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MOBILE SUBSCRIBER EQUIPMENT LESSONS
LEARNED AT THE BRIGADE LEVEL

An Individual Study Project
Intended for Publication

by

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Project Advisor

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MOBILE SUBSCRIBER EQUIPMENT LESSONS
LEARNED AT THE BRIGADE LEVEL

INTRODUCTION

MSE is a revolutionary communications system which, when fully fielded, will have profound impact on the way the Army will conduct business. The equipment is being fielded, a complete corps at time--including active, reserve, and National Guard components. The MSE equipment, its tactical deployment, and the way it is being fielded are so unique that it is appropriate to identify and discuss some of the significant lessons learned, during the 3d Signal Brigade and III Corps fielding, before follow-on units accomplish their fielding.

This article is based on interviews conducted at the 3d Signal Brigade with key leaders at both brigade and battalion level. Their insight and candid discussion of lessons they learned during the past 16 months will provide thought for those in the signal community as well as follow-on units who are already in the fielding process or will be in the near future. Not all conversations with brigade personnel are footnoted because of the many interviews conducted. Portions of the text, where direct quotes or paraphrased quotes have been used from a specific individual, are footnoted.²

MSE changes our old ways of doing business. The corps signal brigade becomes the focal point for signal C2. The corps, as opposed to division, controls the maneuver of signal elements over the battlefield. MSE provides the commander with

communications support throughout the corps area, extending his voice over the battlefield even when he is mobile.

What is MSE and why is its rapid integration into active, reserve, and National Guard units essential? The Mobile Subscriber System is a non-developmental item program which utilizes existing software and hardware components which have been modified to satisfy the communications needs at the corps and division level. MSE, in each fielded corps, will function as the primary means for corps and division leaders to communicate by using a common user voice network.

Mobile subscriber equipment replaces a mixture of Army Tactical Communications Systems (ATACS) and Integrated Tactical Communications Systems (INTACS) which did not support Airland Battle doctrine. Nor did it provide the maneuver commander with the mobile communications needed to accomplish the mission in a dynamic, rapidly changing battlefield. After considering how to best support the new requirements, the Army purchased MSE.

In July, 1984, a request for proposal (RFP) was completed for the acquisition of MSE and released to industry. The RFP started a complex chain of events which culminated in the planned replacement of five corps worth of signal equipment, one corps at a time. The first corps to be fielded was III Corps, stationed at Fort Hood, Texas. The III Corps MSE acceptance exercise, conducted in November, 1989, was completed without surprise. The equipment performed well and both the communicators and III Corps subscribers were highly pleased with the new equipment. Even

though brigade and corps subscribers had minimal operational experience with MSE before the acceptance exercise, it is clear it far surpasses the operational capabilities of the old equipment.

The magnitude of what must be done to convert a TRITAC brigade to MSE is staggering. Units must turn in their old equipment which will not be used under the MSE MTO&E. Then they draw the MSE equipment and the Delta equipment.² Unit personnel must be stabilized for the fielding period and cross leveled within the battalion. Soldiers then receive classroom training on the new equipment and form the new MSE signal teams. The battalions are then, for all intents and purposes, brand new battalions.

During the fielding process units must accomplish the transition while balancing all normal commitments such as post detail. Units must also maintain unit and individual qualifications such as PT, NBC, and rifle qualifications. Consequently, for the better part of a year, unit leaders will be taxed to the limit.

MSE ARCHITECTURE:

The backbone of a notional five division corps network is comprised of 42 node centers which are interlinked by radio shots. Twenty-two node centers are deployed by the corps signal brigade and four are deployed by each divisional signal battalion. A fully-formed grid network can cover a 37,000-

square-kilometer area.

Based on geographical location and subscriber density, nodes are deployed from the corps rear boundary forward to the maneuver brigade rear area. There will be zones in the corps area that will be lightly populated with nodes, and there will be zones where nodes will be more numerous due to heavy subscriber density. In reality, it is unlikely that all 42 signal nodes will be deployed simultaneously in a corps area. The brigade signal battalions will build the node network forward and leave division nodes free to deploy to support the brigades with the flow of the battle.

Typically, non-maneuver battalions, and higher headquarters command posts (CPs) are served by a large or a small extension node switch (SENS). Mobile subscribers are served by Radio Access Units (RAUs) located at nodes. The RAUs enable mobile subscribers to place calls into the corps network or to other mobile subscribers. Large extension node switches will normally be connected to two node switches. Small extension node switches will also normally be dual connected.

