Air Operations Center – Weapon System (AOC-WS)

In October 2023, the Air Force conducted a cooperative vulnerability and penetration assessment (CVPA) of the Air Operations Center – Weapons System (AOC-WS) Increment 10.1, followed by an adversarial assessment (AA) in February 2024. DOT&E published a classified report on the cyber assessment findings in September 2024. The Air Force did not conduct cyber assessments on the AOC-WS Block 20 instantiation. The Air Force continues to develop and deploy AOC-WS Block 20 software but does not intend to conduct operational testing until the capabilities are sufficiently mature. There is still no DOT&E-approved test strategy for the Block 20 instantiation or AOC-WS as a whole.

SYSTEM DESCRIPTION

The AOC-WS is a system of systems that incorporates numerous third party, commercial off-the-shelf, and Agile-developed software applications. The AOC-WS consists of two instantiations:

- The AOC-WS Increment 10.1 (AN/USQ-163 Falconer) is the currently fielded backbone system for the AOC.

- AOC-WS Block 20 consists of software-based upgrades that are delivered incrementally to enhance warfighter capability. The upgrades include the Kessel Run All-Domain Operations Suite (KRADOS) and AppTX. KRADOS is intended to serve as the backbone of the AOC, connecting applications through common data streams and supported by a hybrid cloud infrastructure, with the goal of enabling warfighters to move faster and commanders to be more efficient with their manpower. AppTX is intended to migrate existing applications to the hybrid cloud environment to complement KRADOS.

The Air Force continues to provide upgrades to sustain and improve the fielded AOC-WS Increment 10.1, while also developing and fielding software capabilities through the AOC-WS Block 20. As the Air Force develops more Block 20 capabilities, the AOC-WS will transition from the fielded Increment 10.1 to a hybrid configuration of the two instantiations. Ultimately, the Air Force intends to modernize AOC-WS Increment 10.1 capabilities 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 command and control of joint (or combined) air forces. This includes 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 Increment 10.1 transitioned from Acquisition Category (ACAT) I to an ACAT III program when it entered sustainment in FY12. Block 20 began as a Defense Innovation Unit Experimental Pathfinder effort in 2017 and transitioned to six Middle Tier of Acquisition programs in FY19. In October 2021, the Assistant Secretary of the Air Force for Acquisition, Technology and Logistics designated both AOC-WS Increment 10.1 and Block 20 as software acquisition pathway programs, merged them, and authorized them to enter the execution phase of development. To comply with DoD Instruction 5000.87, the programs require a DOT&E-approved test strategy prior to entry into the execution phase of development. AOC-WS Increment 10.1 has a DOT&E-approved overarching test plan, but there is still no DOT&E-approved test and evaluation master plan or test strategy that covers Block 20, or the AOC-WS as a whole.

The Air Force continues to revise the draft test strategy for the merged AOC-WS Increment 10.1 and Block 20 program, and has partially addressed DOT&E critical comments, including concerns about the roles, responsibilities, and authorities for the two independent Air Force operational test organizations that will both be testing AOC-WS. The program office continues to deliver incremental capability updates and maintenance software revisions to AOC-WS Increment 10.1 via periodic Agile Release Events (AREs). The Air Force delivered and fielded AREs 23-08 and 24-03 in FY24, based on results from integrated developmental and operational testing at the Ryan Center, Joint Base Langley-Eustis, Virginia.

Block 20 capabilities are developed and fielded at numerous sites, following Agile software development and continuous integration and deployment principles. Block 20 continues to undergo iterative development, but no dedicated OT&E has yet been conducted on any Block 20 instance.

DOT&E has determined that annual, independent, dedicated OT&E of AOC-WS Increment 10.1, and frequent observation of Block 20 efforts by the operational test agency (OTA), are required to assess the evolving hybrid

system and Block 20's progress toward system maturity. A single annual test at an operational site that has both AOC-WS Increment 10.1 and Block 20 could satisfy these requirements. However, the Air Force assesses that AOC-WS Increment 10.1 is the only configuration currently ready for operational testing, so Block 20 will begin operational test once the capabilities are sufficiently mature to execute the AOC mission across the entire spectrum of conflict.

DOT&E published a classified report on the cyber assessment findings of AOC-WS Increment 10.1 in September 2024. In FY25, the Air Force plans to conduct a mission-based cyber risk assessment, and a test design and measures review event supporting eventual Block 20 OT&E.

