NOTE: This article focuses on division artillery supporting a division. However, as a Force Field Artillery Headquarters, the same concept could apply to other echelons.

This article captures the 101st Airborne Division Artillery’s key concepts and lessons learned with the integration of unmanned aircraft systems (UAS) in division artillery (DIVARTY) proactive counterfire. These concepts were conceived during 101st DIVARTY’s participation in Warfighter Exercise 15-05 with 36th Infantry Division at Fort Hood, Texas. They were validated and codified in 101st DIVARTY’s standard operating procedures at WFX 16-02 with 101st Airborne Division (Air Assault) at Fort Campbell, Ky. Only real-world mission processes are included in this article. “Gameisms” used to avoid issues with the warfighter simulation are omitted.

Soldiers in 101st DIVARTY followed a dual-pronged approach to dynamically re-task UAS to DIVARTY. See Figure 1. The first prong was an internal DIVARTY dialogue to factor the military aspects of weather (visibility, precipitation, cloud ceiling and temperature) and mission, enemy, time, terrain, troops and civilian considerations (METT-TC) to systematically determine the feasibility, acceptability and suitability of the direct sensor-to-shooter link with DIVARTY and UAS. The second prong was a four-fronted DIVARTY-to-division dialogue to prioritize and request limited UAS assets.

Following the dynamic re-task, the subsequent direct sensor-to-shooter fire mission followed a seven-step fire mission process:

1. UAS coordination.
2. Target identification and target mensuration.
3. Fire mission transmission from lethal Fires/targeting cell to the fire control element (FCE).
4. Legal review and collateral damage estimate (as required).
5. Air clearance.
6. Approval and fire mission transmission to the firing unit.

This systematic process attempts to lend some simplicity to a complex process.

Up front, WFX 16-02 produced three key lessons learned. First, direct sensor-to-shooter rehearsals prior to execution are essential to ensure a fast, responsive and effective counterfire capability. Second, counterfire time is significantly reduced when external coordination is conducted prior to execution. And third, pre-established restricted operations zones (ROZ) facilitate responsive counterfire.

UAS dynamic re-tasking process

The direct UAS to DIVARTY link can be preplanned and tasked 72 hours out as a part of the air tasking order, however, the requirement for...
a direct UAS to DIVARTY link more likely follows from a dynamic re-tasking based off radar acquisitions and intelligence assessments. Due to the erratic nature of this re-task, direct sensor-to-shooter rehearsals prior to execution are critical to ensure a fast, responsive and effective counterfire capability.

A primary, alternate, contingency and emergency (PACE) communication plan should be established during or before these direct sensor-to-shooter rehearsals.

Not factoring the continuous target processing station to the division joint air ground integration cell (JAGIC) dialogue on the location and quantity of enemy indirect fire acquisitions, UAS dynamic re-tasking process exists in two phases:

1. Phase I is a DIVARTY internal dialogue to discuss the feasibility, acceptability and suitability of the requirement for a direct sensor-to-shooter link before a request is initiated to division.
2. Phase II is a DIVARTY to division dialogue to prioritize and request limited UAS assets. This entire process should take less than 15 minutes and all involved parties need 24-hour representation. Figure 2 provides a list of duties and responsibilities for the direct DIVARTY to UAS link.

Phase 1

After the requirement is identified, the DIVARTY S2 (intelligence), brigade aviation element (BAE), air defense airspace management (ADAM), lethal Fires, targeting officer and DIVARTY chief of operations (CHOPS) must discuss the feasibility, acceptability and suitability of the direct sensor-to-shooter link. Heavy reliance on the DIVARTY BAE and the DIVARTY S2 is required to assess the effects of the weather on different UAS. All military aspects of weather apply: visibility, winds, precipitation, cloud ceiling, and to a lesser extent, temperature.

The DIVARTY S2 and DIVARTY CHOPS must then assess the range of both friendly and enemy indirect fire (IDF) systems. If either the enemy or friendly IDF systems are out of range, a direct sensor-to-shoot-er link may not be feasible, suitable or acceptable. However, conditions rapidly change, so any range disparity does not necessarily circumvent a direct sensor-to-shooter link. Another related consideration is the availability of extended-range precision munitions (anything beyond 45 kilometers). These munitions are generally in short supply and these extended-range precision munitions require Category 1 grids. This limits the types of munitions available to support, and it requires other means of target refinement, as no UAS in the United States arsenal can unilaterally acquire Category 1 grids.

