

Wideband Gapfiller Satellite (WGS)

The Wideband Gapfiller Satellite (WGS) communications system will provide communications to the U.S. warfighters, Allies, and Coalition Partners during all levels of conflict short of nuclear war. It is the next generation wideband component in the Department of Defense's future Military Satellite Communications (MILSATCOM) architecture.

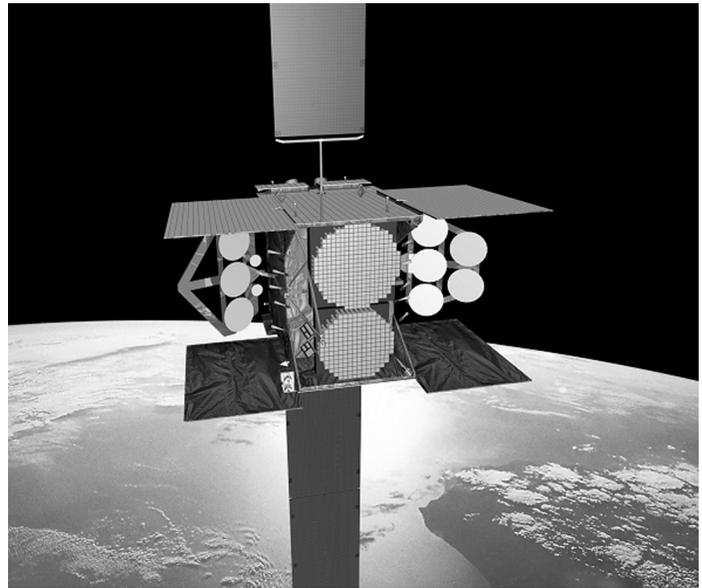
WGS will satisfy military communications needs by providing communications in both the X-band and military Ka-band frequencies. It will combine capabilities onto a single satellite for tactical X-band communications, augment the Global Broadcast Service (GBS) Phase II system, and provide new two-way Ka-band services. This new service is being introduced to alleviate the spectrum saturation of X-band, and should greatly increase both the available single-user data rate and total satellite capacity over today's Defense Satellite Communications System (DSCS) III satellites.

The satellite segment is being acquired by the Air Force under the Federal Acquisition Regulation Part 12 rules for commercial item acquisition. Because of its commercial nature, this program has no lead-in development phase, but will proceed directly from award to launch in one combined Engineering Manufacturing Development/Production phase. The first launch is now projected for 3QFY04. The final two launches are projected for 1QFY05 and 4QFY05. The Army is acquiring the ground control segment and the MILSATCOM Joint Program Office is integrating the WGS and GBS space and ground segments.

The 2001 Defense Appropriations Act signed on August 9, 2000, limited funding to two satellites. Subsequently, the Office of the Secretary of Defense signed a Program Decision Memorandum on August 22, 2000, supplementing WGS funding by \$272.9 million to ensure funding of the complete constellation of three satellites.

TEST & EVALUATION ACTIVITY

- Test and evaluation planning continued in FY02 for the WGS system
- A Milestone II/III Test and Evaluation Master Plan (TEMP) was approved by DOT&E on October 26, 2000, and a TEMP update is in the signature coordination cycle. The Acquisition Decision Memorandum requires that the TEMP be updated within 90 days after the Critical Design Review (CDR).
- Air Force Operational Test and Evaluation Center (AFOTEC) completed an early operational assessment (EOA) of the WGS system September 2000 in support of a combined Milestone II/III decision.
- AFOTEC will perform an Operational Assessment based primarily on the CDR data package
- Government Developmental Test and Operational Test members will start observing contractor developmental testing and intersegment testing in FY03.



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AIR FORCE PROGRAMS

TEST & EVALUATION ASSESSMENT

DOT&E received the WGS EOA outbrief on November 7, 2001, with the following issues highlighted:

- The complexity of cross-banding between the X-band and Ka-band onboard the satellite and the concurrent development of the Gapfiller Satellite Configuration Control Element (GSCCE) with the automation upgrades of the Satellite Operations Center and DSCS Operations Center (DSCSOC) networks pose a risk to successful WGS development and implementation.
- Interoperability and compatibility requirements compound the complexity of developing the control software for WGS. The GSCCE used to control WGS payloads must be interoperable with the DSCSOC network. An ongoing Army software development program is upgrading the DSCSOC network to a new ODOCS system. This is separate from the concurrent WGS program to produce the GSCCE. If the GSCCE and the ODOCS are not interoperable the DSCSOC operators will not be able to successfully establish communication networks with operational users.
- WGS and the GBS must be interoperable and compatible. GBS is fielding its support infrastructure to structure broadcasts and control the payloads on the Ultra High Frequency Follow-On satellites. WGS payloads (at X and Ka-band) are proposed to be controlled by modified DSCSOCs, currently only capable of controlling X-band payloads. Interoperability between these two systems must be synergistic and not compete to ensure high-speed access for broadcast users.

The test results and analysis presented at the CDR indicate that the design is progressing with no major problems. In addition to the risk areas identified during the EOA, the CDR identified two additional areas of interest.

- WGS is projected to provide a total throughput between 1,227 Mbps (threshold) and 3,600 Mbps (objective) using the same bandwidths presently allocated to DSCS and GBS. The added capacity comes through frequency reuse – use of the same frequency over geographically separated beams. This requires evolution of a Concept of Operations (CONOPS) to ensure that beam allocations for concentrated troop positions do not cause overlap of beams on the same frequency. It also requires that the WGS and DSCS satellites be separated sufficiently in their orbits so that the least capable X-Band antenna can discriminate between the two satellites.
- The WGS satellites are being integrated for launch on both the Delta and Atlas Evolved Expandable Launch Vehicle (EELVs). The first launch will be on Delta and the second on Atlas. Boeing added extra solar panels to their original design, which added weight and changed the class of EELV that will be required. The availability of the launch vehicle and an aggressive integration schedule, less than the normal 24 months, are sources of schedule risk.