

PORTFOLIO

PEO  CST

PROGRAM EXECUTIVE OFFICE COMMAND CONTROL COMMUNICATIONS-TACTICAL



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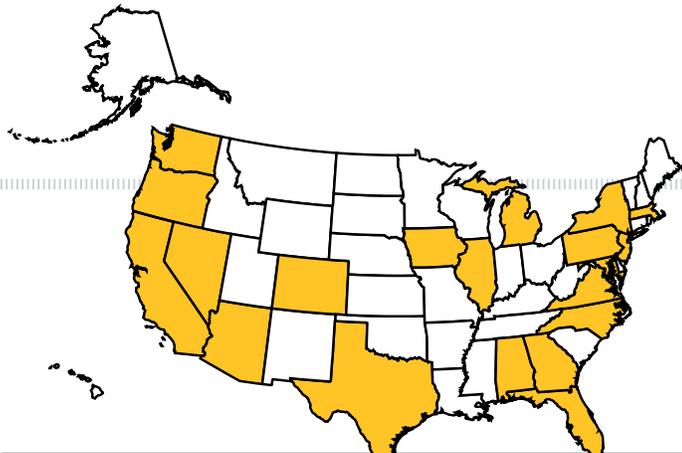
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PEO C3T

PEO C3T is supporting the Army's new network modernization strategy with a commitment to deliver a tactical network that ensures the Army, with Unified Action partners, can prepare for war and fight and win against any adversary in the most challenging contested and congested electromagnetic spectrum and cyber environments. The end-to-end tactical modernization approach is designed to integrate unified network transport, shared data and services including the servers and hardware, and a set of applications and network management tools built upon a common, open, and modular software framework.



The reach of government and contractors of PEO C3T throughout the United States.



CONGRESSIONAL LOCATIONS



PEO C3T manages 45 key acquisition programs, executing more than \$2 billion annually, with a workforce of more than 1600 employees. The organization provides operational units with radios, computers, servers, apps, and other hardware and software required for their missions, while also integrating those systems to function as cohesive capability sets.

Centered upon the proven industry practice of developmental operations (DevOps), the modernization strategy is placing developers side-by-side with Soldiers and commanders in operational units. DevOps enables the Army to evaluate potential technology concepts and solutions earlier and more frequently, incorporating real-time operational feedback and generating requirements that enable and empower innovation. PEO C3T continues to use the DevOps construct to better assess the baseline tactical network, introduce new network enhancement alternatives and gather Soldier-informed feedback and technical data.

PEO C3T is working closely with the Network Cross Functional Team (N-CFT) to modernize the network across four lines of effort: Unified Network Transport; Common Operating Environment; Joint Force and Coalition Interoperability; and Command Post Mobility and Survivability. Key Army network modernization efforts include fielding standard mission command hardware and software across all component formations, accelerated fielding of the Joint Battle Command Platform mounted situational awareness and communications system, fielding advanced tactical data radios

and modernizing the satellite communications systems.

PEO C3T, with the N-CFT, is incorporating new commercial off-the-shelf (COTS) components and transport capabilities to enable network communications in disconnected, intermittent and limited bandwidth (DIL) network transport environments. This effort, termed the Integrated Tactical Network (ITN), provides a simplified, independent, mobile network solution that is available down to the small-unit dismantled leader to facilitate mission command, situational awareness and air-to-ground integration. ITN will provide commanders with resilient communications that are part of their Primary, Alternate, Contingency and Emergency (PACE) communications plan.

Commercial cellular networks are other options under consideration as part of a PACE plan. Commercial standards such as 4G/LTE and Wi-Fi, while not currently hardened against the kind of full spectrum Electronic Warfare (EW) environment envisioned, are being adapted to supplement and thicken the network and decrease the time it takes to get command posts up and running. Emerging commercial satellite communications (SATCOM) constellations, promising high bandwidth anywhere across the globe, are another key element of the modernization vision.

In addition to EW threats, defense against cyber-attack and intrusion remains a critical underpinning of the strategy. Recently, the Army established new program efforts including cyber situational understanding (Cyber SU) to aid

operational units' understanding of the tactical network threat environment.

PEO C3T and the N-CFT are executing these design changes through the delivery of new technology every two years beginning with Capability Set 21, or CS21. This iterative approach enables rapid insertion of new technologies as they are developed and made available, while giving Soldiers working systems in the short term.

The Army has conducted multiple focused ITN demonstrations, experiments, and assessments at lower echelons during several operational exercises and training events in FY18 and FY19. These assessments will lead into initial ITN fieldings to four Infantry Brigade Combat Teams (IBCTs) starting in FY21, with capability set fieldings continuing on a two-year basis to additional IBCTs and Stryker BCTS.

Moving forward, experiments and evaluations will focus on driving network design changes across Security Force Assistance Brigades (SFABs), Infantry, Stryker and Armor Brigade Combat Teams, and tailoring the network and command post configurations to the unique needs of each formation. The output of these efforts will continue to generate informed network capability requirements, while enabling the Army and its industry partners to evolve the network at the pace of warfighter demands and commercial innovation and to meet emerging threats.



The Joint Tactical Networking Center (JTNC) is a support organization to the Services, the DoD Chief Information Officer (CIO), the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)), and USD Research and Engineering (USD(R&E)).



DESCRIPTION

The JTNC enables secure, interoperable, and resilient tactical communications capabilities aligned to modular open architectures in support of Service, Multi-Service, and coalition forces. JTNC core functions include Maintaining a cyber-hardened DoD Information Repository; providing Technical Analyses and Capability Characterizations on tactical communications products; providing Open Systems Architecture Standards; providing exportability analysis and licensing reviews; and serving as Technical Advisor to the Communications, Command, and Control Leadership Board (C3LB).

Specific responsibilities have been identified for establishing and maintaining a Joint enterprise-level view of waveforms and systems, maintaining and monitoring compliance with associated Joint or Military Standards, and providing engineering analysis and recommendations. The JTNC supports DoD CIO in oversight of Lead Service activities and assists in the identification and resolution of cross-Service networking disconnects.

CAPABILITIES

- DoD Information Repository (IR): The JTNC maintains a cyber-hardened DoD IR to provide controlled access for proprietary and non-proprietary waveforms and associated network managers, operating environment software, models, architectural standards, Application Program Interfaces (APIs), and future tactical communications products. This serves to protect and distribute code and documentation based on legal agreements between government and software developers.
- Tactical Communications Marketplace (TCM) is an on-line portal and DoD collaboration space, built within a cloud-based framework for commercial vendors to

showcase their tactical communications products. The TCM provides acquisition authorities the capability to conduct market research on emerging commercial technologies, informed by Government analyses that may JTNC Capability Characterization results.

- JTNC Capability Characterization process has been developed for vendor Commercial Off-the-Shelf (COTS)/Non-developmental Item (NDI) tactical communications products. The JTNC Capability Characterization is an effort to verify and validate a product's performance against developer-stated specifications. The intent is to provide a preliminary characterization report on the innovative technologies and capabilities.
- Modular Radio Architecture (MRA) will expand the Government's ability to develop affordable, secure, and standardized tactical communications products. The MRA is intended to address emerging networking scenarios, while determining the necessary interfaces to maximize interoperability. It will also establish Open Systems Architecture (OSA) bounds to facilitate the integration of commercial technology.
- Technical Analysis: The JTNC implements a modular approach in performing technical analyses of candidate waveform and wireless communications products to determine if they meet DoD standards and policies for interoperable and secure joint tactical networking. Formal program of record waveform analyses align with DoD Instruction 4630.09, Communication Waveform Management and Standardization, and is intended to provide DoD program managers and leaders with the information necessary for deployment and reuse on new radio platforms.



A-C | Enabling interoperable, secure, and resilient waveform and wireless communications by recommending standards, conducting technical analyses, and maintaining a DoD Information Repository.

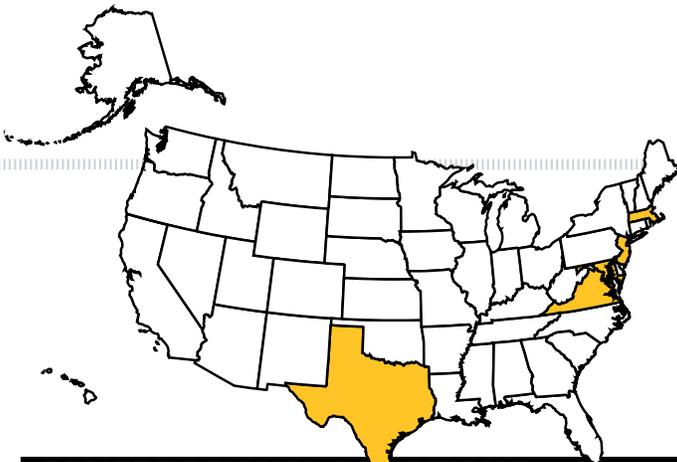


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



CPCE

The Command Post Computing Environment (CPCE), under the direction of Product Manager Tactical Mission Command (TMC), provides a software infrastructure framework (common interface, data and services) upon which current warfighter capabilities can be converged and future capabilities can be built. CPCE is the primary computing environment under the Common Operating Environment (COE) initiative, a major Army network modernization strategy line of effort of the Network Cross-Functional Team (N-CFT). CPCE is the central computing environment developed to support command posts and combat operations, and it will be interoperable with mounted and mobile/Handheld systems.



- Systematic
- Futures Skies
- CACI
- AASKI
- General Dynamics Mission Systems
- Bowhead
- StartGuides
- Dell



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

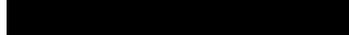
DESCRIPTION

CPCE will eliminate stove-piped legacy systems and provide an integrated, interoperable, cyber-secure and cost-effective computing infrastructure framework for multiple warfighting functions. CPCE will provide programs of record (PoRs) with a core infrastructure, including a common operating picture (COP) tool, common data strategy, common applications such as mapping and chat, common hardware configurations and common look and feel (user interface). This effort eliminates duplicative or redundant implementations, speeds up and simplifies future development efforts and enhances interoperability and data sharing across multiple echelons. CPCE's acquisition goals include acquisition agility, open system architectures (OSAs), reduced lifecycle costs and a cyber-hardened foundation for applications and services.

CAPABILITIES

- CPCE provides an integrated mission command capability across command post and platforms, through all echelons, and provides simplicity, intuitiveness, core services and applications, and warfighter functionality in the areas of fires, logistics, intelligence, airspace management and maneuver.

- CPCE has been optimized through Developmental Operations (DevOps) to improve responsiveness, add briefing capability and implement network management tools. Additionally, to improve system performance and to mitigate unnecessary data flow over constrained tactical network transport bandwidth, program managers and developers are working to address underlying data analytics, data dissemination and federation associated with the use of CPCE. These major efforts are key focuses of Capability Set 23 development.
- CPCE software will reside on a converged commercial off-the-shelf (COTS) hardware solution called the Tactical Server Infrastructure (TSI) stack. TSIv2 several improvements over the legacy Battle Command Common Services server stacks including an 800-pound weight reduction, a 50 percent reduction in setup and teardown time, and a reduction in the number of transit cases from nine to three, significantly increasing agility. TSI must serve as the basis for all other warfighting functions and mission command system software loaded on the server.



A | CPCE capabilities are demonstrated during a media visit to Aberdeen Proving Ground, Maryland.

B | TSI hosts multiple software infrastructure components including Active Directory, Microsoft Exchange, SharePoint, Tactical Defensive Cyberspace Operations Infrastructure (TDI) tools, SQL databases and a Voice over Internet Protocol (VoIP) tool.

C | Soldiers assess an engineering release of CPCE software in the Tactical Systems Integration Facility at Aberdeen Proving Ground, Maryland.

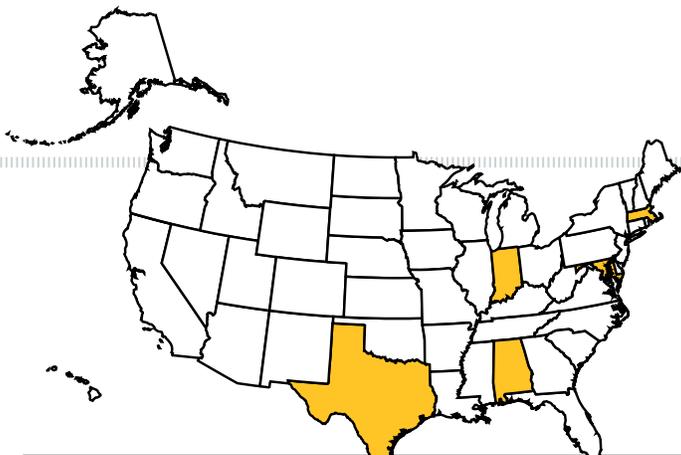


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



CPI2

Command Post Integrated Infrastructure (CPI2), aligns to the Army's Command Post Mobility/Survivability level of effort, addresses capability shortfalls outlined in the Army's Command Post (CP) Directed Requirement by collaborating with government and industry partners to design, prototype, and integrate mobile, survivable and agile CP solutions.



- American General
- Elbit Systems
- BRTRC
- DRS
- CACI



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The CPI2 program has the mission to develop modern and mobile command posts (CPs), which are the field headquarters where Soldiers, the network, procedures and processes, and information systems come together. The mobile CPs replace large legacy CPs that are vulnerable because of their physical signature, limited mobility and lack of standardization. The program provides integrated infrastructure via a mix of vehicle platforms and shelter systems that enable CP functionality, increasing survivability through mobility and rapid displacement of the CP infrastructure.

CAPABILITIES

CPI2 leverages improvements in technology to reduce the current CP footprint and improve agility. It consists of the integration of approved and fielded mission command information systems, government-off-the-shelf (GOTS) and commercial off-the-shelf (COTS) technology that support the operational needs of the corps, division and brigade combat team (BCT) main and tactical CPs, and the BCT battalion CPs. The centerpieces of CPI2 are the Mission Command Platform (MCP) and Command Post Support Vehicle (CPSV). CPI2 also provides all the ancillary equipment for fully outfitting the mobile CP, including the CPI2 Integrated Support System (ISS), tents, environmental control

units (ECUs), power generation, displays, tables and chairs..

- **Mission Command Platform (MCP)** The MCP provides digitally connected workstations to support staffs at CPs, as well as command groups at corps, division, and BCT. The MCP uses current program of record (PoR), GOTS and COTS systems to plan, prepare, execute and assess operations.
- **Command Post Support Vehicle (CPSV)** The CPSV hosts mission command servers, radios, local area network (LAN) systems and a Unified Voice Management System (UVMS) for conferencing, access to tactical voice radio, Voice over Internet Protocol (VOIP) telephone, and radio cross banding.
- **Integrated Support System (ISS)** CPI2 will develop or acquire the Command Post Display System (CPDS) and UVMS. The CPDS, with its accompanying software, will support enhanced collaboration and communication by allowing the commander and staff the option to view multiple common operating pictures (COPs) simultaneously. The UVMS provides data communication exchange between Army standard network and radio protocols within, and between, the mobile CPs.



A | The 1st Stryker Brigade Combat Team, 4th Infantry Division conduct operations at National Training Center, Fort Irwin, California. This represents the desired mobility from the CPI2 program.

B | The 4th Infantry Division demonstrates a Command Post Platform-Improved at Fort Carson, Colorado. It represents a potential CPI2 CPSV solution.

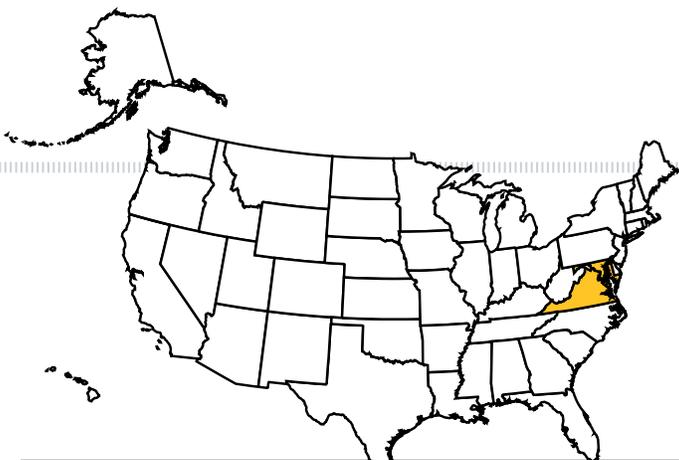
C | Soldiers with the 1st Armored Division, 2nd Armored Brigade Combat Team's 1st Squadron, 1st Cavalry Regiment Main plan their mission from inside the Lightweight Mobile Command Post TAC during the Network Integration Evaluation/Army Warfighter Assessments.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



Fire Support Command and Control (FSC2) empowers commanders to plan and execute the delivery of lethal fires and effects by providing capabilities to employ joint digital fires, enhance situational awareness and increase collaboration.



- Bowhead
- Leidos
- General Dynamics
- CACI
- CSRA



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

FSC2 provides Army, joint and coalition commanders with the capability to plan, execute and deliver both lethal and non-lethal fires and effects. FSC2 systems comprise the entire sensor-to-shooter digital kill chain, from the dismounted forward observer through theater and Combatant Command planning cells. These systems integrate Army, joint and coalition targeting capabilities and fuse that information with the ballistic calculations required to deliver precision munitions.

