

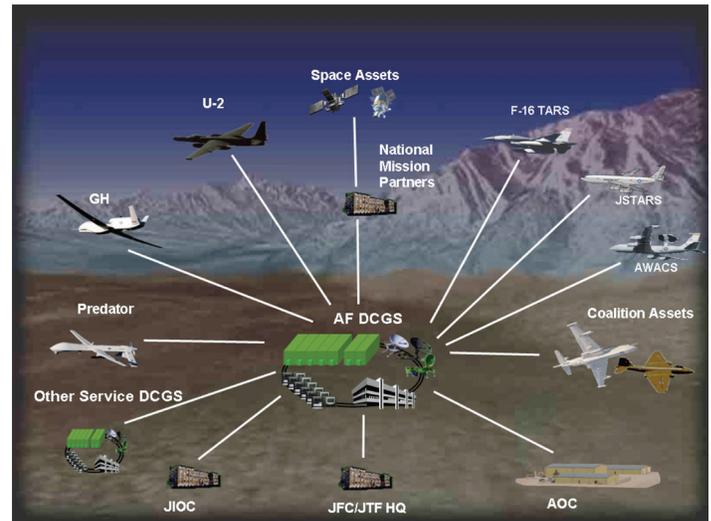
## Air Force Distributed Common Ground System (AF DCGS)

### Executive Summary

- The Air Force Distributed Common Ground System (AF DCGS) consists of eight Acquisition Category (ACAT) III programs. The Air Force plans to phase out the current architecture and move toward an open architecture. The Air Force is updating test and evaluation, systems engineering, and requirements documentation based on the open architecture.
- The Air Force Operational Test and Evaluation Center completed an Operational Utility Evaluation (OUE) of System Release (SR) 3.0 in September 2015. The test showed that the overall signal intelligence (SIGINT) performance is poor, and SR 3.0 did not significantly improve SIGINT performance. SR 3.0 is neither operationally suitable nor survivable against cyber threats.
- The Air Force 605th Test and Evaluation Squadron (TES) completed the second and third phases of the three-phased Force Development Evaluation (FDE) on the Geospatial Intelligence (GEOINT) Baseline (GB) 4.1 in November 2015 and April 2016, respectively. GB 4.1 added the ability to ingest new synthetic aperture radar data from Global Hawk Block 40. However, GB 4.1 did not significantly improve the Air Force GEOINT capabilities.

### System

- The AF DCGS, also referred to as the AN/GSQ-272 SENTINEL weapon system, is an intelligence enterprise system that is composed of 27 geographically separated, networked sites, including 5 core sites across the globe.
- AF DCGS provides hardware and software tools for planning and direction, collection, processing and exploitation, analysis and dissemination (PCPAD) of intelligence, surveillance, and reconnaissance (ISR) information. The DCGS Integration Backbone provides the framework that allows sharing of ISR information with other military Services and intelligence agencies.
- The Air Force declared AF DCGS to be at Full Operational Capability in 2009 despite Air Force plans to continue system development.
- Currently, AF DCGS consists of eight ACAT III programs: Sensor Integration, GEOINT Transformation, GB 4.1, SIGINT Transformation, SR 3.0, Infrastructure Transformation, Multi-Intelligence, and DCGS Reference Imagery Transition (DRT).
- To date, only two of the eight programs have undergone operational testing: GB 4.1 and SR 3.0.
  - GB 4.1 is a GEOINT upgrade that includes deficiency corrections and the capability to process and exploit feeds



**AOC - Air Operations Center**      **JIOC - Joint Intelligence Operations Center**  
**AWACS - Airborne Warning and Control System**      **JSTARS - Joint Surveillance Target Attack Radar System**  
**GH - Global Hawk**  
**HQ - Headquarters**      **JTF - Joint Task Force**  
**JFC - Joint Forces Command**      **TARS - Tactical/Theater Airborne Reconnaissance System**

from updated sensors such as the Airborne Cueing and Exploitation System – Hyperspectral. The GB 4.1 update also allows continued interoperability with the sensors on the Global Hawk Block 40.

- SR 3.0 is a SIGINT upgrade, which makes SIGINT data and services available to internal and external users, improves operations with the Airborne Signals Intelligence Payload low-band sensor, and improves processing, exploitation, and dissemination for high-band sensors.
- The Air Force is in the process of transitioning AF DCGS to an open architecture system via an agile acquisition strategy. This transition is expected to take several years. The open architecture is designed to enable the Air Force to field modular upgrades and updates on a standardized infrastructure.