The MSE network will locate subscribers within the network without relation to their geographical location by using a flood search routing technique. Selection of transmission paths for subscribers is based on traffic loading and link availability at the time of call initiation.

TRAINING

The MSE equipment was not in the Army inventory before its fielding at Fort Hood. Therefore, soldiers had not been trained in its operation. Consequently, it was written in the MSE contract that the contractor, GTE, would provide training for the soldiers in the units as part of the fielding process. After the five corps are fielded, the training for MSE equipment will be conducted fundamentally the same as it has been for other types of signal equipment. Fort Gordon will produce the basic skill level in the individual. Then soldiers will be shipped to the field and be placed with a signal team to receive operational experience. That team will continue to enhance the soldier's ability while he is assigned to the unit.

Equipment training for MSE consisted of the contractor providing training at Fort Hood for supervisors and operators in a classroom environment. Classes included system fundamentals, network management and equipment operation. After operators had received classroom instruction provided by the contractor, they received hands-on training with the equipment (also given by the contractor). Then the unit assumed the training and development role for further enhancement of signal teams. User training for the combat, combat support and combat service support personnel was provided by a mix of contractor training and Army personnel who were trained by the contractor.

After GTE taught the two divisional signal battalions, some of the individual training was revised for the switchboard

operators (MOS 31F). The initial contractor training for the brigade was more organized because the two divisional signal battalions had preceded the brigade. Many of the initial teething problems had been eliminated prior to the start of brigade training.

The contractor taught brigade soldiers fixed switching. It began with the small extension node switch training. All 31F soldiers received small extension node switch training. When this was completed, soldiers from this group who had the aptitude and necessary skill were selected for four more weeks of specialized training on the Large Extension Node (LEN) switch. Completion of this training enabled the soldiers to receive the suffix, V4. The Army will not need many of these individuals because there are few LENS. Therefore, DA and assignment personnel at the installation level must carefully manage these personnel or they might not be assigned repetitively to switch positions and their expertise will be lost.

Upon completion of individual classroom training, soldiers were released to their unit from GTE. At this point the decision was made to conduct crew training in the field and away from the distractions of garrison. Initially, the 16th Signal Battalion took half of its equipment and put it in a training suite of equipment for soldiers to cycle through for hands-on training. This training was conducted 24 hours a day and was divided into three shifts. When the soldiers had progressed to network training, the battalion established permanent signal teams to

deploy to the field together and bond as a team. Consequently, crews and equipment were set prior to deploying to the field for a shake-out period that lasted several weeks and went 24 hours a day. The main function during this period was to conduct intensive crew training in a complete network. The crew training was broken down into leadership training for the crew leaders, platoon leaders and platoon sergeants. They were rotated through the small extension node switch, the radio access units, and the line of sight radios. This rotation was done for two reasons. It gave the leaders a training head start on the enlisted soldiers. It also gave the leaders a chance to gain practice troubleshooting and debugging the equipment before the team members began their training. During previous unit fielding, a training suite of equipment was assembled from the unit issue. This was used throughout the individual and team training. The 16th decided to use equipment that each team owned for the individual and team training. This practice built team confidence in their own individual equipment and it saved many hours of inventorying (for some other team's equipment) because each team used its own assigned equipment. This training consumed more time than anticipated because the equipment had to be debugged during the training. The leaders gained a considerable amount of expertise while going through the process which was beneficial when the brigade went to system training. By the third day of leadership training, leaders were relatively accomplished in troubleshooting procedures and able to determine

what types of electronic problems were occurring and how to fix them without delay.

The crew training, now called network training, started when individual teams began drilling on the fundamentals of parking assigned signal equipment, camouflaging it, and applying power to the equipment. When individual crews became proficient on the basics, the signal equipment was organized into a working network, and soldiers worked up to the more complex tasks. Network management training was conducted in addition to the maintaining of a stable network by the operators.

After soldiers could efficiently bring up the network and troubleshoot problems as well as jump locations, the same skills were practiced at night. After two weeks of network training, soldiers became very proficient at parking and powering the signal assemblages and establishing the network day or night. At this point they were ahead of expectations according to the master schedule. One factor which caused the training to exceed expectations was that the unit was training in the field away from the distractions of garrison. This intensive 24-hour training cycle was key to training soldiers rapidly to the required standard. Additionally, by bringing all the MSE signal assemblages to the field, all were powered and placed in the network. If a signal shelter had any unforeseen bugs, they became readily apparent. The team members then received additional live trouble-shooting training and experience working on their own equipment.

