Global Broadcast Service (GBS)

The Global Broadcast Service (GBS) will augment and interface with other communications systems and provide a continuous, high-speed, one-way flow of high-volume data, audio, imagery, and video information streams at multiple classification levels to deployed and garrisoned forces across the globe.

GBS consists of a space segment, fixed and transportable transmit suites, and fixed and transportable receive suites. The space segment of the current phase of GBS consists of four GBS transponders on each of three Ultra High Frequency Follow-On (UFO) satellites and leased commercial satellite transponders as required to meet demand. Transmit suites build broadcast data streams from various sources of information, including command, weather, and intelligence agencies and commercial television programming. They manage the flow of selected information through the uplink broadcast antenna to the orbiting satellites for broadcast to the appropriate theaters of operation. The receive suites extract the appropriate information for distribution by existing systems to the appropriate end users within selected areas of operation.

The GBS acquisition strategy was conceived as a three-phase program based on an evolutionary system design supported by commercially available technology. The program is currently in Phase II. GBS Phase I, conducted from FY96 to FY98, was used to develop the user requirements and concepts of operations. GBS Phase II, scheduled for completion in FY06, will develop near-worldwide GBS core operational capability and further refine operational requirements and employment concepts. GBS Phase III, scheduled to begin in FY06, is being addressed as part of the Advanced Wideband System program.

Technical problems with transmit suite software and transportable and fixed receive suite design and subsequent program delays led to a Joint Requirements Oversight Council (JROC) decision to defer a small subset of capabilities, field the system with non-deferred capabilities, and then incrementally field upgrades until all the Operational Requirements Document (ORD) thresholds are met. Initial Operational Capability (IOC)1 for the core system will most likely be declared in June 2003, based on combined multi-service Developmental/Operational Test, Army Operational Test, and Operational Assessments (OA) by the Air Force Operational Test and Evaluation Command (AFOTEC) and the Commander, Operational Test and Evaluation Force. The deferred capabilities of full broadcast history, classified video, and remote enable will be fielded in two additional builds. Finally, the more lightweight rugged Transportable Ground Receive Station (TGRS) configuration will be released in FY04. An IOC 2/3 declaration for these deferred capabilities is tentatively scheduled in the draft APB for September 2005.

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At the onset of the GBS program, direct broadcast television was the dominant commercial model and the GBS architecture followed that model using commercial Asynchronous Transfer Mode (ATM) equipment with customized government application software. Over the last three years, satellite Internet service using Internet Protocol (IP) has evolved to where IP-based equipment now dominates the commercial satellite market. GBS functionality has been demonstrated using available off-the-shelf IP-based equipment, which does not require custom software. It appears that the most

cost-effective approach to satisfy the deferred ORD requirements and complete GBS Phase II is to shift to an IP-based architecture for the remainder of the equipment to be purchased. GBS's IP-based architecture has now been funded by the Air Force; with the adoption of the IP architecture, the Air Force is scheduled to approve a new APB for an IP-based GBS program in Feb 2003. There will be an orderly transition to IP-based equipment and a phasing-out of the present ATM-based equipment.

TEST & EVALUATION ACTIVITY

- An updated Phase II Test and Evaluation Master Plan (TEMP) is in coordination that reflects the incremental fielding and testing requested by the JROC and the May 2001 revised ORD.
- AFOTEC has briefed DOT&E on the operational test approach.
- A Combined Test Force was formed to coordinate the planning of all GBS testing.
- Combined Developmental/Operational Test #1 was conducted in January 2001 at contractor and government developmental facilities on the U.S. East Coast.
- Developmental/Operational Test #2 was conducted in June 2001 in the Pacific Theater. MOT&E had been projected for 2QFY02, but the Operation Assessment based on Developmental/Operational Test #2 indicated that system was not sufficiently mature for a successful MOT&E in FY02.
- Additional Developmental/Operational Test performed in FY02 indicated that the system would be ready for the MOT&E. The Developmental/Operational Test performed in FY02 consisted of three major activities: Navy Developmental Test and an OA of Shipboard Receive Suites (SRS) and Subsurface Receive Suites (SSRS), Air Force led joint testing of fixed and transportable receive suites, and Army Developmental Test and an OA of the Theater Injection Point (TIP).

