

DEFENSE SYSTEMS

KNOWLEDGE TECHNOLOGIES AND NET-ENABLED WARFARE

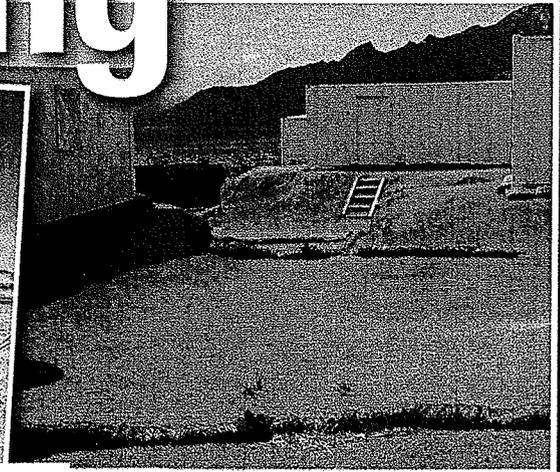
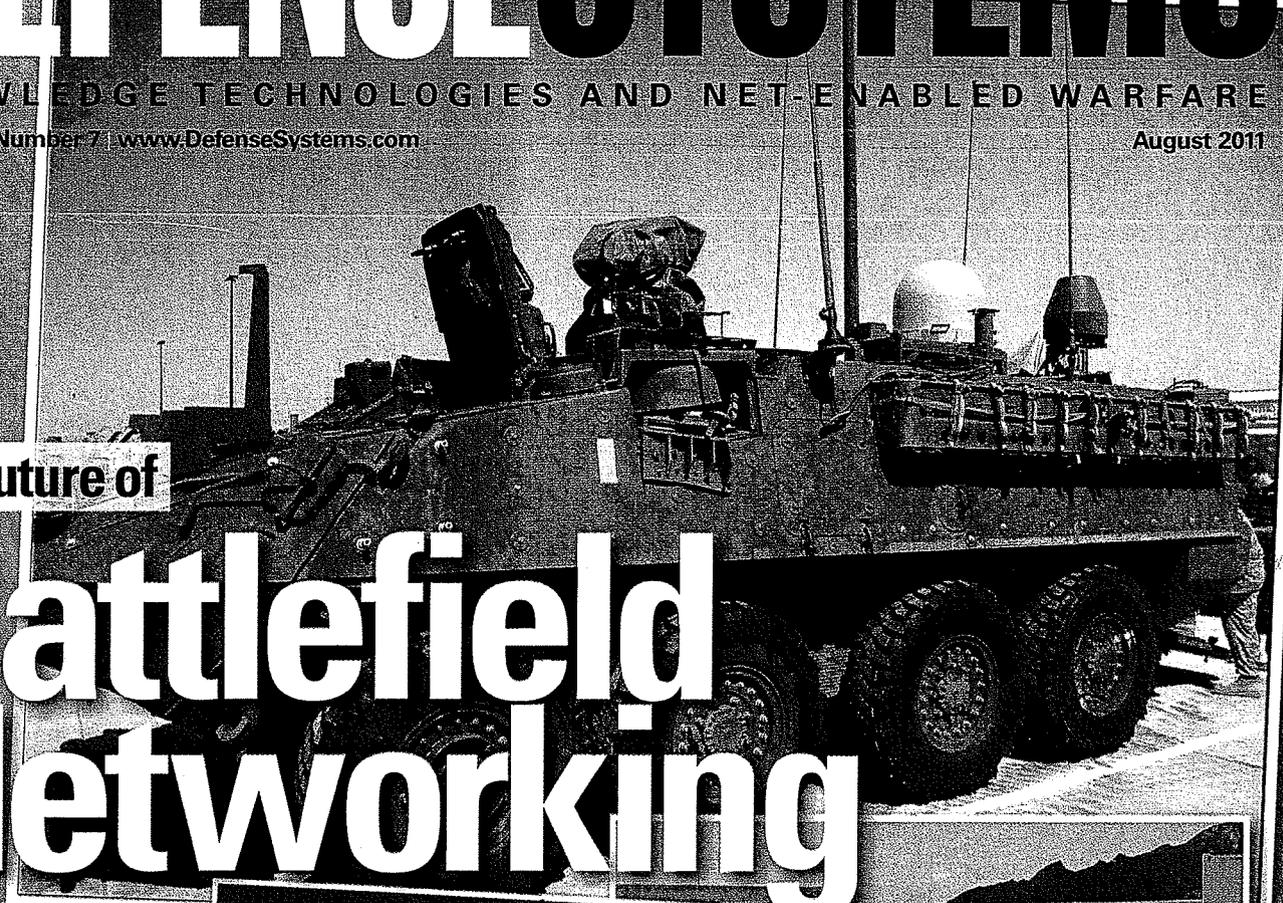
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The future of

