

Air Operations Center – Weapon System (AOC-WS)



The Air Force continues to develop and deploy Air Operations Center – Weapon System (AOC-WS) software. Two capability modernization upgrades were delivered in FY22 to sustain the fielded AOC-WS 10.1 increment. The AOC-WS 10.1 Agile Release Event (ARE) 21.10 is operationally effective, and ARE 22-02 is currently in operational test. The Air Force is also developing and deploying AOC-WS Block 20 software, although a required test strategy has not yet been approved. Also, the Block 20 software released to date lacks sufficient capabilities to support major combat scenarios and the sustainment, maintenance, and training processes would not adequately support a meaningful operational evaluation. The Service submitted a Block 20 test strategy, but critical comments have not been resolved and it is still in coordination. The Air Force conducted a cooperative vulnerability and penetration assessment at a functional AOC-WS 10.1 site and submitted a revision of the outdated 10.1 Test and Evaluation Master Plan (TEMP), which DOT&E approved in 2011. However, there is still no DOT&E-approved TEMP or test strategy for AOC-WS Block 20.

SYSTEM DESCRIPTION

The AOC-WS is a system of systems that incorporates numerous third party, commercial off-the-shelf, and agilely developed software applications. The AOC-WS consists of two instantiations. The AOC-WS 10.1 (AN/USQ-163 Falconer) is the currently fielded backbone system for the AOC. The AOC-WS Block 20 consists of software-based upgrades that are delivered incrementally to enhance warfighter capability. The Air Force continues to provide upgrades to sustain the fielded AOC-WS 10.1 increment, while developing and fielding software capabilities through the AOC-WS Block 20. As more Block 20 capabilities are developed, the AOC-WS will transition from the fielded 10.1 increment to a hybrid configuration of the two instantiations. Ultimately, the Air Force intends to replace AOC-WS 10.1 with Block 20 as the delivered software capabilities mature.

MISSION

The AOC-WS provides the Commander, Air Force Forces or the Joint/Combined Forces Air Component Commander the capability to exercise C2 of joint (or combined) air forces, including planning, directing, and assessing air, space, and cyberspace operations; air defense; airspace control, and coordination of space and mission support operations not resident within the theater of operations.

PROGRAM

The AOC-WS 10.1 began as an Acquisition Category III program when it entered into sustainment over a decade ago. Block 20 began as a Defense Innovation Unit Experimental Pathfinder effort in 2017 and transitioned to six Middle Tier of Acquisition Section 804 programs in FY19. In October 2021, the Assistant Secretary of the Air Force for Acquisition, Technology and Logistics designated both AOC-WS 10.1 and Block 20 as Software Acquisition Pathway (SWP) programs and authorized them to enter the execution phase of development.

The Program Office continues to deliver incremental capability updates and maintenance software revisions to AOC-WS 10.1 via periodic Agile Release Events (ARE). The Air Force delivered ARE 21-10 and ARE 22-02 during FY22, and decided to field them based on results from operational testing at the Ryan Center, Joint Base Langley-Eustis, Virginia, and at the 612th AOC, Davis-Monthan AFB, Arizona.

Block 20 capabilities are developed and fielded following agile software development and continuous integration and continuous deployment principles. The SWP requires Block 20 to deploy a Minimum Viable Capability Release (MVCR) to an operational environment and conduct required operational testing within one year after initial funding obligation. This MVCR occurred on September 17-18, 2022 and delivered initial

warfighting capabilities to enhance mission outcomes for the single AOC supporting U.S. Central Command, with delivery of a mature capability to fully support the missions of the remaining eight AOCs expected in late FY24. The program's acquisition strategy had previously identified future capability delivery points by defining multiple MVCRs, but the Program Office altered its approach in late FY22 and has not yet redefined the capability delivery milestones.

The Air Force submitted an initial draft of the Block 20 test strategy for DOT&E review in November 2021, which DOT&E returned with critical comments. The Air Force has not yet submitted a revised test strategy. In accordance with DOD Instruction 5000.87, the program requires a DOT&E-approved test strategy prior to entry into the execution phase of development. However, there is still no DOT&E-approved TEMP or test strategy for AOC-WS Block 20.

