

Air Operations Center – Weapon System (AOC-WS)

Executive Summary

- The Air Operations Center – Weapon System (AOC-WS) is the senior command and control element of the U.S. Air Force’s Theater Air Control System and provides operational-level command and control of air, space, and cyberspace operations, as well as joint and combined air, space, and cyberspace operations.
- The AOC-WS Increment 10.1 is a system-of-systems that contains numerous third party software applications, including the Global Command and Control System – Joint (GCCS-J) and Theater Battle Management Core System – Force Level (TBMCS-FL).
- The Air Force conducted developmental testing of AOC-WS Increment 10.1 Recurring Event (RE)10 baseline upgrade in FY10. The results demonstrated that GCCS-J was not stable within the AOC-WS environment and could not support AOC-WS threshold stress levels. Due to system performance failures, the Air Force cancelled dedicated operational testing. The Air Force successfully conducted an integrated test of RE10 very-low-risk software updates.
- The Air Force conducted developmental testing of AOC-WS 10.1 out-of-cycle (OOC) 11-1 upgrade in 2QFY11. Due to the priority assigned to the broader GCCS-J upgrade in RE11, and a number of mission-critical problems not resolved by the end of the developmental testing period, further work on this upgrade was halted to prevent schedule impact to the RE11 baseline upgrade.
- The Air Force will conduct developmental testing of AOC-WS Increment 10.1 RE11 upgrade in 2QFY12. The RE11 will be a major baseline change, and dedicated operational testing is planned to begin in 2QFY12.
- The Air Force and Defense Information Systems Agency (DISA) collaborated on the development of GCCS-J versions 4.2.0.8 and 4.2.0.9 intending to address overall system performance problems for AOC-WS. As a result, most of these problems, together with a list of 15 top priority improvements coordinated by the AOC-WS user community, have been resolved prior to GCCS-J 4.2.0.9 entering operational testing in late November 2011. Additional fixes to the GCCS-J 4.2.0.9 baseline will be provided before RE11 enters operational testing, currently scheduled for March 2012.
- Assessments conducted during the U. S. European Command (USEUCOM) exercises Austere Challenge 2010 and 2011 identified a systemic lack of software baseline coordination associated with the GCCS-J and several other programs of record within the AOC-WS, resulting in operationally significant losses of data exchange in critical AOC systems. The RE11 baseline upgrade is designed to address the major AOC-WS findings identified from the Austere Challenge exercises.



System

- The AOC-WS is the senior command and control element of the U.S. Air Force’s Theater Air Control System and provides operational-level command and control of air, space, and cyberspace operations, as well as joint and combined air, space, and cyberspace operations. Capabilities include command and control of joint theater air and missile defense; time-sensitive targeting; and intelligence, surveillance, and reconnaissance management.
- The AOC-WS Increment 10.1 (AN/USQ-163 Falconer) is a system-of-systems that contains numerous third party-developed software applications and commercial off-the-shelf (COTS) products. Each third party system integrated into the AOC-WS provides its own programmatic documentation.
- The AOC-WS consists of:
 - COTS hardware
 - Third party software applications, including the GCCS-J and TBMCS-FL, which make up a majority of the AOC-WS capabilities
 - Additional third party systems that accept, process, correlate, and fuse command and control data from multiple sources and share it through multiple communications systems
- AOC-WS Increment 10.1 operates on several different local area networks (LANs), including Secret Internet Protocol Router Network, Joint Worldwide Intelligence Communications System, and a coalition LAN, when required. The LANs connect the core operating system and primary applications to joint and coalition partners supporting the applicable area of operation. Web-based applications can also be accessed through the Defense Information Systems Network.

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- The future AOC-WS Increment 10.2 will be the first increment for modernization and will lead Air Force transition to a net-centric capability.

Mission

- The Commander, Air Force Forces, or the Joint/Combined Air Component Commander (J/CFACC) use the AOC-WS to exercise control of joint (or combined) air forces including planning, directing, and assessing air, space, and cyberspace operations to meet operational objectives and guidance.