TEST & EVALUATION ASSESSMENT

The GBS system has made very substantial progress from a very elementary capability demonstrated during Developmental/Operational Test #1, and from a system that was almost mature at Developmental/Operational Test #2, to a system that played a substantial role in information distribution during Operation Enduring Freedom. The incremental combined Developmental/Operational Test strategy has worked in concert with the incremental fielding and evolutionary release of software builds to effectively bring the system to its present condition. Testing performed during FY02 has supported fielding and materiel release decisions while identifying the major issues that remain to be solved.

During Developmental/Operational Test #1, the Satellite Broadcast Manager (SBM) was successful in building daily broadcast schedules and beam plans as well as in broadcasting video, audio, and File Transfer Protocol (FTP) classified and unclassified products. However, the Transmit Planning and Scheduling software was immature and several problems were identified for correction. The SBM software used in Developmental/Operational Test #2 was vastly improved from its performance during Developmental/Operational Test #1; however, it was still immature and several new deficiencies were identified. The Receive Broadcast Managers were able to receive video, audio, and FTP Secret, ROKUS, and unclassified products. Developmental/Operational Test #2 and Developmental/Operational Test #1 were very similar in that, at both test events, an inconsistency with product reception success was observed throughout the test sites.

During the second and third quarters of FY02, the Air Force led combined Developmental/Operational Test of the broadcast software, the Navy tested its surface and submarine receive suites, and the Army led testing of the TIP.

Pre-certification testing, conducted jointly by AFOTEC and the 46th Test Squadron to assure readiness to enter MOT&E in 2003 will now most likely be reported as an Operational Assessment. COMOPTEVFOR will likely perform an OT event on the current ATM-based shipboard hardware due to the fact the hardware will be on Navy assets for up to four years. A Multi-service Operational Test and Evaluation (MOT&E), tentatively scheduled for FY05, will support the IOC-2 and 3 decisions on the IP-based equipment.

Broadcast software and overall system performance. Reception reliability was computed at 97 percent overall, which exceeds ORD requirements (90 percent threshold, 95 percent objective). From an operational perspective, the Theater Informational Managers have become integrated into the process. Several new capabilities were introduced, including Immediate File Delivery (broadcast of a limited number of high priority files not included in the broadcast schedule), ability to transmit up to TS/SCI data using concept called "Black Cell," and broadcast of Common Operational Picture. Problems still exist with dynamic tuning, loss of permanent virtual circuits with cryptography equipment, and reliability of the Low Noise Blocks.

Navy Receive Suites. The Navy Operational Assessment determined that the SRS and SSRS are potentially effective and suitable. The system met all SRS-specific ORD requirements except availability, which was 89 percent (threshold 92 percent). Weather conditions in the Norfolk operating area, which can block Super High Frequency transmissions, played a significant part in the low availability results. In addition, product reception rates for the SRS were 77 percent for unclassified products and 82 percent for classified products, below the ORD threshold of 90 percent. The OA combined with the preceding Developmental Test identified several significant problems that have been identified for correction. Problems that are unique to the Navy receive suites include dual antenna blockage, antenna tracking during maneuvers, and vibrations due to flight operations and missile launching.

Theater Injection Point. Developmental/Operational Testing with the TIP took place in three phases: Ku band testing (6-17 May 2002); Logistics Maintainability Demonstration (20-22 May 2002) and Ka band testing (10-21 June 2002). Results in the TIP testing are fair. Generally, testing went well with the Ku band broadcast but significant problems occurred during the Ka band broadcast. Hardware issues persist, and there is no trained crew capable of operating the TIP without extensive support from a Raytheon contractor. Due to these deficiencies, Joint Forces Command stated the TIP should not be deployed until fixes are implemented.

Users need to finalize their CONOPS before the GBS system will be able to enter MOT&E. AFOTEC will not test without a CONOPS. Additionally, the program office must ensure timely installation of an EHF terminal at Sigonella for direct satellite beam control. This is an ORD Key Performance Parameter and an essential capability, enabling the SBM to exercise frequent beam movement precisely coordinated with the broadcast schedule.