» MAJOR CONTRACTORS

- RTX – Dulles, Virginia
- Science Applications International Corporation, Inc. – Reston, Virginia

TEST ADEQUACY

The Air Force is conducting planned AOC-WS Increment 10.1 system upgrades via AREs, in accordance with the DOT&E-approved overarching test plan. DOT&E monitors the releases, observes the testing, and reports on more significant capability releases. In FY24, the Air Force conducted integrated tests on ARE 23-08, ARE 24-03, and ARE 24-09 in accordance with DOT&E-approved

test plans, and DOT&E observed testing of all three upgrades. The integrated test of ARE 23-08 required additional testing of both functionality and deployability, which began in October 2023 and was completed January 2024. ARE 24-03 testing occurred in March and April 2024. ARE 24-09 testing is scheduled to begin in September 2024, with completion in FY25.

The Air Force did not conduct a Block 20 software supply chain test in FY24.

Following DOT&E approval of the test plans, the Air Force conducted a CVPA and an AA at a geographic AOC in October 2023 and February 2024, respectively. The CVPA and AA were adequate to support a cyber survivability evaluation of the AOC-WS Increment 10.1; however, the Air Force needs to collect additional data to characterize the survivability of AOC-WS Block 20 and the hybrid weapon system. DOT&E published a classified report in September 2024 on the CVPA and AA findings. Annual CVPAs and AAs are needed to adequately characterize the mission risk of the evolving AOC-WS. The Air Force intends to conduct a CVPA at another geographic AOC in FY25.

The Air Force did not conduct operational testing of Block 20 in FY24. The OTA observed two program office-led usability assessments of Block 20 at an operational AOC site, and its subsequent use during a major combatant command exercise. However, none of these events qualify as operational tests, nor were they intended

to provide adequate data to draw OT&E conclusions. Block 20 capabilities continue to be 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. DOT&E has determined that frequent observations by the OTA may suffice to monitor progress toward meeting Air Combat Command's annual Capability Needs Statements, replacing AOC-WS Increment 10.1, and assessing the evolving risk that is being imposed on the warfighters. DOT&E does not expect to issue reports based on these observations unless they identify exceptional findings.

PERFORMANCE

» EFFECTIVENESS

The Air Force found that AOC-WS Increment 10.1 AREs 23-08 and 24-03 are operationally effective. The Air Force collected operational progress report observations on operational effectiveness on Block 20, but the data were insufficient for DOT&E to evaluate and comment on its effectiveness.

» SUITABILITY

The Air Force found that AOC-WS Increment 10.1 ARE 23-08 is operationally suitable with limitations; ARE 23-08 regression testing, conducted at a second test location, generated recommendations to improve suitability. The Air Force found

that ARE 24-03 is operationally suitable. Since there has been no operational suitability testing of Block 20, there are insufficient data for DOT&E to comment on its suitability.

» SURVIVABILITY

DOT&E's assessment of AOC-WS Increment 10.1 cyber survivability can be found in DOT&E's September 2024 classified test report on cyber assessment findings.

Although Block 20 capabilities, software, and hardware were present at the CVPA and AA test site, operational constraints and system administration decisions precluded testing them. DOT&E still does not have sufficient data on the cyber survivability of the AOC-WS Block 20 instantiation or of the hybrid AOC-WS configuration. Moreover, the Air Force has not provided sufficient data on critical portions of the software supply chain and the unclassified development environments to enable adequate OT&E planning.

RECOMMENDATIONS

The Air Force should:

1. Address all recommendations in the September 2024 classified test report on cyber assessment findings.

2. As recommended in the FY22 and FY23 Annual Reports, 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 software acquisition pathway programs.

3. Complete the revision of the consolidated test strategy covering AOC-WS Increment 10.1 and Block 20 that will provide for adequate, periodic evaluations of operational effectiveness, operational suitability, and cyber survivability.

4. As recommended in the FY22 and FY23 Annual Reports, conduct a cyber survivability assessment of the Block 20 software supply chain, to include the unclassified development environment and distribution environments, and to adequately inform subsequent OT&E.

5. Complete an annual CVPA and an AA at a fielded AOC, which has both AOC-WS Increment 10.1 and Block 20 capabilities present, to characterize the cyber vulnerabilities of the hybrid weapon system.

6. As recommended in the FY22 and FY23 Annual Reports, implement a solution to meet the long-standing requirement to collect and report stability, reliability, availability, and maintainability data for the AOC-WS.