

Article: The Lost Art of Legacy Equipment: LOS & the SMART-T in a Decisive Action Rotation

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Synopsis / Thesis: Discusses the observations / trends seen regarding both LOS and SMART-T in the DATE environment. The intent behind this article is to help shape the use of LOS and SMART-T procedures prior to arrival at NTC. The lack of planning on both assemblages has been evident in the DATE environment and causes the units to miss out on a combat multiplier during decisive action. Numerous items can be discussed to include training, maintenance, SAR/GAR, COMSEC and the integration as a backup for the loss of an STT.

The Lost Art of Legacy Equipment: LOS & the SMART-T in a Decisive Action Rotation

As an Observer, Coach, Trainer (OC/T) at the National Training Center (NTC) we have the unique opportunity to work with up to ten Brigade Combat Teams (BCT) each year and observe their operations. For the past ten years, the NTC has focused these rotations on preparing units for deployment to Iraq and Afghanistan by tailoring the scenarios' focus on Counter-Insurgency (COIN) and operating off of Forward Operating Bases (FOB). Prior to this change, units would come to the NTC and focus on defeating a nation state instead of insurgents, armor would engage armor across the Mojave desert instead being left at home, and Soldiers would destroy the enemy instead of working with "local populations" to build a working government. From a signal perspective, much has changed during these last ten years as well. Mobile Subscriber Equipment (MSE) has been replaced with Warfighter Information Network-Tactical (WIN-T) Increment 1 (and now WIN-T Inc 2). The division signal battalion has been replaced by the brigade signal company, and networks that depended on line-of-sight communications have now been replaced by satellite backbones and commercial radio links in a static environment.

In March 2012, units conducted the first rotation in over a decade where the unit trained in a Decisive Action Training Environment (DATE) instead of COIN and once again brought back a highly mobile fight against a near peer opposing force. Since then, we have completed five DATE rotations and can now report to the signal community some trends.

Why We Still Need Line-of-Sight

For decades, Line-of-Sight (LOS) radios made-up the backbone of nearly all Army tactical networks. When coalition forces entered Iraq, a network of over 100+ LOS links soon

stretched across the desert. When the Joint Network Node (JNN) was introduced in 2005, one of the advantages it offered was the fact that it came with the satellite transportable trailer (STT) as an organic part of the system. No longer did the brigade have to position itself based entirely on being able to “see” the distant end. Now units could be hundreds of miles away and still be able to communicate.

As WIN-T has evolved, the decision was made to include two High-Capacity LOS (HCLOS) V3 shelters (with the capability to bring in three radio links) and four HCLOS V1 shelters (with the capability to bring in one radio link). Under the current MTOE, all of these assets are located at the brigade signal company for use across the formation as needed. HCLOS offers the BCT a number of benefits over satellite. First, HCLOS is considerably faster than satellite links¹. In addition to speed, HCLOS has the ability to offer the unit a significant increase in available bandwidth². Units at the NTC are limited to 1Mbps HCLOS links due to NASA Goldstone complex and FAA Corridors. Aside from the bandwidth and speed that HCLOS offers the BCT, it provides a critical redundant path for communications to take when the satellite network fails due to Master Reference Terminal (MRT) problems, space weather, or terrestrial weather. In fact a recent rotation was forced to stow their dishes for 24 hours during the rotation due to high wind warnings.

Why Units Don't Use HCLOS

Over the five rotations, we have observed three consistent reasons for the units failing to install a HCLOS network or for the network installation to take a considerable amount of time.

¹ The normal delay associated with one HCLOS link is 2-20 ms compared to 600-900 ms over a Time Division Multiple Access (TDMA) link

² The HCLOS is capable of a max of throughput of 16 Mbps dedicated on the link compared to a normal 5-10 Mbps shared across the entire network that most units get on TDMA.

While some of these reasons are unique to the DATE environment, some of them have carried over to our OEF rotations as well: lack of planning, personnel, and training.