At this point in the training the 16th had several switched networks together and also had the complete battalion chain of command in the field during the exercise. Competition among the company signal teams was emphasized. This caused teams to work very hard and enjoy putting out their best effort. It also accelerated the learning process and stimulated soldiers to develop the basic skills necessary to operate the new equipment.

MSE Equipment Check-Out:

Units need more than a weekend to check and test equipment before signing for it from GTE. The 16th Signal Battalion only had a weekend to check, accept and sign for a battalion's worth of equipment. They needed more time to thoroughly check the equipment because some equipment with minor imperfections slipped past the unit scrutiny. The checkout period for the 16th could not have been lengthened because another unit was drawing equipment right behind them.

By the end of October the brigade felt it was ready for the corps acceptance test which was scheduled for mid-November. Prior to the corps acceptance test the brigade went back into the field and re-established the signal network to give soldiers extra training and troubleshooting time. During this period, further competition was conducted to determine who the best node teams were. A scenario was set up to enable a node team being evaluated to jump to a specified node area, set up their equipment and enter the network. During this period each node

made a day and a night jump. The team efficiency and communications abilities were compared with the rest of the signal teams in the respective companies in the brigade.

This team training, conducted on the team's assigned equipment, brought the teams together, caused them to bond and gave them confidence in their equipment. It also prevented teams from deploying to the field with new equipment that had passed the GTE equipment check-out but had never been employed in an operational network. It is not unheard of for signal equipment to pass operational checks in a standalone mode but fail when placed "in system" and it interacts with other sophisticated electronic equipment.

According to the 16th Signal Battalion commander, the past year has been extremely busy because of the transition to MSE. During transition to MSE the signal battalions still carry on their other functions such as individual weapons qualifications, NBC-team, crew-served weapon qualifications, PT testing and post details. Virtually every unit operational facet has changed. Besides conducting field training with the new equipment the 16th has had to completely overhaul the unit SOP. Each time the unit went to the field the commander set training objectives for the exercise as well as outlining one additional project to be completed during the signal training exercise. The new battalion garrison SOP was completed during the III Corps MSE exercise in November. Setting goals has helped expedite the MSE transition. It has also helped to accomplish several additional tasks every

time the battalion has deployed to the field.'³

User Training:

MSE fielding also imposes new requirements for users. User training for III Corps subscribers was critical because doctrine provides for the using unit to install and operate an array of new equipment. This included the unsecure telephone (DNVT), secure telephone (DSVT), mobile radio telephone (MSRT), facsimile (FAX), and the communications terminal (CT).

It was a GTE responsibility to provide MSE new equipment training (NET) with coordination provided by the MSE task force. Training for the headquarters and associated nondivisional units of III Corps occurred from August to October and prepared the corps for the initial fielding and CPX. However, sustainment training and training of replacement soldiers arriving from non-MSE units is a user responsibility; therefore, a garrison training network (GTN) was developed which will provide this training. The GTN involves a mix of post troop-school instruction and signal-support effort provided by the communicators. The post troop school provides user sustainment training by conducting two classes a week. A small extension switch and subscriber terminals are operational at the post troop school. During training periods personnel can make calls from the DNVT, DSVT, MSRT and transmit information on the FAX until they are proficient.

The GTN utilizes a signal battalion from brigade or a

divisional battalion to provide a radio access unit (RAU) and a small extension switch (SES) and subscriber terminals tied into the post telephone network. Users who want to train on their MSRT will go to a specified location and receive a frequency download, then go to their COMSEC custodian to pick up the key and load it into the equipment. Then commanders and staff who have MSRTs can complete calls to other mobile subscribers or access the post telephone system. This arrangement provides coverage throughout the cantonment area during duty hours, five days a week. If subscribers have additional requirements, RAU coverage above and beyond the normal coverage can be provided. These arrangements give subscribers the ability to use the tactical cellular phone to talk with others who are up on the net or talk with personnel in garrison offices. The use of the MSRT is a perishable skill and most subscribers will need regular reinforcement on the MSRT to remain proficient. Not as much training is needed on the DNVT because its functions are very similar to a regular telephone.

