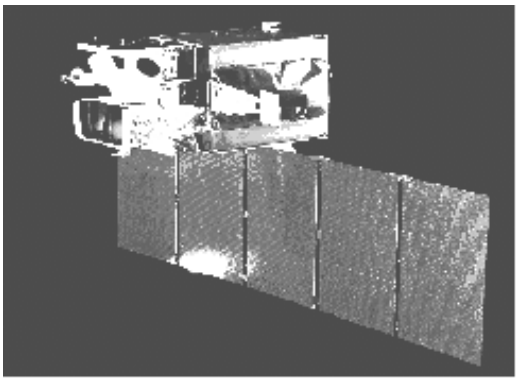
SPACE-BASED INFRARED SYSTEM (SBIRS)



The Spaced-Based Infrared System (SBIRS) replaces the current Defense Support Program (DSP). Utilizing infrared sensor technology, orbiting SBIRS satellites will detect, track and report missile launches. SBIRS improves support to theater CINCs, U.S. deployed forces, and allies by providing better data quality and timeliness in four mission areas: Missile Warning, Missile Defense, Technical Intelligence and Battlespace Characterization.

The SBIRS is being acquired in three increments. Increment 1, which was declared IOC in FY02, consolidates DSP and Attack and Launch Early Reporting to Theater (ALERT) ground stations into a single CONUS ground station. Increment 1 operates with DSP satellite data. Increment 2 upgrades Increment 1 software and hardware to operate SBIRS High satellites. SBIRS High includes four satellites in Geosynchronous (GEO) orbit, with first launch in FY04, and two hosted payloads in Highly Elliptical Orbit (HEO), first available in FY02. A fifth GEO satellite will be procured as a replenishment/spare. SBIRS High satellites will primarily improve on current DSP operational performance. Increment 3 will operate SBIRS Low satellites, which will provide a mid-course tracking and discrimination capability for effective ballistic missile defense. SBIRS Low includes approximately 24 Low Earth Orbit (LEO) satellites, and several spares, with first launch in FY06. SBIRS Low ground mission software was to follow an evolutionary deployment, beginning with a release in FY06 to operate the first satellites, and slated to reach full mission capability in FY09. Recent budget revisions, however, have caused a redefinition of the SBIRS Low program, with emphasis on further sensor research efforts. Program redefinition is ongoing.

BACKGROUND INFORMATION

The SBIRS Increments 1 and 2 entered the EMD phase following a Milestone II DAB review in October 1996. Increment 3 entered the Program Definition and Risk Reduction (PDRR) phase with Milestone I approval in August 1999, and two competing PDRR contracts were awarded. During FY99 the Air Force made substantive programmatic changes to SBIRS Increments 2 and 3 based on a restructured FY00 budget. For Increment 2, the Air Force delayed launch of the first GEO satellites from FY02 to FY04, and rescheduled incremental deliveries of the ground segment to align them with the delayed satellite schedule. For Increment 3 Low satellites, the Air Force delayed first launch from FY04 to FY06, and canceled two proof-of-concept demonstration satellites. To mitigate the increased risk due to cancellation of the flight demonstrations, DOT&E recommended that the Air Force develop an

acquisition strategy with significant design flexibility in the first six satellites, and at least a one-year launch hiatus following those first six.

In February 2000, Increment 1 breached its IOC baseline because of problems and delays with software development. Increment 1 was re-baselined with a November 2001 estimated operational certification date, which was met following IOT&E.

In November 2001, the Program Office notified OSD of serious schedule and cost issues with Increment 2 that may require additional funding and/or further delays. These issues are currently being reviewed by the Air Force and OSD acquisition executives. SBIRS Low was transferred from the Air Force to BMDO at the end of FY01. The Air Force is working with BMDO to review the program's DAB acquisition status and schedule.

TEST & EVALUATION ACTIVITY

Increment 1 entered IOT&E in June 2001, with several known deficiencies and limitations to be corrected post-IOC. These included problems meeting tracking and reporting requirements (e.g., false report rate, raid count, launch azimuth, missile typing) on certain missile events, inadequate memory and processor reserves, and the need to upgrade the nuclear survivability of certain ground assets. During IOT&E, additional deficiencies were identified involving software problems and operational dependability. One of the software problems identified during OT&E was caused by false tracks initiated on a non-target, which filled memory and processing capacity and led mission-processing servers to crash. This problem was deemed sufficiently serious to pause the IOT&E while a software fix was installed. Pausing the IOT&E caused a change in the configuration baseline, and required regression testing and a restart in collecting suitability data.

