20 AUG 1999

ATTACHMENT 1
to
RFP F04701-99-R-0500

STATEMENT OF OBJECTIVES

NPOESS Program Definition
and
Risk Reduction
(PDRR)

1. OVERVIEW

1.1. The National Polar-orbiting Operational Environmental Satellite System (NPOESS) Program

The NPOESS program was designated by Presidential Decision Directive as the single satellite system replacing the Department of Commerce (DOC) Polar-orbiting Operational Environmental Satellites (POES) and the Department of Defense (DoD) Defense Meteorological Satellite Program (DMSP) satellites. The objectives of NPOESS are:

- To provide a single, national, polar remote-sensing capability to acquire, receive and disseminate global and regional environmental data
- To achieve National Performance Review (NPR) cost savings through the convergence of DoD and NOAA environmental satellite programs

- To incorporate, where appropriate, technology transition from the National Aeronautics and Space Administration's (NASA) Office of Earth Science Enterprise (OESE) program

To accomplish this mission, the two satellite DMSP and the two satellite POES constellations will be replaced by NPOESS satellites in two orbital planes, and a EUMETSAT satellite providing data in the mid-morning orbital plane (METOP). The long term goal is to share a common set of instruments on EUMETSAT and NPOESS polar orbiting satellites.

NPOESS will constitute the remote sensing capability that will acquire, receive at ground terminals, and disseminate to processing centers, global and regional data required by the civil and national security user communities. These data will include radiometric observations of the atmosphere and cloud cover imagery, as well as other specialized environmental, climatic, terrestrial, oceanographic, and solar-geophysical data. Data will be processed into Raw Data Records (RDR), Sensor Data Records (SDR), and Environmental Data Records (EDRs) for use by the operational community.

1.2. Acquisition Strategy

The government intends to award one or more contracts for the system level Program Definition & Risk Reduction (PDRR) phase. The selected contractors will provide the government with an NPOESS operational and sustainment concept and architecture for further development, conduct risk reduction demonstrations, and demonstrate their ability to develop and deploy the NPOESS system if awarded the Engineering and Manufacturing Development (EMD)/Production program at the Milestone II/III decision.

A portion of the NPOESS program is the joint NASA/NPOESS Integrated Program Office NPOESS Preparatory Project (NPP), whose purpose is to reduce NPOESS development risk and provide a bridging mission for the NASA Earth Observing System. The NPOESS program is responsible to provide sensors, the primary command, control and communication segment, and the primary interface data processor segment for the NPP mission. This PDRR effort includes the up front systems engineering and integration for the C3 and IDPS portions of the NPP support. The NPOESS program objectives for this support is to provide the maximum commonality between the NPP and NPOESS data processing and C3 segments concept of operations, designs, and materiel solutions.

During the PDRR phase, the government will conduct an interim evaluation of the contractor's technical progress against the Government's requirements. The government's intent is to provide feedback to each contractor with respect to their design, thereby ensuring each contractor remains apprised of the government's desires while competing for the EMD and Production contract award.

Prior to completion of the PDRR phase, the government will release a request for proposal for a competitively selected EMD/Production contract for the NPOESS at the successful completion of Milestone II/III. This will be a separate contract from the

PDRR contract.

1.3 Total System Performance Responsibility

The overall NPOESS strategy is to award, at the Milestone II/III decision, an EMD/Production contract requiring the contractor to assume Total System Performance Responsibility (TSPR) to deliver an NPOESS, meeting all system requirements. The contractor selected for the EMD/Production contract will assume responsibility for the following:

a) Completion of IPO initiated sensor systems' development, production, performance testing, and integration into the NPOESS spacecraft bus.

b) Procurement (or development), integration, and test of additional "leveraged" sensors.

c) Spacecraft bus development, production, integration of satellites [bus and sensors], and satellite test.

d) Ground segment development, production, test, and deployment, to include both the C3 and IDPS portions of the NPP and NPOESS ground segment

e) Field terminal support as necessary.

f) Launch operations support and early orbit checkout of NPOESS. (Note: The launch service is not a part of this responsibility).

g) Operations and maintenance. The extent of O&M performed by the contractor will be determined during the PDRR phase as part of their operational and sustainment concept development.

h) Provide support to NPP and use NPP as a method to reduce risk for the NPOESS program.