The enemy air defense artillery threat must also be assessed for feasibility, acceptability and suitability of the direct UAS to DIVARTY link. The DIVARTY ADAM cell and S2 current operations (CUOPS) must conduct analysis on the composition, capability and intentions of enemy ADA units. With a high demand for a limited number of UAS assets, some risks posed by flying UAS assets are greater than the potential rewards.

Finally, the range, endurance and capabilities of UAS systems must be assessed. UAS endurance varies from 50 minutes to 31 hours and UAS range varies from 10,000 nautical miles to just over three nautical miles. Sensor capabilities are also diverse. Serving as the DIVARTY’s subject matter expert on UAS, the DIVARTY BAE must conduct analysis to determine which (if any) UAS systems are capable of supporting the pending mission.
Phase II

After the DIVARTY team determines the direct sensor-to-shooter link is feasible, acceptable and suitable, dialogue with division must be initiated to prioritize limited UAS assets. This dialogue typically occurs simultaneously, and it exists on four fronts:

1. DIVARTY S2 to division G2 (intelligence).
2. DIVARTY CHOPS to division CHOPS (operations).
3. Targeting officer to division field artillery intelligence officer (targeting).
4. DIVARTY lethal Fires to division Fires (Fires).

The DIVARTY S2 to division G2 dialogue focuses on enemy IDF capabilities, composition, location and intent. Effective enemy IDF is not always the catalyst for a direct DIVARTY to UAS link, even if all other factors align. Assessments of the enemy’s artillery in the most likely and most dangerous course of action are imperative, as are the enemy’s IDF capabilities to support those courses of action. Additionally, the G2 and S2 make a gain/loss assessment that measures the effects on intelligence collection from reallocating UAS assets.

Concurrently with other required dialogues, the DIVARTY CHOPS and division CHOPS must discuss the requirement for a direct UAS to DIVARTY link. The discussion here is the broadest, covering relevant information from all the warfighting functions. The focus is to weigh the main effort within the division. The attack guidance matrix and friendly scheme of maneuver are involved in this analysis, and they play a vital role in prioritizing limited UAS assets.

The targeting officer to division field artillery intelligence officer dialogue and the lethal Fires to division Fires dialogue are identical. These personnel have in-depth knowledge of the division fire support plan and a comprehensive understanding of other assets available to support. This knowledge greatly assists in assessing and mitigating (where required) the effects on fire support from reallocating UAS assets. Those personnel must explore options beyond surface-to-surface Fires. Information collection assets other than UAS are also discussed. This key is to support counterfire efforts with the most efficient means possible. This equates to providing adequate support to committed units, weighing the main effort, maximizing responsiveness and planning ahead to facilitate future operations.

The fire mission thread with a dedicated UAS in the proactive counterfire fight is significantly different than other DIVARTY fire missions. The DIVARTY’s support to the JAG-IC greatly increases within the confines of the proactive counterfire fight. In this role, the DIVARTY has the responsibility to identify targets and clear the ground and air for any subsequent fire missions. Additionally, in its role as the counterfire headquarters, the DIVARTY has the authority to directly coordinate with corps and other divisions to strike beyond the fire support coordination line (FSCL), to strike beyond the supported division’s boundary, or to request support. At WFX 16-02, response time was significantly reduced when this coordination was conducted prior to execution.

With the integration of an UAS, the fire mission process is a longer and more complex, multistep process. After the DIVARTY CHOPS issues the commander’s guidance, the DIVARTY lethal Fires is the driving force behind all dynamic targeting within the DIVARTY, to include the direct UAS to DIVARTY link. Upon notification of the direct DIVARTY to UAS link, the targeting cell must integrate with lethal Fires throughout the entire fire mission process.

**Step 1: UAS coordination**

DIVARTY lethal Fires/targeting cell must coordinate with the UAS controller to assist in locating the enemy artillery. The targeting cell monitors the...
live UAS feed and provides situational awareness to the lethal Fires officer. The Joint Automated Deep Operations Coordination System (JADOCS) feed and counterfire analysis are used to focus the UAS onto specific targets. The DIVARTY S2 CUOPs and the targeting officer assist in the counterfire analysis to refine named areas of interest and target areas of interest.