CAPABILITIES

- **Advanced Field Artillery Tactical Data System (AFATDS)** provides fully automated support for planning, coordinating, controlling and executing fires and effects, including mortars, field artillery cannons, rockets and missiles, close air support, attack aviation and Naval surface fire-support systems. AFATDS is the primary command and control system for Long-Range Precision Fires (LRPF) Cross-Functional Team (CFT) initiatives, such as Extended Range Cannon Artillery (ERCA), Extended Range Guided Multiple Launch Rocket System (ER-GMLRS), Precision Strike Missile Program (PrSM) and Projectile Tracking System (PTS).
- **Precision Fires-Dismounted (PF-D)** is used by forward observers and fire support teams to transmit and receive fire support messages over standard military line-of-sight, high-frequency and satellite communications radios. PF-D enhances this functionality over legacy systems with a revamped user interface and precision fires targeting capabilities. PF-D is hosted as a software application on common Army hardware in the Handheld Computing Environment.

- **Lightweight Forward Entry Device (LFED)** hosts the Forward Observer System (FOS) software, which enables mounted forward observers and fire support officers to plan, control and execute fire support operations at maneuver platoon, company, and battalion and brigade levels across the mounted formation. It will be replaced by Precision Fires-Mounted (PF-M) beginning in FY21.
- **CENTAUR** is the lightweight technical fire direction system that provides an automated cannon ballistic firing solution to the Fire Direction Centers (FDCs). Its primary function is a secondary technical calculation check for AFATDS or manual calculations.
- The **Profiler** weather system improves artillery accuracy by providing meteorological (MET) data, which is one of five requirements for accurate predicted fires. Profiler provides MET information to field artillery assets via AFATDS. Weather information is received via the Weather Data download site or the Global Broadcast Satellite (GBS), and computations provide correction information along the projectile trajectory and within the target area.
- **Joint Automated Deep Operations Coordination System (JADOCS)** is a joint mission management software application that provides a suite of tools and interfaces for integration across battlespace functional areas focusing on the Joint Target Cycle. JADOCS provides timely, accurate, detailed battlespace view for target nomination and vetting, target execution and coordination, air operations information, intelligence operations information, battle damage assessment and campaign plan.



A | A Soldier completes a practical exercise using AFATDS at a field artillery military occupation specialty course hosted by the Wisconsin Army National Guard's 426th Regional Training Institute at Fort McCoy, Wisconsin.

B | A Soldier operates an AFATDS and CENTAURs to calculate aiming data to relay to the howitzer teams during an air assault artillery raid on Fort Drum, New York.

C | A Soldier with the 3rd Battalion, 6th Field Artillery Regiment, 1st Brigade Combat Team, 10th Mountain Division tests the PF-D application at the Mission Training Center at Fort Drum, April 5, 2018.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

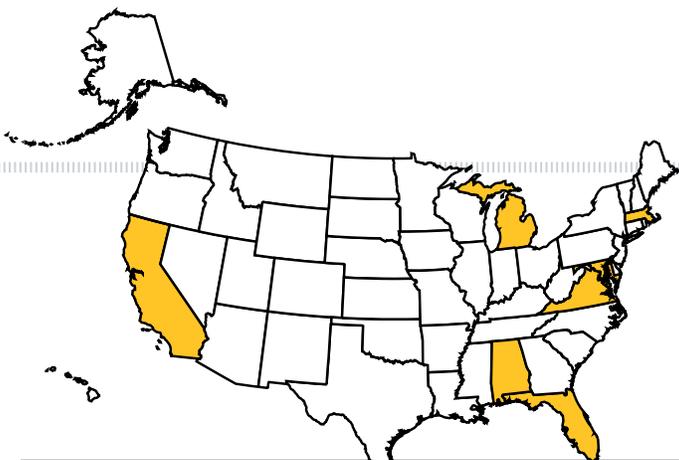
CP MOBILITY/SURVIVABILITY



JBC-P

A

Joint Battle Command-Platform (JBC-P) is the Army's next-generation friendly force tracking system, equipping Soldiers with a faster satellite network, secure data encryption and advanced logistics.



- COMTECH
- ACE Electronics Defense
- DRS Technology
- General Dynamics
- ViaSat
- Telesis
- INMARSAT Gov.



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

JBC-P, is the Army's next-generation friendly force tracking system, equipping Soldiers with a faster satellite network, secure data encryption and advanced logistics. Fielded to the first unit equipped in May 2015, JBC-P includes an intuitive interface with features like touch-to-zoom maps and drag-and-drop icons. JBC-P will be interoperable with the Nett Warrior handheld device, managed by PEO Soldier, delivering situational awareness capabilities to dismounted Soldiers. JBC-P incorporates the common hardware solution known as the Mounted Family of Computer Systems (MFoCS), which encompasses standardized tactical computers that are scalable and tailorable to the mission and vehicle. Ranging in options from a detachable tablet to a fully loaded, vehicle-mounted workstation, MFoCS can also run other software applications, reducing size, weight and power (SWaP) demands. JBC-P builds on the situational awareness capability known as Force XXI Battle Command Brigade and Below/ Blue Force Tracking (FBCB2/BFT), which is integrated on more than 120,000 platforms and is fielded or authorized to every brigade combat team in the Army.

The next generation of JBC-P, known as Mounted Mission Command (MMC) will leverage the existing JBC-P Program of Record and evolve utilizing a phased modernization approach with four Lines of Effort under the MMC Family of Systems:

- Software
 - Network
 - Transport Hardware
 - Compute and Store
- MMC will be based on open standards that promotes competition and enables the ability to inject new technology every two years. Rather than a one-size-fits-all solution, variants of hardware will deliver MMC capability.

CAPABILITIES

- Increased accuracy and density of situational awareness to further mitigate risk of fratricide
- Orders, graphical overlays, friendly, hostile, neutral, unknown, and non-combatant situational awareness
- Free draw, free text, chat and combat messages
- Sensor integration to enable capability to pinpoint location
- Hybrid network
- Improved user interface
- Electronic Causality Report (ECR)
- Improved route planning



A | Mounted Family of Computer Systems (MFoCS) will serve as the hardware provider for the MCE, Android-based software.

B | Soldier working on JBC-P at Network Integration Evaluation 18.2 at Doña Ana Range, N.M., Oct. 30. Photo by: Miguel De Santiago / Special to the Fort Bliss Bugle.

C | Soldier assigned to the 2nd Battalion, 5th Cavalry Regiment, 1st Armored Brigade Combat Team, 1st Cavalry Division tracks three different companies' movement using the blue force tracker during the battalion's command post exercise in Mihail Kogalniceanu, Romania, August 16, 2018.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



MCE

The Mounted Computing Environment (MCE) will provide a common set of applications and services as part of the Army's Common Operating Environment (COE) to enable mission command on ground platforms. MCE will enable modular and scalable solutions allowing for the convergence of current software systems and the agile development and certification of new on-the-move capabilities.



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS



DESCRIPTION

As one of six computing environments that make up the Army-wide Common Operating Environment (COE), MCE embraces a commercially based set of standards, a common understanding of data, and a common map to enable integrated applications for development by government and industry partners. MCE will provide data services that work on the Army's tactical radio networks and network-aware services that enable mission command data to flow throughout the disadvantaged, intermittent and latent network environments among dismounted Soldiers, vehicles and command posts.

MCE uses the same infrastructure as the Command Post Computing Environment (CPCE) and integrates it onto the Mounted Family of Computer Systems (MFoCS), along with the Android operating system framework for applications hosting and simplified user experience. This approach enables tech-savvy Soldiers to rapidly learn and become proficient on MCE applications with minimal training. It will also improve interoperability with command posts and reduce duplication and complexity of software development and configuration management for both MCE and CPCE applications. MCE applications will work seamlessly with the CPCE applications, similar to how commercial programs are integrated across standard computers, tablets and smartphones. MCE will be fully compatible with existing platform-based systems while improving upon the cyber posture and being extensible to meet evolving enemy threats. MCE infrastructure will

provide a framework that will allow seamless integration of other third-party applications.

CAPABILITIES

- Provides operating systems, common applications, software development kits (SDKs) and standards to implement mission command
- Establishes secure applications that are interoperable with existing mission command systems and allow seamless information exchange across all echelons for a complete situational awareness (SA) picture down to the tactical edge
- Provides an SDK framework that allows for seamless integration of third-party applications built by other programs of record (PoRs) and contractors
- Enables mission command on-the-move by providing an environment for an integrated suite of platform-based mission command applications and services
- Eliminates redundant hardware, streamlines product development and consolidates capabilities
- Optimized for use on the existing MFoCS and Blue Force Tracking (BFT) 2 network
- Provides standard interfaces to meet the Vehicle Integration for C4ISR/EW Interoperability (VICTORY) technical specifications



A | Gen. Robert B. Abrams visited Fort Bliss, Texas, and the Soldiers of the Iron Brigade, getting a demo of JBC-P, which serves as the core of the MCE.

B | Maj. Shawn P. McNicol, Division Mission Command Node Officer-in-Charge for the 5th Squadron, 73rd Cavalry Regiment, 3rd Brigade Combat Team, Airborne Division from Fort Bragg, N.C., obtains data from one of the MCE systems in preparation of executing convoy operations during Network Integration Evaluation 18.2.

C | A Soldier tests an MCE prototype kit at Aberdeen Proving Ground, Maryland.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

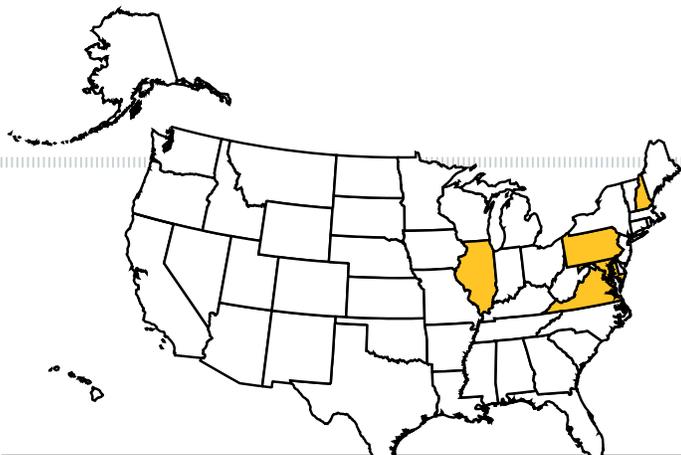
JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



MC CYBER

Mission Command Cyber (MC Cyber) designs, develops and deploys cyber capabilities to the Army to establish cyber operational overmatch. MC Cyber delivers capabilities to corps and brigades at the tactical edge that allow warfighters to understand and depict cyberspace while defending friendly key cyber terrain.



- Enlighten IT Consulting
- Parsons
- CACI
- SOSSEC, Inc.
- CarahSoft Tech Corp
- GovSmart Inc.
- Deloitte & Touche LLP
- OCTO Consulting Group, Inc.



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

MC Cyber’s agile acquisition and integration processes achieve both near- and long-term capability development to ensure dominance in the cyber battlefield.

CAPABILITIES

- **Tactical Defensive (Cyber Operations) Infrastructure (TDI):** Cyberspace defenders have the need to locally and remotely protect friendly tactical cyber terrain, maneuver in and across tactical enclaves, and counter cyber adversaries to ensure the reliability of critical tasks and services. TDI addresses this need by pre-positioning DCO tools onto dedicated computer and storage resources residing at echelons corps and below. The TDI system is physically and logistically converged with the Tactical Server Infrastructure (TSI) to minimize size, weight, and power (SWaP) requirements in a tactical operations center (TOC) or tactical command post (TAC).
- **Cyber Situational Understanding:** Cyber SU will ingest, normalize, correlate, and analyze disparate data from multiple Army programs of record (PORs) within an Army TAC, including Command Post Computing Environment (CP CE), Distributed Common Ground System-Army (DCGS-A), Electronic Warfare Planning and Management Tool (EWPMT), TDI, and Tactical Network (TN).

- **Tactical Digital Media:** Public Affairs (PA) teams are often dispatched with combat patrols and small units that deploy to remote locations. Tactical Digital Media (TDM) kits allow these teams to gather, process and deliver audio files, digital imagery and visual media in austere environments with cameras and video equipment, laptops, night-vision devices and audio gear. TDM aids globally deployed Combat Camera (COMCAM) teams, PA detachments and Military Information Support and Operation (MISO) teams operating from TCPs, forward operating bases (FOBs), combat outposts and forward deployed combat patrols.



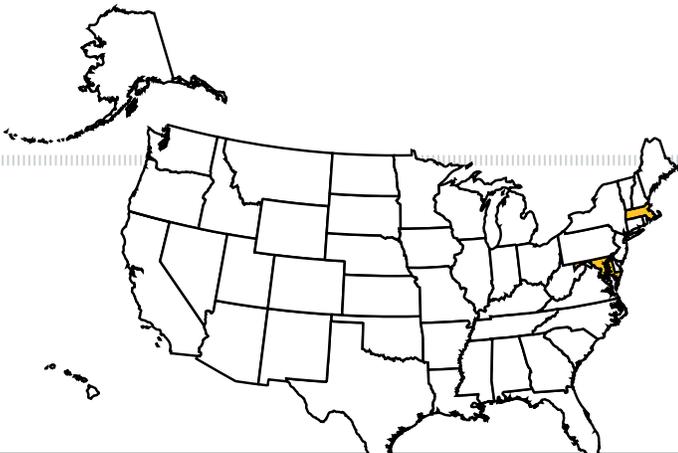
- A** | A Chief Warrant Officer briefs the Cyberspace Situational Understanding capability during a design workshop at Aberdeen Proving Ground, Maryland.
- B** | A Soldier from the 82nd Airborne Division uses Tactical Defensive Cyber Operations Infrastructure (TDI) tools during a User Jury to collect feedback on the capability at Aberdeen Proving Ground, Maryland.
- C** | A Soldier uses a Tactical Digital Media kit.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



Common Hardware Systems (CHS) acquires and supports sustainment of highly flexible, cost-effective, common, and simplified non-developmental, commercial information technology (IT) solutions that improve interoperability and connectivity on the battlefield, while garnering efficient competition to enable the latest commercial technology solutions to meet tactical and operational requirements.



- General Dynamics Mission Systems



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

CHS coordinates across tactical programs providing consolidated procurement and sustainment support of commercial IT hardware, to include non-developmental and modified commercial off-the-shelf (COTS) items. The program portfolio ensures configuration and obsolescence management by continually updating new contract items ensuring modern, emerging technologies resulting in over match capabilities for warfighters.

The CHS-5 contract allows Army weapon system programs to rapidly buy commercial IT equipment like laptops, servers, routers, switches and integrated solutions in large quantities and at discounted prices. CHS provides state-of-the-art computing and networking equipment that improves connectivity, interoperability, logistics and maintenance support to Soldiers, and the program is positioned as the Army's primary organization to oversee commercial IT hardware for the Army's tactical network.

The CHS-5 contract is a single award, indefinite delivery-indefinite quantity contract, with a five-year period of performance and \$3.9 billion ceiling for the rapid procurement of total life cycle system management solutions in support of tactical programs. From receipt of requirements to award of a corresponding delivery order for a supported program, CHS averages a 90-day processing time with an expedited capability available to meet urgent needs. The CHS-5 contract requires the prime contractor to establish a public-private partnership with Tobyhanna Army Depot (TYAD), facilitating

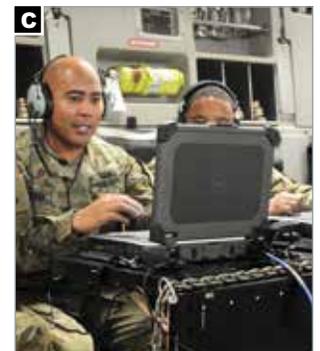
product support for programs procuring hardware via CHS-5 and having core logistics capability requirements. This partnership leverages TYAD and CHS innovation and resources providing the best value to the warfighter.

The CHS-5 contract also provides the Government with an increased ability to perform supply-chain risk management, critical functionality analysis of critical components, critical program information assessment and implementation of other protection measures contained in program protection plans. This contract feature strengthens the Army's cybersecurity posture while protecting the tactical network.

The CHS-5 contract includes a pre-negotiated pricing schedule for the life of the contract; additional warranty options with up to eight years of coverage providing a 72-hour turnaround time; incentives to provide the lowest price hardware; and the ability to procure technical data packages based on competitive pricing.



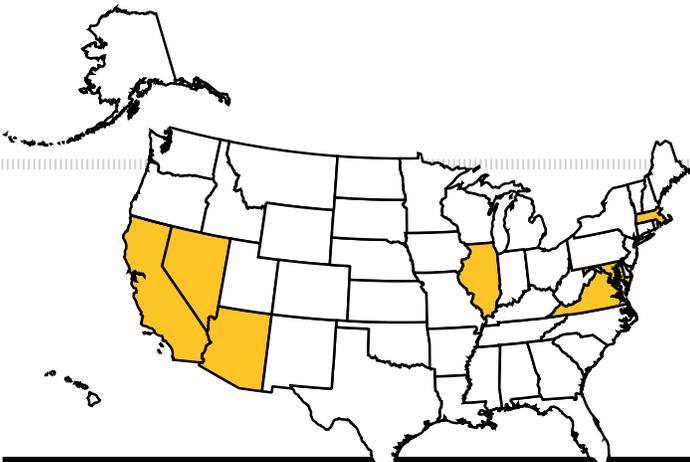
- A | A Soldier uses a CHS rugged handheld device in the field.**
- B | The Tactical Control Console is the primary interface for the AN/VIC-5 system.**
- C | A Soldier assesses for mission using CHS equipment during Enroute Mission Command exercise.**
- D | A Soldiers configures operational transit cases.**



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



Communications Security (COMSEC) develops, tests, procures, fields and sustains COMSEC solutions to secure the Army's network (tactical through enterprise).