Further definitions of TSPR responsibility will be developed and provided to the contractor during the PDRR contract period of performance.

2. PROGRAM OBJECTIVES

The objective of the NPOESS PDRR effort is to perform the necessary requirements analysis, system definition, risk mitigation, planning and costing to prepare to enter EMD and accept total system performance responsibility. An additional objective is to implement a development process reducing cost and appropriately addressing risk. This will include analyzing and recommending alternate solutions to requirements satisfaction, government interfaces, and business approaches. During PDRR, the specific objectives are:

a) Develop an architecture, analyze, and allocate mission requirements to the space, launch, Interface Data Processor and C3 segments and subsystems, and identify associated cost/performance/supportability/risk/schedule sensitivities and trades.

b) Define NPOESS performance with sufficient maturity for a smooth transition to EMD to achieve the system requirements within LCC and schedule constraints.

c) Define, coordinate, and obtain approval of interface requirements. Interfaces requiring definition documents are NPOESS Spacecraft to Sensors; NPOESS & NPP Spacecraft to C3; NPP C3 to NPP/NPOESS IDPS; NPOESS/NPP IDPS to Customers (Centrals and NASA); NPOESS IDPS to Tactical Terminals; and NPOESS C3 to Tactical Terminals (for Direct DownLink).

d) Conduct Cost as an Independent Variable (CAIV) trades, develop credible cost estimates for EMD, and provide information to support the development of government life cycle cost estimates.

e) Identify risk in critical areas, develop risk mitigation plans, and discuss/demonstrate how risk will be been mitigated to a level ensuring NPOESS mission performance and NPP IDP and C3 segment performance with acceptable risk prior to entering into EMD.

f) Demonstrate capability (plans, resources, teaming arrangements, prototype simulations, etc.) to provide the IDP and C3 segments for the NPOESS Preparatory Project (NPP) no later than December 2004, as well as plans to transition appropriate NPP systems, subsystems, algorithms, test facilities to NPOESS.

g) Conduct logistics support analysis, fully integrated within the systems engineering process, of the space, IDP and C3 segment operations for NPP and NPOESS. Implement the planning process and activities necessary to support T&E and subsequent EMD efforts.

h) Support the development of a government and contractor combined test and evaluation program encompassing both developmental and operational tests..

i) Define and develop plans to deliver NPOESS sensor packages to other government and international agencies.

j) Develop plans for the acquisition, integration and test of leveraged sensors.

k) Develop plans to accept government directed, government developed, or government furnished equipment (e.g. sensors, algorithms)

l) Provide flexible and innovative management of program cost, schedule, performance, risks, contracts and subcontracts, and data required to deliver an effective and affordable system design.

m) Provide effective working relationships with the IPO, sensor contractors, other IPO suppliers, associate contractors, and other agencies.

n) Participate in working groups with the government and other IPO contractors and any sub-working groups that may arise.

Attachment 1
to
Statement of Objectives
8/20/99

The following tasks will be accomplished by the PDRR contractor in parallel with the effort outlined in the Statement of Objectives. These tasks should be identified in the IMP.

1. The IPO has submitted the Stage 2 Spectrum Allocation filing to the NTIA. This filing is applicable to both NPOESS and NPP. NTIA Form-44, 7 May 1999, attached, has placed a number of conditions and supporting analysis requirements on the IPO that need to be addressed and resolved, prior to NTIA's approval of the Stage 3 NPOESS spectrum allocation filing. The NTIA coordinated and approved Stage 3 filing is a pre-requisite for IPO Milestone II approval. Many of these NTIA stipulated tasks are NPOESS system implementation specific. The Contractor shall address each of the NTIA concerns listed on pages 2 and 3 of the NTIA-44 form and provide the information to the IPO. This will support preparation of the NPOESS Stage –3 filing, submission, and subsequent review and approval by the NTIA IRAC membership. (Due NLT June 2000)

