Department of the Air Force
Scientific Advisory Board

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE
WASHINGTON DC

Airspace Surveillance to Support A2/AD Operations Study

Abstract

Airspace surveillance provides battlespace situational awareness, initiates the targeting “kill chain” and provides an integrated battlespace picture, effective airspace control and battle management. This awareness requires near-real-time correlated data to provide adversary order-of-battle. Currently, airspace surveillance is provided by ground-based sensors and large aircraft like the E-3 AWACS and RC-135 Rivet Joint aircraft. As A2/AD threats drive these assets farther to the rear, significant gaps in coverage will exist which limit situational awareness of the forward battlespace. Technologies such as ground-based over-the-horizon (OTH) radars and bi-static/multi-static radars have demonstrated the ability to surveil at extended ranges and in complex environments.

Additionally, space sensors may offer the potential to contribute to surveillance if tactical timelines can be met. Other modalities, including the cyber domain, could also contribute to an improved battlespace picture in difficult environments. These technologies may offer the potential to provide battlespace situational awareness in an A2/AD environment. In order to address the emerging gaps in airspace surveillance, the Air Force needs to examine relevant innovative and emerging technologies applicable to the A2/AD environment.

The study will:

1) Assess current and emerging US and allied technologies for over-the-horizon (OTH) radar systems and their potential applicability for providing battlespace surveillance of potentialA2/AD adversaries.

2) Determine if airborne bi-static or multi-static radar systems are feasible for this environment, and if so what would be the capabilities and limitations of these approaches.

3) Assess the potential for space and cyber assets to contribute to battlespace situational awareness within tactical timelines.

4) Identify potential countermeasures to the above approaches and assess their likely impacts on US ability to maintain battlespace awareness in these types of environments.

5) Determine promising technologies that can support improved battlespace situational awareness, including combat ID, in A2/AD environments or that can offset adversary countermeasures to such capabilities.

6) Recommend key demonstrations, timelines, and transition opportunities for near, mid, and far term implementations of promising approaches.

SAF PA Approval: 2025-0629