- Booz Allen Hamilton
- CACI
- CSLA
- General Dynamics
- ViaSat
- Raytheon
- Sierra Nevada Corp



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Under the umbrella of the National Security Agency (NSA), the Army provides all users from enterprise down to tactical units with secure organic key management, including ordering, generation, distribution and destruction.

The Army Key Management Infrastructure (AKMI) consists of three subcomponents: Management Client (MGC), Automated Communications Engineering Software (ACES) and Next Generation Load Device (NGLD). AKMI provides a system for distribution of COMSEC, electronic protection, mission initialization data, and signal operating instructions (SOI) information from the planning level to the point of use in support of current, interim, and objective force structure. AKMI introduces capabilities and processes to transform operations from manual to secure automated distribution of keys and firmware directly to end devices.

New and emerging architectures, cease key dates, and DoD and Army policy are driving the need to replace legacy devices with technically advanced (network-centric GIG compliant) modern devices that incorporate Chairman of the Joint Chiefs and Joints Requirements Oversight Council directed cryptographic standardization, Key Management Infrastructure (KMI) and network centric performance capabilities. This enables the Army to equip the force with critical cryptographic solutions and services during peacetime, wartime and contingency operations.

CAPABILITIES

- **Cryptographic Mission Planner:** Provides ACES Crypto network planning; generates SOI data; creates COMSEC key tags; supports emerging requirements.
- **COMSEC Load Devices:** NGLD-S, NGLD-L, and SKL ruggedized mission and cryptographic keys fill into SHIELD devices, radios, end cryptographic units, interfaces between key-generation MGC, and mission planners.
- **Secure High Assurance Inline Encryption Link Device (SHIELD):** SHIELD encryption systems secure the Army's data and voice communication networks. SHIELD encryption devices include in-line network and in-line media, link and trunk, secure voice, and commercial solutions for classified communications.



A | Soldier from the 4th Infantry Brigade Combat Team, 3rd Infantry Division, uses a simple key loader (SKL) to ensure her communication systems inside a tactical mobile station for the network are secure.

B | A Soldier works on encryption devices.

C | SHIELD encryption and key systems family.

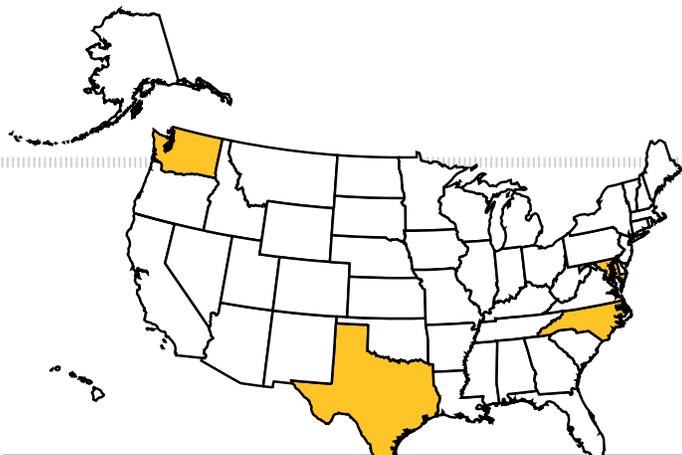


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



TNIC

Tactical Network Initialization and Configuration (TNIC) rapidly delivers relevant network initialization products and solutions to the warfighter in support of evolving Army directives.



- Booz Allen Hamilton
- MITRE



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Data Products are a collection of mission data required to initialize the tactical network and command and control (C2) applications. This data includes the information required to enable end-to-end network-centric connectivity and interoperability across the tactical internet (TI) such as internet protocol (IP) addressing, unit reference numbers (URNs), router, switch, and firewall configurations, and more. Data Products are used to instantiate the digital systems. Once loaded, they populate look-up tables and local databases, and are expected to be maintained within the runtime operational environment by the systems utilizing the data or by the network manager responsible for that system.

The information within Data Products is used to populate address books; create default message lists; determine communication protocols between systems; and determine how a system processes and handles information from another system. Every PM that touches the tactical network needs Data Products of some kind in order to establish the network layer and enable binary messaging protocols such as Variable Message Format (VMF) and United States Message Text Format (USMTF) in support of the common operating picture (COP), situational awareness (SA) and command and control (C2) messages for Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, Reconnaissance (C5ISR) applications. All systems internal and external to PEO C3T who meet these criteria need Data Products.

CAPABILITIES

C2/Application Initialization Team Deliverables

- Software Block 2 (SWB2)
- BFT database(s) and Global
- SWB11-12/capability set (CS) baselines
- adam.Idif
- Address book to support Air and Missile Defense Workstation (AMDWS)
- Lower tactical internet (LTI) vehicle data sets Unit Task Organization (UTO) and URN
- Storage definitions (encoded)
- .pdf LDIF versions
- UTO report and Warfighter Initialization Tool (WIT) URN files
- Tactical radio report (TRR) for CS units
- Quality assurance/quality controls
- Configuration management

Network Initialization Team Deliverables

- IP address templates
- Telephony numbering plans
- Multicast addressing/autonomous system numbering
- Network device configurations
- Interconnectivity diagrams
- Engineering field notices
- Traffic flow management and Quality of Service (QoS)
- System-of-systems engineering and integration
- Quality assurance/quality controls
- Configuration management



A | Initialization products provide the technical glue to ensure the components of the overall network are able to function together in a manner consistent with current and future warfighter requirements.

B | Initialization products assign every system in a command post a unique identifier, role and IP address, taking into account a unit's specific mission, personnel footprint and mix of networked mission command systems. This contact information enables the various systems to connect and share information.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



The Integrated Tactical Network (ITN) provides a simplified, independent, mobile network solution that is available down to the small-unit dismounted leader to facilitate mission command, situational awareness, and air-to-ground integration. The ITN will provide commanders with resilient communications as part of their primary, alternate, contingency and emergency communications plan.



DESCRIPTION

The ITN is not a new or separate network but rather a concept that incorporates the Army's current tactical network environment (applications, devices, gateways, and network transport) with commercial off-the-shelf components and transport capabilities to enable communications when faced with contested or congested communications environments.

For Capability Set 21, ITN is comprised of an integrated set of 2-channel Leader Radios and single-channel commercial radios with advanced networking waveforms, high capacity line of sight radios, voice and data gateways, tactical cross domain solutions, small aperture satellite terminals, expeditionary servers, variable height antennas, commercial phone technology, applications and associated ancillary devices. These commercial components and current network systems offer commanders multipath communications diversity and will interoperate with current network systems.

CAPABILITIES

- Operates in both a Secret and a Secure but Unclassified (SBU) enclave to provide commanders with the flexibility to balance security and connectivity based on mission need:
 - Allows data to be categorized in accordance with its classification
 - Provides the ability to securely transmit data to Army and coalition forces in an unclassified environment
- Simplifies training, set-up, and employment of the network
- Enables use of alternate transport including 4G/LTE
- Interoperates with current network systems to enable mission command systems used in command posts and on platforms.



A-C | Paratroopers with C Company, 1-508th Parachute Infantry Regiment (PIR), 82nd Airborne Division (Air Assault) assess the Integrated Tactical Network (ITN) while performing an air assault exercise in January at Camp Atterbury, Indiana. Paratroopers used the Android Tactical Assault Kit end-user device to obtain position location information of their troops as soon as they hit the ground. The ITN provides smaller, lighter, faster and more flexible communications systems with multiple connectivity options primarily at battalion and below.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



IVAS

A

Integrated Visual Augmentation System (IVAS) is an effort to modernize the Soldier by providing a single platform that allows the Soldier to fight, rehearse and train. It improves Soldier sensing, decision making, target acquisition, and target engagement through a next generation, 24/7 situational awareness tool.



DESCRIPTION

PM Tactical Radios (TR) and the Network CFT (N-CFT) are integrating the IVAS product into the Army's Integrated Tactical Network (ITN) to deliver advanced tactical and IVAS Synthetic Training Environment services to the edge.

As part of this effort, PM TR is providing a new single channel small form factor radio that links squads and platoon leadership together for sharing internal PLI and synchronization data. The single channel radios are coupled with an integrated network enhancement kit called the Bloodhound, which is a platform agnostic network communications gateway and data management kit that supports IVAS network requirements. The Bloodhound allows greater connectivity throughout the company echelon through the use of a tactical radio integration kit, which includes radio gateways that enable voice and data information to be pushed and pulled from multiple sources.

Advanced tactical service cloud capabilities (integrated into a small modular package) provide onboard compute capability for graphical processing and data management. IVAS can operate in three network environments: jammed, contested and permissive. The puck body device allows for continued communications and some functionality in network-denied environments, including pre-loaded mission packs, navigation, fused thermal or low light night vision and simple language translation, but the capabilities increase with network connectivity.

In conjunction with Bloodhound, IVAS also features advanced tactical service cloud and data management capabilities to provide an advanced mission planning pack, 3-D mapping and advanced artificial intelligence for face recognition. It also includes both written and spoken language translation and synthetic training for complete command and control capabilities.

CAPABILITIES

- IVAS is not network dependent, but it is enhanced by the network.
- IVAS can operate in three network environments: jammed, contested and permissive.
- The organic Soldier PUK wearable device allows for continued communications and some functionality in network-denied environments.
- Software defined radios, coupled with integrated network enhancement kit (called the 'Bloodhound') enable IVAS network enhancement in network permissive environments
- The network allows IVAS enabled Soldiers to push and pull information to their IVAS devices.
- Current enhanced capabilities provided by network connectivity include access to 3-D mapping, face recognition and language translation, both written and spoken.



A,C | The team is providing quick transport capability under the IVAS Bloodhound effort. Bloodhound is a network gateway, cloud and communication capability integrated, pictured here integrated onto an MRZR platform that can push into and out of the main objective to enhance the network.

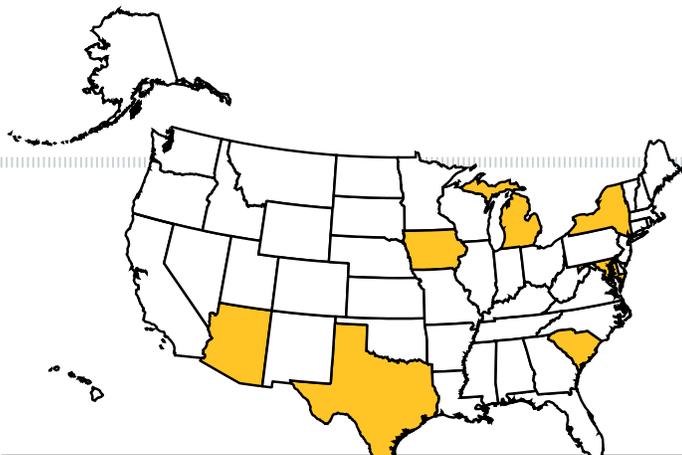
B | PEO C3T and the Network CFT (N-CFT) are providing the critical network component to the Army's IVAS effort, which is a heads-up display equipped with an advanced set of night-vision goggles and sensors to display shared maps, simulated training scenarios, infrared and low-light vision, language translation and other capabilities in a single platform to allow close-combat teams to fight, rehearse and train 24/7.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



Handheld, Manpack and Small Form Fit (HMS) acquires Non-Developmental (NDI) radio solutions providing affordable networking tactical radio systems that meet operational requirements from the Army. Other customers include the Marine Corps, Navy, and Special Operations Command (SOCOM). HMS products provide state-of-art networking waveforms, provide human factor upgrades over legacy radio solutions, and are interoperable with specified radios within the current force.



- General Dynamics Ground Systems
- L3Harris Corporation
- Collins Aerospace
- Thales Defense and Security, Incorporated (TDI)
- Advanced Technology International (ATI)



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Handheld, Manpack and Small Form Fit (HMS) is the total lifecycle manager for tactical radio communication. Paramount to the HMS mission is providing interoperable communications to the tactical edge Warfighter with an on-the-move, at-the-halt and stationary Line of Sight (LOS)/Beyond the Line of Sight (BLOS) capability for both dismounted personnel and platforms. HMS radios provide voice communications as well as support for data services such as text, control graphics, imagery, and video to the tactical edge Warfighter through interoperability with tactical End User Devices (EUDs), and provide Single Channel Data Radios (SCDR), primarily in support of the Integrated Visual Augmentation System (IVAS). HMS products enable net-centric operations, operate in multiple bands and multiple modes, and deliver reliable, secure tactical communications. They are network-scalable to meet operational needs and are developed based on reprogrammable modular Software Communications Architecture (SCA), allowing field and depot service to upgrade such features as security and waveforms.

Low Rate Initial Production

(LRIP) Rifleman Radio:

- AN/PRC-154/A/C, Single-Channel SRW only (General Dynamics Mission Systems)

LRIP Leader Radio:

- AN/PRC-148C(v)6, Two-Channel, SINCGARS, TSM™ (TDI)
- AN/PRC-163(v)2, Two-Channel, SINCGARS, TSM™ (L3Harris Corporation)

LRIP Generation 1

Manpack Radio:

- AN/PRCs-155, Two-Channel, Type 1 and Type 2 (General Dynamics Mission Systems)

LRIP Generation 2

Manpack Radio:

- AN/PRC158, Two-Channel, Type 1 and Type 2, SRW, MUOS, SINCGARS, SATCOM, TSM™ (L3Harris Corporations)
- AN/PRC162, Two-Channel, Type 1 and Type 2, SRW, MUOS, SINCGARS, SATCOM, TSM™ (Collins Aerospace)

CAPABILITIES

- Simultaneous voice, data and video communications
- Software reprogrammable, enhancing network security and sustainability
- Increased throughput using networking waveforms such as TSM™
- Routing and Retransmission (Crossbanding)
- Increased functionality in a reduced footprint to include Size, Weight, and Power (SWaP) improvements, addition of a display for the Rifleman Radio, and additional waveforms (e.g. TSM™ and TACSAT IW for the Manpack)
- Mobile User Objective Systems (MUOS) for BLOS
- Interoperability with legacy systems and End User Devices (EUD)



A | U.S. Army 1st Lt. Jordan C. Donnelson, a platoon leader assigned with C Troop, 5th Squadron, 73rd Cavalry Regiment, 3rd Brigade Combat Team, 82nd Airborne Division provides security prior to extraction from a key leader engagement Dec. 14, 2019 in Southeastern Afghanistan.

B | AN/PRC-163 (Harris); AN/PRC-148B/C (Thales).

C | AN/PRC-155 (v)2 (GD); AN/PRC-162 (v)1 (Rockwell Collins Inc.); AN/PRC-158 (v)3 (Harris)

D | Advisors in the 2nd Security Force Assistance Brigade conduct blank and live fire training in October 2018 on Fort Bragg, North Carolina.



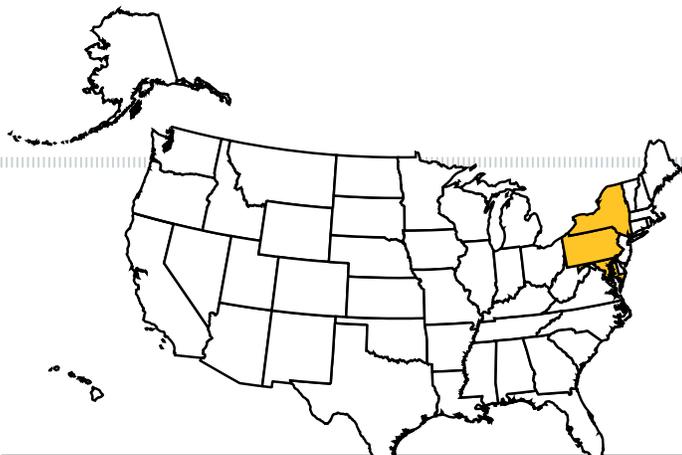
ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK	COMMON OPERATING ENVIRONMENT	JOINT & COALITION INTEROPERABILITY	CP MOBILITY/SURVIVABILITY
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HAMMR

Helicopter and Multi Mission Radios (HAMMR) procures tactical communication enhancement equipment, ancillaries, and related services in support of the Army's Network Modernization Strategy.



- L3Harris Corporation
- SEV1TECH



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

HAMMR provides air-ground interoperability between maneuver ground forces and aviation and is the Army's program for the Integrated Tactical Network (ITN) concept and the Security Forces Assistance Brigades (SFABs) tactical radio COTS procurement, fielding, and sustainment. HAMMR also provides the overall network interoperability for the Integrated Visual Augmentation Systems (IVAS) products. HAMMR radio products include all Army Link-16 radios (Ground ADA, Ground Fires, Aviation, and Gateways).

CAPABILITIES

ITN: For Capability Set 21, the ITN injects new commercial components and network transport capabilities to lower echelons within the Army's tactical network environment. Components include radios, variable height antennas, small satellite terminals, and commercial phone technology to enable communications through a Secret and a secure but unclassified (SBU) enclave.

