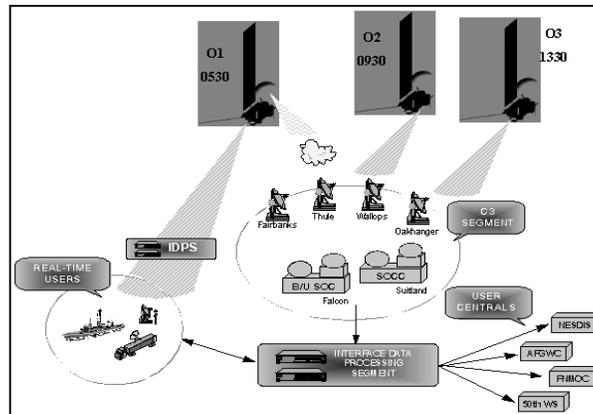


NATIONAL POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM (NPOESS)



The National Polar-orbiting Operational Environmental Satellite System (NPOESS) is a Tri-Agency program jointly administered by DoD, the Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA), and the National Aeronautics and Space Administration (NASA). The program is managed by an NPOESS Executive Committee (EXCOM) through an Integrated Program Office (IPO) and is being acquired under U.S. Air Force acquisition authority. NPOESS will provide a national remote sensing capability to acquire and disseminate global and regional environmental data for a period of at least ten years after achieving initial operational capability.

NPOESS contains the following segments:

- A space segment, comprised of satellite payload components and ground support equipment, and operating in a sun-synchronous, near-polar orbit at a nominal 833 km altitude.
- A C³ segment, providing for spacecraft control and state-of-health monitoring and supporting the delivery of data to designated centralized facilities and field terminals.
- An Interface Data Processor Segment (IDPS) comprised of data processing functions for centralized facilities and field terminals.
- A Field Terminals Segment (FTS) that receives direct real time mission data from the spacecraft into field terminals, and a NPOESS Preparatory Project (NPP) Science Data Segment (SDS) that is responsive to NASA’s needs for science-quality data and algorithms.
- Launch Support, which is comprised of the resources to accomplish launch operations and to place the satellite in the correct orbit.

BACKGROUND INFORMATION

NPOESS Milestone I occurred in FY97. The Program Definition/Risk Reduction (PDRR) phase was structured around system architecture studies, sensor and algorithm development, and Pre-Total System Performance Responsibility (TSPR) contracts. During PDRR, multiple contracts were awarded

for each higher risk sensor and/or suite of sensors and for system studies. Selection of the final TSPR contractor will occur shortly after Milestone B in FY02.

A key risk reduction activity is the NPP, which is a joint Integrated Program Office/NASA space flight of selected critical imager and sounding sensor systems. This flight, scheduled for FY05, will provide NPOESS with a risk reduction demonstration and NASA with selected sensor data to provide continuity with the current environmental and weather satellites.

TEST & EVALUATION ACTIVITY

T&E and risk reduction activities in FY01 included revision of the Integrated Operational Requirements Document (IORD), an update of the TEMP, further definition of roles and responsibilities for a Combined Test Force (CTF) to conduct NPOESS testing, and development of a Memorandum of Agreement (MOA) between the IPO and the Services to refine Field Terminal concepts.

A revised IORD (IORD II) was approved by the Joint Agency Requirements Group (JARG). IORD II includes Interoperability as a KPP, defines top-level Information Exchange Requirements (IERS), and defines current field terminals and centralized facilities with which NPOESS is required to interoperate.

The initial TEMP was approved in 1997 and is currently being revised for Milestone B to reflect the current test strategy. The test strategy utilizes Modeling and Simulation (M&S) and combined DT/OT for early insight into the system's potential operational performance, followed by dedicated Multi-Service OT&E (MOT&E). During dedicated MOT&E, operational testers will conduct tests on production-representative hardware and software, supplemented as required with data from validated and accredited M&S. Two Operational Assessments (OAs) are planned: OA1 beginning in FY02 in support of Milestones B and, if needed, C, and OA2 in FY05 in support of Critical Design Review (CDR) and the NPP risk reduction effort. The MOT&E will be conducted once two satellites, the C3/IDPS, and a sufficient number of field terminals are fielded, nominally in the FY11 timeframe.

The concept of a tri-Agency Combined Test Force (CTF) was refined to correspond with the current acquisition strategy and to better define AFOTEC's role in each of the T&E activities within the overall NPOESS Operational Test (OT) concept. Although AFOTEC will be the lead agency for all OT&E events, it will combine efforts with other Service Operational Test Agencies, NOAA, and NASA during MOT&E to make the most efficient use of expertise and resources.

The IPO is developing a Memorandum of Agreement (MOA) with the Services on the issue of Field Terminal interoperability and funding. Under this MOA, the IPO proposes providing two direct data links to Field Terminal users, one for High Rate Data (HRD) in X-band at 20 Megabits per second (Mbps), and one for Low Rate Data (LRD) in L-band at 3.5 Mbps for more austere users. The IPO plans to demonstrate prototype NPOESS HRD and LRD terminals as a guide to users in modifying or replacing their existing terminals, and will fund and distribute non-proprietary HRD and LRD versions of Field Terminal IDPS. Under the proposed MOA, individual agencies are expected to fund, procure, and manage their own Field Terminals to satisfy their user needs.

TEST & EVALUATION ASSESSMENT

No assessment of operational effectiveness or suitability can be made at this time. NPOESS is still in the Program Definition/Risk Reduction phase, only limited DT&E has been conducted, and no dedicated OT&E has been conducted on the program. DOT&E is focusing its current activities on reviewing risk reduction activities and test concept development. The following comments are based on DOT&E's early insight into program activities and are provided to foster the fielding of a system that meets all operational effectiveness and suitability requirements.

The test strategy for the era beginning with NPP, and beyond, is satisfactory. Final TEMP approval, however, is awaiting resolution of issues related to the degree of OT&E involvement prior to Milestone B, and the need for a Milestone C. The IPO plans to conduct source selection during much of the time remaining until Milestone B, which will severely restrict DOT&E's access to contractor data. DOT&E is negotiating with the IPO to develop an acceptable test strategy that balances the IPO's needs for an extended source selection with DOT&E's need for early involvement to support the Milestone B decision. Resolution of this issue may shift a portion of OA1 to a subsequent Milestone C.

The current field terminals used throughout DoD, the Department of Commerce, and the worldwide civilian community will not be capable of receiving NPOESS data in their current configurations. For example, the planned LRD frequency and data rate are substantially higher than the current DMSP Real-time Data Smooth (RDS) data or the POES Automatic Picture Transmission (APT). DOT&E is working with users to ensure that the IPO's proposals address all user requirements and that an integrated test strategy is developed to evaluate end-to-end interoperability.

For the space segment, the IPO is developing a Calibration/Validation (Cal/Val) plan for NPP and NPOESS sensors. The NOAA and NASA portions of the NPOESS community are conducting much of this work, and these Cal/Val plans and results are essential to the OT&E community for an adequate operational test program. The Atmospheric Infrared Sounder (AIRS) sensor on NASA's upcoming Aqua mission should be used to support validation of M&S of the NPOESS infrared sounder. Quality control of the data processing string in the IDPS should be planned to ensure that erroneous data is properly filtered and that operators are alerted whenever error conditions arise. In general, care must be taken to ensure that NPOESS provides for successful translation of science code to operational code for its users.

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