Capability Set Production and Fielding:

Capability Set Production and Fielding: Enhancing the U.S. Army's Combat Effectiveness

As I reflect upon the pace of technological change in today's modern world and the impact of rapid, global information exchange upon our overall security environment, I am both inspired and encouraged by the Army's approach to building a network able to connect our forces at all echelons. This remains our number one modernization priority. . . . At the end of the day, our equipment modernization program remains focused on the Soldier, who will be equipped in the smartest, most effective and "lightest" way possible. We will never stray from our core task of ensuring that America's Army is the most capable, best-led, best-trained and best-equipped fighting force in the world.

General Raymond T. Odierno,
Chief of Staff, Army
7 August 2012[1]

Introduction

Today, people are always connected. Current smartphones, tablets and computers are user-friendly and compatible with one another, seamlessly sharing data and applications from one device to the next. But in today's complex operational environments, such seamless connectivity cannot be taken for granted on the battlefield. At present, commanders must be inside a static tactical operations center (TOC) to access many mission command capabilities over the Army network, greatly limiting their freedom of movement. Soldiers sometimes encounter interoperability issues that interfere with unified land operations; with some non-integrated systems, Soldiers must log on and off of different technology platforms to share information. Those Soldiers at the lowest echelons—farthest from the TOC and closest to the conflict—can face delays in accessing the full range of information about their area of operations. That is about to change.

Starting in October 2012, the Army will begin to equip deploying brigade combat teams (BCTs) with Capability Set (CS) 13, the Army's first integrated package of radios, satellite systems, software applications, smartphone-like devices and other network components. CS 13 provides uninterrupted connectivity from the static TOC to the commander on the move to the dismounted Soldier. It directly addresses 11 critical operational needs statements submitted by combatant commanders and offers Soldiers vastly increased capabilities to communicate and share information. Through unprecedented synchronized fielding efforts,

CS 13 is on track to be fielded to up to eight BCTs (with priority to a forward-stationed BCT in Korea and to units deploying to Operation Enduring Freedom).

This capability set is the first fully integrated suite of network gear fielded as part of the Army's new Agile Capabilities Life Cycle Process (or Agile Process), a fundamental change in the way the service delivers equipment to Soldiers. Rather than developing network systems independently and on their own timelines, the Army is integrating capabilities up front, testing them at semi-annual, Soldier-driven Network Integration Evaluations (NIEs) and delivering complete technology packages aligned with the Army Force Generation cycle. As each capability set is fielded, the Army is developing and evaluating the next capability set via the NIE process.

This process allows the Army to assess capability gaps, rapidly form requirements, solicit mature industry solutions and perform laboratory and field

evaluations. This unified approach permits the Army to buy the right amounts and types of gear for the BCTs that need them first and then modernize incrementally—instead of spending resources to develop technology that may be obsolete by the time it can reach the entire force. By fully aligning fiscal resources, requirements development and fielding through Capability Set Management, the Army is providing a greater depth of capability to more formations than was possible before.

The First of a Generation: Capability Set 13

Capability Set 13 is anchored by two major upgrades: allowing commanders to take the network with them in their vehicles (mission command on the move) and bringing dismounted Soldiers into the network, empowering ground troops with a new level of real-time information.

Capability Set 13 took shape over the course of three NIEs, from NIE 11.2 in June 2011 to NIE 12.2 in June 2012. During that time, the Army evaluated more than 115 systems from government and industry, leveraging the 3,800 Soldiers of the 2d Heavy Brigade Combat Team, 1st Armored Division. These Soldiers executed realistic missions in the punishing terrain of White Sands Missile Range, New Mexico. Test data and Soldier feedback from the NIEs—each iteration building on results from the previous event—enabled the Army to establish a network based on a hybrid integration of satellite-based communications and terrestrial networking radios. The full brigade-level CS 13 architecture was validated and finalized during NIE 12.2—the largest NIE accomplished to date—where Soldiers simulated the execution of combined-arms maneuver, counterinsurgency and stability operations in a hybrid threat environment.