Activity

- The Air Force has developed an RE test cycle for major AOC-WS Increment 10.1 upgrades along with OOC testing to sustain interoperability and provide minor upgrades to third-party systems as required.
- The Air Force conducted developmental testing of AOC-WS 10.1 RE10 baseline upgrade in FY10. The RE10 baseline was intended to introduce GCCS-J-Integrated Imagery and Intelligence (I3) as the intelligence and targeting capability provider for AOC-WS and upgrade TBMCS-FL (with Maintenance Release 1-MR1) to migrate to current Modernized Integrated DataBase (MIDB) 2.1. Without the TBMCS-FL upgrade, the AOC-WS is restricted to using a less capable MIDB 2.0. Due to system performance failures, the program removed all RE10 high-risk software changes from the baseline upgrade, to include GCCS-J and MR1, and cancelled the dedicated operational testing.
- The Air Force successfully conducted an integrated test of RE10 very-low-risk software updates in August 2011 at the 613th AOC at Hickam AFB, Hawaii, and successfully fielded the updates.
- The Air Force conducted developmental testing of AOC-WS Increment 10.1 OOC 11-1 in 2QFY11. OOC 11-1 did not proceed to operational test and was not fielded due to the potential delay to the planned RE11 testing in FY12.
- The Air Force is conducting early risk reduction testing of AOC-WS 10.1 RE11 in 4QFY11 – 1QFY12 and will conduct RE11 developmental testing in 2QFY12. The RE11 will be a major baseline change, and dedicated operational testing is planned to begin in 2QFY12.
- Under the oversight of the DOT&E Information Assurance (IA) and Interoperability (IOP) Program, the Army Test and Evaluation Command conducted an IA and IOP assessment of the USEUCOM exercise Austere Challenge 2010 April 30 – May 8, 2010. The interoperability portion of the assessment focused on coalition targeting and the associated command and control systems used by the Combined Task Force-North, 3rd Air Force, the French Combined Forces Air Component Command, and the theater Joint Forces Air Component Command (603rd AOC). These command centers made use of the MIDB associated with the GCCS-J.

Major Contractors

- AOC-WS 10.1 Production Center
 - Jacobs Technology Inc., Engineering and Technology Acquisition Support Services – Hampton, Virginia
- AOC-WS 10.2 Modernization
 - Northrop Grumman Corporation – Hampton, Virginia

- An update to the program's Test and Evaluation Master Plan, an overarching operational test plan for all AOC-WS 10.1 testing, and a dedicated RE11 operational test plan are being prepared and submitted to DOT&E in support of RE11 testing.

Assessment

- The results of three successive developmental tests of the RE10 baseline system demonstrated that GCCS-J was not stable within the AOC-WS environment and could not support AOC-WS threshold stress levels. There were numerous high-risk problems requiring corrective action before the RE10 baseline could enter operational testing.
- RE10 testing highlighted that the AOC-WS program could not incorporate GCCS-J upgrades in a timely manner when those upgrades were built on the same servers as other AOC-WS applications. As a result, the Air Force plans to use a more flexible, current version of GCCS-J in the RE11 system baseline upgrade. This GCCS-J version will be built on separate servers using the standard GCCS-J program build instructions and design tailored specifically for RE11. RE10 testing also highlighted the differences and incompatibility between GCCS-J requirements and AOC-WS unique operational requirements for GCCS-J capabilities.
- The OOC 11-1 system upgrade was intended to update the version of the GCCS-J Common Operational Picture from version 4.0.2 to version 4.2.0.7U4, and to provide information assurance updates to the AOC-WS baseline. Due to the priority assigned to the broader GCCS-J upgrade in RE11, and a number of mission-critical problems not resolved by the end of the developmental testing period, further work on this upgrade was halted to prevent schedule impact to the RE11 baseline upgrade. Developmental testing of OOC 11-1 also highlighted the need for AOC-WS requirements to be more proactively vetted within the GCCS-J community and, if necessary, additional AOC-WS funding to ensure the required GCCS-J capabilities are implemented.
- The Air Force and DISA collaborated on the development of GCCS-J versions 4.2.0.8 and 4.2.0.9 intending to address overall system performance problems for AOC-WS. Three early risk reduction tests of the AOC-WS RE11 major

