



U.S. Army Green Berets assigned to the 3rd Battalion, 10th Special Forces Group (Airborne), prepare for MRZR night movement during Exercise Diesel 26 at White Sands Missile Range, New Mexico. The 10th Special Forces Group (Airborne) Green Berets participated in Exercise Diesel 26 to assess how Special Operations Forces integrate into the Army's Next Generation Command and Control (NGC2) architecture while operating in austere, communications-contested environments. (Photo by Sgt. Rhianna Ballenger)

A Case for Integrating Counter Position Navigation and Timing Weapons

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1st Multi-Domain Task Force (1MDTF) has been continuously experimenting with its ability to execute deep electromagnetic attack. In its latest experiment at Diesel 26, White Sands Missile Range, NM, the 1MDTF sourced a creative, low-power Counter Position Navigation and Timing (C-PNT) solution to accomplish two goals: Successfully transmitting disruptive and degraded effects and developing the pathway to integrate those effects into the overall effects plan.

The 1MDTF C-PNT Test team employed its assigned Multi-Domain Electromagnetic Warfare System (MDEWS), which is essentially a Viavi TRx with a directional antenna and unique waveforms to transmit precise effects on the target L1, L2, and L5 spectrum. Prior to executing C-PNT, it is essential to understand the “back blast” of the weapon, known as the antenna rear and side lobes. Although target center frequencies may be offset from friendly frequencies, the transmission site can cause significant

unintentional Electromagnetic Interference (EMI) on the surrounding area by raising the noise floor over several miles. Note the bleeding effects may also impact friendly systems if care is not taken to determine which signals are targeted. Ways to mitigate this are:

- Employing terrain masking techniques between the antenna and nearby friendly systems.
- Shrouding the transmission site in electromagnetic energy absorbing materials, such as electromagnetic energy absorbing camouflage nets or blankets.
- Creating a model of the transmission site that can easily depict an estimate of the affected area. These models can be turned into graphical control measures incorporated into a common operating picture for rapid integration of planned and dynamic effects.
- Ensuring the transmission path is offset from friendly munition and aircraft flight paths to reduce interference down range. For the best effect, transmissions must



A U.S. Army Green Beret assigned to the 3rd Battalion, 10th Special Forces Group (Airborne), surveys their objective during a raid mission as part of Exercise Diesel 26 at White Sands Missile Range, New Mexico. (Photo by Sgt. Rhianna Ballenger)

persist the entire duration of the mission. Care must be taken to reduce pauses in transmissions unless absolutely required to prevent electromagnetic (EM) fratricide during operations.

- Physically transmitting at a safe distance from friendly receivers. This may be overlooked when reacting to an unmanned aerial system (UAS) threat with C-PNT capabilities.
- Notifying the battlespace owner of pre-planned or immediate effects and establishing a Restricted Operating Zone (ROZ) over the transmission site. This zone should consider the distance and altitude at which friendly forces may experience unintended EMI. These ROZs and effects must be communicated up to the joint force as soon as possible.
- Ensuring the Electromagnetic Attack (EA) team and nearby friendly forces have encrypted their GPS dependent systems with the appropriate keys and are aware of when effects are underway prior to transmitting.

In case of civilian air traffic or maritime concerns, planners should release a Notice to Airman (NOTAM) or work with host nation partners to help notify civilians of planned effects. Additionally, while a general-purpose directional antenna can achieve effects, a purpose-built, high-gain directional antenna that is resonate to the appropriate center frequency will also reduce EMI and have greater effect on target. This is due to the reduction in energy passed through the antenna's rear and side lobes.

Tactical C-PNT Planning

A unique challenge of employing these weapons is integrating the effects on the target locations during operations while reducing or mitigating EM fratricide. The further back the transmitter is from the forward line

of troops (FLOT), the greater the potential for EMI to cause unintended EM fratricide. This can be somewhat mitigated by the angle and azimuth of the transmit antenna but may also reduce effectiveness at distance against intended targets.

