

Space-Based Infrared System Program (SBIRS)

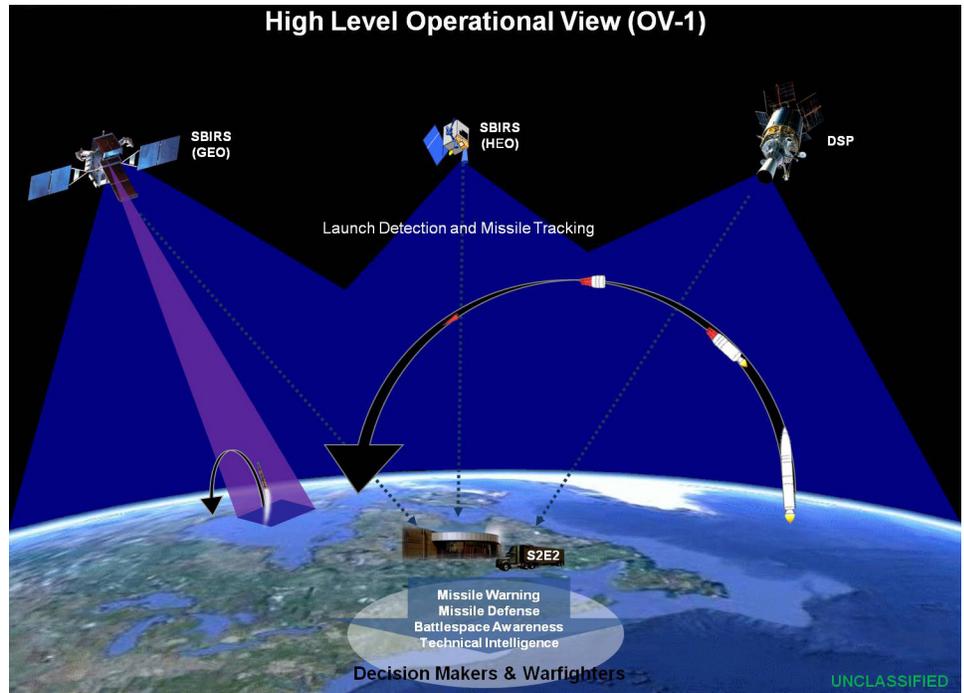
Executive Summary

- The Air Force Operational Test and Evaluation Center (AFOTEC) conducted an IOT&E of the Space-Based Infrared System (SBIRS) baseline release 18-1/Block 20 from April 8 through July 12, 2019, in accordance with the DOT&E-approved test plan. The system under test included SBIRS geosynchronous Earth orbit (GEO) satellites, hosted infrared payloads in highly elliptical orbit (HEO), and legacy Defense Support Program (DSP) satellites.
- DOT&E is currently evaluating the wealth of data from this test and plans to publish a classified IOT&E report to inform Air Force employment and follow-on development decisions. Initial review of the test data indicates that SBIRS Block 20 performed well.

System

- SBIRS is an integrated system of systems consisting of both survivable and non-survivable space and ground segments, designed to provide infrared sensing from space to support the DOD and other customers. SBIRS replaces or incorporates legacy Defense Support Program (DSP) ground stations and satellites and is intended to improve upon DSP timeliness, accuracy, and threat detection sensitivities. The Air Force is developing SBIRS in two system increments.

- Increment 1 used the SBIRS fixed-site ground control segment, operating with DSP satellites, to sustain legacy DSP capability. The Air Force attained Initial Operational Capability for Increment 1 on December 18, 2001.
- Increment 2 includes a space segment consisting of DSP satellites, hosted payloads in HEO, and satellites in GEO. Increment 2 also includes a Mission Control Station (MCS) fixed-site ground facility with software and hardware for consolidated data processing across all sensors; a Mission Control Station Backup (MCS-B) fixed-site ground facility; and a SBIRS Survivable Endurable Evolution (S2E2) mobile ground capability to replace the legacy Mobile Ground System. The Increment 2 architecture includes four relay ground stations (RGS) that receive data from the GEO and DSP satellites and relay the data to the MCS and MCS-B and one RGS that provides SBIRS HEO infrared data processing. The Increment 2 capabilities are being delivered in multiple, discrete blocks.
- SBIRS Increment 2, Block 10 introduced new ground station software and hardware that enabled the integrated