SFABs: SFABs are receiving connectivity/interoperability and network access to enable shared mission planning and situational awareness across units and forces, including:

- Mix of Non-Developmental Item (NDI) and Commercial Off the Shelf (COTS) items
- Mix of single and multi-channel NSA Type 1 certified and SBU radios to provide seamless real-time information for operations in mobile and dynamic environments
- Waveforms: Single Channel Ground and Airborne Radio System (SINCGARS), Soldier Radio Waveform (SRW), Tactical Scalable MANET (TSM), High Frequency (HF), Link-16

Air to Ground Networking Radio (AGNR): AGNR uses Program of Record ground radios and a federated

integration approach that will allow aviation to keep pace with technological changes on the ground to enable Multi-Domain Operations (MDO) Force Packages by FY28:

- Provides multi-band, multi-mode two-channel ground radio system to provide VHF/FM, SINCGARS, TSM, and MUOS
- Replaces ARC-201D legacy radio
- Provides voice, data and advanced network communications
- Utilizes new Aviation Mission Common Server to control radio

Multifunctional Information Distribution Systems (MIDS):

- MIDS Low Volume Terminal (LVT) (2/11) is the DoD's primary Link 16 tactical data link network, providing joint/allied interoperability, situational awareness and support for air and missile defense operations at division through corps.
- MIDS Joint Tactical Radio System (JTRS) Ground Variant builds upon and will ultimately displace MIDS LVT with a software defined radio solution that introduces modernized Link16 networking.

High Frequency Radios: NDI, COTS networking radios supporting a Class II Engineering Change Proposal (ECP) for ground based HF requirements, created to mitigate current crypto-modernization and obsolescence issues.

- The new PRC-160 HF Radio will provide increased throughput rates and address obsolescence and cryptographic modernization challenges found with the Army's current PRC-150 HF ground-based radio.

Survivor Handheld Evader Locator Device (SHIELD): SHIELD will provide the current CSEL HHR capabilities in a smaller form factor.



- A | American commandos during an exercise, a Special Forces soldier in Afghanistan.**
- B | AN/PRC-160(V) Wideband HF/VHF Manpack Radio (Harris)**
- C | MIDS-LVT(2/11) platform-based Link 15 terminal**



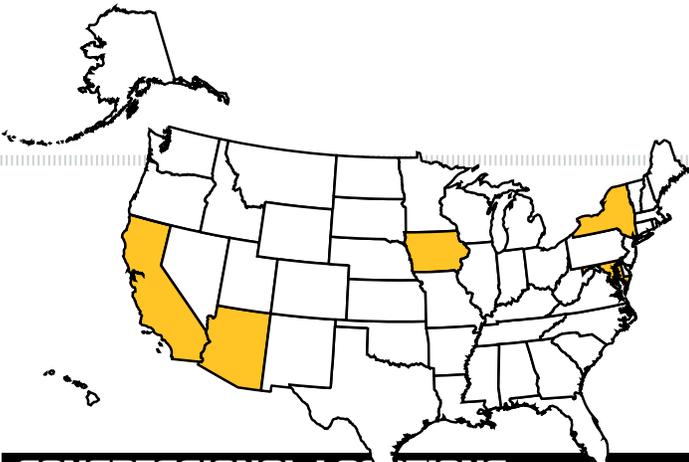
ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



WAVEFORMS

A

Waveforms provides the warfighter with a suite of extensible and interoperable software products, enabling secure tactical communications, seamless networking, and real-time network management capabilities supporting the Army tactical radio portfolio.



- Thales
- Collins Aerospace
- Northrop Grumman
- General Dynamics



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Waveforms provides and sustains mobile and ad hoc networks and enterprise services to enhance tactical warfighting capabilities to enable Army tactical radios platforms to transmit voice and data across the battlespace.

Products and services include multiple Army waveform modernization efforts such as Single Channel Ground and Airborne Radio System (SINCGARS), which counters present and emerging Cyber Electromagnetic Activities (CEMA) threats; Warrior Robust Enhanced Network (WREN), which is based on current commercial waveform technologies; and the Advanced Network Waveforms (ANWf) operational analysis, which enhances radio communication interoperability solutions for the DoD, ABCANZ.

CAPABILITIES

SINCGARS:

- SINCGARS waveform provides warfighting commanders and troops with a highly reliable, secure, easily maintained Combat Net Radio (CNR) with voice and data handling capability in support of command and control operations
- Facilitates voice and/or data transmission to conduct a myriad of missions across the operational continuum
- Is integrated in all dismounted Soldier, ground and aviation platforms including the RT-1523, PRC-148 series, PRC-152 series, HMS MP, LR, PRC-117 series

WREN:

- WREN waveform enhances network scalability, increases communication range, reduce spectrum foot print, and harden Electronic Warfare (EW) protection

- Supports VHF, UHF and L-Band frequency ranges using 50 kHz, 1.2 MHz, 3.6 MHz, and 10MHz+ bandwidth
- Provides simultaneous PLI and voice services
- Two modes to address the Army's existing and future Integrated Tactical Network (ITN) networking problems:
 - WREN TSM - provides Spectrum Supportability, Point to point range of 3-5km
 - WREN-NB - provides enhanced Electronic Protection and Spectrum Supportability, for operations in contested and congested environments up to ~15km
- Adopts TSM BRn (Barrage Relay networking) for extended range and fast frequency hopping.

Black Sails:

- Black Sails is a simple toolset that provides the signal staff and general purpose user the ability to dynamically publish, discover, install and monitor networks across the battle space, manage connected radios and integrate with the ATAK map on Nett Warrior
- Reduces the need for vendor configuration tools and facilitates integration with higher level planning tools

enterprise Over The Air Management (eOTAM):

- eOTAM is an Application Programming Interface (API) framework and radio service that simplifies network management and enables secure over the air monitoring and remote re-provisioning
- Features a standardized and secure protocol defined by the Government to provide the ability to manage and monitor the Army's tactical radios securely

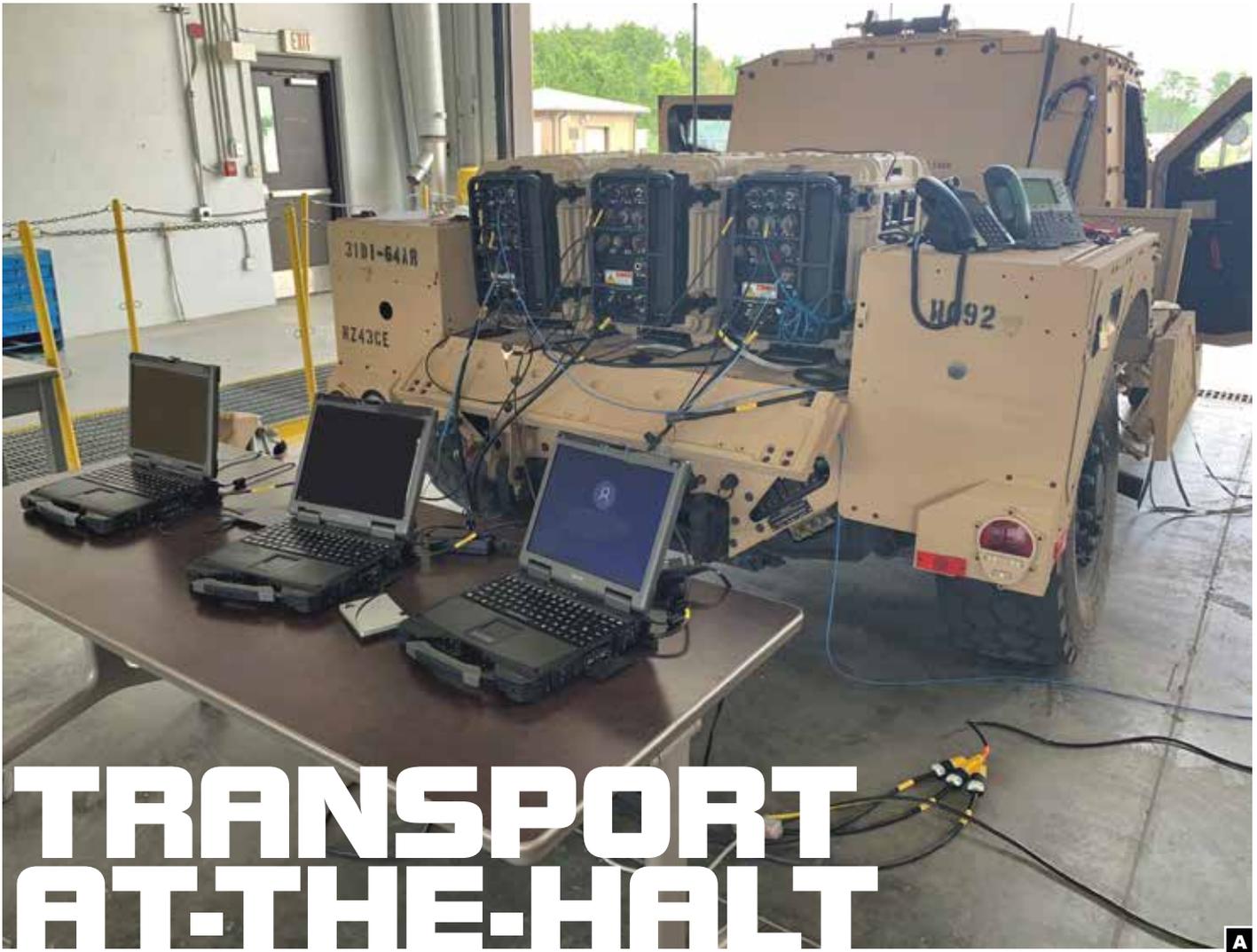


A | U.S. Soldiers, all assigned to B Company, 1-502nd Infantry Regiment, 2nd Brigade, 101st Airborne Division, set up AN/PRC-155 (Manpack) radios at Fort Bliss, Texas.

B | Soldier with 1st Battalion, 26th Infantry Regiment, 2nd Brigade Combat Team, 101st Airborne Division, listens on Manpack while conducting a live fire exercise.

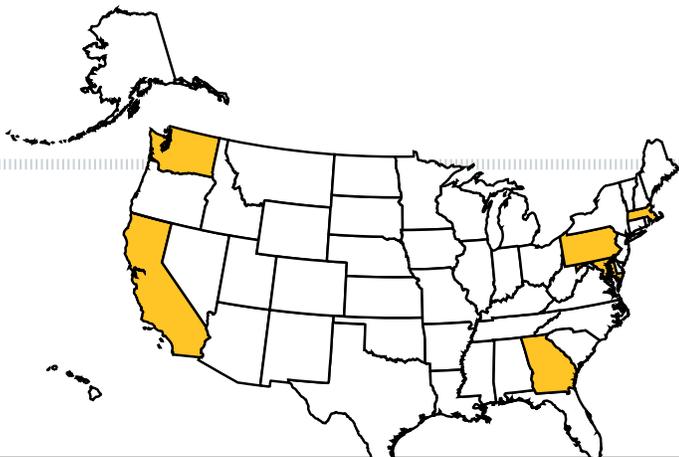


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



TRANSPORT AT-THE-HALT

Tactical Network Transport - At The Halt (TNT- ATH) enables mission command and robust voice, video, and data communications for global data exchange from anywhere on the planet. These robust line-of-sight and beyond-line-of-sight network communications systems operate at-the-halt and deliver a real-time common operating picture to enable Commanders to make rapid informed decisions. To support expanding network requirements and improve the readiness of today's operational force, the Army continues to modernize the ATH capability, improving mobility, computing power, and interoperability, while optimizing and increasing bandwidth and resiliency in congested and contested environments.



- General Dynamics
- CodeMettle
- Telecommunication Systems, Inc
- Envistacom
- Microsoft
- Riverbed Technology



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The Network Integration Technology Enhancement (NITE) is the next modernization effort that will refresh the Army's widely fielded TNT-ATH equipment, which is reaching end of life. Using a unified network approach, NITE leverages new technology and pre-existing Tactical Network products for a common user experience. This modular solution will provide more computing power, reduce size, weight and power (SWaP) and equipment setup time for increased mobility, while increasing usability, network resiliency and equipment flexibility. PM Tactical Network is currently piloting the new NITE prototype solutions, leveraging Soldier feedback to inform design and fielding decisions.

PM Tactical Network will also pilot enhanced Tactical Hub Node (THN) and Satellite Transportable Terminal (STT) prototypes to modernize these configuration items as well.

ADDITIONAL PILOT EFFORTS

As part of the Army's Capability Set 21 network modernization efforts, the Expeditionary Signal Battalion-Enhanced (ESB-E) Pilot provided valuable feedback to shape equipment solutions and force structure to enhance the service's 24 ESBs. In support of this pilot effort, PM Tactical Network delivered an innovative mix of smaller, lighter more mobile and expeditionary Tactical Network Transport equipment that eliminated the need for traditional TNT-ATH equipment. The final ESB-E's line-of-sight and beyond-line-of-sight expeditionary equipment package enables uninterrupted mission command

and the ability to rapidly deploy and maneuver across the battlefield in support of other units. The equipment tool suite is also tailorable and scalable to enable new ESB-Es to support small teams to corps sized elements, and a wide variety of mission sets.

MAIN COMPONENTS

- The Army's TNT-ATH has three main transportable network nodes that provide high-speed wide area network capability for secure voice, video and data exchange. The THN and Joint Network Node (JNN) support division headquarters; the JNN also supports brigade combat team level headquarters; and the Command Post Node (CPN) supports battalion level headquarters and smaller-sized units.
- STT is a highly transportable and mobile satellite system, which operates in conjunction with the JNN and CPN. It is designed to establish secure voice, video and data communications virtually anytime and anywhere. As part of its network modernization efforts, the Army is upgrading its fleet of STTs to increase capability, modularity, mobility, and operational flexibility, while reducing SWaP for a more expeditionary force.



A | PM Tactical Network completed equipping the 1st ABCT, 3rd ID with new prototype more expeditionary TNT-ATH equipment enhancements, referred to as NITE, in September 2019, at Fort Stewart, Georgia.

B | The 1/3 ID uses its prototype NITE equipment, during the Marne Focus communication exercise in November 2019, at Fort Stewart, Georgia.

C | The 50th ESB-E pilot unit demonstrated its new expeditionary network equipment package to FORSCOM leadership on May 29, 2019, at Fort Bragg, North Carolina.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

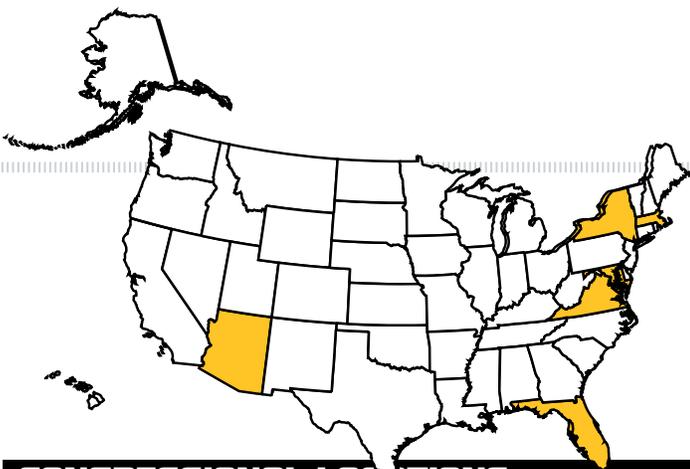
JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



TRANSPORT ON-THE-MOVE

Integrated on a variety of tactical vehicles to best suite unit requirements, Tactical Network Transport - On The Move (TNT-OTM) configurations enable mobile mission command; robust, secure reliable voice, video and data communications; and a real-time common operating picture from anywhere on the battlefield. TNT-OTM enables Soldiers operating in remote and challenging terrain to maintain network communications while on patrol, with connectivity similar to that found in a stationary command post. Using both line-of-sight and beyond-line-of-sight for optimal network connectivity, these configurations deliver a global, mobile, resilient, redundant tactical communications network.



- General Dynamics
- Lockheed Martin
- L3 Technologies



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

TNT-OTM ensures effective and less predictable offensive and defensive operations. In the fires battalions, the system improves the speed and reliability of the fires network, while also extending range and increasing the survivability of artillery units. Soldiers can expand operational reach well beyond line-of-sight radio ranges and still maintain voice/chat/data communications using satellite-based retransmission, or retrans. Retrans can be located with maneuver forces alleviating the need for isolated retrans elements that require combat power to protect.

In support of expeditionary, quick reaction and air assault mission requirements, Project Manager Tactical Network (PdM Mission Network) integrated the Tactical Communications Node (TCN) and Network Operations and Security Center (NOSC) onto HMMWVs, versus Family of Medium Tactical Vehicles (FMTVs), which can be sling loaded and transported by helicopter across the battlefield or rolled onto a C-130 aircraft, making the Army more expeditionary and providing significantly increased agility and operational flexibility.

Integrated on a variety of tactical vehicles, the TCN-Lite (L); NOSC-L; Next Generation Point of Presence (NextGen PoP) and NextGen Soldier Network Extension (SNE) provide significant reductions in size, weight and power (SWaP), but more importantly, they reduce system complexity to make the systems easier to train, operate, maintain and sustain. Supporting the Army's Capability Set 23 efforts to provide OTM network connectivity to armored brigade combat teams (ABCTs), Project Manager Tactical Network will pilot TNT-OTM prototype integrated into

ABCTs, enabling more effective and less predictable offensive and defensive operations.