Lack of Planning

The lack of planning is the number one reason why the HCLOS network installation is delayed or fails.. This lack of planning occurs in a variety of ways. A DATE rotation forces the unit to be highly mobile. While things are relatively static for the first 7 days during STX, once the force-on-force portion of the rotation begins, battalions are constantly relocating as the battle progresses. This makes the installation of a HCLOS link to many units unrealistic. Despite this, there are several battalions that are relatively static throughout the entire exercise. Examples of these include the brigade support battalion within the brigade support area, the brigade special troops battalion, attached aviation battalions, and the field artillery battalion. This makes these units prime candidates for HCLOS links however when we speak to brigade S6s and network technicians about their plans to install links to these units, we're often told that they "have no idea where the unit is going to setup so we can't tell if a HCLOS link is possible." Moving a TOC is a deliberate action with planning involved and requires coordination across multiple levels. Often we find that the brigade plans section is aware of all unit moves being planned and the S6 is unaware of these plans. A part of their mission analysis for TOC jumps, the battalion S6 should consider HCLOS capabilities along with FM and retransmission coverage among many other items when recommending a TOC location to the commander.

Once proposed locations are identified, it is incumbent on the S6 and network technician to determine if a HCLOS link is possible and desirable. This determination requires the use of the SPEED program. For anyone not familiar with it, SPEED is a terrain analysis program that looks on the effects of radio propagation. We consistently see units delay the completion of this

analysis first because they are unaware of where units are moving and further because “the guy” who knows SPEED is working on other things.

Once a HCLOS link is identified for installation, the planning must continue with NETOPS. NETOPS has the responsibility to plan and manage all parts of the network (including HCLOS), not the signal company. In previous rotations we have seen a HCLOS plan fail to be developed for 72 hours because the signal company commander was responsible for putting the plan together and he was instead actually being a commander and working with his retransmission teams.

The final and perhaps most important comment in reference to planning the HCLOS network is to ensure that everyone understands the plan. This is done through both the formal orders process and through publishing technical data. The orders process must be used because generally when a HCLOS link is installed between a JNN and a CPN, it at the very least requires the battalion to receive the equipment (and possibly personnel) from the signal company. This implies that the battalion will be responsible for supporting those resources. Technical data must be published so that both operators and NETOPS ensure that they have a common operating picture of the network. All too often we see technical data pushed to operators with a simple phone call. It is then written down incorrectly, illegibly, or just plain lost, further delaying the installation of the link. Technical data can be as simple as a small spreadsheet that includes grid locations, azimuths, polarization and frequencies or as complex as including the full SPEED analysis and detailed data flow. Either way, a written record exists in digital form that everyone can easily access (SharePoint, Email, etc.) and reference in the future.

Lack of Personnel

There is not a unit within the Army that will tell you that they have every single Soldier in their formation that they would like to have. Even deploying units have shortages in personnel assigned and even more who are not able to deploy for one reason or another. For low-density MOSs such as signal within the BCT, this can have a large impact. Because we will never have everyone we want, it is important that we fully maximize the impact of the people we have.

When the Army operated under Mobile Subscriber Equipment (MSE), it was not at all uncommon for a node to operate as a “team” as opposed to a node with several sections. When a Small Extension Node (SEN) arrived on the site, it was everyone’s responsibility to get the system operational. With WIN-T, we have seen the disturbing trend that cross-training between MOSs doesn’t occur nearly as often any more. A 25N rarely knows how to even help setup the STT, let alone operate it. A 25Q similarly does not have the training to understand what is inside the JNN, let alone pull shift in it.



Figure 1 Rotational Unit Installs HCLOS V3 during STX portion of rotation

Units must work to ensure that their Soldiers at least receive basic cross-training on all of the equipment that makes up their team. It is unrealistic to expect them to be experts on all systems, but Soldiers should at least be able to assist in the setup of equipment and be able to tell when there is or is not a problem with the equipment. One recent rotation waited over a week to install a HCLOS link at the JNN (the lack of this link would later prove critical to the unit) because of a “lack of personnel.” The commander’s reasoning was that he didn’t have all three 25Qs that he needed to put up the HCLOS antenna. What he failed to consider was that he had a 25N sitting in the JNN pulling shift, staring at a screen waiting for something to happen and a 25S sitting on a chair next to the STT with the hatch closed “watching” the system. There is no reason why a 25Q who is trained in the installation of that antenna couldn’t supervise and direct those other two Soldiers in how to get the antenna up and then go back and actually get the link up.

