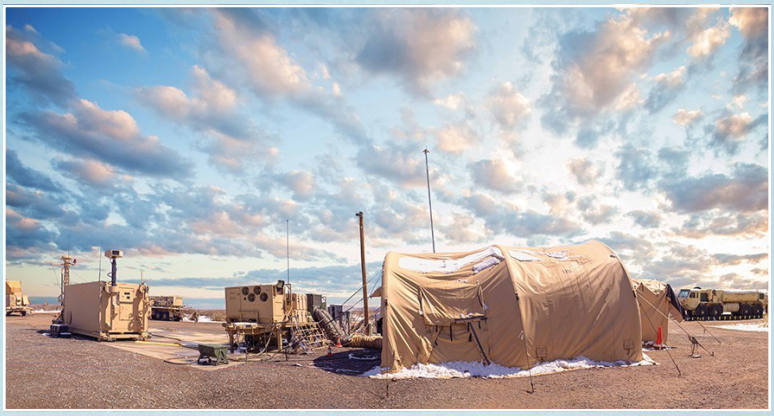
LEVERAGING THE CLOUD TO DEPLOY, FIGHT & WIN

By COL (R) Dave Shank



The IBCS provides a common mission command and sensor/weapon integration network for all Army AMD echelons that improves protection against threats in complex integrated attack scenarios. (Photo Credit: Nathaniel Pierce, U.S. Army)

In an ideal warfighting environment, the Department of Defense joint forces' integrated air and missile defense (IAMD) capabilities would expand the globe providing a secure, cloud-based architecture framework with an unlimited number of effectors. A series of microservices would serve as the backbone to this network of layered, multi domain sensors and weapon systems supported by a cloud environment, capturing and filtering data at speed. Focusing on a U.S. Army problem set, this article will take a detailed look at the current U.S. Army IAMD laydown using my company grade years of service as examples followed by a more capable framework of an integrated, modernized air and missile defense structure leveraging existing Army cloud infrastructure; in essence, an evolution in command and control. By decreasing the time and physical resources required, a secure cloud infrastructure will not only provide the speed of information for leaders to act, but also provide a combination of human and technical means to sense, make sense, and determine the best possible outcome of a high demand, low density capability of critical air and missile defensive fires (and protection in some cases) to defend maneuver formations, semi-fixed, and fixed locations.

During the late 90's and early 2000's, I had the privilege of serving in U.S. Army Short Range Air Defense (SHORAD) Artillery units responsible for providing defensive fires in support of maneuver formations; these included two divisions and an armored cavalry regiment. This is important to note because ultimately the kill chain was similar across all three organizations located on three different continents. The threat (variety of rotary wing and fixed wing aircraft) was fairly simple during this period, our weapon systems and sensors were very capable (Stinger, Bradley, Patriot, and Sentinel), formations were commanded at the Battery level, and procedures controlled at the Battalion echelon or higher; this included both positive (e.g., positive identification by way of systems or other identification capabilities) and procedural controls (e.g., airspace control measures such as coordinating altitudes).

Communications in a tactical setting for ADA operations over extended ranges cannot be understated. Since the post-Vietnam War era, the challenge of sharing critical information has become even more important since the days of the Airland Battle doctrine to how the fundamental principles adhered to today in Unified Land Operations. From manned and unmanned airframes to ballistic and cruise missiles to hypersonic, the ability to communicate through a series of voice and data messages in a timely manner is critical to decision making and defeating adversary capabilities. Undoubtedly these joint and multi-national communications networks must be resilient and secure, and leverage present day technology such as cloud services in an effort to provide real time, actionable data at the tactical edge.

As a company grade officer leading SHORAD formations, the priorities of ADA coverage were more often than not: maneuver forces, command and control nodes, and logistical hubs. As a platoon leader providing direct support ADA fires to a maneuver battalion/task force (BN/TF) and as a battery commander providing ADA fires in support of a brigade combat team (BCT), tactical communications were always a challenge; the greater the battlespace, the greater the challenge. As a platoon leader and battery commander, I had between two to four Single Channel Ground and Airborne Radio Systems (SINCGARS) in each of my vehicles (and command post as a battery commander). Monitoring a minimum of four frequencies at each of these echelons is challenging, and even more challenging when data networks are part of the communications plan. Ensuring SHORAD assets are positioned in accordance with the maneuver commander's mission, intent, and directed ADA priorities was paramount. In doing so, a constant flow of voice and data communications were necessary at all times to ensure the right weapon system(s) was positioned at the right time and location to defeat any the enemy.