MAIN COMPONENTS

- The TCN and TCN-Lite provide satellite and line-of-sight network connectivity, both on-the-move in a convoy, at the quick halt, and to the stationary command post, enabling mission command and advanced communications.
- The NOSC and NOSC-L provide network management and enhanced tactical network planning, administration, monitoring and response capabilities. The hardware is located on the vehicle and is connected by cables to the laptops and large display screens inside the tactical operations center (TOC) where the communications officers manage the network.
- The PoP and NextGen PoP are installed on select combat platforms at corps, division, brigade and battalion echelons, enabling mobile mission command by providing on-the-move network connectivity, both line-of-sight and beyond-line-of-sight. The PoP and NextGen PoP enable mobile mission command by providing on-the-move network connectivity, both line-of-sight and beyond-line-of-sight.
- The SNE and NextGen SNE are installed on select vehicles to provide on-the-move network communications to extend the network from the battalion down to the company level. Using its on-the-move satellite communication systems, the SNE can also be used to heal and extend lower echelon tactical radio networks for geographically separated elements blocked by terrain features.



A | A CH-47 Chinook sling loads a TCN-L at Fort Campbell, Kentucky.

B-C | U.S. Army paratroopers assigned to the 173rd Airborne Brigade train on TNT OTM NextGen PoP and SNE, during Exercise Saber Junction 2019, in Grafenwoehr Training Area, Germany, September 7, 2019.

D | The 3rd Brigade Combat Team, 82nd Airborne Division uses its TNT OTM Next Gen SNE at the Joint Readiness Training Center, in October 2019, at Fort Polk, Louisiana.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



RHN & GAIT

A

Regional Hub Nodes (RHNs) are the largest transport nodes for the Army's tactical network. The five regionally located RHNs enable global connectivity to transport information from intra-inter theater tactical networks around the world. They support current and contingency operations, humanitarian disaster relief and national emergency response.



- Decisive Point Consulting
- Envistacom
- ESP
- General Dynamic
- Leidos
- LNO Inc



DESCRIPTION

The five RHNs are at the upper-most level of the Army's tactical network architecture, and their innovative baseband and satellite communications capabilities enable regionalized reach-back to the Army's global network. They enable the transport of information across the tactical network in and out of theater and around the world. The RHNs operate out of the conflict area and give the Soldier in the field immediate access to secure and non-secure internet and voice communications anywhere on the globe. To provide tactical users with secure, reliable connectivity worldwide, the Army has positioned RHNs in five separate regions: Continental United States (CONUS) East and CONUS West, Central Command, European Command and Pacific Command.

The Global Agile Integrated Transport (GAIT) network design interconnects the RHNs -- and can also interconnect Department of Defense (DOD) Teleport Sites -- to create a global network mesh that enables high-capacity fluid data exchange from anywhere on the planet. Additionally, with the evolution of the architecture, units can now also choose to transport data directly between the approximately 125 GAIT Points of Presence (PoPs) -- located at military formations, including divisions, corps, theater tactical signal brigades and special users -- without the need to leverage the RHNs or teleports. This simplifies network transport even further, and adds multipath diversity to increase network robustness and resiliency.

GAIT provides more routing options, more paths and solutions for data to flow through allowing the Army to leverage the global network more efficiently and effectively. The GAIT delivers a more unified and robust network, enabling current expeditionary network capabilities and laying the ground work for future network transport innovation.

CAPABILITIES

- RHNs are currently used by both deployed Marine Corps and Army units.
- RHNs possess full Network Operations capabilities for network monitoring, management and trends analysis, as well as information assurance tools.
- RHN Commercial Internet and Phone (COM-IP) package supports contingency operations, disaster relief or U.S. homeland emergency response.
- Leveraging GAIT, commands with dispersed units around the globe can maintain mission command and Network Operations (NetOps) capabilities from their home station or forward-deployed headquarters.
- GAIT enables and enhances new capabilities, including Enroute Mission Command (EMC), Transportable Tactical Command Communications (T2C2), Modular Communications Node-Advanced Enclave (MCN-AE), Secure, Mobile, Anti-Jam, Reliable, Tactical-Terminal (SMART-T), and Disaster Incident Response Emergency Communications Terminal (DIRECT).



A | The extensive satellite communications capabilities of RHNs enable regionalized reach-back to the Army's global network.

B | Soldiers at the network service center of CONUS East RHN provide 24/7 support to missions worldwide.

C | RHN network components are seen here at the Continental United States East RHN.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

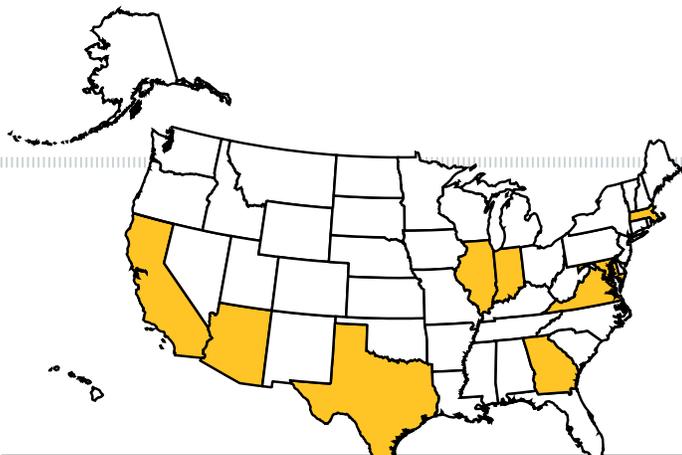
CP MOBILITY/SURVIVABILITY



EMC

A

Enroute Mission Command (EMC) provides XVIII Airborne Corps units, such as the 82nd Airborne Division's Immediate Response Force, with the critical in-flight mission command and plane-to-plane/plane-to-ground network communications they need to be successful in joint forcible entry operations.



- ViaSat
- Boeing
- STS
- General Dynamics
- L3 Communications



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

EMC improves the Army's ability to combat sophisticated peer threats by enabling commanders to continue to refine their products and plan the mission as they approach their objective, receiving the critical intelligence they need to be effective and lethal. The system's suite of network communications capabilities provide commanders with the same mission command capabilities they would use in a command post on the ground, in essence turning the plane into a flying command post. Paratroopers receive operational updates and watch full motion video of upcoming drop zones before their parachutes ever open. The real-time situational awareness enables early entry forces to be better prepared and to adjust courses of action as needed prior to combating near peer adversaries on the ground. Once they hit the ground, they can immediately begin executing the mission.

EMC enables early entry units to access communication and mission command capabilities, including Advanced Field Artillery Tactical Data System (AFATDS), and secure reliable voice, video and data communications, all from an Air Force C-17 aircraft.

Additionally, EMC capabilities increase the reliability of unit communications between aircraft. Soldiers operating EMC can extend the same enroute communications, enhanced situational awareness and planning capabilities to other planes that are flying to the mission, enabling all forces to remain synchronized.

MAIN COMPONENTS

- The Fixed Installed Satellite Antenna (FISA) provides tactical network connectivity on select Air Force C-17 aircraft. Once EMC's FISA is integrated onto a C-17

aircraft, Soldiers merely roll-on the other EMC equipment, and roll it off at the end of the mission. Project Manager (PM) Tactical Network fields and manages the EMC equipment for the Army and is working with the Air Force to transition the current C-17 Ku-band (commercial satellite) FISAs to commercial Ka-band FISA capability. The commercial Ka-band provides dedicated bandwidth, improved service, and better worldwide coverage at a comparable cost.

- The Key-leader Enroute Node (KEN) provides airborne units with broadband reach-back data capability; intra-aircraft data and voice communications with subordinate units, Secure Video Teleconferencing and SVoIP, plane-to-plane and plane-to-ground communications between task force commanders and combatant commanders.
- The Dependent Airborne Node (DAN) enables subordinate commanders that are flying in formation (connected with their leaders operating a KEN) to receive critical situational awareness updates through the intra-aircraft data and voice capability.
- The Command And Staff Palletized Airborne Node (CASPAN) coupled with the KEN provides the Airborne task force commander and his staff with a complete platform in which they can conduct mission planning while enroute to the target area. In addition to EMC's individual workstations, this large roll-on/roll-off workstation is designed for in-flight mission command collaboration
- LED screens, integrated mar-quees and an intercom system.



A | Airborne Soldiers from the XVIII Airborne Corps and 82nd Airborne Division successfully utilized EMC during the Joint Forcible Entry exercise at Fort Irwin, California.

B | D Co, 50th ESB-E provided EMC support to the 3rd Battalion, 321st Field Artillery Regiment on board an Air Force C-17 aircraft inflight to the mission objective, during a recent 2019 Air Force Weapons School Integration mission.

C | Brigade staff from the 1/82 ABN used the CASPAN during an overnight airborne operation in November, at Fort Bragg, North Carolina.

D | Soldiers from the 50th Expeditionary Signal Battalion set up a communications systems in a C-17 Globemaster III Feb. 7, 2019, at Joint Base Charleston, South Carolina.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



TRILOS

A

The easy-to-transport, high-capacity Terrestrial Transmission Line of Sight (TRILOS) Radio program-of-record improves the expeditionary nature of U.S. Army units, significantly increases network throughput and range, operational flexibility and multipath diversity in congested and contested environments .



• Blue Sky Mast



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Packed in a few rapidly deployable transit cases, the small form factor TRILOS Radio provides a significant reduction in size, weight and power (SWaP) compared to the legacy High Capacity Line Of Sight (HCLOS) radio, which needs two sheltered-vehicles and two large antennas to relay information. The TRILOS radio increases the robustness of the Army's tactical network by providing a significant increase in bandwidth and range, with lower latency than satellite communications. The system is also much easier and faster to set up, operate, and maintain.

TRILOS is a dual channel radio and can execute two responsibilities at the same time -- it provides point-to-point communications, but unlike the HCLOS, it will also provide point-to-multipoint communications, enabling Soldiers to shoot multiple shots with one antenna mast, versus needing extra antennas to shoot to multiple terminals. With TRILOS fewer radios, Soldiers and supporting resources are needed.

TRILOS is a key component of the Army's Capability Set (CS) 21 Expeditionary Signal Battalion-Enhanced network tool suite, which modernizes the Army's 24 ESBs. TRILOS will also be a key element in the CS 21 Integrated Tactical Network (ITN), providing high capacity terrestrial backhaul transport from the brigade to the enterprise. Other emerging PM Tactical Network radio and cellular capabilities are also expected to be part of the ITN.

CAPABILITIES

- Adds multipath diversity and operational flexibility to the tactical network
- Operates in satellite denied environments
- Significant SWaP reduction over current capability for improved unit agility
- Significant increase in bandwidth and range versus legacy capability
- Easy to operate and deploy; requires only two Soldiers for rapid set-up/tear-down
- Fully interoperable with the Army's tactical network and architecture
- Dual channel provides point-to-point and point-to-multipoint communications, enabling Soldiers to shoot multiple shots with one antenna mast, versus needing extra antennas to shoot to multiple terminals
- Reduces the Army's reliance on satellites; saves significant costs by reducing the use of expensive commercial satellite airtime leases



A | 67th Expeditionary Signal Battalion (ESB) new equipment training and fielding for the expeditionary TRILOS Radio.

B | Florida Army National Guard 146th ESB TRILOS training in September 2019, at Jacksonville, Florida.

C | TRILOS demo at the Army National Guard Mission Command Workshop, in May 2019, at Little Rock, Arkansas.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

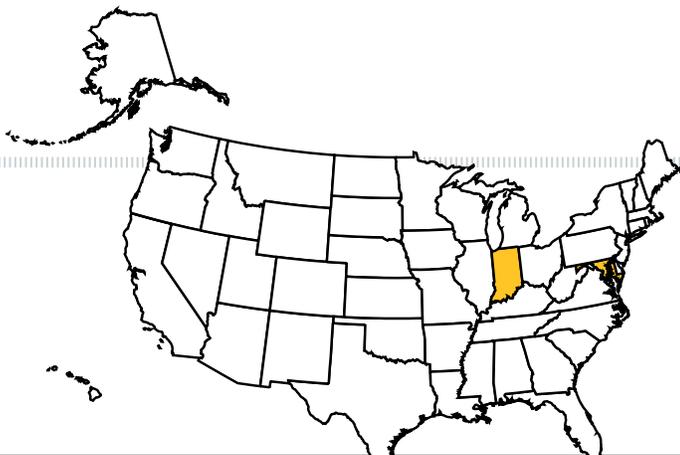
COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



The Army's next generation Tropospheric Scatter Transmission (Tropo) capability will provide expeditionary beyond-line-of-sight capability that will significantly extend network range and throughput, and greatly reduce size, weight and power (SWaP) requirements, compared to the legacy Tropo capability that it will replace. This versatile commercial-off-the-shelf system can operate in satellite denied environments, and will increase multipath diversity in congested and contested environments against near peer adversaries.



• Raytheon



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The Army's next generation Tropo system uses tropospheric scattering capability, which bounces signals off of the Earth's atmosphere to provide high-capacity beyond-line-of-sight capability without using expensive and limited satellite resources. It also uses particles in the atmosphere as reflectors for microwave radio signals. Tropo reduces the Army's over-reliance on satellites, while saving significant costs by reducing expensive commercial satellite airtime leases. When fielded, the Army's next generation Tropo will augment and expand the transport capacity of the Army's tactical network.

When fielded, Tropo will be a key component of the Army's Expeditionary Signal Battalion-Enhanced network tool suite, which modernizes the Army's 24 ESBs.

CAPABILITIES

- Beyond-line-of-sight without satellites; diffracts over mountains
- Operates in satellite denied environments, increases multipath diversity, and adds redundancy and operational flexibility to the tactical network
- Significant increase in bandwidth and range versus legacy Tropo capability
- Significant size, weight and power (SWaP) reduction over current capability for improved unit agility
- Rapid set up by two Soldiers
- Reduces the Army's reliance on satellites; saves significant costs by reducing the use of expensive commercial satellite airtime leases



A-B | Tropo capability will provide expeditionary beyond-line-of-sight capability that will significantly extend network range and throughput.

B



**NEW TROPO
 VS
 LEGACY TROPO**





Secure Wireless uses the National Security Agency-approved Commercial Solutions for Classified solution to provide secure classified and unclassified Wi-Fi to the Command Post, with prototype capability also enabling vehicle-to-vehicle wireless communication. Secure Wireless provides agility and operational flexibility, enabling commanders and staff to stay securely connected with full situational awareness and mission command capability for the maximum amount of time possible during command post relocation.



- GDMS
- PacStar
- Aruba



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

By going wireless, command post set up and tear down times are significantly reduced, for increased unit maneuverability, operational flexibility, and survivability. Following command post setup, units can turn on their Secure Wireless and the network will come up first instead of last as with cabling, in minutes instead of hours, and Soldiers can stay connected longer when jumping the command post.

The logistical burden is also reduced with less cable and protective flooring needed to be transported from location to location. Soldiers can be untethered from their workstations with wireless laptops for improved collaboration.

Project Manager Tactical Network is fielding a new Secure Wireless Campus Wide Local Area Network (CWLAN) upgrade to improve system resiliency, ease of use and reduce setup/tear down times even further, for increased unit mobility and command post survivability.

To improve units' expeditionary command-post capabilities, PEO C3T's Command Post Integrated Infrastructure (CPI2) modernization efforts will provide mobile, scalable and survivable platforms and further increase command post survivability. Secure Wireless is a key component of this effort and is being integrated on prototype vehicles, enabling Soldiers to pull up to any site and connect to the network in minutes. This enhanced Secure Wireless system

will provide a vehicle-to-vehicle wireless connection that will enable units to disperse their command post vehicles, making the command post more survivable. PEO C3T is working directly with Soldiers for continual feedback on prototype solutions and progressing toward a fielded solution.

Secure Wireless is also key component of the Army's Capability Set 21 Expeditionary Signal Battalion-Enhanced network tool suite, which modernizes the Army's 24 ESBs.

CAPABILITIES

- Enables an Expeditionary Command Post, significantly reducing Command Post setup and teardown time; eliminates 17 boxes of expensive cable weighing hundreds of pounds
- Fast and easy set up / tear down for rapid relocation and maneuver
- Secure Wireless provides agility and operational flexibility, enabling commanders and staff to stay securely connected with full situational awareness and mission command capability for the maximum amount of time possible.
- SIPR without Encryption Hardware: National Security Agency (NSA)-approved Commercial Solutions for Classified (CSfC) software based encryption
- Works with commercial, Non-secure Internet Protocol Router (NIPR), Secure IPR (SIPR) and coalition networks.



A | Secure Wireless provides agility and operational flexibility, enabling commanders and staff to stay securely connected with full situational awareness and mission command capability for the maximum amount of time possible.

B | Secure Wireless is a key component of PEO C3T's CPI2 efforts and is being integrated on prototype vehicles, enabling Soldiers to pull up to any site and connect to the network in minutes. An enhanced Secure Wireless system will provide a vehicle-to-vehicle wireless connection that will enable units to disperse their command post vehicles, making the command post more survivable.

C | PM Tactical Network provides CWLAN training to the 1st Brigade Combat Team, 3rd Infantry Division, in May 2019, at Fort Stewart, Georgia.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



The small form factor Commercial Coalition Equipment (CCE) provides expeditionary coalition or commercial network connectivity to enable mission command and situational awareness between forces. Integrating coalition or other non-governmental organization communications unifies disparate mission partners and extends the network. CCE is core component in the Army's Mission Partner Environment (MPE).



- Cubic/DTech
- General Dynamics Mission Systems



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Each of the coalition countries has their own unique transport networks that enable them to connect into the combined coalition network. The U.S. Army uses CCE to connect to the coalition network over its tactical communications network. This easy to transport system enables the Army to both send and receive critical situational awareness with its coalition partners and contribute to a trusted real-time common operating picture across the theater of operations. The CCE can be rapidly reconfigured to provide secure tactical access for the coalition or commercial networks to support both civil and military operations.