### Mission

- The Air Force uses AF DCGS to plan sensor information requests and to produce intelligence information from data collected by a variety of sensors on the U-2, RQ-4 Global Hawk, MQ-1 Predator, MQ-9 Reaper, MC-12, and other ISR platforms.
- The Air Force uses AF DCGS to connect to the multi-Service DCGS Integration Backbone, manage requests for sensors, process sensor data, exploit sensor data from multiple sources, and disseminate intelligence products.

## Major Contractors

- Raytheon – Garland, Texas
- Lockheed Martin – Denver, Colorado
- L-3 Communications – Greenville, Texas

## Activity

- The Air Force Operational Test and Evaluation Center conducted the SR 3.0 OUE from September 10 to November 6, 2015. Testing was conducted in accordance with a DOT&E-approved test plan. DOT&E published a report on the test results on July 20, 2016.
- The 605th TES conducted Phase 2 of the three-phased GB 4.1 FDE from November 11 – 20, 2015, at Distributed Ground System (DGS)-2 and Phase 3 at DGS-1 from April 19 – 28, 2016. DOT&E reported on the results of the first phase of the FDE on November 23, 2015. The FDE was conducted in accordance with a DOT&E-approved test plan.
- The 605th TES conducted a high altitude mission workflow comparison test between the GEOINT Workflow Enhancement (GWE) and the GB 4.1 baseline (legacy) at DGS-X from March 28 – 30, 2016, to assess differences in the workflow of geospatial analysts.
- The 605th TES conducted GWE OUE from August 7 – 16, 2016, at DGS-1.
- GB 4.1 continues to have problems with mission planning. In Phase 3 of the GB 4.1 FDE, some mission sets were not compatible with the external tasking service, forcing operators to manually complete mission planning.
- Training and documentation continues to be problematic. In Phase 2 of the GB 4.1 FDE, for instance, 50 percent of general system administrators reported that documentation did not support maintenance duties. The test team reported that operators were using old checklists and had not been trained on the GB 4.1 system upgrades.
- DOT&E will evaluate the GEOINT capability using the data from the GB 4.1 FDE and GWE OUE.
- The SR 3.0 OUE showed that the overall SIGINT performance was poor. Only a small percentage of collectable SIGINT was accurately reported.
  - SR 3.0 processing and exploitation software did not add significant operational value to the onboard processing and exploitation provided by the Airborne Signals Intelligence Payload on Global Hawk.
  - SR 3.0 reliability, availability, and maintainability were poor and negatively affected performance; SR 3.0 availability was 33 percent versus the required 98 percent.
  - SR 3.0 is not survivable against cyber-attacks.
- The 46th Test Squadron conducted a cybersecurity assessment of AF DCGS GEOINT 4.1 at DGS-X March through June 2015 and reported vulnerabilities. The Air Force is working on completing the Plan of Actions and Milestones (POA&M) to mitigate the vulnerabilities. DOT&E will work with the Air Force to maintain an accurate and timely cybersecurity POA&M.

## Assessment

- The Air Force does not have a test plan that integrates the eight ACAT III programs that comprise AF DCGS. This approach makes it difficult to determine if AF DCGS, as a whole, supports mission success. DOT&E is working with the Air Force to integrate test events. The integrated evaluation plan will be documented in the TEMP.
- The program lacks rigorous and comprehensive software problem tracking and reporting procedures. The Air Force is working to develop and implement the software tracking and reporting process.
- AF DCGS continues to have challenges executing PCPAD of GEOINT.
  - GB 4.1 did not deliver significant new capabilities other than the ability to work with Global Hawk Block 40 sensors.
  - Full motion video continues to have problems with freezing and degraded images. Full motion video analysts continue to rely on software that is not a part of AF DCGS.
  - The 605th TES observed problems creating secondary image products (images with analyst's annotations) in the GB 3.0 system and these problems continue in GB 4.1. A GEOINT exploitation tool called Softcopy Exploitation Tool – Geospatial Exploitation Products (SOCET GXP) occasionally creates secondary image products with corrupted metadata and metadata fields. When this happens, operators have to completely rebuild the secondary image product.

## Recommendations

- Status of Previous Recommendations. The Air Force satisfactorily addressed, or made satisfactory process towards implementing, six of the nine previous recommendations. The three recommendations still pending are:
  1. Submit a Test and Evaluation Master Plan (TEMP) for DOT&E approval, which includes an accurate description of AF DCGS requirements, architecture, and interfaces sufficient to justify the test approach. The Program Office is making good progress, but the TEMP is not yet approved.
  2. Develop and implement a software change request process including tracking of software metrics for problems open and closed by severity and time.
  3. Document all known cyber vulnerabilities and plan for mitigation in a POA&M and track the progress.
- FY16 Recommendations. None.