upgrade focused on achieving a stable baseline, particularly with GCCS-J version 4.2.0.9 and TBMCS-FL Maintenance Release 2. As a result of AOC-WS tester involvement in GCCS-J 4.2.0.8 and GCCS-J 4.2.0.9 testing, the Air Force identified critical GCCS-J problems early for corrective action. As a result, most of these problems, together with a list of 15 top priority improvements coordinated by the AOC-WS user community, have been resolved by the GCCS-J program office prior to GCCS-J 4.2.0.9 entering operational testing in late November 2011. Additional fixes to the GCCS-J 4.2.0.9 baseline will be provided before RE11 enters operational testing, currently scheduled for March 2012.

- The 46th Test Squadron Site Activation Test and Fielding team has a mature process for effectively assisting operational AOC-WS personnel in upgrading the system software following integrated test.
- The Air Force is in the process of implementing a Joint Reliability and Maintainability Evaluation Team (JRMET) process for AOC-WS. This process is required to assist in the collection, processing, and analysis of reliability, availability, and maintainability data during both developmental and operational testing.
- Assessments conducted during the USEUCOM exercises Austere Challenge 2010 and 2011 identified a systemic lack of software baseline coordination associated with the GCCS-J and several other programs of record within the AOC-WS, resulting in operationally significant losses of data exchange in critical AOC systems. In multiple instances, data essential to air mission planning in the AOC-WS were either not available or had to be manually transferred between command and control systems. Along with observations during the Austere Challenge exercises, a number of reports and exercise observations associated with the multiple systems populating and supporting the global AOCs have been reviewed. The findings from the exercises are consistent with other tests and assessments, which have demonstrated similar results for other systems fielded as part of the AOC-WS software.
- RE11 baseline upgrades are designed to address all of the major AOC-WS findings identified from the Austere Challenge exercises.

Recommendations

- Status of Previous Recommendations. The Air Force has adequately addressed all previous recommendations.
- FY11 Recommendations. The Air Force should:
 1. Coordinate with third party programs to ensure that critical AOC-WS third-party systems (such as GCCS-J) have testable requirements that meet AOC-WS requirements. Requirements should be properly vetted within the

appropriate user and program communities for schedule and funding priority.

2. Ensure the AOC-WS users and test community continue to actively participate in GCCS-J developmental and operational testing and work together to develop a capability to adequately test GCCS-J to AOC-WS threshold stress levels.
 3. Ensure the AOC-WS test community and GCCS-J developers and test community exchange operationally relevant test data to help find and fix problems early in the GCCS-J software development cycle.
 4. Establish an interface control working group to oversee third-party requirements identification, development, scheduling, testing, and fielding of AOC-WS.
 5. Finalize a JRMET process and provide monthly status information to the AOC-WS Configuration Review Board.
- Additional recommendations from DOT&E's IA/IOP assessment memorandum to the Director of Operations, Joint Staff (J3) specific to AOC-WS include:
 1. The Joint Staff's Interoperability Certification Panel (ICP) review the existing Interoperability Certification Legacy Waivers granted to AOC-WS 10.1 in 2008 and review the ICP Interoperability Watch List.
 2. The Joint Staff, together with the Air Force, reviews and re-validates the current and planned interfaces and interoperability requirements between GCCS-J and other mission-critical systems to establish a clear set of requirements traceable to the operational capabilities within the AOC-WS. These efforts should be synchronized with the Joint Staff's Plan-Build process and combatant commander Integrated Priority Lists.
 3. The Joint Staff and the GCCS-J Program Office should review program priorities and schedules, and conduct a gap analysis to determine critical differences between AOC-WS and other GCCS-J implementations to identify a strategy and prioritization of effort for addressing the AOC-WS shortfalls highlighted in this memorandum.
 4. The Joint Staff or designated sub-unified element should establish or identify a systems integration group for command and control systems that will be responsible for providing comprehensive oversight/management of joint command and control systems and mission-critical interfaces, with particular emphasis on joint data fusion and operations centers, such as the AOC. Systems that should be addressed include, but are not limited to, GCCS-J, MIDB, TBMCS-FL, Joint Automated Deep Operating Coordination system, Joint Targeting Toolbox, and AOC-WS.

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