After the signal brigade and III corps subscribers underwent an intensive training period, they deployed to the field for the MSE acceptance exercise. The III Corps exercise READY PHANTOM, in November, was the first corps exercise to use all digital MSE equipment exclusively. After the exercise, the 3d Signal Brigade Commander, Colonel Douglas D. Buchholz said:

I feel quite confident with the equipment and the soldiers' ability to employ the equipment. I would not rate us above a C3 in training proficiency at this time--mainly because of the inability to rapidly

trouble-shoot. That only comes with experience in the field. When we began fielding MSE, I told General Graves, the III Corps Commander, that we would come out at C3 and I haven't seen a unit yet that was happy with a C3 level of communications. One part of the C3 rating at this time is the network will not be as responsive to the subscribers right now as it will be when the brigade has more training in the field. The nodes also will not be able to deploy and jump as fast as they should to be able to support Airland Battle. It isn't that the equipment won't move. It's that our ability to move and install it rapidly isn't there yet. That will come with experience. Because of the capability and reliability of the equipment--even though the brigade is at the C3 level of training now--we are better than we were at C1 with the old equipment. MSE is a good system. It's so much more than we had before. No school trains the NCOs yet; the MSE training they receive is provided by the units that have already fielded. What makes an NCO a big man in a private's eyes? Not his stripes, it's his knowledge of procedures together with his experience. With MSE he is in a new system, and all his accumulated knowledge of the old equipment doesn't do him a bit of good with MSE because it's all new. MSE has a higher rank structure; team chiefs of LOS radios are E-6s. Formerly, because of their grade, they would have been leaders or supervisors. Now higher ranking soldiers are operators and they can't ignore the actual workings of the equipment. This also will tend to weed out those who are not technically proficient or don't carry their load. They will probably be given extra training or phased out if they can't cut the mustard. The soldiers and NCOs who are working with MSE are truly amazing. They are so excited about what they are doing and they are really sharp technically.*

OPERATIONS

MSE is working well in the brigade at this point. The brigade had the benefit of the equipment being first fielded in the 13th Signal Battalion, and in a company from the 57th Signal Battalion. Then the 142nd Signal Battalion fielded along with another company from the 57th. The concept in fielding a company from the 57th along with each divisional battalion was that the companies could be used to fill III Corps signal requirements during exercises and NTC rotations until the corps had completed the transition to MSE.

NETWORK ESTABLISHMENT:

After the individual and network training the brigade could have benefitted from a lash-up of all the switches, side by side, in a close-in training area. The node switches and LENS must be capable of interfacing smoothly with each other before the SENS and RAUs are added to the training network. If the whole network is lashed together without the switch operators fully understanding network operation, network training will progress very slowly until the switch operators become proficient. During this portion of network training the 16th Signal Battalion had several node switches in operation. Each node switch was connected to two other nodes so they had internodal links to train with. Each node had two SENS and a RAU off the node so soldiers could train on two SEN links and a

RAU link. The SENS and RAUs in the network were changed at 12 hour intervals. If node switch operators were not up to speed, they couldn't handle the training problem scenarios expeditiously and the network would be idle while training scenarios were re-worked. As the battalion progressed and the switch operators became more proficient, set-up time decreased and training progressed more rapidly. In the later stages of the exercise the SEN and RAU teams would move in before the 12 hour period was up. The node switches would have already initialized the link, done all their checks, shut the links down and brought them back up several times before the SENS and RAUs plugged into the net. Then new node switches would replace ones in the net that had been certified as proficient and another rotation would begin. The unit could have saved time if all node switches had conducted a separate exercise to gain proficiency before establishing the network training.

SYSTEM CONTROL CENTER (SCC):

The SCC can be employed in two different ways: functionally, it can do the frequency management and profiles, or it can be employed to utilize the full range of functions it is capable of and to command and control the corps network. The brigade decided, up front, to use the SCC and MSE system as it was designed, for better or worse, even though management with the SCC can be cumbersome. There are fixes scheduled for the SCC in the future which will facilitate network control. When

all of the corps and divisional MSE network is lashed together for the first time, there will be nodes in the net that have never been controlled by messages from the SCC. These messages will require nodes to interact with the SCC with pre-formatted messages. If all the nodes and the SCC are not shaking hands in exactly the prescribed manner, the network can go into gridlock.

