Army Tests Wireless Detection Technology

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Paul McLeary•Fort Benning, Ga.

The U.S. Army isn't shy about promoting its efforts to revolutionize the way it buys communications gear, sensors and ground robotics, while at the same time refocusing doctrine to push tactical decision-making down to its rifle squads as much as possible. The two efforts go hand-in-hand. Over the past two years, the service has been asking industry to come up with mature solutions for everything from ad hoc mobile networks, to iPhone-like handheld devices, to communications equipment and portable solar equipment that keep soldiers connected and powered up on long dismounted patrols, all in the name of modernization and empowering the squad.

This was the focus of efforts recently at the Maneuver Center of Excellence here, where the Army put 46 new technologies in the hands of several squads before turning them loose on a weeks-long war game against a hybrid opposition force (Opfor) that was given access to drones and night-vision equipment.

Dubbed the Army Expeditionary Warrior Experiment (AEWE), the effort hasn't received as much ink as the Army's much larger, brigade-sized Network Integration Exercise (NIE) that takes place twice a year at Fort Bliss, Texas. But this set of tests has in previous iterations proved critical technologies like the 1.2-lb. ReconScout “throwbot,” hundreds of which have since been shipped to Afghanistan.

The Fort Benning tests are tied to the NIE, Col. John Wendel of the Army Program Executive Office for Integration tells DTI. He describes them as a “feeder event to the NIE” that gives the Army a chance to ensure that some technologies are mature before they reach the brigade-level exercise.

Run out of a small forward operating base, the company-sized AEWE used a 3G wireless network as a backbone to tie the smartphones, tablets and radios to sensors and unmanned ground and air assets that the squads used to gather situational awareness of their operating environment. This included the McKenna Urban Training Site and deep-woods operations.

Maj. Gen. Robert Brown, commander of the Maneuver Center of Excellence, says the goal of the exercise “is to enable mounted and dismounted elements to be linked more effectively, and to share better situational awareness and a common operating picture when they are on the ground and separated from the vehicle.” With an eye toward a future in which irregular threats will require U.S. forces to operate in small, mobile teams, Brown adds that “the complexities of the contemporary and future operating environments have elevated the squad's impact to strategic levels.” While major advances in individual soldier equipment and communications have taken place over the past decade, Brown says “dismounted squads are still unable to be networked together like their mounted counterparts, which keeps them from gaining situational awareness.”

During one mission, a squad took positions in two houses facing the tree line at the Urban Training Site, awaiting an expected assault by Opfor. As “townspeople” strolled by, they were observed by soldiers who were on guard against suicide bombers. When a small group of men seemed to defer to one man, Staff Sgt. Robert Hollett grabbed his iPhone and snapped a picture of him. Using Raytheon's One Force communications system, he uploaded the image on a digital map viewable by everyone on the network, including the handheld devices issued to other squads in the village. The program allows soldiers to access feeds from unmanned aerial vehicles (UAV) on their smartphones or tablets, and gives them the ability to do “white-boarding”—drawing on digital maps and transmitting the drawings across the network. Raytheon's MainGate battlefield network hub was also used to connect the radios, smartphones and combat systems. When darkness fell the squad moved out, flipping on their Enhanced Night Vision Goggles (ENVG) from ITT that not only provides a 1X zoom capability, but a one-flip thermal-imaging mode so sensitive it can pick up residual body heat on a wall after someone leans against it, or left by recent footfalls on the ground.

While the soldiers set up in their new positions, an unmanned ground vehicle, the Squad Mission Support System (SMSS), made by Lockheed Martin, prowled the streets. The vehicle was operated by Spc. Roberto Alejandres, who set himself up on the roof of the police station at the McKenna site to have a good vantage point of the town. He “drove” the SMSS while monitoring the feed sent from another robot that soldiers had piggybacked on top.

The smaller bot, the Cougar 10 from robot maker TiaLinx Inc., detects human movements behind walls and closed doors. But the problem with it, according to soldiers, was that it was too slow and made mapping the inside of multiple buildings time-consuming. So they picked it up and put it on the back of the faster SMSS. None of this was stealthy—the SMSS is neither small nor subtle. The six-wheeled hauler carries 600 lb. of gear, and is quite loud when the engine is operating. Still, it performed the mission the soldiers wanted. With the Cougar 10 on its back, “it made our mission possible—a company cannot clear and occupy a town” by itself, one officer would later say.

Cougar “looks” through walls with a radiofrequency scanner mounted on a lightweight arm, while transmitting wideband signals to capture reflections from targets inside buildings or behind barriers. Alejandres later explained that when the Cougar “sees” though a wall—it's so sensitive that it can pick up breathing—it sends back an image that looks like a seismograph, with undulating lines that show humans.

While SMSS did what the soldiers wanted it to in town, it didn't always get such a glowing reception. Hollett says he would be reluctant to take the vehicle on a dismounted patrol given its limitations in wooded or extreme terrain, the noise it makes, and the fact that it can't be left alone if the unit has to disperse or move quickly.

Still, SMSS was effective—with some caveats—during a night ambush when it was mounted with a Lockheed Martin Gyrocam 9, which includes thermal and high-definition color imaging, laser pointing, geo-location and a laser range finder that marks targets 20 km (12 mi.) away. SMSS was driven to the northernmost point of the ambush site and parked in the woods, protecting the unit's flank. An iRobot PackBot was placed a few dozen meters down the trail to provide more coverage, and a single soldier was able to access feeds from both platforms on a laptop screen.

Standing silently in the dark with the Gyrocam's thermals on, the soldiers assigned to it were able to keep watch on their sector, with one problem. Once an hour, they had to turn the SMSS on for 5-10 min. to keep the battery charged. When sitting silently in an ambush in the dark, that noise is unwelcome. (Riflemen down the line communicated with one another and positioned their squads by texting on their Nett Warrior handhelds—which were given to squad and team leaders—and would later praise the system for silently keeping them in touch.) As it turns out, the opposition force walked into the ambush further down the line that night, but later the opposition commander said he had redirected some fighters toward the SMSS when he heard the engine kick in from hundreds of meters away.

Tests like this, and the NIE, are an attempt by the Army to “buy what it needs, when it needs it,” as Vice Chief of Staff Gen. Peter Chiarelli put it earlier this year. “This allows us to buy less more often and incrementally improve network capability over time,” he added.

Since the AEWE just ended, judgments about the technologies are premature, though a few early winners—and losers—stand out. Raytheon's One Force was hugely popular with soldiers, as were ITT's night-vision goggles. Also of interest was FLIR's “water from air” truck, which produces 500 gal. of potable water a day by concentrating humidity.

The Nett Warrior system was seen as effective, particularly its texting function. On the other side of the ledger was Northrop Grumman's Hercm scalable 4G wireless waveform, which was abandoned after the first day following repeated failures. PSI Inc.'s InstantEye quad-rotor UAV crashed both days that DTI viewed the exercise.

But this was from only a few days of testing. As Brown says, the experiment “is not about passing or failing, or even rating the technologies. It is about collaboration and providing a look at how a technology may work when applied.”