DSP - Defense Support Program
 GEO - Space Based Infrared System (SBIRS) Geosynchronous Earth Orbiting Satellite
 HEO - SBIRS Highly-Elliptical Orbit Payload
 S2E2 - SBIRS Survivable/Endurable Evolution Program

processing of DSP, HEO, and GEO sensor data at the MCS and MCS-B, and allowed the integration of GEO Starer sensor data. Air Force Space Command accepted Block 10 for operations in December 2016.

- SBIRS Increment 2, Block 20 further improved ground station software at the MCS and MCS-B. The improvements optimized sensor data clutter and background suppression to improve detection of dimmer targets, and enabled the GEO Starer sensors to provide better threat tracking and impact point prediction. Operational acceptance of Block 20 occurred on August 29, 2019.
- An Operational Assessment of S2E2 by the 17 Test Squadron is scheduled for late FY20/FY21.
- The SBIRS constellation currently consists of both HEO payloads and SBIRS GEO satellites on orbit. Due to the initiation of the Next Generation Overhead Persistent Infrared (Next Gen OPIR) program, which will supplement and then replace SBIRS, the Air Force reduced the Full Operational Capability (FOC) space segment for SBIRS and will launch final GEO satellites by 2022 to complete the constellation. The Air Force will use SBIRS Increment 2 to operate the legacy DSP satellites until each is decommissioned.

FY19 AIR FORCE PROGRAMS

Mission

SBIRS is operated by Air Force Space Command (AFSPC). The primary SBIRS customer is U.S. Strategic Command (USSTRATCOM). USSTRATCOM uses SBIRS to provide reliable, unambiguous, timely, and accurate missile warning and missile defense information, as well as technical intelligence and battlespace awareness to the President of the United States, the SECDEF, Combatant Commanders, and other users. SBIRS

Block 20 supports four mission areas to include missile warning, missile defense, technical intelligence, and battlespace awareness.

Major Contractors

- Lockheed Martin Space Systems – Sunnyvale, California
- Northrop Grumman Electronic Systems – Azusa, California
- Aerospace Corporation – El Segundo, California

Activity

- AFOTEC conducted a SBIRS baseline release 18-1/Block 20 dedicated IOT&E from April 8 through July 12, 2019, in accordance with the IOT&E test plan and the DOT&E-approved addendum to the Enterprise Test and Evaluation Master Plan (ETEMP). Preceding the IOT&E and with DOT&E approval, AFOTEC collected operationally relevant effectiveness and suitability data for its IOT&E evaluation during the integrated test and evaluation conducted by the contractor and Air Force Program Office from December 5, 2018, through February 28, 2019.
 - The SBIRS Integrated Test Team created an integrated test window early in the planning phase and provided data to 74 percent of the operational test measures. DOT&E estimates the integrated test window saved 37 days of dedicated operational testing.
 - The test team collected data from real-world events and accredited simulations using threat characterization scenarios, as well as end-to-end testing with strategic and theater users. AFOTEC evaluated operator training and human-factor concerns using questionnaires, observations, and interviews.

- AFOTEC published a classified IOT&E report on August 28, 2019.

Assessment

- DOT&E will publish a classified IOT&E test report to inform Air Force employment and follow-on development decisions.
- The Air Force lacked the capability to emulate some current emerging threats to SBIRS during IOT&E, which will hamper DOT&E's ability to characterize the performance of SBIRS against some realistic threats.
- Initial reviews of the test data indicate the SBIRS Block 20 performed well, although it failed to meet the thresholds for some operational measures.

Recommendation

1. The Air Force should plan for FOT&E of SBIRS and S2E2, including comprehensive threat representation in accordance with published DOT&E guidance, to inform the operational acceptance and FOC decisions for SBIRS Increment 2.