» MAJOR CONTRACTORS

- Raytheon Intelligence, Information and Services – Dulles, Virginia
- Science Applications International Corp. – Reston, Virginia

TEST ADEQUACY

The Air Force adequately assessed both AOC-WS 10.1 software upgrades, ARE 21-10 and ARE 22-02, in accordance with the

DOT&E-approved test plan, and DOT&E observed testing of both upgrades. ARE 21-10 underwent integrated testing at the Ryan Center in October 2021 and was subsequently deployed to the field. ARE 22-02 included a major update of the Global Command and Control System – Joint, along with upgrades to other critical targeting and planning systems as well. Based on results from previous operational testing of these upgrades, DOT&E requested the Air Force conduct an operational test of ARE 22-02 functionality and its ability to be installed by typical users. Testing uncovered critical deficiencies, resulting in a fix period and subsequent regression testing prior to fielding to a single site. Operational testing of ARE 22-02 at the first fielded site revealed a recurrence of the deficiencies, so the Air Force paused the test for two months to implement additional fix actions, resuming test once the site’s operational schedule allowed.

The Air Force conducted a cooperative vulnerability and penetration assessment at a functional AOC-WS 10.1 site. Deviations from the DOT&E-approved 10.1 test plan due to unforeseen constraints at the site, as well as test resource limitations, precluded a full investigation of the entire system. Although some AOC-WS sites currently use both 10.1 and Block 20 capabilities, the Air Force still needs to conduct operational cybersecurity testing of this hybrid configuration, and of Block 20 capabilities at a fielded site. Additionally, the Air Force has not conducted an adequate

cybersecurity assessment of the Block 20 software supply chain.

The Air Force conducted an operational assessment of the Block 20 MVCR on September 17-18, 2022 at a fielded site to inform the user community. This event characterized the ability of the MVCR to meet the performance standards for operations in the U.S. Central Command Theater. In particular, the assessment focused on the production of error-free air tasking orders and airspace control orders for the current mission set. However, the scheduled duration of the test was not sufficient to characterize the system’s ability to operate at near-peak system loading. Block 20 capabilities are being deployed incrementally through an agile release capabilities model. Capabilities are released to the field, then feedback is obtained from the users, and the capability is refined to fit warfighter needs. However, capabilities released to date are not sufficient to support meaningful operational testing of major combat scenarios or an evaluation of sustainment, maintenance, and training processes.

The Air Force has not yet met the long-standing requirement to collect and report reliability, availability, and maintainability data for the AOC-WS. The required data capture capability does not exist in AOC-WS 10.1, so the Air Force has deferred this requirement to Block 20.

PERFORMANCE

» EFFECTIVENESS

AOC-WS 10.1 ARE 21-10 is operationally effective. ARE 22-02 is operationally effective with limitations that prevent mission accomplishment in certain circumstances. Currently, Block 20 capabilities cannot support all major combat scenarios. During the MVCR assessment, Block 20 produced an error-free air tasking order for daily operations in the U.S. Central Command Theater.

» SUITABILITY

AOC-WS 10.1 ARE 21-10 is operationally suitable. ARE 22-02 is operationally suitable. Block 20 sustainment, maintenance, and training processes require more development to support meaningful operational testing.

» SURVIVABILITY

The survivability of the AOC-WS, increment 10.1, Block 20, or the hybrid configuration in a cyber-contested environment is currently unknown due to the lack of adequate cybersecurity testing. This includes the cyber supply chain, where, if adequate cybersecurity testing is not accomplished, then potential risks may not be identified and resolved.

RECOMMENDATIONS

The Air Force should:

1. Provide an updated Block 20 acquisition strategy with

product roadmaps that identify when capabilities under development are expected to be sufficiently mature for operational testing; sufficient lead time is necessary for test planning and to comply with DOD policy for SWP programs.

2. Submit an approach to testing the hybrid AOC-WS, inclusive of the continued evolution of 10.1 and Block 20, in their respective TEMPs and test strategies, or

ideally in a single, consolidated TEMP or test strategy covering both programs.

3. Conduct cybersecurity operational testing at a fielded AOC that uses both AOC-WS 10.1 and Block 20 in the hybrid configuration to characterize the mission survivability of the system in a realistic, cyber-contested environment.
4. Conduct a cybersecurity assessment of the software

supply chain to characterize the effectiveness of the controls and defensive capabilities against expected supply chain threats.

5. Implement a solution to meet the long-standing requirement to collect and report reliability, availability, and maintainability data for the AOC-WS.