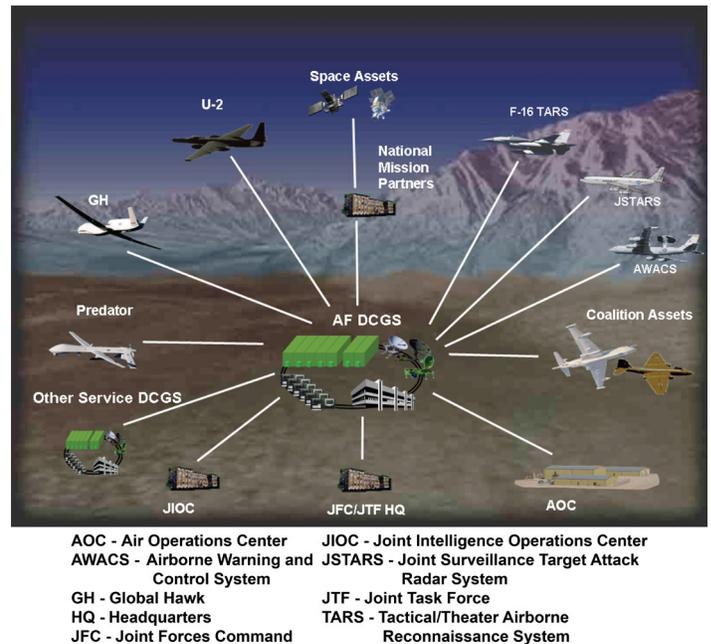# Air Force Distributed Common Ground System (AF DCGS)

Executive Summary

- The Air Force Distributed Common Ground System (AF DCGS) consists of eight Acquisition Category (ACAT) III programs. The Air Force has conducted OT&E for only three of those eight programs. Because the Air Force has not tested the entire integrated AF DCGS as a system, DOT&E cannot provide a comprehensive evaluation of AF DCGS operational effectiveness, operational suitability, and survivability.
- The operational tests for the three acquisition programs are:
  - The 605th Test and Evaluation Squadron (TES) conducted an Operational Utility Evaluation (OUE) for the Geospatial Intelligence (GEOINT) Workflow Enhancement (GWE) in August 2016. The OUE data indicate that GWE does not provide operational benefits to system operators.
  - The Air Force Operational Test and Evaluation Center (AFOTEC) conducted the System Release (SR) 3.0.1 OUE at Distributed Ground Station 2 (DGS-2) and the Distributed Mission System (DMS) site between January and February 2017. The SR 3.0.1 is intended to improve AF DCGS Signal Intelligence (SIGINT) capabilities. The test showed that the overall SIGINT performance is poor, and SR 3.0.1 did not significantly improve SIGINT performance. SR 3.0.1 is not operationally suitable, and it is not survivable against cyber threats.
  - The Air Force 605th TES completed the last phase of the four-phased Force Development Evaluation (FDE) on the GEOINT Baseline (GB) 4.1 in July 2017. GB 4.1 did not significantly improve the Air Force GEOINT capabilities.
- The Air Force began implementing an open architecture infrastructure for AF DCGS. The open architecture will phase out the legacy architectures that are no longer sustainable.

System

- AF DCGS, also referred to as the AN/GSQ-272 SENTINEL weapon system, is an intelligence enterprise system 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, processing and exploitation, analysis, and dissemination 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

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

Transformation, SR 3.0, Infrastructure Transformation, Multi Intelligence, and DCGS Reference Imagery Transition.

- To date, only three of the eight programs have undergone operational testing: GB 4.1, SR 3.0/3.0.1, and GWE.
  - GB 4.1 is a GEOINT upgrade that includes deficiency corrections and the capability to process and exploit feeds 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 3.0.1 is a SIGINT upgrade, which makes SIGINT data and services available to internal and external users, improves operations with the Airborne SIGINT Payload low-band sensor, and improves processing, exploitation, and dissemination for high-band sensors.
  - GWE is one of eight subsystems under the GEOINT Transformation program. GWE is intended to shorten the GEOINT workflow process.
- 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 Technologies – Greenville, Texas
- Leidos – Beavercreek, Ohio

Activity

- The 605th TES conducted a comparison test between GWE and the legacy workflow at DGS-Experimental (X) in March 2016 followed by an OUE at DGS-1 in August 2016. Both DGS-X and DGS-1 are located at Langley AFB, Virginia. The 605th TES conducted the GWE OUE in accordance with a DOT&E-approved test plan.
- AFOTEC conducted the SR 3.0.1 OUE at DGS-2 at Beale AFB, California, and DMS-Maryland in Fort Meade, Maryland, January through February 2017. DOT&E delegated test plan approval for this test to AFOTEC because it was not significantly different from the SR 3.0 OUE, which AFOTEC conducted in accordance with a DOT&E-approved test plan.
- The 605th TES conducted phase four of a four-phased FDE for GB 4.1 in July 2017 at DGS-3 at Osan Air Base, Republic of Korea, in accordance with a DOT&E-approved test plan.
- The Air Force is continuing the work on test and evaluation, systems engineering, and requirements documentation. These documents will reflect the system's transition to an open architecture infrastructure.

Assessment

- The Air Force has not conducted end-to-end AF DCGS testing that evaluates the system's ability to plan, process, and exploit multiple sources of intelligence (such as GEOINT, SIGINT, and other sources of intelligence such as web pages) and produce actionable intelligence by fusing this information.
- Neither GB 4.1 nor SR 3.0.1 significantly improved operational effectiveness. Neither GB 4.1 nor SR 3.0.1 are operationally suitable. The last phase of the GB 4.1 FDE did not produce the data to evaluate if the shortfalls noted from earlier phases regarding Full Motion Videos (FMV) have been resolved because the operational mission set at the test site during the FDE did not require FMV.
- The GWE showed potential to improve operations in a laboratory comparison test, but not during the OUE.
- AF DCGS is vulnerable to cyber adversaries. The Air Force delayed the cybersecurity Adversarial Assessment until the program can implement the new and improved firewall. The Air Force still has to resolve vulnerabilities found from previous Cooperative Vulnerability and Penetration Assessments.
- The Air Force did not provide a written description of cyber defense procedures for the system; therefore, DOT&E does not have sufficient information to recreate an operationally realistic cyber defense in operational tests.

Recommendations

- Status of Previous Recommendations. The Air Force addressed or made satisfactory progress toward implementing eight of the nine previous recommendations. The Air Force should still submit a Test and Evaluation Master Plan 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 progress.
- FY17 Recommendations. The Air Force should:
  1. Conduct an AF DCGS system-level operational test that comprehensively evaluates the system's ability to help users process and exploit multiple sources of intelligence and produce actionable intelligence.
  2. Provide a written description of AF DCGS cyber defense process and procedures.