

Space-Based Infrared System, High Component (SBIRS HIGH)

Executive Summary

- Highly Elliptical Orbit (HEO) Satellite 1 is undergoing developmental testing, and planning is ongoing for operational testing and message certification in 2008. Early data indicate better than expected sensor performance; yet, overall system performance may be restricted initially by ground software limitations.
- Deficiencies in the Geosynchronous Orbit (GEO) satellite Flight Software Subsystem (FSS) were identified during GEO-1 developmental testing. The FSS may require redesign to meet spacecraft control and telemetry functionality.
- The ground architecture and operational requirements for subsequent HEO and GEO deliveries, including mobile survivable and endurable elements, need further definition.

System

- The Space-Based Infrared System (SBIRS) program is being developed to replace the Defense Support Program (DSP) satellites and is being developed in two system increments:
 - Increment 1 uses the SBIRS Control Segment and User Segment, operating with DSP satellites, to provide current military capability. Initial Operational Capability for Increment 1 was attained in December 2001, consolidating the operations of the DSP and Attack and Launch Early Reporting to Theater missions.
 - Increment 2 develops new software and hardware for the Mission Control Segment to conduct integrated SBIRS spacecraft operations. The SBIRS Space Segment consists of two hosted payloads in HEO and four satellites in GEO. The launch of the GEO SBIRS satellites for Increment 2 has not yet started.



Mission

- Combatant commanders, deployed U.S. military forces, and allies intend to use SBIRS to conduct missions that require improved space sensors and operational launch detection capabilities.
- Commanders will use SBIRS to provide enhanced data quality and more timely reporting to joint combat forces in four key areas:
 - Timely and responsive space-based missile warning and detection
 - Launch detection for missile defense operations
 - Technical intelligence
 - Battlespace awareness

Activity

- An Acquisition Decision Memorandum (ADM) in July 2007 approved Air Force acquisition of the third SBIRS GEO satellite and sensor payloads for the third and fourth HEO satellites as well as an option for a fourth GEO satellite.
- The contractor conducted thermal-vacuum developmental testing on the GEO-1 spacecraft bus between November 2006 and March 2007.
- The contractor delivered the GEO-1 payload to the integration facility in August 2007 for assimilation and testing with the spacecraft bus.
- The HEO-1 sensor continues developmental testing in preparation for operational testing and certification of the HEO mission in 2008.

- The HEO-2 payload is undergoing ground testing and integration.
- Progress continues toward development of modeling and simulation required to support SBIRS operational testing.

Assessment

- The SBIRS Increment 1 system, operating with the current DSP satellites, continues to demonstrate improved performance over the earlier DSP system.
- Early HEO-1 on-orbit data indicates better-than-expected sensor performance; however, overall system performance appears to be limited by the capabilities of the current ground software. Evaluation of actual end-to-end operational

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performance should be accomplished during a planned 2008 Operational Utility Evaluation.

- The SBIRS ground architecture and overall system operational requirements need better definition to support development of an integrated test strategy that can meet the program schedule and mission needs. Specifically, the ground architecture for full HEO and GEO message processing, and the survivable and endurable mobile elements, lack sufficient definition.
- Compressed schedules for accredited SBIRS operational test scenarios and simulations increase program risk.
- The contractor identified deficiencies in the GEO FSS following analysis of thermal-vacuum developmental test data on the GEO-1 bus. These deficiencies could impact spacecraft control and telemetry functionality. If FSS redesign is necessary, significant program schedule impacts are likely.

Recommendations

- Status of Previous Recommendations. There were no FY06 recommendations. The Air Force has made progress on the FY05 DOT&E recommendations. Two of the original four recommendations remain valid as the Air Force continues to refine concepts of operation and operational requirements for each SBIRS increment.
- FY07 Recommendations.
 1. The Program Office should identify modeling and simulation requirements as soon as possible to provide sufficient time for validation and verification of modeling and simulation prior to the program's need date.
 2. The Air Force should conduct integrated operational testing in support of SBIRS GEO message certification.