LIMITATIONS OF AIRSPACE CONTROL

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Despite the exponential growth in airspace control capabilities across the Department of Defense (DOD), airspace control is not without its flaws and limitations. Because of the complexity of most modern airspace control systems, multiple factors can affect the overall effectiveness of any particular system. Factors limiting the airspace control system's effectiveness are the environment, communications, and politics.

Environmental characteristics can have a large impact on airspace control. Afghanistan's mountains presented severe radar tracking and communications problems to ground-based US and coalition forces conducting airspace control for Operation ENDURING FREEDOM. Radars and communications are only effective when objects are within line of sight. If aircraft are over the horizon or behind terrain, radar tracking and communications are not possible. Elevated airspace control systems (i.e., AWACS, JSTARS) are not affected by terrain obstacles to the same degree as ground-based systems. Major storms (sand, snow, and rain) can also obscure radar and radio signals if the particulate is numerous and dense enough.. Intense solar activity, because of its effects on electronics, can also negatively impact airspace control.

Communications at all levels can affect the airspace control systems' performance.[1] Airspace control system personnel and equipment have their own limitations. A lack of proper training or outdated or poorly maintained systems limits their effectiveness. Alternatively, the airspace control system will never reach its potential if all airspace users are not required to use and "feed the system" with information. At the user level, all participants should have access to the same information and should adhere to the same equipment requirements before entering a given section of airspace. Operationally, disconnects between internal elements of the theater airspace control system and external component systems can impose unexpected barriers to airspace control system performance. Equipment compatibility between Service components and host nation systems can present multiple issues.

Politics can also play a role in limiting the airspace control system. Policies as simple as those limiting the number of personnel granted access to a location may deny a

[1] AF/A9 L2, *Integration of Airpower in Operational Level Planning Report*

needed element of the airspace control system. Even if that element is able to establish itself elsewhere, the optimum placement has already been affected. On a different note, political decisions to upgrade or purchase equipment can affect an airspace control system's effectiveness by impacting an element's maintenance rate, stability, or compatibility with other, newer systems.

The benefits and risk mitigation provided by airspace control rely upon the active participation of airspace users and controlling agencies. The technologies allowing forces to identify, spatially locate, and then communicate with airspace users require resources; ultimately all rely on human beings to operate. To properly execute an ACP, trained personnel and resources should first be made available. In addition, the airspace control systems' placement, design, and setup impact an airspace control system's efficiency and effectiveness. Planners should establish airspace control systems that account for each of the limitations listed above and still operate effectively.