Battlefield Networking

BCT modernization takes shape in the desert



INSIDE:

Interview: Lt. Gen. William Lord, Air Force CIO

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Army tactical network gets a stress test

NIE vets new components slated for unit modernization



A soldier from the 2nd Brigade Combat Team, 1st Armored Division uses the Joint Tactical Radio System Ground Mobile Radio to exchange information with headquarters during the NIE.

BY HENRY KENYON

In the midst of live action on the battlefield, the last thing warfighters should need to worry about is figuring out how to use the equipment that provides intelligence and information that can make the difference between an operation's success and failure — sometimes even life and death.

But managing communications in a modern, networked military during wartime is full of challenges. New technologies are often developed and rushed into the field, where deployed troops have to make do with little training or familiarity with the equipment. The lack of preparation leads to mistakes and inefficiency, and forces don't

operate at their full capacity.

The Army plans to avoid this steep learning curve through a series of events, held each spring and fall. The goal of the Network Integration Evaluation is to field-test new equipment and capabilities, approve those systems that make the grade, and develop lessons and doctrine for using the gear. As units return to the United States, the Army will issue new systems to them and make sure they receive proper training before redeployment.

The NIE, which just concluded in July, saw an entire brigade equipped with new technology move and maneuver across the rolling desert and high, harsh mountains of New Mexico's White Sands Missile Range. From this inaugural event, the Army hopes

to establish a regular set of tests and evaluations that will smoothly move battle-ready hardware and software to warfighters.

NEED FOR OPERATIONAL CONDITIONS

Scale is an important factor for the evaluation. To test networking and communications systems in operational conditions, units must be large enough to support a far-flung network across a range of terrain, much of which resembles Afghanistan. The formation at the heart of the NIE is the 1st Armored Division's 2nd Brigade Combat Team. For at least the next two years, the brigade's soldiers will apply its combat experience to help determine the usefulness of new equipment.

Three organizations are primarily responsible for managing the NIE:

- Program Executive Office for Integration.
- Army Test and Evaluation Command.
- Brigade Modernization Command.

Attached to the BMC, the 2nd Brigade is a heavy brigade combat team with a full complement of vehicles and more than 3,000 soldiers.

The brigade's predecessor was the Army Evaluation Task Force, which evaluated systems as part of the former Future Combat Systems program. AETF was not a full brigade, with a complement of only 1,100 personnel. "It was a made-up organization," said Col. Richard Juergens, BMC's deputy commander.

Unlike AETF, whose personnel rotated in and out of the unit every year, the 2nd Brigade's soldiers will have a mix of experienced and new personnel, most of whom will remain with the unit through the entire two-year evaluation cycle. Two years from now, the Army will decide whether to keep the 2nd Brigade in its current role or rotate

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a new unit in.

The 2nd Brigade's battalions ran through a series of exercises during the NIE. For the first part of the six-week evaluation held in June and July, each of the battalions focused on individual missions before coming together for a major capstone exercise during the last two weeks of the evaluation.

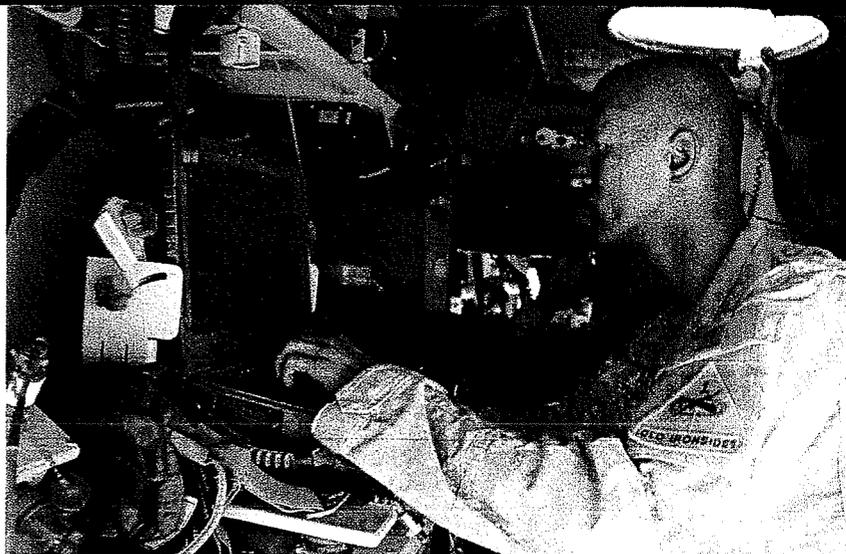
To cover a variety of military operations, the 2nd Brigade's battalions were modified. The brigade normally would have a cavalry squadron and two combined arms battalions equipped with tanks and Bradley fighting vehicles. But to better simulate how forces are equipped in Afghanistan, one combined arms battalion was equipped with mine-resistant, ambush-protected vehicles (MRAPs) to operate as a composite infantry unit.

