

BULLET BACKGROUND PAPER  
ON  
COMMAND AND CONTROL APPLICATIONS OF PHOTON TECHNOLOGY

PURPOSE:

This paper outlines potential use cases for further investigation of the tools under the Advanced Collaboration Enterprise Services (ACES) Program. Specifically, this paper is exploring the backbone of ACES: Photon and its applicability to the Theater Air Ground System (TAGS).

BACKGROUND:

- In August 2021, a total force working group from the 513 Air Control Group, 552 Air Control Wing, and Hadron Industries convened to test and develop procedures for Photon tools. These tools allow worldwide users to share media across networked screens. This capability allows users to view and collaboratively edit media and documents. It also has the potential to share media across cross domain networks and geographic boundaries. The team developed a script to test multiple command and control (C2) competencies between operational and tactical C2 platforms during a three hour military use assessment (MUA).

- In October 2021, the team reconvened with operators from the 552 ACW to perform a simulation on user interfaces similar to those on the E-3 AWACS and Control Reporting Center (CRC). Using current tactics, techniques, and procedures these crews applied Photon technology across 14 scenarios over the course of three hours and provided modifications for the Hadron team. Over the course of three days, crews executed six iterations of the scenario. The AWACS Military Utility Assessment of ACES published on November 4th, 2021 documented a consistent 20% reduction in the kill chain in a PR scenario and higher user satisfaction.

DISCUSSION:

- Photon hardware is comprised of mini PCs to drive user's physical monitors and commercial-off-the-shelf servers. To help users share imagery, documents, and virtual machines running mission relevant software, the Photon web based application offers a simple-to-use graphical user interface for operators to drag and drop media and edit documents simultaneously. Additionally, Photon can be flexibly integrated with a variety of cross-domain solutions to support multi-domain missions

- The scenario tested in the October MUA was loosely based on an enemy fighter aircraft shoot-down event in Syria and it was conducted as an unclassified event with notional aircraft, entities, and locations. This scenario showcased how the use of the Photon software could reduce communication time between an E-3 AWACS crew and supporting operations with ground based operators from the CRC, AOC, ASOC, and JPRC. Scenario injects included real time sharing of RADAR feeds for air domain awareness, tools depicting real-time status of aircraft and fuel in the assigned battle management areas, Joint Tactical Air Strike Requests (JTAR), Dynamic Targeting 10-Lines, and PR 15 Lines.

- Due to limited crew availability and sim time, other use cases were not tested and are recommended here for further investigation.

-- Photon software could be used for conducting information management and outside the traditional means of reporting via Tactical Datalinks like Link 16. Photon could be a viable tool to help JDNOs (Joint Data Network Officers) and JICOs (Joint Interface Control Officers) at the AOC to disseminate useful COP (Common Operational Picture) level data to the ground based tactical command and control platforms. Higher classified tracks from Global Command and Control System – Joint (GCCS-J), which might not otherwise be disseminated via traditional means, could be provided to the CRC for cueing and collaboration.

-- Another scenario for Photon use would be a joint air domain awareness test. In this scenario a SENTINEL or PATRIOT Air Defense Artillery co-located with a CRC (Control and Reporting Center) would be included. All systems would be interoperable via the MTN (Multi-TDL Network) to integrate track data (Link 16). An E-3 on-station is currently overhead overseeing a TPA (Track Production Area) for a DCA (Defensive Counter Air) mission. The players are all operating in Link 16 with the CRC acting as a gateway bridge between terrestrial platforms Army ADA via Joint Range Extension Protocols JREAP-C (TCP/IP). Photon can be tested in this environment to help bridge air domain awareness in the absence of Link 16 or as a complement to Link 16.

-- Another usage for Photon would be for trouble-shooting and monitoring the health of an airborne E-3. With internal E-3 monitoring applications, the airborne computer technician can display system anomalies in a graphical format on the jet with ground computer technicians monitoring and assisting via Photon. This could help resolve troubling-shooting faster.

#### RECOMMENDATIONS:

- We would look to incorporate an AOC in the next MUA to test the capability of COP to CTP integration. This would validate the cuing concept as mentioned. A JICO or JDNO would be part of the requirements for testing this potential use of the Photon application along with an E-3 or CRC with notional tracks.

- Additionally, in order to test the air domain awareness function between joint forces, Photon should be tested at a flag level exercise between services to integrate outside the traditional Link 16 network to test if response times are faster in the DCA mission.

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