

Boeing Defense, Space & Security  
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## Space Based Space Surveillance (SBSS) System

**Description and Purpose:** The United States depends on space assets for a wide range of commercial, civil and military purposes, from communications to navigation to weather forecasting. To protect these assets, the ability to detect and track space objects is crucial – especially those objects considered to be possible threats, whether real or accidental.



The Space Based Space Surveillance (SBSS) System is the only space-based sensor in the U.S. Air Force's Space Surveillance Network, providing around-the-clock visibility to provide timely detection, collection, identification and tracking of space objects from low-Earth orbit to deep space without interference from weather, atmosphere or time of day.

**Customer:** U.S. Air Force

**General Characteristics:** The SBSS system will revolutionize the nation's Space Situational Awareness by detecting and monitoring dimmer, more distant objects than ever before. SBSS was launched from Vandenberg Air Force Base on Sept. 25, 2010 and completed on-orbit testing on Dec. 23, 2010.

The SBSS spacecraft features a digital optical sensor mounted on a high-speed, two-axis gimbal. That allows ground controllers to quickly swivel the camera between targets without having to expend the time and fuel to reposition the entire spacecraft.

This agile sensor mount enables SBSS to find and track objects in space – even new spacecraft launches and maneuvers – with significantly greater speed, capacity and sensitivity than previous space sensors, including:

- twice the sensitivity
- twice as fast at detecting threats
- three times improvement in the probability of detecting threats
- 10 times improvement in capacity

The satellite also has an onboard image-processing payload and software developed by Boeing that's reprogrammable to enhance mission flexibility and upgrades. The SBSS Satellite Operations Center has an open, flexible ground architecture with the ability to add additional satellites and sensors.

Operating in conjunction with the Space Surveillance Network, SBSS supports spaceflight safety and conjunction analysis, ensures space catalogue completeness, warns of on-orbit separations and maneuvers, supports space object characterization and provides indications and warnings in space.

**Background:** The U.S. Space Surveillance Network relies on ground-based radars and optical telescopes around the world to track thousands of objects in space. But their monitoring abilities are limited by weather, the atmosphere and, in the case of telescopes, daylight. Plus, these instruments can get only intermittent glimpses of orbiting objects as they pass overhead.

In orbit, SBSS sensors aren't affected by weather, atmosphere or time of day, and they have a much wider field of view than sensors on the ground.

SBSS is the next step in the evolution of space-based monitoring of objects in orbit, building on the success of the most recent orbiting sensor, the MSX Space-based Visible Sensor (SBV), which ceased operation in December 2008.

Boeing was awarded the contract in 2004 and teamed with Ball Aerospace to design and deliver the first SBSS Block 10 spacecraft and associated ground segment. Boeing has overall responsibility for the SBSS system, including the ground system and initial mission operations. Ball Aerospace provided the satellite and sensor, which leverages the Boeing onboard mission processor.

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