2. The contractor shall prepare a data denial implementation strategy and specific hardware implementation plans that will comply with the NPOESS TRD and Presidential Directive. (This is not applicable to NPP.) At a minimum, the NPOESS system shall be capable of enabling mission data denial by ground command for the data in each/any of the NPOESS data downlink streams [SMD, HRD, and LRD], except for data from the Search and Rescue sensor and the Surface Data Collection sensor which are never encrypted or denied. Specifically, the contractor shall evaluate commercial bulk stream encryption implementation options such as the Commercial Digital Encryption system (DES) with a 1024 bit key, or larger. Other bulk encryption schemes or methods of implementation may also be considered. If needed, a key escrow management system, similar to the DOD's EKMS program for military users of the NPOESS program, must be part of the recommendation (i.e., each receiver must be specifically enabled by the key.) In addition to the Stored Mission Data (SMD) links to Mission Ground Sites, the contractor shall evaluate and complete an encryption design implementation for the HRD and LRD field terminal receivers intended for US Military utilization, including provisions for decryption key receipt. (Due NLT July 2000).

3. The contractor shall support the development of the TRD Appendix C (NPOESS Baseline RF Requirements for C3 Links). This specification shall be sufficiently detailed to enable the NPP spacecraft contractor to proceed with SMD and HRD communication link design tradeoffs. Completion of all analysis necessary to support the government's NPP SMD downlink frequency decision must be completed no later than April 2000.

4. In conjunction with the development of the TRD Appx C in Item 3 above, the contractor shall develop a strawman design for the NPOESS 20 Mbps HRD broadcast. Detail must be sufficient to enable the IPO to specify the interfaces necessary to create this link on-board the NPOESS spacecraft and associated HRD ground receive stations.

5. In conjunction with the development of the TRD Appx C in Item 3 above, the contractor shall develop a strawman design for the NPOESS 230 Kbps LRD broadcast. Detail must be sufficient to enable the IPO to specify the interfaces necessary to create this link on-board the NPOESS spacecraft and associated LRD ground receive stations. Until further notice, this link will consist of three channels of lossy compressed VIIRS data. (This does not apply to NPP.)

6. In conjunction with the development of the TRD Appx C in Item 3 above, the contractor shall develop a strawman design for the NPOESS (TBS) Mbps SMD downlink data link. Detail must be sufficient to enable the IPO to specify the interfaces necessary to create this link on-board the NPOESS spacecraft and associated SMD ground CDA receive stations. (This does not apply to NPP.)

7. The contractor shall develop a concept for reloading the NPOESS spacecraft and sensor memory. The IPO's desire is to have only one aperture supporting the primary mission, i.e., uplink commanding and SMD downlink should be performed in the same aperture. Consider 128/256 Kbps uplink @ S-band, X-band, Ka-band. (Impacts must be considered for NPP.)

8. After contract award, the prime and all significant software subcontractors shall participate in a tailored Software Development Capability Evaluation (SDCE) which will include a site visit by the IPO. Contractors shall revise the Software Development Plan (SDP) after the SDCE and obtain government approval of the SDP. The SDCE is defined in AFMC Pamphlet 63-103.

9. The contractor shall evaluate the feasibility of a programmable modulator on-board the NPOESS that can adjust modulation and data rates as operational tempo and considerations require. Demonstrate that the modulation/demodulation concept works at the various NPOESS data rates (up to 400 Mbps). (This does not apply to NPP.)

10. To support the synthesis of the LRD broadcast, the contractor shall investigate the feasibility of programmable/adjustable data compression ratios and algorithms, on-orbit. This could provide the spacecraft with the capability to deliver more data to the ground as communications costs drop in the future. (This task is tightly coupled to decisions that need to be made regarding a single, vice multiple, VIIRS data stream(s) and the need to compress different types of data at different compression ratios.) Determine the impact of a single VIIRS instrument data stream at a not to exceed (NTE) 8.0 Mbps (orbit average) and NTE 10.5 Mbps (peak) on the spacecraft C&DH, in particular the requirement to synthesize the LRD stream. Include the provision of ground commandable instrument data channel selection with ground commandable adjustable lossy data compression of the selected channel. (Impacts must be considered for NPP.)