Those modifications are necessary because they reflect the operational reality of troops in Southwest Asia. Army forces in Afghanistan often use available vehicles and other gear to support a specific mission. "It might fight in MRAPs, or it might fight in tanks and Bradleys," Juergens said. "So we haven't done something weird here with this organization. We've just task organized it in such a way that we can get at full-spectrum operations."

The battalions simulated missions such as counterinsurgency operations, wide-area security operations and traditional combined arms maneuvers that focused on combat between mechanized units. "We really owe the Army a good look at what these capabilities do to support the fight now," Juergens said. "But also as we look to the future, we can't neglect the other end of the spectrum."

AIR AND GROUND NETWORKS

The NIE featured several distinct phases. The first four weeks consisted of individual battalion-level evaluations and tests, and in the final two-week capstone event, the entire brigade deployed across a 150-mile by 30-mile block in the heart of the White Sands Missile Range. This operational space encompasses a variety of terrain, from rolling desert plains to 9,000-foot mountains cut by steep canyons and valleys.



Soldiers from the 2nd Brigade Combat Team, 1st Armored Division monitor and coordinate fire missions using the Advanced Field Artillery Tactical Data System, an automated fire support system that increases accuracy and reduces time.

During the evaluation, the brigade's soldiers worked with the equipment, but their goal was not to destroy or coddle it. "Our job is to employ these capabilities in a realistic situation. If it breaks, we're going to take note of that," Juergens said.

One of the primary goals of the NIE was stress-testing the Joint Tactical Radio Systems Ground Mobile Radio (GMR) and Handheld Manpack Small Form Fit radios. Because most battalions involved in the exercise were motorized, the HMS devices were mounted in MRAPs. Dismounted troops used some, and others were placed in command posts.

The HMS radios were used to simultaneously run three waveforms, the Soldier Radio Waveform (SRW), a satellite communications waveform and the Single Channel Ground and Airborne Radio System (SINCGARS). Besides testing the waveforms during operational conditions, the NIE examined how the HMS radios scaled and operated in a network. For this initial event, most of the work was focused on connecting and maintaining voice communications, said HMS program manager Col. John Zavarelli.

Testing the range and scalability of the JTRS waveforms was perhaps the most important part of the NIE, said Col. John Wendel, deputy program executive officer for network integration at the Army PEO-Integration.

The Wideband Networking Waveform (WNW) and SRW are the backbone of the JTRS communications networks. "It's less about the program, the contract or the provider," Wendel said. "It's more about finally

getting those waveforms mature so we can openly compete them with industry and port them onto hardware agnostic radios."

The Army also reviewed the Advanced Networking Wideband Waveform (ANW2) during the NIE. Developed by Harris as a complement and alternative to the JTRS waveforms, the ANW2 went through a variety of tests, including supporting a brigade-size network.

During the event, personnel used a 30-node network of Harris AN/PRC-117G radios as a battalion's wireless communications backbone. One of the program's goals was to validate that the radio — loaded with the latest version of the ANW2 designed to support as many as 30 nodes — could indeed scale up in operational conditions, said Dennis Moran, vice president of government business development at Harris' RF Communications Division.

Soldiers at the NIE also examined how the different systems and operational clouds could communicate in the field via the WNW. For example, some Stryker units were equipped with surrogate Net Warrior systems, which are variants of the older Land Warrior technology. The operational challenge was to transmit individual soldiers' Enhanced Position Location Reporting System data back into the cloud in a composite format, said Maj. Michael Tremblay, operations officer for the 2nd Brigade Combat Team.

During the first weeks of the exercise, the battalions independently reported data to brigade headquarters but did not share that information or coordinate operations, Tremblay said. However, for the capstone

event, the battalions worked together to form communications networks across White Sands Missile Range. The size of the exercise area stretched the networking equipment to the limits of their ranges, well beyond line of sight. "We're really [simulating] the Afghanistan-based fight, while looking at emerging capabilities," he said.