Using rapid acquisition processes, Project Manager Tactical Network fielded new expeditionary commercial-off-the-shelf coalition network enclaves -- known as Combined Enterprise Regional Information Exchange (CENTRIX) Network Extension Packages, or CX NEPs -- to the first units in early 2019 in response to an operational needs statement from theater. Like CCE, these CX NEPs enable the exchange of data between U.S. Joint and coalition force networks to support a MPE during military and stability operations, counter-insurgency missions, or disaster/humanitarian contingencies.

CCE and CX NEPs continue to successfully support large multinational exercises such as the Army's annual Warfighting Exercises (WfXs); Joint Warfighting Assessments (JWAs); and multinational exercises.

CCE is will be a key component of the Army's Capability Set 21 Expeditionary Signal Battalion-Enhanced network tool suite, which modernizes the Army's 24 ESBs.

CAPABILITIES

- Enables communication (voice, video, and data) and mission command between U.S. and coalition force networks
- Core component in the Mission Partner Environment (MPE)
- Provides secure tactical access for coalition or commercial networks to support both civil and military operations
- CCE reduces size, weight and power (SWaP) for initial entry operations and increased unit agility.
- Supports up to 48 simultaneous users
- Provides access to commercial Internet and phone services through the Tactical Network Regional Hub Nodes



A | U.S. and coalition Soldiers monitor the tactical network during the JWA 18.1 at Grafenwohr, Germany, in May 2018.

B | The 62nd Expeditionary Signal Battalion, 11th Tactical Theater Signal Brigade utilizes CCE during a communication exercise in February 2019, at Fort Hood, Texas.

C | In support of Warfighting Exercise 19, Soldiers from the 11th Tactical Theater Signal Brigade (TTSB) use CCE during a communication exercise in March 2019, at Fort Hood Texas.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK	COMMON OPERATING ENVIRONMENT	JOINT & COALITION INTEROPERABILITY	CP MOBILITY/SURVIVABILITY
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MCN-AE

A

Sharing intelligence data is critical to successful missions on the battlefield. The small form factor Modular Communications Node-Advanced Enclave (MCN-AE) augments the existing intelligence network, enabling intelligence users to connect to all of the same resources they have when using the traditional standalone TROJAN Intelligence Network, but instead using the Army's Tactical Network.



- Cubic/DTech
- General Dynamics Mission Systems



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Each MCN-AE fits into a suitcase-sized transit case, and the system uses a unit's organic tactical network transport equipment to relay intelligence data across the battlefield. MCN-AE enables the Army to replace the tactical elements of the intelligence network's TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) system, a large truck and trailer, with two carry on cases, cutting down on footprint. The system reduces size, weight and power (SWaP) requirements for a more expeditionary force while increasing a unit's operational flexibility.

MCN-AE improves operational flexibility and multipath diversity. Unlike the current TROJAN Network that only uses the TROJAN SPIRIT system for network transport, the Tactical Network provides numerous network transport options via a wide range of transport nodes, including Joint Network Node and Satellite Transportable Terminal (JNN/STT), Tactical Communication Node (TCN) and the STT, Transportable Tactical Command Communications (T2C2), Global Rapid Response Information Package (GRRIP), SIPR/NIPR Access Point (SNAP), Phoenix, Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T), and eventually Low Earth Orbit/Medium Earth Orbit and other emerging technologies. These network transport nodes can operate in all satellite bands (Ka, Ku, X-band, etc).

The MCN-AE enables commanders conducting operational missions to dynamically assign bandwidth between their tactical mission command and intelligence assets as they see fit, with the ability to reassign additional bandwidth on demand.

Traditionally, in the past, the Army's tactical operations, intelligence, logistics and medical communities each used separate communications networks to pass information. The Army is converging the intelligence, logistics and portions of the medical networks onto the tactical network, an effort, known as Transport Convergence. The lightweight expeditionary MCN-AE is at the heart of the intelligence convergence effort – Phase 1 of Transport Convergence.

CAPABILITIES

- Small form factor reduces size, weight and power (SWaP) for increased unit agility
- Multiple transport node options versus TROJAN's single transport, improving operational flexibility and multipath diversity
- Enables commanders conducting operational missions to dynamically assign bandwidth between tactical mission command and intelligence assets, with the ability to reassign additional bandwidth on demand
- Uses the more robust and redundant tactical network, delivering needed redundancy to the intelligence community



A | The small form factor MCN- AE augments the existing intelligence network, enabling intelligence users to connect to all of the same resources they have when using the traditional TROJAN Intelligence Network, but instead using the Army's Tactical Network.

B | Each MCN-AE fits into a suitcase-sized case, and the system uses a unit's organic tactical network transport equipment to relay intelligence data across the battlefield.

C | PM Tactical Network demonstrated MCN-AE to Army leadership at the Army National Guard G6 Mission Command Workshop, in May 2019, at Little Rock Arkansas.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

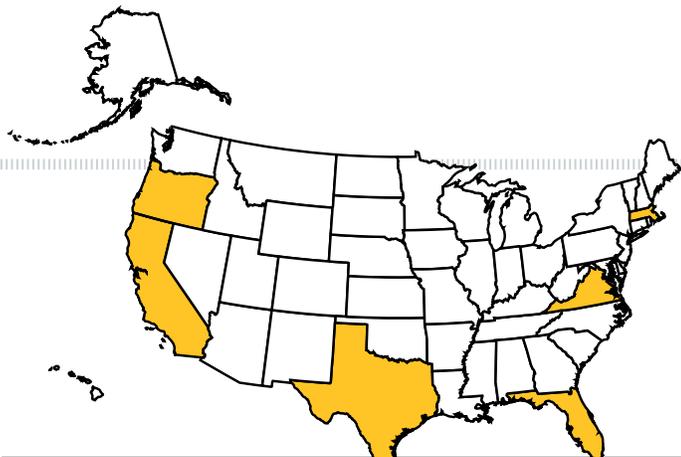
JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



DIRECT

The Disaster Incident Response Emergency Communications Terminal (DIRECT) tool suite enables National Guard signal units to provide commercial phone, internet access, and commercial Wi-Fi and 4G LTE to first responders -- military, government and non-governmental -- during domestic natural disasters, emergencies and civil support operations.



- GDMS
- Pacstar
- Aruba
- Oceus
- Cubic/DTech
- BSM



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

DIRECT securely leverages the Army National Guard's organic satellite-based tactical network transport equipment, the same used by the Active Army, to enable voice, video and data communications, even when local infrastructure has been damaged or destroyed. The DIRECT tool suite also comes with a voice bridging capability that connects disparate radios operating on different frequencies, and it interconnects military and first responder radios, cell phones and internet telephones, to enable a seamless collaboration and synchronization across the entire team.

In 2018 the Army National Guard first used the DIRECT tactical network communication tool suite for the first time to provide lifesaving communications capabilities to first responders during the aftermath of Hurricane Michael and Hurricane Florence. It continues to provide lifesaving communications to support first responders in the homeland.

CAPABILITIES

- The Joint Network Node (JNN) is organic to the unit and is also the same system used by Active Army units. This transportable network node provides high-speed wide area network capability for secure voice, video and data exchange. (The Army is looking at providing smaller ground satellite terminals to some states for increased deployability and mobility.)
- The Satellite Transportable Terminal (STT) is also organic to the unit and used by Active Army units. This highly transportable and mobile satellite system operates in conjunction with the JNN and is designed to establish

secure voice, video and data communications virtually anytime and anywhere, even if local infrastructure has been destroyed.

- Commercial Coalition Equipment (CCE), the same used by the Active Army, fits into a single man-portable transit case and provides the tactical access to commercial internet and telephone services. Integrated into the CCE, the radio-bridging and voice cross-banding capability enables interconnection between cell, landline and Voice over Internet Protocol (VoIP) calls, and various military and first responder radios. It enables seamless interoperability among disparate radio networks without supplying common radios to all the users, as was done in the past. Army National Guardsmen can combine radio and phone networks for crossed communications or create secure forums where various agencies can talk in independent groups.
- Commercial Wi-Fi and Commercial 4G LTE Cellular capability will support Soldier wireless and cellular handheld requirements. The Commercial Wi-Fi capability covers a limited footprint and is used inside the 'skin' of the incident site tent, while 4G LTE is used with smartphones and eventually tablets to extend coverage to an entire base radius.
- The DIRECT package also includes a towed generator, towed equipment trailer with communications equipment, tent and support supplies.



- A |** The DIRECT tool suite enables National Guard signal units to provide lifesaving network communications to first responders during domestic natural disasters, emergencies and civil support operations.
- B |** Soldiers from the Florida Army National Guard 146th Expeditionary Signal Battalion used their DIRECT system to provide lifesaving communications to support emergency response following Hurricane Michael, including support to the Calhoun County Emergency Operations Center seen here.
- C |** Army National Guard (ARNG) Soldiers demonstrate the DIRECT capabilities during the ARNG Mission Command Workshop in May 2019, at Little Rock, Arkansas.

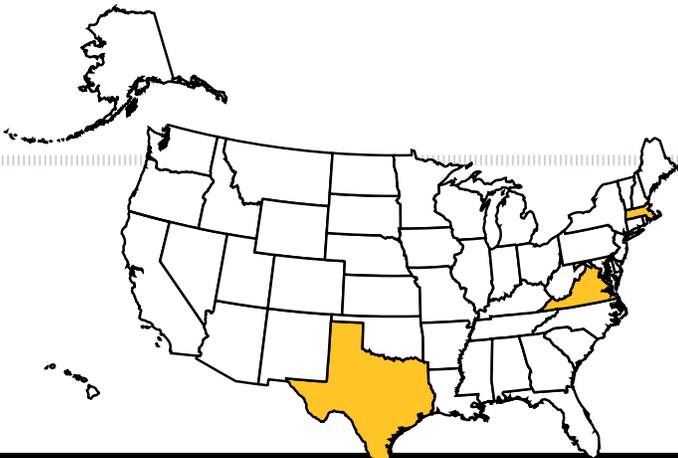


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



BVTC III

Battlefield Video Tele-Conferencing (BVTC) III provides commanders with access to accurate and timely situational information that depicts a clear picture of the battlefield.



- GDMS
- Dell
- Cubic/DTech



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

BVTC III helps commanders coordinate and interact with different echelons and adjacent units. It enables commanders to effectively disseminate tactical orders, clearly dictate their intent, and collaboratively plan courses of action with subordinate commanders and key staff elements.

The Army completed the BVTC III upgrade fielding in fiscal 2019.

CAPABILITIES

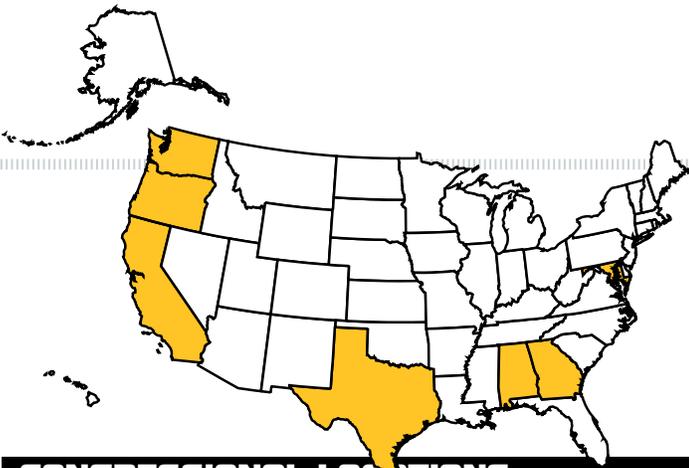
- Video teleconference capability for tactical commanders to provide accurate and timely situational information
- User friendly
- Interoperable with the existing communication Local Area Network (LAN) infrastructure across a multi-platform backbone network
- Outdoor-Readable Resistive Touchscreen
- Large speaker added for large room communications



A | Battlefield Video-Teleconferencing Center (BVTC)



The Transportable Tactical Command Communications (T2C2) Lite and T2C2 Heavy high-bandwidth inflatable satellite terminals enable initial entry forces to connect to the Army's tactical network to obtain the situational awareness and mission command capabilities needed to conduct initial entry operations and set the stage for follow-on forces. In more mature operations, T2C2 Heavy will provide high bandwidth tactical network extension to company level and small forward operating bases and T2C2 Lite will support special teams in austere locations with high bandwidth requirements.



- GATR
- L3 Technologies
- Pacific Star
- CodeMettle



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The T2C2 program of record provides agile robust voice, video and data communications without the need of static infrastructure. The system is easy to use and can be operated by non-signal Soldiers.

T2C2 provides satellite capability to small detachments and teams operating in remote locations without network infrastructure, enabling them to securely relay critical and time sensitive information, increasing the situational awareness for the entire operation. The system greatly increases throughput over legacy systems by taking advantage of military satellite capability. Because the T2C2 solution is inflatable, it can provide a larger dish size, with increased capability and bandwidth efficiency, in a smaller transportable package. These highly expeditionary inflatable satellite antennas provide the commander with increased operational flexibility and speed in maneuver.

Until T2C2 fielding is complete, Secure Internet Protocol Router Network/Non-Secure Internet Protocol Router (SIPR/NIPR) Access Points (SNAPs) and even smaller suitcase-sized Global Rapid Response Information Packages (GRRIPs) are being used as bridging capability.

T2C2 is a key component of the Army's Capability Set (CS) 21 Expeditionary Signal Battalion-Enhanced network tool suite, which will be fielded to modernize the Army's 24 ESBs.

CAPABILITIES

T2C2 Lite (AN/TSC-232) 1.2M: tri-band (X, Ku and Ka-band)

- Transportable by two-man team with rapid setup
- Supports two user defined enclaves: (NIPR/SIPR/Coalition Secret) and a Colorless Core enclave
- Three user access ports per user enclave

T2C2 Heavy (AN/TSC-233) 2.4M: tri-band (X, Ku and Ka-band)

- Transportable in five hard sided transit cases
- Supports three user defined enclaves (NIPR/SIPR/Coalition Secret) and a Colorless Core enclave
- 16 user access ports per user enclave



A | The 3rd Security Force Assistance Brigade (SFAB) is utilizing its new expeditionary network communications package during its training rotation in August 2019, at the Joint Readiness Training Center at Fort Polk, Louisiana.

B | PM Tactical Network provided T2C2 Lite new equipment training to the Maryland Army National Guard 58th Expeditionary-Military Intelligence Brigade at Towson, Maryland on March 26, 2019.

C | The 3rd SFAB trains on T2C2 in February 2019, at Fort Hood, Texas.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



MICRO-VSAT

A

The Micro Very Small Aperture Terminal (Micro-VSAT) provides expeditionary satellite communications in remote locations. This versatile non-program of record ground satellite terminal can be operated by a single general purpose user and sets up rapidly for increased agility and mobility. Packing options include small backpacks, a single commercial aircraft overhead transit case and soft side roll aboard luggage.



- COMTECH
- Tampa Microwave



DESCRIPTION

Micro-VSATs provide small teams with an expeditionary satellite capability for low bandwidth communications and exchange of secure and non-secure data, voice, and video. Among the many units these systems support, micro-VSAT variants are successfully providing network communications to Security Force Assistance Brigades and the Expeditionary Signal Battalion-Enhanced, as part of their modular tactical network transport equipment packages.

CAPABILITIES

- Major system components have been modularized into separable subsystems to meet customer needs and to simplify upgrades and logistics
- Can be configured for single, dual or tri-band operation at time of delivery or through field upgrades
- Rapid setup/teardown by one General Purpose User
- Packaging options include small backpacks, a single-commercial aircraft compliant overhead transit case and soft side roll aboard luggage
- Terminal operators can change frequency bands in the field without tools
- Three variants: V1-65cm Dish; V2-95cm Dish; V3-1.3m Dish



A | PM Tactical Network provided micro-VSAT new equipment training to the 4th Security Force Assistance Brigade in December 2019, at Fort Carson, Colorado.

B | Soldiers from the Expeditionary Signal Battalion-Enhanced set up Micro-VSATs during an Army Forces Command demonstration in May 2019.

C | The 3rd SFAB used Micro-VSATs during its Joint Readiness Training Center rotation in August 2019.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

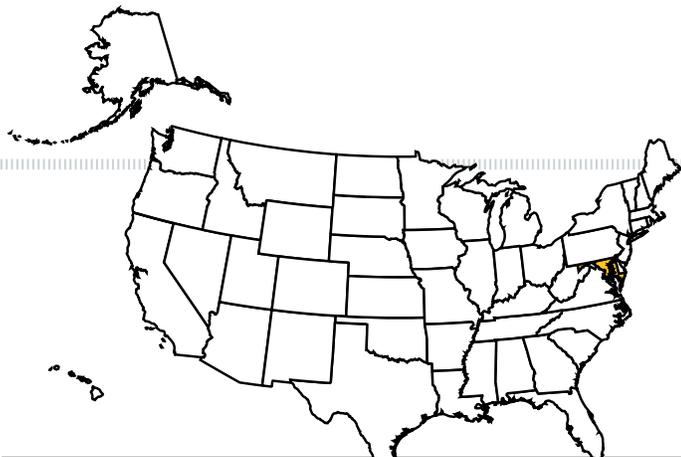
JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



GRRIP

Fitting into a single handheld 28 pound transit case for rapid mobility, the ground satellite network communications kit known as the Global Rapid Response Information Package (GRRIP) provides secure, beyond-line-of-sight voice and data communications without the need for local network infrastructure, so Soldiers can communicate anytime and anywhere on the planet.