As mentioned, a SHORAD battery commander by way of his tactical vehicle and command post (typically integrated with the maneuver formation's command post) is required to monitor several voice and data frequencies. Data system networks in this case include the Air and Missile Defense Work Station (AMDWS), Forward Area Air Defense Command and Control (FAAD C2), and

Force XXI Battle Command Brigade and Below (FBCB2) later replaced by the Joint Capabilities Release (JCR)) which is the 'parent system' to the Blue Force Tracker (BFT). AMDWS and FAAD C2 was configured and networked thru an internet protocol (IP) backbone, physically located in a command post architecture (static), provided a constant air picture. BFT, using a global positioning system (GPS) established through satellite connectivity, enhanced situational awareness at echelon across the battlefield providing near real time status of both friendly and enemy locations. AMDWS / FAADC2I is one of the U.S. Army's legacy systems, derived from the Army Tactical Command and Control System (ATCCS) family of systems. Another system of the ATCCS family of systems is the Advanced Field Artillery Tactical Data

System (AFATDS). The AFATDS is used to support field artillery planning, coordination, control, and execution of fires and effects; this also includes the U.S. Navy's long range naval gunfire systems, close air support, and attack aviation. These two legacy systems, and a number of others require extensive manpower and resources to maneuver, position, and emplace, to become operational. Couple these requirements with the technical expertise and time needed to enter the network architecture, and you have a pre-9/11 tactical recipe. In the words of former Secretary of Defense Donald Rumsfeld, "you go to war with the Army you have." That being said, change is a must now, and part of that change is determining ways to leverage these legacy systems to transform and modernization capability in a multi domain and contested environment to be ready to defeat any adversary in 2025 and beyond.

Project Convergence (PC), the Army's contribution to the Department of Defense' Joint All Domain Command and Control (JADC2) concept, has been an annual experiment since 2019 hosted by the Army Futures Command (AFC). In short, PC is intended to experiment and develop capability to deter future adversaries during large scale combat operations (LSCO). Directly focusing on the Army 's six modernization priorities, AFC combines joint and multinational forces while integrating both offensive and defensive capabilities across all domains to achieve overmatch.

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Some of this recent testing and experimentation has included AFATDS in a cloud environment. Put simply, Cloud AFATDS (C-AFATDS) is the name of the currently fielded version of AFATDS within a virtual machine vice the standard 'miltope' laptop that is issued and used throughout the Army today. Through continuous experimentation, C-AFATDS has been tested during a number of theater level and above exercises, the most recent being PC-22. Additionally, 18th Airborne Corps, three subordinate divisions, and 56th Theater Fires Command in U.S. Army Europe have also recently experimented with C-AFATDS, embracing the speed, sustainability, resilience and agility of this capability through continuous modernization. In so doing, continuous modernization provides an edge to cloud (E2C) infrastructure and services to deploy a consistent cloud stack from the enterprise to edge nodes through the development of microservices to connect, enhance, and modernize the deployed legacy applications.

Like the testing, experimentation, and familiarization being accomplished with AFATDS in a cloud environment, the opportunity to do the same with AMDWS exists. Placing AMDWS in a cloud framework will have no impact to other existing systems, and place emphasis on the

benefits of using cloud as a service while vastly speeding up both voice and data communications, and providing leaders at echelon the information, intelligence, and decision space required to make sound and timely decisions. E2C, as mentioned above, is an infrastructure ecosystem which unites the hardware, software, and cloud to securely connect sensors, mission software, services, and data via vendor-interoperable infrastructure aiding in bridging the gap between legacy systems and new capabilities across diverse environments. Leveraging recent and ongoing experiments and exercises, combining legacy systems with modernized capabilities in a cloud environment will afford Army senior leaders to focus in greater detail on joint and multinational offensive/defensive integration of fires, ultimately bringing the effects necessary to deter and when required, defeat an adversary.

In conclusion, it is time to begin testing and experimenting with AMDWS in a cloud environment, moving away from the legacy ways aforementioned during my company grade years. By doing so, this will enable the rapid deployment of legacy systems and applications, extending capabilities by way of microservices in an effort to enhance the command, control, and coordination of ADA formations throughout the battlespace. It will allow users to leverage developed microservices and build a pipeline of information at speed from the enterprise cloud to the edge providing a more resilient, sustainable, and survivable capability. This speed of data, intelligence, and decision making is exactly the recipe needed to continue to maintain pace with evolving adversarial capabilities while operating in challenging, and at times, contested environments.

COL (R) Dave Shank currently serves as an independent consultant supporting integrated air and missile defense programs and initiatives. During his career, he served in every ADA leadership position from Platoon to Army Air and Missile Defense Command. His last assignment was at Fort Sill, OK, as the sitting ADA Commandant.