Some of the major systems that constitute CS 13 include:

WIN-T Increment 2. The Warfighter Information Network–Tactical (WIN-T) is essentially the Soldier's internet, providing the tactical communications network backbone to which other networked systems need to connect in order to function.

The currently fielded WIN-T Increment 1 provides satellite-based, beyond-line-of-sight voice, video and data communication down to the battalion level. Vehicle-borne

Click here to view graphic.

Soldiers have only to pull over to the side of the road to communicate. **WIN-T Increment 2 is a major upgrade that will introduce mission command on the move, allowing Soldiers to communicate continuously inside moving tactical vehicles. WIN-T Increment 2 will also extend satellite communications down to the company level, which means that the Soldiers closest to the fight will have greater connectivity than ever before. WIN-T Increment 2 also introduces self-forming, self-healing networking radios and enhances network operations tools for network planning and monitoring.**

Among WIN-T Increment 2's main component systems for the BCT are the Tactical Communications Node (TCN),

**Click here to
view graphic.**

the Point of Presence (POP), the Soldier Network Extension (SNE) and the Vehicular Wireless Package (VWP). The TCN is the centerpiece and hub of the WIN-T network, delivered to the unit on a medium tactical vehicle platform. As the main network support element for command posts and TOCs, the Increment 2 TCN remains connected as Soldiers "jump" to a new command post location—a capability that is not possible with Increment 1 technology. The WIN-T POP is the primary on-the-move configuration item that will be installed on the tactical combat platforms of select commanders and staff officers at division, brigade and battalion echelons. WIN-T SNEs will be installed in combat vehicles for select battalions and companies. The final component of the WIN-T Increment 2 network is the VWP,

which extends the WIN-T network to command post vehicles moving in convoy with the TCN.

Company Command Post. The Company Command Post (CoCP) delivers to the company level communication capabilities previously found only at the battalion level and above, thereby increasing the effectiveness of commanders in decentralized operations. A CoCP for a maneuver company is scalable, supports mobile and short-halt operations, requires minimum manpower and is reliable, with limited field support necessary to sustain it.

Joint Capabilities Release. The Joint Capabilities Release (JCR) is a key upgrade to the widely fielded Force XXI Battle Command Brigade and Below/Blue Force Tracking (FBCB2/

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**Click here to
view graphic.**

JTRS Handheld, Manpack, Small Form Fit (HMS) Rifleman Radio. The two-pound, software-defined Rifleman Radio will be carried by platoon-, squad- and team-level Soldiers for voice communications. It can also connect with Nett Warrior handheld devices to transmit text messages, GPS locations and other data.

JTRS Handheld, Manpack, Small Form Fit (HMS) Manpack. The two-channel, software-defined HMS Manpack radio provides line-of-sight and beyond-line-of-sight communications through current and future higher bandwidth waveforms, enabling connectivity at the lowest echelons.

AN/PRC-117G tactical radio. This wireless voice and data radio allows Soldiers to exchange large amounts of tactical data, such as video and biometrics. The radio can support small-unit operations and connect the tactical edge with forces at the company level and above.

Single Channel Ground and Airborne Radio System (SINCGARS). This device is the primary radio the Army uses for voice communications in the field today. With configurations including manpack, vehicular (both low and high power) and airborne models, more than 500,000 SINCGARS have been fielded.

Soldier Radio Waveform Appliqué. This item is a single-channel, vehicle-mounted radio that runs the Soldier Radio Waveform (SRW). It fits into the SINCGARS Combat Net Radio (CNR) vehicular mount. SRW Appliqué radios act as a conduit for voice and data among dismounted Soldiers, their units and higher headquarters.

Production and Synchronized Fielding

To field these technologies to deploying units as quickly as possible, the Army is now immersed in production and synchronized fielding of CS 13. This is an Army-wide effort, spanning dozens of commands and locations and requiring constant coordination among network and vehicle project managers, production facilities, brigade staffs and fielding and training professionals.

The main production effort for vehicles equipped with CS 13 is taking place at the Space and Naval Warfare Systems

BFT) system that allows Soldiers in vehicles, aircraft and command posts to track friendly forces and exchange messages in order to synchronize operations and avoid fratricide. JCR utilizes the faster BFT2 satellite network for improved accuracy of position location information.