Successfully managing the network was another challenge and goal of the NIE. To support the operation, the 2nd Brigade used the JTRS WNW Network Manager to direct and control data traffic across the network. Commanders can use the JWNM to dynamically move communications to avoid terrain obstructions such as mountains by routing through connecting nodes, said Warrant Officer Matt Smith.

During operations, a Joint Network Node has a throughput of 2 megabytes/sec. The JWNM allows commanders to vary that bandwidth to send larger, more data-intensive documents, such as imagery or operational orders, to specific users. With-

vanced Research Projects Agency program, TIGR allows soldiers to access sensor feeds from overhead aircraft and unmanned aerial systems through a handheld monitor. The devices have been used in Southwest Asia since 2007, said Brian Slaughter, a strategic business development manager at General Dynamics' C4 Systems.

For the NIE, troops also tested a new situational awareness capability that allowed squad and platoon leaders to identify the locations of all their soldiers. The system pushes what had been a vehicle-based blue force-tracking tool down to the individual soldier, Slaughter said. The TIGR software can reside on a variety of handheld devices, such as rugged General Dynamics GD300S devices, Motorola Xoom tablet computers, Android-based smart phones and JTRS GMR radios.

The CPOF is deployed in tactical operations centers across the theater. The version of CPOF used in the event was loaded with the Personal Assistant at Large software, the

ANW2 waveform operating on a Harris AN/PRC 117-G radio, the EPLRS waveform and the SINCGARS Advanced System Improvement Program. The three waveforms were loaded into the PGSS radios along with the aerostat's sensor suites.

The Army also used a second aerostat with a larger payload than the PGSS. Referred to as the Testbed Aerostat, it was used to loft 150-pound to 200-pound payloads to a height of 1,500 feet. Its communications equipment transmitted WNW and SRW-based communications to forces operating on the ground.

DEFINING SUCCESS

For this first NIE, success has several meanings. For the programs of record, success will be a thorough evaluation of those capabilities approaching an acquisition decision. BMC is following a test and evaluation master plan with a set of criteria that must be met by new technologies. "At the end of the day, did the capability perform as it was supposed to perform?" Juergens asked.

Gathering enough data for an accurate evaluation is key to making systems ready for warfighters, otherwise the tests are useless, Juergens said. A major challenge will be convincing Army and Defense Department decision-makers to spend money on a new capability.

Feedback from the soldiers in the 2nd Brigade is perhaps the most important part of the NIE, Juergens said. By replicating the operating environment, collecting data and soldier input, BMC hopes to determine the readiness of the new systems.

Another measure of success is ensuring that the lessons learned in the first NIE are carried over to subsequent events. Having more evaluations and establishing a biannual cycle are critical to the entire endeavor.

This summer's evaluations will lead to a series of limited user tests at the next NIE. For the fall event, a new set of equipment and technologies will be added to the systems undergoing additional testing. In the time between the June and November events, industry will have time to make modifications to systems based on user feedback from the previous event, Juergens said. ■

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Col. Richard Juergens, Army

out JWNM, such files would need to be compressed and shared among many users via limited bandwidth.

The JTRS GMR radios can automatically compensate for variations in bandwidth without the need for direct JWNM supervision. If a network link breaks and a message cannot immediately go through, the device stores the data in the GMR's memory. The message transmits when connectivity is regained. Smith said this process is similar to a civilian user shutting off a cell phone when boarding a plane and then receiving voice mail and text messages en masse after turning on the phone after landing.

Besides new technologies, the NIE also examined the latest versions of existing systems such as the Tactical Ground Reporting system and the Command Post of the Future (CPOF). Originally a Defense Ad-

which automates certain preselected work flows in a command post, allowing personnel to work more efficiently, said Thomas Core, a business development representative at General Dynamics' C4 Systems. The technology lets users build a library of tasks, such as the steps needed to request a medevac flight to evacuate wounded soldiers.

This NIE featured an aerial communications element that included four Shadow unmanned aircraft systems, two of which were equipped with radio relays to transmit the SRW and Rifleman Radio waveforms. Two aerostats with different mission configurations also were used in the event as communications and sensor platforms.

