Improving Digitized Engineer Communications

By Captain Daniel R. Smith

The Army has pushed its advanced guard into the 21st century. The past decade has seen extensive experimentation at all levels, with the concept of a computerized (or digitized) Army of the future. Units involved in these experiments are known as Task Force XXI.

Recently, I served as supply officer (S4) and senior battle captain in the engineer battalion Administration and Logistics Center (ALOC) during the Task Force XXI Advanced Warfighting Experiment. For the 299th Engineer Battalion and the rest of 1st Brigade Combat Team, 4th Infantry Division, the AWE was much more than a two-month exercise in the desert. It was an 18-month learning experience. The daily lessons learned, problems solved, and challenges met provided Army soldiers, numerous defense contractors, and our senior leaders with valuable feedback to use in charting our course into the future. Ironically, communications—the very thing Force XXI was supposed to improve and the lifeblood of any tactical operations center (TOC)—became our biggest challenge. This article discusses four communications problems experienced by the 299th Engineer Battalion S1/S4 section and recommends some possible solutions.



Officers of the 299th Engineer Battalion (Task Force XXI)

Communications Problems

The experiment was conducted through a train-up and brigade-level training rotation in March 1997 at the National Training Center, Fort Irwin, California. Preceding the train-up were various computer instruction classes, computer equipment installations (known as *appliqué*), and new equipment training to familiarize leaders and soldiers with initiatives we were expected to use and test in simulated combat operations.

Numerous problems plagued our communications. Most grew out of the contractors' misunderstanding of engineer logistical operations and communications requirements and how they differ from maneuver logistical operations and communications requirements. Like other members of the brigade, we in the engineer battalion ALOC faced a myriad of technical, training, and architectural problems with the tactical internet and other experimental initiatives.

Problem: *Digital message traffic between the ALOC and specific engineer vehicles, which was essential to combat service support (CSS) execution, was virtually nonexistent.*

There was no digital message traffic between engineer company first sergeants or TOCs and the engineer battalion ALOC. The command sergeant major, the three company first sergeants, and each company TOC continually sent appliqué messages to the ALOC from their respective vehicles (known as platforms), but the messages never arrived. Digitized message acknowledgment logs inside the appliqué showed neither a machine acknowledgment of nor an operator response to the messages.

Possible operator training and/or communications and maintenance problems were exhaustively investigated and corrected when necessary, but we determined that they weren't the main problem. Continued investigation showed that the digital messages had to move through other platforms called *servers* or *nodes* to get from one vehicle's appliqué to another's. If a message had to "hop" through more than four nodes, it disappeared.

Lacking understanding of engineer operations, the contractor had arranged the vehicles in the tactical internet so if engineers tried to send a message to the battalion ALOC from one of the vehicles, the message almost always had to pass through more than four nodes. In addition, whenever a server became overloaded with digital traffic, messages reaching that server were ignored and disappeared. While a few messages were received, digital message communications



A soldier shows the appliqué inside his vehicle.

from each of the platforms remained inconsistent and unreliable.

Recommendation: *Continue to investigate the software for problems and revise the architecture so that the engineer command sergeant major, company first sergeants, and TOCs have a direct route for messages to the ALOC.*

With few exceptions, engineer units must maintain effective communications with maneuver command and logistics nodes as well as with their parent battalion's command and logistics nodes. It is essential that digital systems allow the company to communicate as effectively with the engineer battalion ALOC as it does with the task force.

Problem: *The modified table of equipment (MTOE) and appliqué architecture allocate an insufficient number of radios to the ALOC to monitor all essential nets.*

The MTOE allocates the engineer battalion ALOC only two radios. The appliqué architecture forces the ALOC to use those radios to monitor only the engineer battalion administration and logistics (A&L) net and the forward support battalion (FSB) A&L net. This architecture is not tactically sound for several reasons. First, the FSB conducts command and control (C2) and all other business on the FSB command net, not on the FSB A&L net. Therefore, the engineer battalion ALOC is out of the loop and does not receive essential information. Examples of missed information are enemy contact reports in the brigade support area (BSA), jump or movement C2, changes in the mandatory operational protective posture (MOPP) level, air defense artillery status, and all net calls. As a member/tenant of the BSA, the engineer battalion ALOC must monitor the FSB command net, not the FSB A&L net.

Second, current architecture does not allow the ALOC to monitor the engineer battalion command net. The ALOC is a battalion command post and an alternate TOC for the battalion TOC. Thus, the ALOC needs the capability to monitor, track, and C2 engineer combat operations. The A&L net is not effective for this purpose because the architecture dictates that the only platforms on that net are the ALOC, the company first sergeants, the command sergeant major, the support platoon, and the headquarters company commander. The architecture does not allow the Maneuver Support Company a single radio on the A&L net. If the ALOC could monitor the battalion command net, it would have voice communications with the battalion and company TOCs and commanders, which would facilitate battle and CSS tracking. A third radio is needed so the ALOC can monitor the engineer battalion command net.

