Updated September 27, 2021

Advanced Battle Management System (ABMS)

The Advanced Battle Management System (ABMS) is the U.S. Air Force's latest effort to create a next-generation command and control (C2) system. ABMS proposes using cloud environments and new communications methods to allow Air Force and Space Force systems to share data seamlessly using artificial intelligence to enable faster decisionmaking. The Air Force describes ABMS as its effort to create an internet of things, which would allow for sensors and C2 systems to be disaggregated from one another (counter to how the Air Force has traditionally performed C2). This program is the Air Force's contribution to the DOD's Joint All Domain Command and Control (JADC2) effort focused on modernizing DOD decisionmaking processes for combat operations.

ABMS was originally envisioned to replace the E-3 Airborne Warning and Control System (AWACS) (**Figure 1**), which currently directs air combat operations, but later took on a broader scope. Former Assistant Secretary of the Air Force for Acquisition Will Roper directed that the program become less focused on command centers and aircraft, and to instead create digital technologies, like secure cloud environments, to share data across multiple weapons systems. Dr. Roper stated the contested environment envisioned by the 2018 National Defense Strategy forced the Air Force to restructure the ABMS program. In May 2021, General David Allvin, the Vice Chief of Staff of the Air Force in a DefenseOne article stated, "What exactly *is* ABMS? Is it software? Hardware? Infrastructure? Policy? The answer is yes to all." In other words, the Air Force envisions ABMS as an acquisition program that will both procure things *and* implement other nondevelopmental efforts that the service views as equally important: new techniques to command and control airborne forces.

Figure 1. E-3 AWACS

Source: https://en.wikipedia.org/wiki/Boeing_E-3_Sentry#/media/ File:E-3_Sentry_exercise_Green_Flag_2012_(Cropped).jpg.

Since ABMS's inception, Congress has expressed interest in the development of next-generation C2 systems. The Air Force states that ABMS is a nontraditional acquisition program. As a result, Congress has questioned the Air Force's approach to replacing older systems and its approach to experimenting with emerging technologies.

ABMS Development Efforts

The Air Force has performed five events to date to demonstrate the new C2 capabilities it hopes to eventually field. In December 2019 the Air Force, in its first ABMS "on-ramp"—the term the Air Force uses to denote a demonstration—showed the ability to transmit data from Army radars and Navy destroyers to both F-22 and F-35 fighter aircraft. This event also demonstrated the Space Force's Unified Data Library (UDL), which is a cloud environment combining space-based and ground-based sensors to track satellites.

In September 2020, ABMS performed its second on-ramp. This second on-ramp demonstrated detecting and defeating a simulated cruise missile bound for the United States using hypervelocity weapons as defenses. In addition, ABMS exhibited capabilities to "detect and defeat efforts to disrupt U.S. operations in space." According to an Air Force press release "70 industry teams and 65 government teams" participated in the event.

The Air Force held a third on-ramp event in late September 2020, in support of exercise Valiant Shield at Joint Base Pearl Harbor-Hickam. During this event, the Air Force demonstrated using a KC-46 tanker aircraft to perform tactical C2 by relaying data from older, fourth-generation fighters to newer, fifth-generation aircraft like the F-22. In May 2021, the Air Force stated that procuring a communications pod for the KC-46 will be the first capability release for the ABMS program. The Air Force said, "In a fight, the tankers will need to be flying near the action anyway, supporting fighters, so using them as a command-and-control system, either as the primary or a resilient backup, just makes sense."

A fourth on-ramp was held in Europe in February 2021. According to press releases, the Air Force curtailed this event due to budget constraints. This fourth on-ramp linked allied nations including the Netherlands, Poland, and the United Kingdom into combined air operations. According to General Harrigan, commander of U.S. Air Forces Europe, this fourth event tested U.S. and allied capabilities to perform long-range strike missions with F-15E aircraft launching AGM-158 Joint Air-to-Surface Standoff Missile (JASSM) (see **Figure 2**), while simultaneously utilizing U.S. and allied F-35s for airbase defense missions.