When another MSE unit interfaces with the established corps network, the operational methods of the additional nodes must be identical to the nodes within the corps network. If not, the additional nodes could profoundly affect the corps network because of the flood-search technique which induces information throughout the network. In order to prevent any operational network problems with units entering the corps network, the brigade has perfected the MSE gateway. Just like the gateway into TRITAC, the brigade network can place a gateway in between two nodes. The brigade will program a new unit to access the corps system through the gateway until both parties determine they are in complete operational synchronization. Then the gateway can be removed and the unit wishing to flood-search through the corps network can do so. The gateway approach is critical, particularly if the unit wishing to enter the corps net has modified its data tape so that it is different from the standard Army data tape.

At this point the SCC is not a friendly beast, nor is the UGC 74 which is provided to the node management facility. The

network data base so personnel can see what the network looks like. The UGC 74 interface to the SCC still needs improvement. An operational shortcoming is the cumbersome SCC management system that exists at this point. This is partly caused by the SCC software and partly caused by the clumsy input/output device that feeds data into the system data base. It is unfortunate that there isn't any automated telemetry and that reports must be manually submitted to the SCC. The probable reason for this is funding. Hopefully, this can be addressed in a future system upgrade.

The SCC is billed as the MSE network management tool. To collect information for the network data base the SCC must receive formatted reports. The system has room to improve because the reporting system is still a manual system that is just electronically transmitted.

The brigade is working hard on network management. The brigade and battalions have replaced the UGC 74 with laptop computers. Key network managers now have laptops that are used to manage the network. The SCC calls for pre-formatted messages which must be letter perfect. If they are not, the SCC will receive and acknowledge the message but will not add it to the data base. This situation creates the risk of errors residing in the network management data base. After sending a message and receiving an acknowledgment from the node management printer, the UGC 74 believes the message was accepted into the data base. Once this has occurred, it takes time for the network

data base. this has occurred, it takes time for the network managers to run it to ground and recognize what has happened. Then the node management facility must tell the sending station to reformat and resubmit the message. Frequently, an excruciating amount of detail work must be done to sort through this type problem. When this happens during the crunch of doing business, the node management personnel don't have time to work through the problem. Consequently, what happens is that a soldier at the node puts in a "close team message" to update the data base. The close team message goes into the queue at the node management facility because the format is not perfect. The signal team believes the message has been accepted by the SCC and added to the network data base. When the team prepares to break down to move the node switch, the node team sends a move team message to the SCC. The SCC computer says "Wait a minute, you haven't closed the team yet." From that time on the node team is out of synchronization with the SCC. It takes a sustained effort to sort the problem out and make the data base agree with the current signal deployment picture. The short term fix is to configure the laptop software to preclude message release from the node into the network unless the format is letter perfect.

The brigade has worked very hard on the network management aspect of MSE, but they do not believe they are where they want to be yet. Part of it is they still don't know enough about how the system reacts and doesn't react to various inputs. This applies from the node level on up. However, the brigade is

SWITCH CRASHES:

One of the symptoms the brigade is looking into is unexplained switch crashes. One line of reasoning is that when the switches crash, they are only being over-processed. Soldiers could be causing this when they give improper commands which confuse the switch. A strong possibility exists that some overloading of switches occurs when network managers ask for too many diagnostic reports. The diagnostic reports take a lot of processing. When one combines this load with larger and larger networks, there are more and more things tracking through the switches. In November, during the equipment acceptance exercise, the brigade managed an eight node network--the largest the Army has functioned with so far. Now the brigade will concentrate on growing the system into a true corps network.

The finesse soldiers gain each time they deploy to the field is amazing. During the November exercise the brigade was able to recognize a sick switch. Operators knew some of the things to do to allow it to limp along for a while and network managers promoted switch success early on by taking extra demands off a sick switch. In these cases the switch tends to clear its own registers and start working if operators can take action to unload the switch early enough.®

CORPS FM RADIO TRAFFIC:

MSE works so well that the commanders and staff use it

MSE works so well that the commanders and staff use it heavily. Consequently, traffic on the Corps FM nets has diminished significantly. This has ramifications for the combat arms. They are used to having several radios operating in the TAC. All in the TAC are used to tracking the battle by listening on the brigade or division nets. Having MSE will cause some of the old ways of doing business to change.

MSE Experimentation:

An interesting feature of fielding and observing MSE at Fort Hood is the experimentation which normally occurs while exploring the potential of new equipment. Every time the brigade goes to the field, someone says, "Lets try this." A few days later a group returns to report that it works. Then another addition is made to the realm of possible. MSE has so much capability and flexibility that it is an understatement to say that both the signal personnel who run the network and the subscribers in III Corps units are enthusiastic about it."