Nett Warrior. Nett Warrior is a Soldier-worn, smartphone-like mission command system that runs various mission applications. These handheld devices will be fielded to team leaders and above, allowing them to communicate seamlessly within their units and with higher headquarters. These devices connect to the Army's larger tactical communications network through the Joint Tactical Radio System (JTRS) Rifleman Radio.

Army Evaluates Coalition Communications Through NIE Process

By Claire Heininger, U.S. Army, September 7, 2012

The U.S. Army is bringing coalition partners into its future tactical communications network through the Network Integration Evaluation process.

During a risk reduction event held last month [in August 2012] at Aberdeen Proving Ground, Maryland, the Army demonstrated the ability to share information at the company level across the various mission command systems used by the United Kingdom, Canada and Australia. The laboratory assessment will feed into the Army's execution of the Network Integration Evaluations, or NIEs, a series of semi-annual, Soldier-driven field evaluations designed to further integrate and mature the Army's tactical network and accelerate and improve the way network technologies are delivered to Soldiers.

To date, the NIEs have focused on establishing an integrated network baseline that links all echelons of the brigade combat team from the static tactical operations center to the commander on-the-move to the dismounted Soldier. Future NIEs will connect partner nations to that network.

"The NIE will allow us to evaluate communications solutions for coalition forces in a realistic operational environment and quickly improve them based on Soldier feedback," said Brigadier General Daniel Hughes, director of Army System of Systems Integration, or SoSI. "By using the Aberdeen Proving Ground network labs, we get an early look at potential solutions in preparation for future NIE operational exercises and allow the coalition partners to share lessons learned on both technology capability and integration challenges."

The demonstration scenario required the Army to transmit messages between company command posts for each nation using industry radios that are under evaluation as part of the NIE. The goal was to combine the information from each country's mission command technology into a shared commander's vision of the battlefield, so "(you're) seeing the same picture I'm seeing," said C.A. Aiken, a senior systems engineer for the Canadian National Defence Department.

The scenario reflects the reality of circumstances faced by partner nations in theater today, where the force elements they contribute may be task-organized at levels far lower than previously envisioned and yet need to communicate with one another directly and dynamically, said United Kingdom Lieutenant Colonel Philip Deans, SoSI international embedded officer. Performing such tests helps determine "how to be interoperable using our native systems, thereby reducing training times and removing costs," he said.

Senior representatives from the visiting nations said the event offered an opportunity to collaborate on budget and requirements challenges as well as on innovative technology. They expressed interest in the Army's new Agile Process approach to acquisition, which is designed to procure critical capabilities in a more rapid, cost-effective manner by soliciting mature solutions from industry, then integrating and evaluating them at the NIE.

The strategy of integrating network technologies earlier in the development cycle will pay dividends not only for the United States but across the coalition, said Brigadier Barry Neil McManus, Australia. "The ability for us to do this from the start of an opportunity is the very clear emphasis here," he said. "It's activities like this that bring us closer and closer together."

Command (SPAWAR) Atlantic in Charleston, South Carolina. SPAWAR is integrating the mine-resistant, ambush-protected (MRAP) vehicles to support staggered deliveries to the 3d and 4th BCTs of the 10th Mountain Division, aligned with new equipment training schedules beginning in October 2012. These MRAPs, configured with WIN-T Increment 2 and other CS 13 components, will then accompany those BCTs when they deploy.

The MRAP configurations for CS 13 were validated through the NIEs, with Soldier feedback leading to many design and user interface improvements. Prior to SPAWAR production getting underway, the first five "super configuration" MRAP prototype vehicles were built at the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) located in Warren, Michigan.

These prototype vehicles are significantly different from one another—aligned to a specific network-related need—and include a Soldier Network Extension (SNE) vehicle, a Point of Presence (PoP) configuration, a Vehicular Wireless Package (VWP) version, a MaxxPro vehicle and an MRAP-Lite version. These configurations enable the Army to build vehicles spanning the numerous unique roles within a BCT, taking into account the need for different combinations of network systems along with size, weight and power constraints.