Figure 2. F-15E Launching a JASSM Missile

A fifth on-ramp was in the Pacific in spring 2021, but canceled this event due to budget constraints.

GAO Report Recommendations

The FY2019 National Defense Authorization Act (NDAA) directed the Government Accountability Office (GAO) to evaluate the ABMS program. In an April 2020 report, GAO recommended to the Air Force Chief Architect four actions to improve program performance:

1. Develop a plan to attain mature technologies when needed for ABMS development areas.
2. Produce a cost estimate updated regularly reflecting actual ABMS costs, updating Congress quarterly.
3. Prepare an affordability analysis that should be updated regularly.
4. Formalize and document acquisition authority and decisionmaking responsibilities of Air Force offices involved in ABMS.

The Assistant Secretary of the Air Force concurred with all recommendations. General David Goldfein, former Chief of Staff of the Air Force, disagreed with the recommendations, noting that GAO's analysis did not reflect classified information. GAO stated that it had access to the classified information, and that this additional information did not affect its analysis and recommendations.

ABMS Management Structure

According to the same GAO report on ABMS, the Air Force originally identified the Air Force Chief Architect, currently Preston Dunlap, to coordinate ABMS-related efforts across each of the Air Force's Program Executive Offices. GAO expressed concern about the potential lack of decisionmaking authority for ABMS as a result of this management structure. In November 2020, however, Dr. Roper selected the Air Force Rapid Capabilities Office to serve as the ABMS Program Executive Office. The Chief Architect Office continues to develop the service-wide architecture (i.e., how software and radios are able to connect with one another) to support ABMS.

Summary of Congressional Actions on AMBS

Congress has expressed interest in the development of ABMS systems. The following list summarizes congressional action in the previous three NDAAs:

- FY2019 NDAA (P.L. 115-232)
  - Section 147: Limitation on Availability of Funds for Retirement of E-8 JSTARS Aircraft
- FY2020 NDAA (P.L. 116-92)
  - Section 236: Documentation Relating to the Advanced Battle Management System
- FY2021 NDAA (P.L. 116-283)
  - Section 146: Analysis of Moving Target Indicator Requirements and Advanced Battle Management System Capabilities
  - Section 221: Accountability Measures Relating to the Advanced Battle Management System

The FY2021 Defense Appropriations Act (P.L. 116-260 Division C) reduced ABMS funding from the $302 million requested to $158.5 million, citing "unjustified growth and forward financing."

Throughout ABMS's development, Congress has expressed concern about retiring older C2 systems such as JSTARS and AWACS before identifying a suitable replacement. Congress also directed the Air Force to develop traditional acquisition justifications, such as cost estimates and requirements documentation, to ensure that both Congress and the service understand what is to be procured. These actions reflect the recommendations from GAO.

Potential Questions for Congress

- What are the risks of disaggregating command and control using the ABMS approach?
- How should the Air Force balance innovation and experimentation with procuring mature technologies?
- What opportunities does ABMS provide that traditional command and control systems cannot provide?
- Would ABMS benefit from utilizing the new budget authority flexibilities found in the 6.8 Software and Digital Technology Pilot Program budget activity code?

CRS Products

CRS Report R44108, *U.S. Command and Control and Intelligence, Surveillance, and Reconnaissance Aircraft*, by Jeremiah Gertler and Jeffrey Nelson

CRS In Focus IF11493, *Joint All-Domain Command and Control (JADC2)*, by John R. Hoehn

CRS In Focus IF11654, *The Army's Project Convergence*, by Andrew Feickert

Other Resources

GAO-20-389, *Defense Acquisitions: Action is Needed to Provide Clarity and Mitigate Risks of the Air Force's Planned Advanced Battle Management System*

This product benefited from Katherine Leahy research during her internship with CRS.

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IF11866

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