The systems tested in the aerial tier included the Persistent Ground Surveillance System (PGSS). The aerostat-based system operated three different waveforms: the

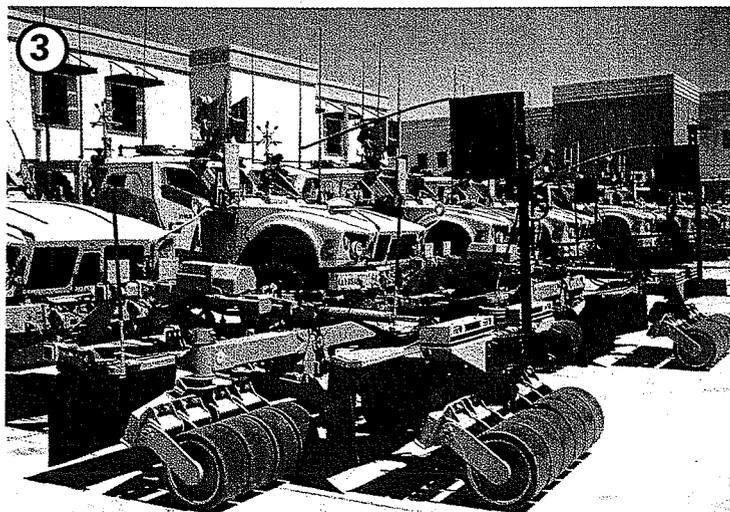
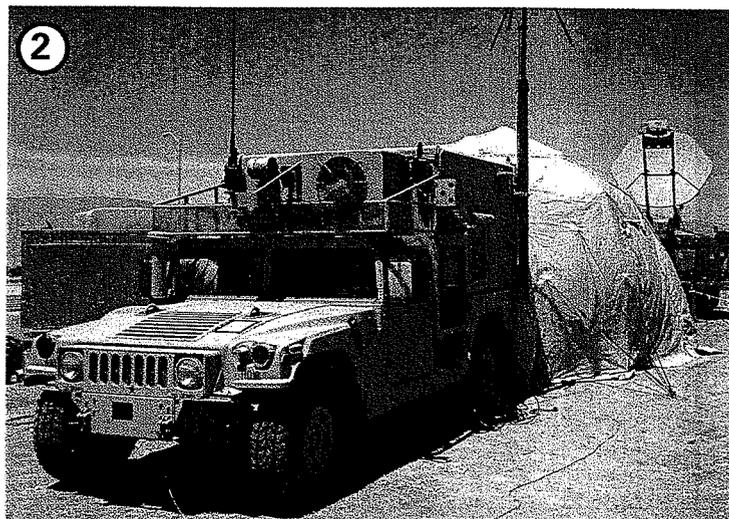
SPECIAL REPORT

The Army conducted its Network Integration Exercise this summer at White Sands Missile Range, N.M., and Defense Systems staff had an opportunity in late May to inspect network and communications systems as soldiers set up the equipment for Limited User Tests during the NIE.