TACSAT EMPLOYMENT:

One exercise last August involved the 1st Cavalry Division. The 3d Signal Brigade sent a TACSAT terminal with the MSE area company, from 13th Signal, to the desert. They were deployed in support of a brigade from the 1st Cavalry on NTC rotation. A TACSAT terminal was also operational at Fort Hood

and it had signal lines run to the 1st Cavalry CP. Additionally, during the exercise a ROUNDOUT brigade was hooked to the 1st Cavalry CP via an AUTOVON circuit and a signal network spanning a 2,000 mile distance was lashed together. The division CP was receiving MCS traffic from the desert over the satellite link, and the simulation center in Mississippi was receiving information from both Fort Hood and the desert. All of this was feeding right into the 1st Cavalry Headquarters in their war room. During that exercise, tragically, a helicopter crashed at the NTC. There were fatalities. The division commander, from his vehicle at the crash site, was able to speak to the corps commander, in his quarters, because he had an MSRT installed in his vehicle. The power of the system and its flexibility are truly amazing.7

MSE FLEXIBILITY:

There is more signal capacity in a smaller package with MSE than the old equipment has. The vehicle and shelter footprint is smaller than the footprint of the older equipment. This makes it easier and less costly to transport signal equipment from one area to another to support an exercise. The brigade is currently looking to use opportune air to ship an area company package, complete with SATCOM, to Fort Bliss for a couple of weeks to train with the the 3d Armored Cavalry Regiment (ACR) which is fielding its MSE equipment. With the the use of the satellite terminal they can become a part of the network at Fort

FREQUENCY INTERFERENCE:

There are so many electronic emitters at Fort Hood that preventing frequency interference takes a considerable amount of planning and effort. In the heat of battle during exercises, several personnel are occupied full-time to sort out the issue and handle frequency change requests. One huge gain with MSE is that the equipment is so precise that frequencies can be re-used more often without having bleedover interference problems. During the corps acceptance exercise, the brigade S-3 only had to work five frequency problems. The SCC has proven to be amazingly good about frequency management and profiles up to this point. If the output indicates a system will go with a margin of 15, then that system will go.

During an October exercise the brigade had 57 active radio systems operational on Fort Hood. That is more active radio systems than anyone can remember being on the air during a brigade exercise. There were two bona fide radio frequency problems during the exercise. There are a couple of reasons why the brigade experienced fewer interference problems with MSE than with the old equipment. First, the MSE radios stay tuned to precisely the frequency they are set to operate on. The radio antennas are also very directional. This tends to cut down on the scattering problem and create more corridors to shoot down. Both of these are additional pluses over the old equipment because they enable the communicators to re-use

frequencies. This helps make the life of the network planners less hectic.

PERSONNEL

The main personnel issue was slotting soldiers against the MSE MTO&E. For the most part, the slotting in the battalions was accomplished because of very hard work at brigade and in the battalions. Proper slotting of MSE personnel in the battalions is difficult and tedious but will make the newly formed battalion strong if done with careful deliberation. Slotting can cause many difficulties if not well done.

It helps to have good strong personnel in the S1 shop during the slotting procedure. It is also valuable to have a strong and effective executive officer who believes in centralized control because of the myriad of things that can go wrong. An elaborate slotting matrix comes in the DA plan which calls for battalions to assign soldiers by MOS and SCEL scores. This practice can be disruptive because it could cause a large number of soldiers to be transferred to another company in the battalion. Keeping as many troops on the same team, in the same platoon, and in the same company as possible will cut turbulence and help maintain strong cohesive teams within companies. Maintaining platoon and team integrity as much as possible helped keep the platoons strong during the training period. The NCOs already knew their team personnel well and could help their soldiers during the training period. During the slotting process, the platoon

sergeants, first sergeants, and platoon leaders made prime recommendations as to who should be 31Ds and 31Fs. They considered the desires, abilities and inclinations of each soldier prior to the decision. This process worked well.