In addition to the MRAPs manufactured at SPAWAR, the Red River Army Depot in Texarkana, Texas, is hosting production of networked High Mobility Multipurpose Wheeled Vehicle (HMMWV) platforms that will be used as training sets by continental U.S. (CONUS) units as they

prepare to deploy. CS 13 vehicles are also undergoing safety release and network verification testing, performed at Aberdeen Proving Ground, Maryland, and Fort Dix, New Jersey, during fall 2012.

Next Steps

The Army's institutionalization of a new unified approach that combines rapid operational testing, acquisition and deployment has already proved to be a significant step forward in terms of both expanded responsiveness to security challenges and cost savings. In conjunction with other time-honored methods, the Agile Process, its associated Network Integration Evaluation process and the Capability Set Management construct allow the Army to modernize its information systems far more rapidly and at far better total value than ever before.[2]

The Army and its industry partners agree that this unified approach is the right way to develop solutions promptly. However, because industry partners make considerable business investments by participating in this process, they need to have a reasonable expectation that the Army will make real purchases. The Army needs support from Congress and the Department of Defense (DoD) to continue to invest in industry participation in the Agile Process and quickly procure systems through the NIE process for fielding—maintaining momentum now that the realization of its own investments in acquisition reform is imminent.

The Army also needs support from the DoD test community. As the paradigm evolves toward "testing as we fight"—in other words, a paradigm in which programs of record are not measured in isolation but as part of an integrated package via the NIE process—the methods employed for grading systems' performance must evolve as well. In an integrated tactical network, the operational suitability and effectiveness of one technology is inherently linked to others. Programs must not fall behind or be penalized at other levels for adjusting their test and evaluation plans according to the Army's new way of doing business.

With support from partners in Congress and DoD, the Army can continue to reap the benefits of a new approach to network modernization—informing requirements, aligning programs of record, allowing for integration of systems prior to deployment, providing a flexible avenue for industry to bring in mature capabilities for evaluation and ultimately fielding decisive capabilities.

Conclusion

Capability Set Management is an iterative process that allows the Army to incrementally modernize over time and ensure that Soldiers have what they need when they need it. Looking ahead to future capability sets, the Army is uniting its network and vehicle modernization efforts into an affordable, synchronized plan.

The implications of the Army's unified approach to operational testing, acquisition and deployment are clear. Capability Set 13 will give Soldiers a significant advantage over adversaries by enhancing their situational awareness, improving maneuverability, speeding decision cycles and connecting Soldiers at the lowest level with one another and their higher headquarters. CS 13 provides an unprecedented, integrated network solution supporting mission command requirements for the full range of operations. But the Army cannot stop there. It will use NIE 13.1 during fall 2012 to evaluate materiel solutions that could enhance the network baseline for the next capability set, CS 14, expected to be fielded to up to six BCTs beginning in Fiscal Year 2014.

These parallel lines of effort—synchronized fielding of one capability set while simultaneously building the next—will allow the Army to continuously fill capability gaps to meet Soldiers' needs, enabling them to prevent, shape and win by making decisions more rapidly than their adversaries.

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[2] See AUSA Torchbearer National Security Report "U.S. Army Operational Testing and Evaluation: Laying the Foundation for the Army of 2020," October 2012, http://www.ausa.org/publications/torchbearercampaign/tnsr/Documents/TB_ATEC_web.pdf.

