are included in Section 10 below.

7. A determination by the contracting officer that the anticipated cost to the Government will be fair and reasonable:

The proposed price by Moog Broad Reach will be evaluated by the Contracting Officer's Representative and the Contracting Officer to determine if the price is fair and reasonable. The Contracting Officer will obtain the appropriate data on the price at which the same item has previously been developed/acquired by DoD, and determine if the data is adequate for evaluating the reasonableness of Moog Broad Reach's proposed price. Also, the Government will compare the proposed price with the independent Government estimate.

8. Description of the market research conducted, and the results, or a statement of the reasons market research was not conducted:

Market research was not conducted as LCRD is leveraging optical communications technology previously developed for NASA and the Department of Defense (DoD) by MIT Lincoln Laboratory (MIT/LL). As previously stated, GSFC will transfer technology, optical systems, and component designs developed at MIT/LL over the past decade from MIT/LL to NASA.

9. Other facts supporting the use of other than full and open competition:

The added costs to LCRD and the Government if another vendor were selected would result in substantial duplication of costs that are not expected to be recovered through competition. As stated previously, the CE was developed over the last five years at a considerable cost to NASA and the DoD. If the Government were to use another vendor, these years of knowledge in the field of optical communication would be lost. Many more problems will be expected, each one taking a long time to overcome. GSFC will have to pay for numerous months of extra testing and troubleshooting. Added to the non-recurring engineering that LCRD would have to pay for (such as facilities improvements, and designing and building Ground Support Equipment), the extra cost of using another vendor is estimated to be in excess of \$500,000. Additionally, the risk that the hardware would fail to meet performance requirements would increase greatly, as would the risk of LCRD missing its program milestones.

10. Sources, if any, that expressed an interest, in writing, in the acquisition:

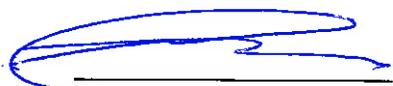
In accordance with the requirements of FAR 5.203(a), a notice of NASA's intent to acquire Controller Electronics was published through NAIS to the Electronic Posting System and to the Federal Business Opportunities worldwide Web site on February 5, 2013. During the 15-day response period, two companies expressed interest, however, after being provided the Statement of Work and Specifications, they decided not to submit their capability statements. To date, no companies submitted capability statements for the Controller Electronics procurement.

11. The actions the Agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required:

Optical communication technology has been on the cusp of wide-spread use for years. The advantage of the technology is very appealing. Spacecraft can achieve much higher data rates, with lower power and lower mass than existing communication systems. However, the design and implementation of an optical communication system is very difficult. Spacecraft designers are extremely hesitant to use new technology for subsystems where heritage hardware exists, such as propulsion, communication, or guidance, navigation and control, because of the decrease in overall mission reliability. The LLCD project will show that the MIT/LL CE design is capable of surviving launch and operating on-orbit. However, the LLCD Flight unit is only slated to operate intermittently over a short period of time. While this will be a significant step forward, it will likely not be enough to entice other programs to use optical communication as their primary means of communication. The LCRD mission has a 2-year lifetime requirement. During those two years, high speed communication will be available almost all the time. Seeing this performance from an optical communication system should be enough to create demand for the hardware from other missions. With the risk of using the hardware sharply reduced, programs will want to take advantage of the high data rates, low mass, and low power. As LLCD and LCRD show that the technology performs on orbit and performs for a long time, other companies will begin to make the internal investments necessary for designing, building, and testing. In time, industry will be able to supply a variety of designs from a variety of vendors, and competitive awards will be the norm.

JOFOC Signature Page for Controller Electronics
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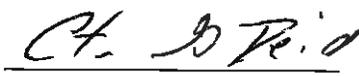
TECHNICAL DIRECTORATE: I certify that the facts presented in this justification are accurate and complete.



Signature

01-18-2013
Date

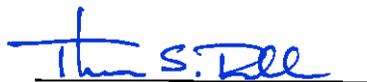
CONTRACTING OFFICER: I certify that this justification is accurate and complete to the best of my knowledge and belief.



Signature

1/18/13
Date

 PROCUREMENT OFFICER:
(CONCURRENCE)



Signature

4/23/13
Date

GSFC COMPETITION
ADVOCATE:
(APPROVAL)



Signature

4/30/13
Date