Third, current architecture doesn't allow the ALOC to monitor the brigade A&L net. The engineer battalion is the only battalion in the brigade not on the brigade A&L net. As a result, the engineer ALOC is out of the loop for essential CSS information and coordination necessary for brigade mission success. The nature of engineer operations requires detailed coordination and cross talk among the engineer ALOC and the brigade and task force ALOCs. For example, Class IV resupply operations and task organization changes require detailed coordination to effectively distribute assets and materials. Allocation of a fourth radio would allow the ALOC to monitor the brigade A&L net.

Recommendation: *Allocate the engineer battalion ALOC two additional radios and change the architecture to allow the ALOC to monitor the proper nets.*

Typically, Force XXI maneuver battalion field trains command posts (FTCP) and headquarters company combat trains command posts (CTCP) are colocated and have a seven-net capability. They monitor task force command, A&L, brigade A&L, FSB command, and three other nets. The engineer battalion ALOC is required to perform both roles and, as a minimum, requires four-net capability to monitor engineer battalion command, engineer A&L, brigade A&L, and the FSB command nets.

Problem: *The appliqué architecture does not allow the Maneuver Support Company to monitor the A&L net for voice traffic.*

The Maneuver Support Company lacks even one platform with voice communications with the ALOC; the architecture

dictates total dependence on digital message communication with that company. Digital message traffic, even if dependable, is not sufficient for battle or CSS tracking and does not support the ALOC's role as alternate battalion TOC.

Recommendation: *Change the architecture to allow voice communications between the Maneuver Support Company and the ALOC.*

Problem: *The battalion and company TOCs are not allocated a radio to monitor the battalion A&L net.*

According to current architecture, the engineer battalion and company TOCs do not have engineer A&L net capability, and the current MTOE does not allocate a radio to monitor the A&L net. As a result, the ALOC's only link to the engineer battalion and companies is through one of six platforms: the command sergeant major, the four company first sergeants, or the headquarters company commander. In addition, each vehicle is a light-skinned, low-survivability vehicle that is easily killed, further degrading the ALOC's ability to communicate. This problem is intensified because the engineer company TOCs are the primary battle and CSS trackers for the company (not the company first sergeant as in a maneuver company). With no A&L capability in the TOCs, the engineer battalion and company TOCs cannot talk to the engineer ALOC unless one platform or the other deviates from the architecture by changing nets. This is not practical because changing nets for any length of time disrupts the flow of digital traffic and either pulls a major C2 node off command nets or clutters them with A&L traffic.

Recommendation: *Change the MTOE to allocate engineer battalion and company TOCs an additional radio and change the architecture to allow the TOCs to monitor the A&L net.*

Summary

The technological advancements tested by Force XXI are exciting and point to a new era of combat operations. As combat engineers, we must be able to communicate and coordinate CSS issues to support faster moving, more flexible maneuver forces. Solving the shortcomings that hinder engineer ALOC communications will help ensure our digitized Army of the future.

Captain Smith served in the 17th Engineer Battalion as platoon leader, A&O platoon leader, and a company XO. After the 17th reflagged to the 299th, CPT Smith served as battalion S4 throughout the Task Force XXI Advanced Warfighting Experiment. He is a graduate of the United States Military Academy and holds a master's degree in engineering management from the University of Missouri-Rolla.

Note From the Directorate of Combat Developments

By Mike Bonomolo

In essence, Captain Smith is correct. The initial version (1.0) of the Force XXI Battle Command Brigade and Below (FBCB2) software had the six-node limit, which included the initiator and the destination. This problem has been solved through the application of role-based functionality. Now, if a first sergeant sends a logistics message, the FBCB2 software configures the network so that the message will not "hop" through more than four nodes. The FBCB2 system no longer sends the message up and across to reach a destination, therefore eliminating lag and reducing handling errors.

The shortage of radios within the battalion ALOC is a much more difficult problem to solve. The ALOC is authorized a fax, an Enhanced Position Locating Reporting System User Unit (EPUU-V1), a mobile subscriber receiver/transmitter (MSRT), a lightweight computer unit (LCU), a Unit-Level Logistics System (ULLS)-S4, and a VRC-89D radio. The maneuver battalion configuration can monitor up to seven FM nets between the FTCP and the battalion task force CTCP. Because the engineer battalion is not authorized a battalion task force CTCP, it is required to perform both roles from the engineer battalion FTCP. At the next command, control, communications, and computers (C4) configuration board in early FY99, we will recommend adding a single-channel, ground-to-air radio system (SINCGARS) with dual-net capability. Although operational requirements show that divisions need approximately 700 SINCGARS, there are only enough available to fill 535 of these requirements.

A joint tactical radio is being developed that passes voice and digital traffic simultaneously. This radio, which is scheduled for distribution in the FY03 time frame, should align the requirement of radio nets monitored with the capability on hand. In the interim, voice-based logistics messages must move to a digital format. The LCU can move digital message traffic within the battalion. The success of this option weighs heavily upon fielding the updated Maneuver Control System.