**Step 2: Target identification and target mensuration**

Upon target detection, the targeting cell refines target location through target mensuration using Precision Strike Suite for Special Operations Forces. Target mensuration is required with precision munitions and is a measurement of a feature or location on Earth to determine the absolute latitude, longitude and elevation. At WFX 16-02, most counterfire missions required precision munitions due to the increased range of those munitions.

**Step 3: Fire mission transmission from lethal Fires/ targeting cell to the fire control element**

After target mensuration, the fire mission is sent from lethal Fires/targeting cell to the FCE’s Automated Field Artillery Targeting Data System (AF-ATDS) utilizing JADOCS.

**Step 4: Collateral damage estimate (as required) and legal review**

The targeting cell conducts a collateral damage estimate using the Digital Precision Strike Suite Collateral Damage Estimation, as required. The judge advocate on the CUOPS floor then provides a fast legal review. In self-defense, there are typically few restrictions, especially in a decisive action fight.

**Step 5: Air clearance**

If there is no pre-established restricted operations zone (ROZ), the ADAM/BAE cell clears the air for the fire mission on Tactical Airspace Integration System (TAIS). (ROZs denote airspace activities in which the operation of one or more airspace use is restricted.) When set up correctly, the firing unit’s fire control panel will directly interface with the AF-ATDS, which will directly interface with the TAIS system. This will occur near instantaneously after the fire mission is sent to the firing unit.

At WFX 16-02, a pre-established ROZ significantly reduced counterfire times. The ADAM/BAE cell can create ROZs to “preclear” the air when armed with the gun target line, point of origin, point of impact and the maximum ordinate. These ROZs should remain in a cold status until fire missions are imminent to minimize airspace restrictions. Techniques, tactics and procedures for establishing a ROZ fell outside the scope of this article, but the two primary methods used at WFX 16-02 included the “hotwall” and the “goal post” methods.

**Step 6: Approval and fire mission transmission to the firing unit**

The DIVARTY CHOPS must approve or deny the fire mission. If approved, the FCE will send the firing unit a “fire when ready” command on AF-ATDS.

**Step 7: Battle damage assessment confirmation**

Once the fire mission is complete, UAS confirms the battle damage assessment.

Reattack is conducted as necessary.

After completion of the fire mission process, the decision to release focus of the UAS back to division is twofold. First, analysis to weigh the supported division’s main effort is conducted to prioritize limited UAS assets. The supported division’s UAS must go where they can best support the division. Second, the range to the enemy artillery is assessed to determine if the targets are within M26A2 (Dual Purpose Improved Conventional Munition Extended Range Rocket) range (45 km). If the targets are within M26A2 range, Q-37 or Q-53 radar acquisitions are probably sufficient to serve as the direct sensor-to-shooter link because there is no requirement for a Category 1 grid. However, conditions may prevent Q-37 or Q-53 radars from cueing (e.g., the presence of enemy UAS within the vicinity of friendly radars to avoid detection).

**Lesson learned:**

**Communication, coordination and rehearsals can streamline counterfire operations and significantly reduce counterfire time.**

1. Rehearsals and PACE plan: Direct sensor-to-shooter rehearsals prior to execution are essential to ensure a fast, responsive and effective counterfire capability. A PACE communication plan should be established prior to execution, preferably during or before direct sensor-to-shooter rehearsals.

2. Coordination prior to execution: Counterfire time is significantly reduced when required coordination is conducted prior to execution. As the division’s counterfire headquarters, the DIVARTY can directly liaison with corps and other divisions for cross-boundary Fires, Fires beyond the F5CL or to request support.

3. “Pre-cleared” air: A pre-established ROZ can significantly reduce counterfire times, when feasible. As the subject matter experts in airspace clearance, the DIVARTY ADAM/BAE cell should advise on the best ways to “preclear” air to facilitate responsive counterfire.

Filling the void of existing doctrine, the process employed by the 101st Airborne DIVARTY at WFX 16-02 can be effectively applied to DIVARTYs across the Army to enhance proactive counterfire operations. The dual-pronged approach that factors the military aspects of weather and METT-TC enables an internal DIVARTY dialogue to systematically determine the feasibility, acceptability and suitability of the direct sensor-to-shooter link with artillery and UAS. The dialogue with division to prioritize limited UAS assets is streamlined and organized with a concurrent, four-fronted approach. Finally, the systematic, seven-step fire mission process offers simplicity to a complex process.

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