One of the most difficult and time-consuming personnel tasks is slotting and tracking battalion personnel during the MSE conversion which lasts about one year. Until the E date of the MSE MTO&E, the unit continues to report personnel on SIDPERS according to the old MTO&E. Months before the unit attends MSE classroom training, the unit must organize the battalion (on paper) according to the MSE MTO&E. This conversion allows the unit to facilitate slotting and determines who will belong on a specified signal team within its platoon. Conversion also allows each company and the battalion staff to become organized on paper so leaders and all soldiers know who the players are and where they will be slotted. This slotting is also critical because it allows the unit to determine precisely how many and where the holes exist in a unit since they must be filled before the MSE training begins. Units are using the old MTO&E UMR for about a year while slotting personnel for MSE. For example, the battalions organized for MSE in November, 1988. Since that time they began tracking and reporting within brigade as an MSE battalion. However, the SIDPERS report was still based on the old MTO&E until the E date of the MSE MTO&E.

It would greatly reduce the load in the follow-on battalions if VTADS could be interfaced with SIDPERS earlier than the E date

of the MSE MTO&E. The two should be interfaced early in the transition, preferably before the unit attends MSE training so battalions could develop a new UMR using the MSE MTO&E. This would save S-1 staff a considerable amount of extra work and frustration. They are doing double duty now by maintaining the two sets of documentation. The 16th Signal Battalion solved the problem by using a Zenith 248 computer to track personnel slotting on the MSE MTO&E. This solution was not ideal because doing this made the Zenith unavailable for its primary job. The battalion continued to use the TAX computer to provide input to the SIDPERS system. It was cumbersome because the battalion was slotting 31Fs against 31M positions. This dual accounting lasted from November, 1988, until September, 1989, when the MSE E date became effective. The Army system is just not geared to accept the total reorganization of a battalion as happens during MSE conversion. The corps AG only had visibility of what went into SIDPERS. When the Corps AG only saw a battalion's shortages based on SIDPERS, he was looking at the old MTO&E and not the slots the battalion had to fill according to the MSE MTO&E before training could begin on the new digital equipment. The SIDPERS reported (accurately) that the battalion was approximately 100 soldiers overstrength; however, the overstrength personnel were not slotted for MSE and were going to depart the unit on or before the E date of the MSE MTO&E. The corps AG personnel were not taking into account these losses and would not give the battalion the fills necessary to bring them up to the MSE

strength by the time MSE training was to begin. This area has a high potential for misunderstandings which could throw the unit into a time crunch during a very busy period. Ultimately the commanders became involved and the units received their fill of soldiers before the training began.

LOGISTICS

At the battalion level it is difficult to fully appreciate and understand the depth of the MSE reorganization and the pitfalls of equipment turn-in until the unit is in the middle of the fog of reorganization. It is a demanding task to stand an independent company down and turn in all the equipment. It is even more difficult to stand down and turn in a complete battalion with five companies. Many lateral transfers occur between companies and battalions of a brigade for them to have the right type and quantity of equipment for turn-in. The brigade turned the BCR-II items into DOL for shipment to depots. The serviceable non-BCR-II items not on the MSE MTO&E were laterally transferred to other units on post, with documented shortages, per guidance from DOL.

There were three fundamental decisions made that greatly smoothed turn-in for the brigade. A decision was made to turn signal equipment in "as is" because the BCR equipment was going back to depot for rebuild and re-issue. Much of the signal and wheel equipment in signal battalions is older than the soldiers operating it. Consequently, it would have been a nightmare for

operating it. Consequently, it would have been a nightmare for any unit to turn in a complete battalion to 10/20 standards. The brigade turned all equipment in, clean, operational, and PMCS ready with updated shortage annexes. The second decision was that all Army common equipment being laterally transferred to other on-post units would go through DOL. The battalions could not field MSE on a tight schedule and concurrently deal with a multitude of lateral transfers to various units on post. The third decision was made by the brigade commander and affected the turn-in and lateral transfer issue. DOL came on line early in the transition process and explained they didn't have sufficient personnel to deal with the MSE turn-ins and lateral transfers to on-post units. DOL wanted the battalions to deal directly with the gaining units on post. The brigade commander asked how many additional personnel DOL needed to accomplish the job and subsequently transferred 12 good NCOs, to DOL, who were not remaining in the brigade for MSE fielding. The brigade commander asked that they not be used to inventory or classify the brigade equipment. He wanted DOL personnel to accomplish this as disinterested parties. The turn-in and transfer of equipment went well and was accomplished ahead of schedule.

The MSE and Delta equipment were issued to units immediately following the old equipment turn-in. After the new equipment issue the companies basically had to rebuild their hand receipts and component lists from the property book.