- KLAS Telecom Services



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The air jumpable GRRIP provides initial entry capability and situational awareness in air-to-land missions, enabling Soldiers to stay connected and informed. GRRIPs can also support special small team elements that require network connectivity in austere environments in later phases of operations.

The GRRIP is small enough to fit into the overhead bin of commercial aircraft and sets up rapidly. The system provides both enterprise and tactical network communication, either through the Defense Information Systems Network (DISN) or a Global Agile Integrated Transport (GAIT) connection to a Regional Hub Node (RHN), enabling initial entry units and elements at the tactical edge to exchange critical information (data/voice). GRRIP provides classified and unclassified communications to forces operating in austere and demanding environments, who do not have access to the network equipment and infrastructure of established forward operating bases. This commercial-off-the-shelf terminal is designed for small teams entering locations where the infrastructure has either been dismantled, destroyed or is non-existent.

CAPABILITIES

- Network communications from anywhere on the planet no reconfiguration and uses L-Band based satellite access
- Fits into a single handheld transit case for rapid mobility and force scalability
- Provides both enterprise and tactical network communication either through the DISN or a GAIT connection to a RHN
- Continued communications and situational awareness from early entry to the tactical edge in more mature operations
- Can be configured for use on Secure Internet Protocol Router Network (SIPR) Non-Secure Internet Protocol Router (NIPR) or coalition networks



A | GRRIP enables the Soldier or first responder to communicate anywhere in the world by using SIPR/ NIPR or coalition voice and data capability without electricity or an existing infrastructure.

B | A Soldier from the 1st SBCT, 2nd ID connects a flat panel commercial Ka-band antenna to a GRRIP systems for higher throughput, during the unit's training rotation in early March, at NTC at Fort Irwin, California.

C | GRRIPs provide secure and non-secure communications to forces operating in austere and demanding environments such as embedded training teams and other small units that do not have access to the network equipment and infrastructure of established forward operating bases.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

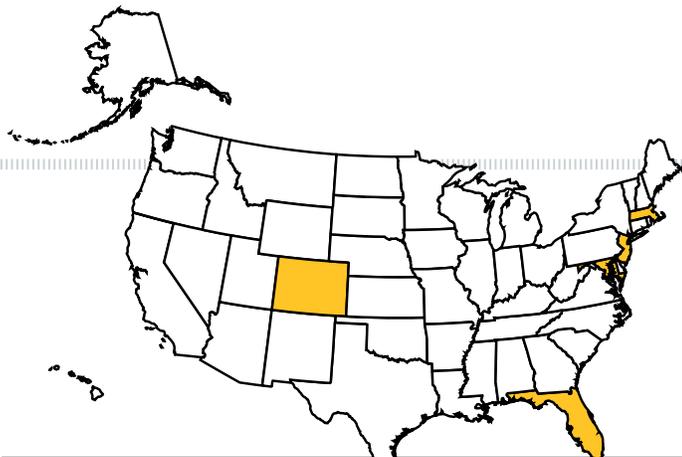
CP MOBILITY/SURVIVABILITY



SMART-T

A

The Secure, Mobile, Anti-Jam, Reliable, Tactical Terminal (SMART-T) is the Army's protected satellite communications system that enables commanders at brigade and higher to operate in an electronic warfare (EW) threat environment that includes both radio frequency signal interference (jamming), signal detection and geographic location threats.



- Booz Allen Hamilton
- LinQuest
- MIT Lincoln Lab
- Raytheon
- Engineering Solutions & Products



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

Additionally, the SMART-T can also survive the effects of a high-altitude electromagnetic pulse produced by nuclear detonations and can operate and survive in a biological and chemical environment.

SMART-T makes it possible for units to reliably and securely extend the range of their network in such a manner that communications cannot be jammed, detected or intercepted, enabling Soldiers to send critical text, data, voice and video communications beyond their area of operations.

CAPABILITIES

- Interoperable with AEHF satellite constellation
- Enhanced system interfaces
- Provides Low and Medium Data Rate (LDR/MDR) or Extreme Data Rate (XDR) capability for voice and data transmission
- Interoperable with MILSTAR, EHF MIL-STD 1582D and MIL-STD 188-136 compatible payloads
- Provides anti-jam and anti-scintillation (nuclear environment) communications



A | The 2nd BCT, 1st ID used this SMART-T at Hohenfels Training Area, Germany, January 25, 2018, during Allied Spirit VIII.

B | The 3rd BCT, 82nd ABN Div used this SMART-T during NIE 18.2 at Fort Bliss, Texas in November 2018.

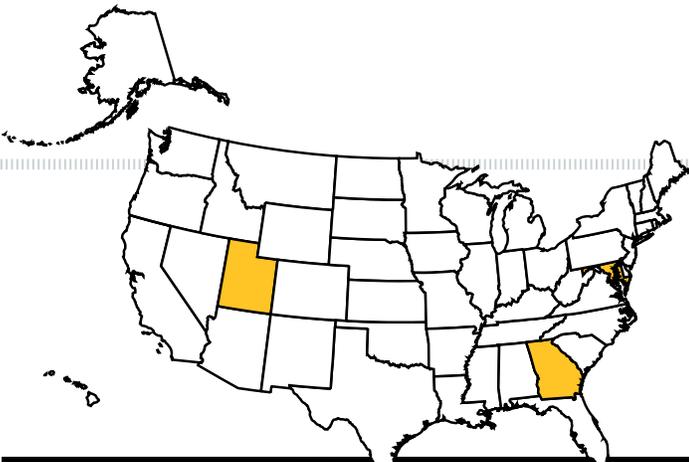
C | The 2nd BCT, 101st ABN Div used these SMART-Ts on March 20, 2018, during its JRTC rotation, at Fort Polk, Louisiana.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



Phoenix ground satellite terminals enable Expeditionary Signal Battalions (ESBs) to provide large division and corps headquarters with agile high-bandwidth network communications. Phoenix terminals provide with high capacity, inter- and intra-theater range extension for networked battle command and control information, including logistical, operational, intelligence, and administrative data. They are used for high-throughput missions, which include Unmanned Ariel System feeds, video teleconferencing, and large numbers of subscribers and computers on the network.



- Envistacom
- L3 Communications
- JANUS Research



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The versatile Phoenix terminal is a transportable, quad-band, tactical satellite terminal that is mounted on an expanded capacity vehicle (legacy version). It provides assured access to satellite communications and enables operational flexibility and multipath diversity, by providing a rapidly deployable capability that can operate over military X/Ka and commercial C/Ku satellite bands.

PHOENIX E-MODEL PROTOTYPE

PM Tactical Network fielded the 50th Expeditionary Signal Battalion-Enhanced (ESB-E) pilot unit with the first transit case-based Phoenix E-Model ground satellite terminal prototypes to inform design and fielding decisions to modernize the Army's 24 ESBs. In addition to the ESB-E's previously fielded small and medium ground satellite terminals, the Phoenix E-Model prototype serves as the unit's largest satellite capability.

Like the legacy version, the flexible Phoenix E-Model prototype operates on four different satellite bands (military X/Ka and commercial C/Ku-bands), however, its dual-head capability enables the use of two antennas on two different frequency bands, or two different satellites, simultaneously. This reduces manning requirements for equivalent capability, doubles bandwidth throughput, and enhances multipath diversity and resiliency within the tactical network. In addition to operating on traditional Geosynchronous Earth Orbit (GEO) satellites, the systems also have the potential for growth to

operate on existing Medium Earth Orbit (MEO) constellations.

The legacy Phoenix is completely vehicle based, with a permanent vehicle-mounted antenna. Contrarily, if needed, the new E-Model enables Soldiers to remove the equipment from the vehicle in transit cases so they can easily deploy and operate the system without the vehicle, increasing the unit's expeditionary nature, mobility and operational flexibility in support of a variety of missions around the world.

CAPABILITIES

- Operates in military X and Ka band and commercial C and Ku bands
- Qualified for the military environment: temperature, shock, vibration
- Can interface with other strategic networks via standardized tactical entry points, Regional Hub Nodes or strategic assets
- Transmits one Frequency Division Multiple Access (FDMA) link and receives up to four FDMA links simultaneously
- Multi-carrier capable (transmit two FDMA carriers) in C, Ku and Ka band
- Supports point to point, mesh and hub-spoke networks



A | PM Tactical Network demos the new Phoenix E-Model prototype to the 50th Expeditionary Signal Battalion-Enhanced, in July 2019, at Fort Bragg, North Carolina.

B | The 151st ESB, South Carolina National Guard, set up an AN/TSC-156 Phoenix Tactical Super High Frequency (SHF) Satellite Terminal during a field training exercise in Hodges, South Carolina, Jan. 11, 2020.

C | The Phoenix E-Model prototype served as the 50th ESB-E's largest satellite capability during the ESB-E pilot to inform Army capability and fielding decisions.

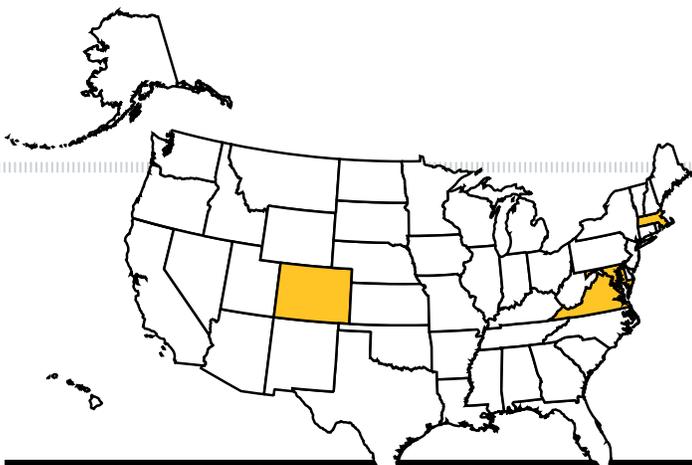


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



GBS

Global Broadcast System (GBS) provides real-time situational awareness to commanders and Soldiers and can be used to inform and update disadvantaged units on the battlefield that are disconnected from the tactical network. With bandwidth that is 20 times higher than traditional satellite terminals, GBS enables Soldiers to securely receive large data files in minutes versus hours, while reducing burden and network congestion on the tactical network.



- General Dynamics
- Northrop Grumman
- Raytheon
- VIA SAT



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

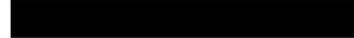
GBS provides receive-only high-speed broadcast of large-volume data and multimedia products including Unmanned Aerial Vehicle (UAV) video, imagery, intelligence, maps, weather, biometric data, and security and system software updates, to deployed command posts and garrisoned forces worldwide.

Since GBS is a broadcast service, large up-to-date data files can be delivered to subordinate units in the fight simultaneously, without additional load on the command networks. GBS leverages military and commercial satellites, sending information over the DOD Information Network (DoDIN) via DoD Teleport sites. Because GBS leverages the DOD's enterprise network instead of the Army's tactical network, it frees up tactical network bandwidth to use for other critical data exchange. GBS could be used to rapidly push software updates and security patches to tactical network transport equipment across the Army.

GBS consists of a variety of receive suites that are owned and operated by the armed services and other government agencies, and a Satellite Broadcast Manager (SBM) co-located with Defense Information System's Agency's (DISA) Defense Enterprise Computing Centers (DECC). The DECC SBM connects to a variety of national sources through the Department of Defense Information Network (DoDIN) and generates broadcasts for transmission over Wideband Global SATCOM (WGS) satellites through worldwide DoD Teleport/Standard Tactical Entry Point (STEP) sites.

CAPABILITIES

- Provides near real-time situational awareness to commanders and Soldiers
- Operates over the WGS system, augmented as required by commercial Ku band satellites
- Reduces burden on the Tactical Network: By leveraging Department of Defense (DOD) Information Network (DoDIN), network and satellite constellation bandwidth demands are reduced thus, providing more satellite/network bandwidth to deployed forces
- Receives data at a rate 20 times higher than current tactical network ground terminals
- Easy to deploy Ground Receive Suites enable deployed forces to directly receive two channels of national level data and full motion video and distribute to them to command post local area network users



A | GBS new equipment training with the 2nd Brigade Combat Team, 1st Cavalry Division at Fort Hood, Texas, in July 2018.

B | PM Tactical Network demonstrated GBS during the ARNG MC Workshop in May 2019, at Little Rock, Arkansas.

C | The Vermont Army National Guard (ARNG) 86th IBCT used this GBS equipment during their Joint Readiness Training Center rotation in May 2019, at Fort Polk, Louisiana.

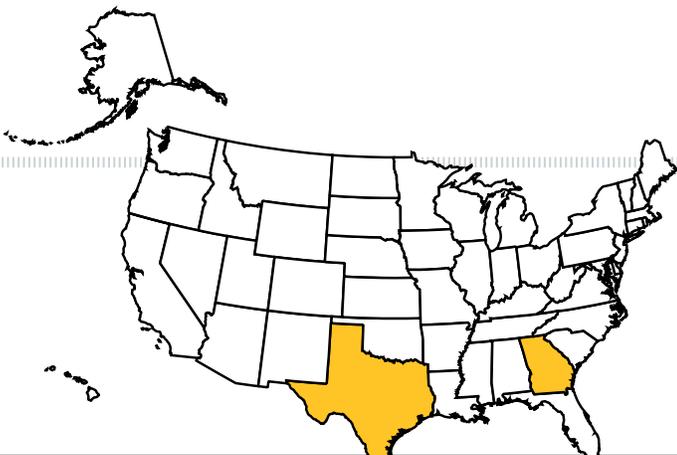


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



DKET

Deployable Ku band Earth Terminals (DKETs) are non-program of record systems used at brigade and higher headquarters elements to augment the Army's tactical communications network infrastructure. Some of the DKETs take on dual roles as hubs, providing inter- and intra- theater satellite links at brigade and higher and linking multiple regional command headquarters. The DKET reduces the traffic load on the Army's five worldwide Regional Hub Nodes by providing network hub services for disadvantaged forward operating bases.



- Datapath
- General Dynamics



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

DKETs are satellite terminals designed for use at larger hub locations. They support commercial Ku-band frequencies, and have been certified for Ka and X band capability to take advantage of U.S. military satellites. They are transportable and self-contained, and can establish headquarters-level, network-hub connectivity anywhere a mission dictates.

CAPABILITIES

- DKETs are currently deployed in three configurations: Light (3.7 – 3.9M), Mobile (4.5M) and standard (4.6M – 7M), with the majority being the light design
- The Light design has a tri-fold antenna and a smaller shelter to make redeployment and setup faster and easier
- The robust DKET network makes for a seamless transition to backup equipment or terminals, eliminates long outages and minimizes impact to the Soldier
- DKETs operate on Ku, Ka and X-band frequencies
- Electronics are housed in separate shelters



A | A DKET is shown as part of Project Manager Tactical Network’s Ka and X-band frequency certification effort that enables earth satellite terminals to utilize military satellites.

B | DKETs support commercial Ku-Band frequencies and their electronics are housed in separate shelters. They are highly transportable, self-contained and can establish headquarters-level, network-hub connectivity anywhere a mission demands.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

UNIFIED NETWORK

COMMON OPERATING ENVIRONMENT

JOINT & COALITION INTEROPERABILITY

CP MOBILITY/SURVIVABILITY



SNAP

Secure Internet Protocol Router/Non-Secure Internet Protocol Router (SIPR/NIPR) Access Point (SNAP) ground satellite terminals are fielded to augment current tactical network capabilities to extend network access to forward operating bases (FOBs) at the company, platoon and team level.



- Comtech Command and Control Technologies



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

These non-program of record commercial-off-the-shelf Very Small Aperture Terminal (VSAT) satellite terminals provide access to the tactical network (SIPR, NIPR, and Coalition), enabling mission command, information exchange (voice, video and data), call for fires and Medevac support. SNAPs are a key communications component for smaller units, providing secure beyond-line-of-sight communications and network connectivity.

The SNAP's transit case design enables easy transport in the back of High Mobility Multipurpose Wheeled Vehicles or helicopters, and the modular design allows for varying dish and antenna sizes to appropriately satisfy mission requirements.

CAPABILITIES

- Provides robust, long-range, beyond-line-of-site SIPR, NIPR and Coalition network communications capability down to the tactical company, platoon or team forward operating base
- Interoperable with both the at-the-halt and on-the-move tactical network equipment, as part of the tactical network architecture
- Transit case design enables easy transport in the back of High Mobility Multipurpose Wheeled Vehicles or helicopters
- Modular design allows for varying dish and antenna sizes to appropriately satisfy mission requirements
- Easy to move around the battlefield, providing an expeditionary element to the force
- Certified Ka and X-band capability to take advantage of the Department of Defense's Wideband Global SATCOM satellites



A | The 102d Strategic Signal Battalion, 2d Theater Signal Brigade, set up a SNAP during a best SNAP competition at the 2d Theater Signal Brigade field training exercise March 22, 2019, in Grafenwoehr, Germany.

B | U.S. Army Reserve soldier Pfc. Aaron Mitchell, a satellite communications systems operator/maintainer attached to Bravo Company, 98th Expeditionary Signal Battalion, connects panels to SNAP at Camp Buehring, Kuwait, April 16, 2019.