SBIRS High satellite T&E activity during FY01 included continued HEO DT&E, Critical Design Reviews (CDR) on the GEO Payload and on the Increment 2 integrated ground-space system, and completion of the Advanced Sensor Test and Integration Facility (ASTIF) at Aerojet to support sensor payload qualification and acceptance testing. The GEO CDR approved development of a revised GEO "solar flyer" configuration, as opposed to the original "plane flyer." The solar flyer configuration corrects a potential problem with off-axis solar rejection, which would have caused problems in meeting Key Performance Parameters (KPP). The solar flyer configuration will require installation of an extended solar shade on the spacecraft, and in-plane yaw and flip maneuvers to maintain the solar shade between the telescope and the sun. GEO qualification tests will begin in 4QFY02.

SBIRS Increment 3 T&E activity during FY01 included continued development of contractor models, simulations, and facilities to conduct PDRR-level ground demonstrations of Critical System Performance Characteristics in preparation for MSII and entry into the EMD phase in FY02.

TEST & EVALUATION ASSESSMENT

Based on results its IOT&E, Increment 1 is effective and potentially suitable. Operational effectiveness however, was affected by degradations of missile warning accuracy, timeliness, and reliability caused by the limitations and deficiencies described above, as well as mission software problems found during IOT&E. The most serious problems have already been corrected, workarounds are in place for other problems, and users can accomplish the basic missile warning mission using Increment 1. Post IOC–1 software upgrades to address the workarounds are planned in January 2002.

Increment 1 is only potentially operationally suitable because of dependability problems caused by immature software, the lack of a backup to the DSP-legacy Satellite Readout Station (SRS), and non-SBIRS limitations in Milstar's dependability. The SRS dependability shortfall is due to the lack of a backup satellite antenna with control capability to support training or satellite control while one of the two primary antennas normally used to control and monitor operational spacecraft is down for preventive maintenance. Survivability problems are primarily caused by the need for Hardness Maintenance / Hardness Surveillance (HM/HS) upgrades at the Survivable Relay Ground Station (SRGS) and the Survivable Mission Control Station (SMCS). Some of the software problems identified during IOT&E were a repetition of problems initially identified during DT&E, suggesting an inadequate deficiency correction process.

Increment 2 will not enter IOT&E until FY07, and DOT&E's current role is maintaining insight into developmental activity to ensure that the system is progressing towards an operationally effective and suitable system. We remain concerned with the schedule risk from the degree of concurrency between the Increment 2 ground and space segments, and with the adequacy of Models and Simulations (M&S) for IOT&E support. Concerning schedule risk, the Increment 2 ground segment will be fielded in late FY05, coincident with operational turnover of the first GEO satellite, and there is no fallback for late delivery of Increment 2 software. In comparison, Increment 1 development was late by nearly 2 years, but the legacy DSP ground system continued to perform the operational mission. Any delays in Increment 2 ground segment development may incur the risk of having to operate an on-orbit asset without a certified operational ground segment. Concerning M&S, adequate simulation tools to develop operational scenarios for Increment 2 training and IOT&E have yet to be developed. Furthermore, the spacecraft yaw and flip motions required by the new solar flyer configuration for the GEO satellites may introduce dynamics in the imaged earth background which complicate clutter rejection algorithms and may require re-accomplishment of any M&S validation activity based on the previous plane flyer configuration. The Program Office has agreed to the establishment of an inter-agency Sensor Analysis Team to independently assess this and other sensor-related issues.

For Increment 3, while the current acquisition strategy provides for an almost two-year on-orbit evaluation period for the first group of satellites, the production schedule for the remaining satellites remains so aggressive that it is doubtful improvements could be made to subsequent satellites based on observations gained from the first six, without a break in production. However, we recognize that SBIRS Low is constrained to this procurement strategy by its launch schedule and the required NMD need date. Early on-orbit testing of SBIRS Low satellites must utilize realistic test targets and must incorporate design flexibility as a mitigation for the risk of on-orbit failure. It is critical that M&S-based scenarios and test targets be intelligence-validated. NMD targets must conform to threat-representative configuration and deployment, to include realistic countermeasures. Given the three- to four-year development time required for new targets, it is essential that target development begin as soon as possible.

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