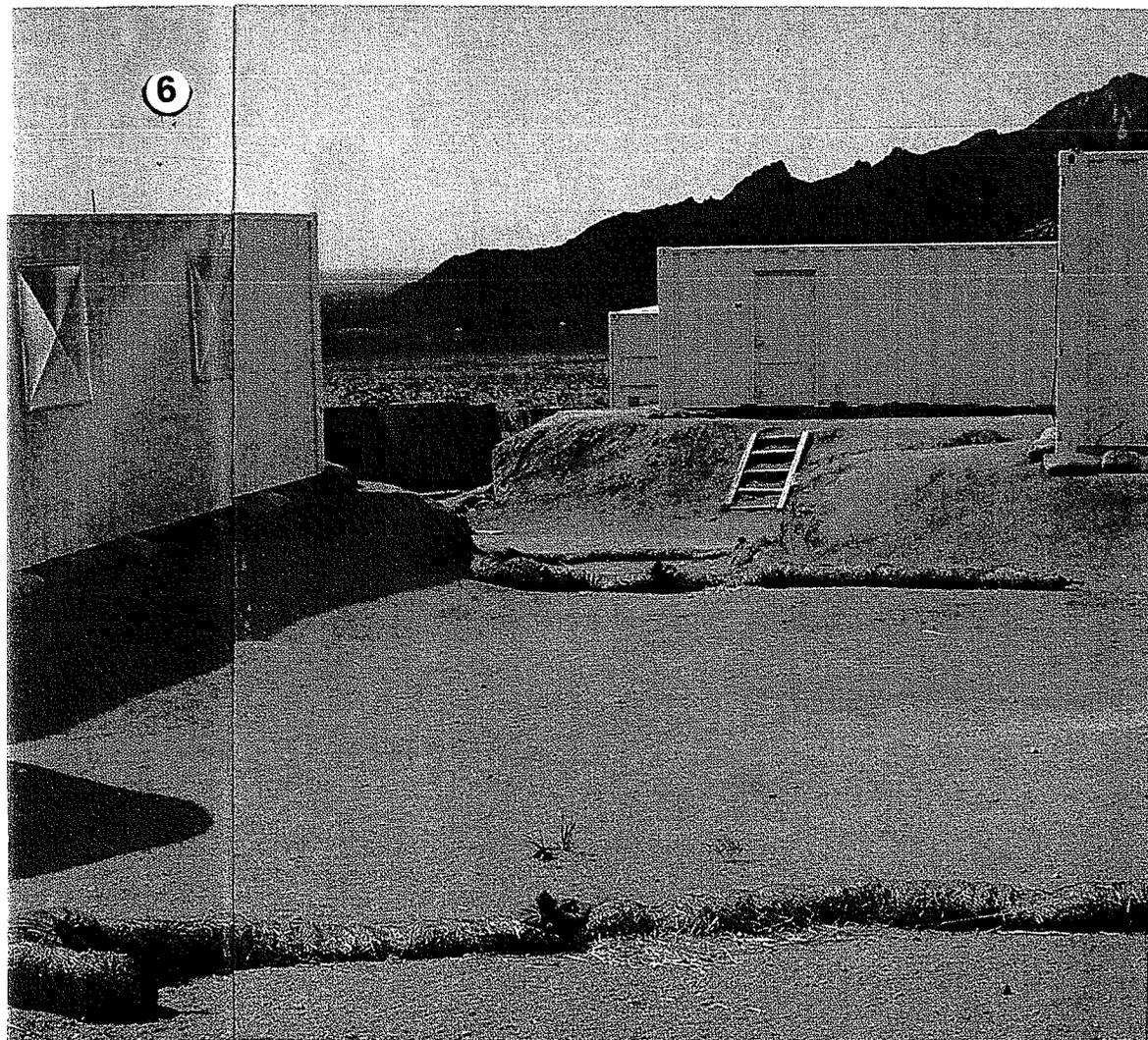
Fort Bliss, Texas, and the White Sands Missile Range are about 90 minutes apart by car, and visiting the facilities before the NIE in May seemed to be a better idea than visiting the desert in July. It also was better timing for the senior officers responsible for various elements of the NIE, who wouldn't have had time to meet with us after the NIE started.

Visitors to Defense Systems.com can find interviews and stories that we have already run about the NIE, and there are a couple more to come, including the special report in this issue.

**Photos and captions by
Defense Systems
Editor-in-Chief
Barry Rosenberg**



The Army goes into desert to meet the future of comms



① Chief Warrant Officer Matt Smith, left, a signal systems technician with the 2nd Brigade Combat Team, 1st Armored Division, and Maj. Bill Venable, assistant project manager of the Infantry Brigade Combat Team at the Program Executive Office for Integration, were responsible for testing networking equipment before the Network Integration Exercise.

② Smith and Venable helped Army personnel set up the SIPRNet/NIPRNet Access Point terminals and very small aperture terminals in a large open lot at Fort Bliss to make sure they worked properly before moving them out to tactical operations centers in the desert.

③ Army equipment spends much of its time in the Fort Bliss motor pool, awaiting assignment. These mine-resistant, ambush-protected vehicles have been modified with the Self Protection Adaptive Roller Kit, a mine roller used to detonate improvised explosive devices.

④ One of the most historically noteworthy areas is just inside the White Sands Missile Range: the missile park, which contains a collection of the nation's most important missiles and rockets. One of the first relics you encounter at the missile park is a duplicate of the original bomb casing of the Fat Man nuclear bomb. The other casing was dropped on Nagasaki, Japan, in 1945.

⑤ A Navistar Defense-built MRAP looms large at the radio installation Network Synchronization Center at White Sands Missile Range, where engineers and technicians conduct communications verification and integrate systems into the vehicles. During the NIE, soldiers use systems that tap the Soldier Radio Waveform and Wideband Networking Waveform to communicate across long distances of rough terrain, such as mountains and scorching desert sands.

⑥ Twenty minutes outside of White Sands Missile Range is Mountain Village, where role-playing actors/soldiers interact with squads of soldiers on patrol. Soldiers communicate from here over long distances and across mountains with the Soldier Radio Waveform and Wideband Networking Waveform. The facility is seen through the opening at the base of the mountains.