The ideal approach is to place a C-PNT EA team's weapons near the FLOT and incorporate a "shoot-and-scoot" approach to maintain continuous suppressive effects. In practice, two teams would transmit while the third repositions to a new suitable transmit point. Once the third team is emplaced and transmitting, the first team would cease effects and maneuver to a new transmission site. This would maintain constant effects on a target while improving the survivability of the transmit elements.

Missions may be required to last 30 minutes to 3 hours to create and maintain the desired effect. C-PNT planning must consider the following: What is the minimum requirement for the duration of effects, the potential firing point, and the hide sites, and how can continuous suppressive effects be rendered over time? Planners should assume that once effects stop, the target will immediately regain PNT capability on their systems. All deliberate and planned C-PNT missions must be reported to the Joint Force as soon as possible to integrate effects into the ongoing operations and reduce the chances of EM fratricide.

The waveforms used also play a role in integrating effects with friendly forces and reducing the impact on friendly use of the spectrum. C-PNT effects must be tightly controlled from the tactical edge through the joint forces command headquarters to ensure effects do not create unintended EMI on cross-border or adjacent element units.

A U.S. Army Green Beret assigned to the 3rd Battalion, 10th Special Forces Group (Airborne), moves through the forest during a raid mission as part of Exercise Diesel 26 at White Sands Missile Range, New Mexico (Photo by Sgt. Rhianna Ballenger)



C-PNT Performance Steps

Units need to either request or task an element to monitor and assess the effects of C-PNT attacks by performing Electromagnetic Warfare Support (ES) on the target area prior to and throughout the duration of effects. In practice, this is very similar to how “Call for Fire” works.

1. The ES team must report the target spectrum noise floor threshold to the EA team or Electromagnetic Attack Coordination Authority (EACA).
2. The ES team will then request the EA team to transmit a narrow band pilot signal offset from the target center at the lowest possible power required to achieve effects.
3. After the ES team has registered the pilot signal, the ES team will confirm the appropriate power setting for the specified attack. Note that there is a drop in received signal strength if the transmission bandwidth is greater than the pilot signal at the target area. EA teams will need to compensate for that change.
4. The EACA must ensure the transmission site has completed clearance of fires, established a ROZ, and is prepared to transmit. At this point, the weapon is laid, the area is clear, and the EA team is ready to fire.

During transmissions, the ES team monitors effects and changes in the target area as EA teams maintain suppression while maneuvering as required. The EACA will monitor the appropriate channels for reports of EMI and, if required, issue a check fire to localize areas of reported interference. Once the mission is complete, the EACA will call end of mission and request the ES team to report a clear target spectrum, and the EA teams to report weapons cold status. Once end of mission is verified, all teams maneuver to their appropriate hide sites.

Conclusion

Commanders, EW Planners, and Operators have an excellent opportunity to leverage C-PNT weapons and create an unfair advantage over our adversaries. Properly incorporating these systems with deliberate planning and pragmatic protection measures can reduce the unintended effects of these systems while creating a disrupted or degraded electromagnetic spectrum environment on the battlefield. Commanders and Planners can choose to either plan 9–12 months in



A U.S. Army crew chief assigned to the Combat Aviation Brigade, 1st Armored Division, looks out the window during a military free-fall jump for Green Berets assigned to the 3rd Battalion, 10th Special Forces Group (Airborne), New Mexico (Photo by Sgt. Rhianna Ballenger)

advance to train and certify crews at a national training center or seize opportunities with test centers to transmit live effects. Permissions and Authorities for these weapons will be initially tightly held, but after continued demonstrated safe and deliberate use of C-PNT weapons in training, leaders will be inoculated to incorporating these weapons in the future. Commanders and staffs can also exploit opportunities in Command Post or Warfighting Exercises to incorporate C-PNT planning and operations to prepare for their eventual use. C-PNT weapons are actively employed against our forces—it is time to seize the initiative and modernize our approach to dominating the spectrum.

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