Tracking Property:

One procedure which helped track property in the 16th Signal battalion was that all new equipment went through the S-4 and was recorded on the property book before being issued to the company. All equipment turn-ins and lateral transfers from the companies also went through the S-4. The battalion had total control of property being moved in or out of the companies and battalion, and--more importantly--the paperwork. This procedure took more organization initially, but saved hours of extra effort during the fielding. Other units expended a great deal of time looking for new equipment which was issued directly to companies. After it was "found," it was picked up on the battalion property book. Another policy which helped maintain property accountability, was that soldiers who were transferring to another company, whether inside or outside the battalion, were not transferred until all of their old equipment was turned in and accounted for.

MSE Hand Receipts:

The hand receipts that come with the MSE TMs are not totally satisfactory yet, partly because soldiers don't know exactly what they are supposed to have when they get the equipment. So it's confusing to the soldiers who are signing for the equipment. CECOM is working this issue to sort it out.

Delta items are items which are called for in the MSE TO&E but not provided by GTE. Typically these are common items in the Army inventory. Because MSE is down-sized and there are many smaller signal sites which operate independently, the MSE MTO&E calls for more water trailers, FM radios and other equipment such as 3/4-ton trailers to be issued by the Army. One drawback is that the Army is short 3/4-ton trailers and FM radios. Consequently, fielding units will get due-outs for the equipment but will be expected to train and operate without these items until they become available. With the Army budget drawdown, fielding units will have to operate short of these items, more than likely for a long time. This deficit will make it very difficult for operational units, particularly for an isolated signal team that has a vehicle breakdown on the way to link up with the unit they support and no FM radio to call their headquarters to explain the situation.

CONCLUSION

The procurement of Mobile Subscriber Equipment to provide flexible and reliable communications for the U.S. Army at corps and division was a "first" on several counts. It is the first large scale buy of signal equipment using "off the shelf" technology. It is also the first time new signal equipment is being fielded to a whole corps at a time to include non active components.

The transition to MSE at Fort Hood has not been without some growing pains, as expected with any new system. The benefits of having the new equipment are tremendous and far outweigh the experience of growing pains during the transition period.

The power and flexibility of the new digital equipment to serve subscribers at the corps and division level is remarkable. The signal personnel who operate the signal node network and the subscribers who are now responsible for the subscriber equipment are pleased with the flexibility and clarity of transmission provided by MSE.

The bottom line is that this revolutionary new digital equipment will significantly enhance commanders' ability to influence the battle by providing quality C3. The full potential of this powerful medium will not be fully utilized for several years until all understand its great capacity to provide responsive C3 to the leaders on the battlefield.

ENDNOTES

1. Interviews were done in confidentiality. Owing to that condition, a blanket release of the interview text has not been received to date. At some future date the transcript might be deposited with the U.S. Army Military History Institute at Carlisle Barracks.
2. Delta equipment is the additional equipment required on the MSE MTO&E that is not issued by GTE as part of the MSE issue.
3. From an interview with the 16th Signal Battalion Commander, XO and S-3.
4. From an interview with the 3d Signal Brigade Commander.
5. From an interview with the 3d Signal Brigade commander and S-3.
6. Ibid.
7. Ibid.

Glossary

Acronyms and Abbreviations

AUTOVON	automatic voice network
CAV	cavalry
CE	Communications-Electronics
CNR	combat net radio
COMM	communications
CONUS	Continental United States
CP	command post
DIV	division
DNVT	digital nonsecure voice terminal
DSVT	digital subscriber voice terminal
DTH	down the hill
DVOW	digital voice orderwire
EAC	echelons above corps
EMP	electromagnetic pulse
EUB	essential user bypass
FAX	facsimile
FM	frequency modulated
HMMWV	high mobility multipurpose wheeled vehicle
IDS	intermediate direct support
IGS	intermediate general support
I/O	input/output
LEN	large extension node
LENS	large extension node switch
LOS	line of sight
MCS	maneuver control system
MOS	military occupational specialty
MSE	mobile subscriber equipment
MSRT	mobile subscriber radiotelephone terminal
MUX	multiplex
NICP	national inventory control point
NMF	node management facility
RAU	radio access unit
RMC	remote multiplexer combiner
SEN	small extension node
SENS	small extension node switch
SOP	standard operating procedures
TACSAT	tactical satellite
TOE	table of organization and equipment
VDU	video display unit