Commanders Requirement by Echelon

	Soldier	Team Leader	Squad Leader	Platoon Leader/Sergeant	Company Commander	Company Tactical Operations Center	Battalion Commander	Battalion Tactical Operations Center
MCEC Requirements*	• Voice • Position Location Information • (one way, up)	• Voice • Position Location Information • Situational Awareness	• Voice • Position Location Information • Situational Awareness • Command and Control	• Voice • Position Location Information • Situational Awareness • Command and Control • maps and control graphics • orders • situation reports	• Voice • Position Location Information • Situational Awareness • Command and Control • maps and graphics • orders • situation reports • sensor data • video	• Voice • Position Location Information • Situational Awareness • Command and Control • maps and graphics • orders • situation reports • whiteboard • sensor data • video	• Voice • Position Location Information • Situational Awareness • Command and Control • maps and graphics • orders • situation reports • sensor data • video	• Voice • Position Location Information • Situational Awareness • maps and graphics • orders • situation reports • whiteboard • sensor data • video
Connect To	• Soldier • Team Leader	• Soldier • Team Leader • Squad Leader • Platoon Leader	• Soldier • Team Leader • Squad Leader • Platoon Leader	• Soldier • Team Leader • Squad Leader • Company Commander	• Platoon Leaders • Company TOC • Battalion Commander/TOC • Fires • Logistical Support • JIIM	• Platoon Leaders • Company Commander • Battalion Commander/TOC • Fires • Logistical Support • JIIM	• Company Commanders/TOC • Battalion TOC • Brigade Commander/TOC • Fires • Logistical Support	• Company Commanders/TOCs • Brigade Commander/TOC • Fires • Logistical Support • JIIM
Network Requirements (upload/download)	• FM voice • GPS (15kbps/2mbps)	• FM voice • GPS • data (15kbps/2mbps)	• FM voice • GPS • data (15kbps/2mbps)	• FM voice • GPS • data (15kbps/2mbps)	• Internal/External C2 voice • Secure Internet Protocol Router • video • sensor links (1.2mbps/2–4mbps)	• Internal/External C2 voice • Secure Internet Protocol Router (SIPR) • Non-Secure Internet Protocol Router (NIPR) • Voice Over Internet Protocol (VoIP) • video • sensor links (1.2mbps/2–4mbps)	• Internal/External C2 voice • Secure Internet Protocol Router (SIPR) • video • sensor links (>4mbps)	• Internal/External C2 voice • Secure Internet Protocol Router (SIPR) • Non-Secure Internet Protocol Router (NIPR) • Voice Over Internet Protocol (VoIP) • video • sensor links (>4mbps)

Network Equipment	• Rifleman Radio	• Nett Warrior	• Nett Warrior	• Net Warrior
				• HMS MP
				• Multiband Inter/Intra Team Radio
					• WIN–T
					  ○ SNE/Mobile Point of Presence
					• JTRS
					  ○ MNVR
					  ○ HMS MP
					  ○ Nett Warrior
					  ○ JCR/JBC-P BFT2
						• Mission Command systems
						• JTRS
						  ○ MNVR
						  ○ HMS MP
						• Requirements
						  ○ ATH WIN–T PoP/COTS
							• WIN–T
							  ○ Mobile PoP
							  ○ Mission Command systems
							  ○ Nett Warrior
							• JTRS
							  ○ MNVR
							  ○ HMS MP
							  ○ JCR/JBC–P BFT2
								• WIN–T Increment 2
								• SMART–T
								• Global Broadcast Service (GBS)
								• Trojan Spirit
								• CSS VSAT
								• Mission Command
								• TRC-190 (v3)
								• Joint Capabilities Release
								• SINCGARS
								• JBC–P/SC Tactical Satellite
								• High Frequency Radio
								• Joint Tactical Radio System (JTRS)

ATH – At the Halt
BFT2 – Blue Force Tracking 2
C2 – Command and Control
COTS – Commercial Off the Shelf
CSS VSAT – Combat Service Support Very Small Aperture Terminal
FM – Frequency Modulation
GPS – Global Positioning System
HMS MP – Handheld, Manpack, Small Form Fit Manpack

JBC-P – Joint Battle Command – Platform
JCR – Joint Capabilities Release
JIIM – Joint, Interagency, Intergovernmental and Multinational
JTRS – Joint Tactical Radio System
MCEC – Mission Command Essential Capabilities
MNVR – Mid-tier Networking Vehicular Radio
NIPR – Non-secure Internet Protocol Router
PoP – Point of Presence

SC – Single Channel
SINCGARS – Single Channel Ground and Airborne Radio System
SIPR – Secure Internet Protocol Router
SMART–T – Secure Mobile Anti-jam Reliable Terminal – Tactical
SNE – Soldier Network Extension
TOC – Tactical Operations Center
WIN–T – Warfighter Information Network – Tactical

* Mission Command Essential Capabilities White Paper, 19 June 2010