Likewise with the LOS V1 shelters that are pushed down to the battalions, manning is an issue. The current BCT MTOE does not provide those shelters with any operators. This means that either the signal company must take a Soldier out-of-hide to send with the shelter or the battalion must utilize the 25Qs (with the help of the 25Bs) that are already down there as part of the CPN team. This does present some challenges in the area of property accountability but they are easy to workout with some proper planning.

Lack of Training

There is never enough time to train our Soldiers to the level that we would like. Mandatory training, budget restrictions, and a host of other reasons keep our units from being able to go out to the field and learn their jobs. Fortunately, HCLOS is one of those things that we can train on, often without even leaving the motor pool. A 15 meter mast can be installed pretty much anywhere where you have some open dirt (make sure you check for dig restrictions and overhead power lines). Actual radio shots can be installed across the motor pool either using just the RF cables (with attenuator in the middle) or by using the antennas themselves and offsetting their azimuths so that they don't shoot directly to each other (ensure that low power is used and check your receive levels to prevent radio burnout). For additional flexibility, the antenna can even just be placed on the top of the shelter to install a test link. These easy training methods provide the unit the ability to ensure not only that HCLOS operators remain proficient on their job, but they also provide a great opportunity for cross training across the entire team and ensure that the equipment is fully operational before the unit goes into the field.

SMART-What?

It is hard to think of another signal system within the BCT that is as neglected and underutilized as the Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T). The

SMART-T was first introduced to the Army in the 90's as a way to provide smaller teams (SEN and LEN) the ability to bring in a beyond line-of-sight link in. It was used extensively during the beginning of the wars in both Afghanistan and Iraq but quickly faded away as JNN and CPN teams started to appear on the battlefield with their organic STT. Each BCT is authorized two SMART-Ts but they rarely are even powered on for basic maintenance much less used in the network. Of the last 12 rotations to pass through NTC, only 3 units have actually considered or attempted to install a SMART-T link, and of those, only one has actually been successful in that attempt.



Figure 2 One Common Use of the SMART-T at the National Training Center (Fuel Truck)

The SMART-T provides the BCT with a number of capabilities. First, it is a beyond line-of-sight system that can operate completely independent of the STT. It operates on the military controlled Extremely High Frequency (EHF) (soon to be replaced by Advanced EHF) satellite constellation instead of a commercially operated Ku or military operated Ka satellite. All

SMART-T links are Frequency Division Multiple Access (FDMA) instead of TDMA which means the bandwidth is dedicated to you and not shared across other users. One final distinction is the fact that SMART-T links operate using TRANSEC in a frequency range that makes them extremely hard to jam and are able to operate in a CBRN environment. SMART-T is a good option for a unit's BSA that is well outside of LOS range but would still like a high bandwidth link between it and the BCT main or in some cases to the division main to eliminate the double satellite-hop with the STT.

SMART-T use suffers from all of the same problems mentioned above with the HCLOS plus a few that are unique to it. With HCLOS the unit often does not have all of the trained operators that it would like. With SMART-T it is extremely likely that the BDE as a whole doesn't have a single trained operator within its formation. This means that BCTs must reach out to their sister units or even their division headquarters to get the needed training to operate the system. Additionally, there is a three week course at Fort Gordon to teach Soldiers how to operate and maintain the system.

On the occasion that we have seen units attempt to install the SMART-T we often discover that the system has maintenance issues that were not previously identified because basic PMCS had not been conducted on the equipment.

The final challenge we have seen units face is a complete lack of planning. When a unit goes to the field, several weeks before they submit a satellite access request (SAR) to get permission to use the satellite resources. Sadly, units generally fail to complete this same step when they are attempting to use the SMART-T. Additionally the SMART-T requires a number

of COMSEC keys that are not normally used with WIN-T. It is important that prior coordination is made with the unit's COMSEC custodian to get the proper keys prior to going to the field.

Ultimately, use of HCLOS and SMART-T can greatly increase a brigade's capacity. However, to get the maximum value from these systems requires considerable attention in the areas of training, personnel, and planning. Without these factors being addressed at home station prior to deployment, the full value of these systems cannot be realized.