C | A 34th Red Bull Infantry Division Soldier sets up a SNAP to provide satellite communications in the Middle East during an emergency deployment readiness exercise in Jordan on May 3-10, 2019.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



STN

The Sustainment Tactical Network (STN) program provides best value, highly effective, expeditionary satellite communication (SATCOM) solutions to the combat service support community. Developed for the general purpose user, these rapidly deployable satellite systems provide network connectivity for logistics information (sustainment, medical, and administrative) to be exchanged on the battlefield across multiple echelons. STN systems fully integrate into the Army's unclassified Non-secure Internet Protocol Router (NIPR) network.



- L3Harris
- GD Mission Systems
- GATR



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The STN portfolio includes a suite of local transport solutions that enable current and emerging battlefield logistics automation devices to electronically exchange information via tactical networks. It employs a deployable wireless local area network (LAN) infrastructure, linking Army logistics information system computers in an area several square miles wide.

STN Very Small Aperture Terminal (VSAT) ground satellite systems provide tactical network transport for logistics, personnel, medical and force protection data that support logistics information systems. Current STN VSATs provide a wide area network (WAN) solution that leverages commercial-off-the-shelf, Ku-band, and auto-acquire capability. They are easy-to-use and transit case-based for rapid deployability and mobility.

The STN network provides end-to-end service for Army logistics communications, with worldwide continuity of service from Soldier to server. It supports data exchange for Army Enterprise Resource Planning solutions and applications, including Global Combat Support System-Army (GCSS-Army), Integrated Personnel and Pay System-Army (IPPS-A); Medical Communication for combat Casualty Care (MC4) and General Fund Enterprise Business Systems (GFEBS).

CAPABILITIES

- Wireless local area network infrastructure covers several square miles
- Global tactical network transport
- Ku-band
- Auto-acquire satellite terminals
- Easy to use for general purpose user
- Easy to transport for rapid deployment and battlefield mobility
- Fully integrated into the Army's unclassified network
- Supports Army Enterprise Resource Planning solutions



A | The STN portfolio includes a suite of local transport solutions that enable current and emerging battlefield logistics automation devices to electronically exchange information via tactical networks.

B | Chief Warrant Officer 3 Anthony Taylor and Spc. Daniel Bardge from 335th Signal Command (Theater) configures a CSS VSAT at the headquarters in East Point, Ga. April 18, 2019.

C | STN Very Small Aperture Terminal (VSAT) ground satellite systems provide tactical network transport for logistics, personnel, medical and force protection data that support logistics information systems.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



UNO

Unified Network Operations (UNO) provides a robust, integrated, standardized set of network management capabilities that enable communications officers (S6/G6) from tactical edge up through corps to plan, configure, manage, monitor, control and secure/defend their network.



- Vendors are constantly changing as prototypes change



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

The program delivers assets an integrated, standardized, and simplified Network Operations (NetOps) framework that will combine the management of the strategic and tactical network environments into an Army centrally integrated NetOps architecture.

UNO efforts simplify and reduce the number of network management tools communication officers (G6s and S6s) use to manage and defend the tactical communications network and the program leads the Army's Tactical NetOps convergence efforts. UNO assures uninterrupted access to critical communications and information links [satellite communications, positioning, navigation, and timing (PNT), and intelligence, surveillance, and reconnaissance (ISR)] across a multi-domain architecture, even when operating in a contested, congested, and competitive operating environment.

UNO integrates network management capability to simplify user experience, increase situational awareness, strengthen Cyber Network Defense capability, and integrate network planning with mission planning capabilities. It delivers capability as software upgrades that run in multiple common operating environment (COE) computing environments. Additionally, the program integrates functionality between the tools of the Upper Tactical Internet and Lower Tactical Internet, enhances visualization of NetOps functions and pushes network data to cyber situational awareness tools. UNO also implements a common data model that enables reconfiguration of the Network in support of unit task reorganization.

CAPABILITIES

- Delivers advancements in the monitoring, control and planning tools to simplify management of emerging voice, data and internet transport networks
- Modeling and simulation capability to analyze the best possible network configuration with dynamically changing network due to global complex variants
- Provides improved information assurance and Network Centric Enterprise Services
- Inherent software modernization through recurring technical refresh within the PM Tactical Network family of programs
- Provides NetOps users with the capability to “operationalize” the planning, configuration, monitoring and management of the network through a single consistent tailor-able user interface
- COE compliant, portable, and interactive common GUI with a user definable presentation workspace/ dashboard
- Integrates network planning with mission planning, enabling the S6 to optimize capability to move data around the virtual battlefield in support of the Commander’s scheme of maneuver
- Integrates Upper Tactical Internet and Lower Tactical Internet network management tools and services
- Provides near-term “bridging” of NetOps capabilities for tactical radios and tactical network transmission systems operating within the tactical environment
- Sets the foundation for further integration of tactical and strategic networks for both network management services and cyberspace operations



A | PM TN engineers brief prototype network management software enchantments to 10th Mountain Division network engineer, on December 18, 2019, at a network integration facility at APG, Maryland.

B | New prototype software, known as NOMS, makes it easier for Soldiers from the tactical edge up through corps to plan, configure, manage, monitor, control and secure/defend their tactical network assets.

C | Maj. Nicholas Milano, assistant product manager for Tactical Cyber and Network Operations, (center left) discusses the network management prototype tool suite, with members of his team and Maj. Simon Watch, 11th Theater Tactical Signal Brigade Australian exchange network operations officer (center right), during a developmental operations Soldier touch point with the unit, on December 10, 2019, at Fort Hood, Texas.

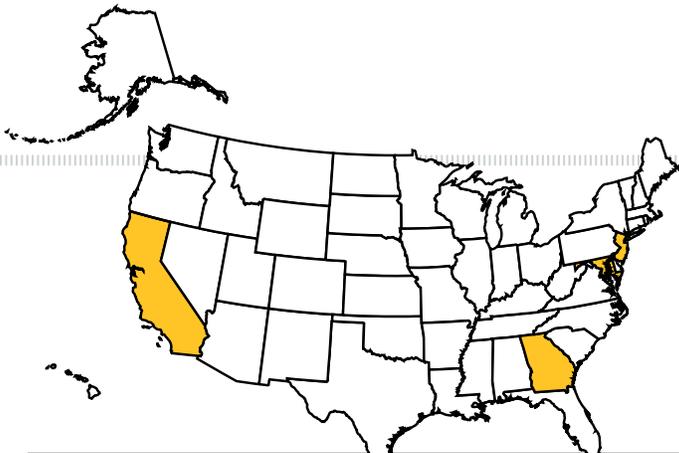


ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT



JENM & RAP-TR

The Joint Enterprise Network Manager (JENM) is a consolidated software application for planning, loading, managing and securing/defending mid and lower-tier software defined radios and associated waveforms.



- Vendors are constantly changing as prototypes change



CONGRESSIONAL LOCATIONS

KEY CONTRACTORS

DESCRIPTION

JENM can be used to plan and configure an entire network of disparate networking radios and waveforms, ensuring interoperability across and between echelons. Its enterprise Over-the-Air Management (eOTAM) capability reduces manpower hours to reconfigure, manage, control a tactical radio network, by performing the tasks rapidly over-the-air. The JENM eOTAM capability reduces the need for Signal Soldiers to travel from location to location, allowing them to manage and configure their radio networks from remote locations, such as the battalion tactical operations cell. Additional improvements to JENM include a more intuitive graphical user interface, simplification in planning tactical networks, network monitoring and troubleshooting, and capability with more software defined radios and respective waveforms.

PEO C3T is piloting a new software tool suite prototype that reduces the time it takes to initialize, plan and load a brigade's worth of radios, from four weeks to minutes. These new user-friendly software prototypes also lay the foundation for rapid unit task reorganization and enable tasks once performed by advanced Signal Soldiers to be performed by general purpose users for increased operational flexibility.

New JENM enhancements are also helping pave the way for the convergence of NetOps tools and management for both the Upper Tactical Internet and the Mid and Lower Tactical Internet (radio networks). The goal of NetOps convergence is to provide one

framework for integration of tools, into a single seamless delivery so that the S6 has one tool set to more easily see and manage the entirety of the network. The S6 will be able to see all the many facets of the network in one cohesive picture.

The Ruggedized Application Platform-Tactical Radio (RAP-TR)

RAP-TR consolidates separate lower tactical network tools onto a single laptop to streamline how signal Soldiers manage the tactical network. RAP-TR will host three software applications: JENM) Coalition Joint Spectrum Management Planning Tool (CJSMP) and Systems Planning Engineering and Evaluation Device. RAP-TR will be integrated into the core tactical network capability baseline software and it will remain a standalone platform for units with Software Defined Radios and without direct tactical network connectivity.

CAPABILITIES

- Operates within the Integrated Tactical Networking Environment and handles the planning, configuration, monitoring, management, and analysis functions for all signal components and systems within the Joint tactical radio environment.
- Reduces manpower hours to reconfigure, manage, and control a tactical radio network, by performing the tasks rapidly over-the-air.
- Paves the way for the convergence of NetOps tools and management for both the Upper Tactical Internet and the Mid and Lower Tactical Internet (radio networks).



A | The 3rd Security Force Assistance Brigade (SFAB) utilizes its new expeditionary network communications package during its training rotation in August 2019, at the Joint Readiness Training Center at Fort Polk, Louisiana.

B | PEO C3T provided a leaders' professional development session to the 1st Brigade Combat Team, 82nd Airborne Division, on August 26, 2019, in preparation for the fielding of Integrated Tactical Network capabilities.

C | PEO C3T is piloting a new software tool suite prototype that reduces the time it takes to initialize, plan and load a brigade's worth of radios, from four weeks to minutes.



ARMY NETWORK MODERNIZATION STRATEGY LINE OF EFFORT

ACRONYMS

- A** Advanced Field Artillery Tactical Data System (AFATDS)
Air to Ground Networking Information System (AGNIS)
Air and Missile Defense Workstation (AMDWS)
Army Key Management System (AKMS)
Army National Guard (ARNG)
Android Team Awareness Kit (ATAK)
At The Halt (ATH)
Automated Communications Engineering Software (ACES)
- B** Battle Command Common Services (BCCS)
Communications, Command, and Control Leadership Board (C3LB)
Battlefield Video Teleconference (BVTC)
Beyond Line Of Sight (BLOS)
Brigade Combat Team (BCT)
Blue Force Tracker (BFT)
- C** Campus Wide Local Area Network (CWLAN)
Capability Set (CS)
Coalition Joint Spectrum Management Planning Tool (CJSMPT)
Combat Camera (COMCAM)
Combat Net Radio (CNR)
Combat Survivor Evader Radio (CSEL)
Combined Enterprise Regional Information Exchange (CENTRIX)
Command and Control (C2)
Command and Staff Palletized Airborne Node (CASPAN)
Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR)
Command Post Local Area Network (CP LAN)
Command Post Computing Environment (CPCE)
Command Post Display System (CPDS)
Command Post Integrated Infrastructure (CPI2)
Command Post Support Vehicle (CPSV)
Commercial Coalition Equipment (CCE)
Commercial Internet and Phone (COM-IP)
Commercial-Off-The-Shelf (COTS)
Commercial Solutions for Classified (CSfC)
Common Access Card (CAC)
Common Hardware Systems (CHS)
Common Operating Environment (COE)
Common Operational Picture (COP)
Communications Security (COMSEC)
Continental United States (CONUS)
- D** Defense Enterprise Computing Centers (DECC)
Defense Information Systems Network (DISN)
Defense Readiness Reporting System-Army (DRRS-A)
Defensive Cyber Operations (DCO)
Department of Defense (DoD)
Dependent Airborne Node (DAN)
Deployable Ku Band Earth Terminals (DKET)
Developmental Operations (DevOps)
Disaster Incident Response Emergency Communications Terminal (DIRECT)
Distributed Common Ground System-Army (DCGS-A)
Division Hub Node (DHN)
- E** Electronic Causality Report (ECR)
Electronic Warfare (EW)
Electronic Warfare Planning and Management Tool (EWPMT)
Embedded Cryptographic Modernization Initiative (ECMI)
End of Life (EOL)
Enroute Mission Command (EMC)
Enterprise Over The Air Management (eOTAM)
Environmental control units (ECUs)
Expeditionary Signal Battalion (ESB)
Expeditionary Signal Battalion-Enhanced (ESB-E)
Extended Range Cannon Artillery (ERCA)
Extended Range Guided Multiple Launch Rocket System (ER-GMLRS)
Extreme Data Rate (XDR)
Extremely High Frequency (EHF)
- F** Fire Support Command and Control (FSC2)
First Unit Equipped (FUE)
Fiscal Year (FY)
Fixed Installed Satellite Antenna (FISA)
Forward Entry Devices (FED)
Force XXI Battle Command Brigade and Below (FBCB2)
Forward Observer System (FOS)
- G** General Fund Enterprise Business Systems (GFEBs)
Global Agile Integrated Transport (GAIT)
Global Broadcast Service (GBS)
Global Combat Support System-Army (GCSS-Army)
Global Information Grid (GIG)
Global Rapid Response Information Package (GRRIP)
Global Response Force (GRF)
Government-Off-The-Shelf (GOTS)
Gun Display Unit - Replacement (GDU-R)
- H** Hand Held (HH)
Handheld, Manpack, and Small Form Fit (HMS)
Helicopter and Multi Mission Radios (HAMMR)
High-Altitude Electromagnetic Pulse (HEMP)
High Capacity Line Of Sight (HCLOS)
High Frequency (HF)
High Mobility Multipurpose Wheeled Vehicle (HMMWV)
- I** Information Assurance (IA)
Integrated Personnel and Pay System-Army (IPPS-A)
Information Repository (IR)
Integrated Support System (ISS)
Integrated Tactical Network (ITN)
Integrated Visual Augmentation System (IVAS)
Integrated Tactical Networking Environment (ITNE)
- J** Joint Automated Deep Operations Coordination System (JADOCS)
Joint Battle Command-Platform (JBC-P)
Joint Enterprise Network Manager (JENM)
Joint Forcible Entry (JFE)
Joint Incident Site Communication Capability (JISCC)
Joint Network Node (JNN)
Joint Tactical Networking Center (JTNC)
Joint Tactical Network Environment Network Operations Toolkit (J-TNT)
- K** Key Management Infrastructure (KMI)

- L** Lightweight Forward Entry Device (LFED)
Line Of Sight (LOS)
Local Area Networks (LANs)
Long-Range Precision Fires (LRPF)
Low Rate Initial Production (LRIP)
- M** Management Client (MGC)
Manpack (MP)
Medical Communication for combat Casualty Care (MC4)
Military Information Support and Operation (MISO)
Mission Command (MC)
Mission Partner Environment (MPE)
Mobile User Objective System (MUOS)
Modular Communications Node - Advanced Enclave (MCN-AE)
Modular Radio Architecture (MRA)
Mounted Computing Environment (MCE)
Mounted Family of Computer Systems (MFOCS)
- N** National Security Agency (NSA)
Network Cross-Functional Team (N-CFT)
Network Extension Packages (NEP)
Network Integration Technology Enhancement (NITE)
Network Operations (NetOps)
NetOps and Security Center (NOSC)
NOSC-Lite (NOSC-L)
Next Generation Load Device (NGLD)
Night Vision Device (NVD)
- O** On-The-Move (OTM)
- P** Point of Presence (PoP)
Positioning, navigation, and timing (PNT)
Precision-Fires Dismounted (PF-D)
Precision Strike Missile Program (PrSM)
Program Executive Office Command, Control and
Communication-Tactical (PEO C3T)
Program Management Office Network Enablers (PMO Net E)
Project Manager Mission Command (PM MC)
Project Manager Tactical Radios (PM TR)
Project Manager Tactical Network (PM TN)
Projectile Tracking System (PTS)
Program of Record (PoR)
- R** Regional Hub Nodes (RHN)
Remote Desktop Protocols (RDPs)
Rifleman Radio (RR)
Ruggedized Application Platform-Tactical Radio (RAP-TR)
- S** Satellite Broadcast Manager (SBM)
Satellite Communications (SATCOM)
Satellite Transportable Terminal (STT)
Satellite Transportable Terminal Plus (STT+)
Secure High Assurance Inline Encryption Link Device (SHIELD)
Secure Internet Protocol Router (SIPR)
Secure Internet Protocol Router Network (SIPRNET)
Secure, Mobile, Anti-Jam, Reliable, Tactical - Terminal (SMART-T)
Signal Operating Instructions (SOI)
Single Channel Ground Airborne Radio System (SINCGARS)
Simple Key Loader (SKL)
SIPR/NIPR Access Points (SNAP)
Situational Awareness (SA)
Software Communications Architecture (SCA)
Software Development Kit (SDK)
Soldier Network Extension (SNE)
Soldier Radio Waveform (SRW)
Size, Weight and Power (SWaP)
Special Purpose Integrated Remote Intelligence Terminal (SPIRIT)
Special Operations Command (SOCOM)
Standard Tactical Entry Point (STEP)
Super High Frequency (SHF)
Sustainment Tactical Network (STN)
Systems Planning Engineering and Evaluation Device (SPEED)
- T** Tactical Communications Marketplace (TCM)
Tactical Communication Node (TCN)
Tactical Command Post (TAC)
Tactical Communication Node-Lite (TCN-L)
Tactical Defensive (Cyber Operations) Infrastructure (TDI)
Tactical Digital Media (TDM)
Tactical Hub Node (THN)
Tactical Internet (TI)
Tactical Mission Command (TMC)
Tactical Network Initialization & Configuration (TNIC)
Tactical Operation Center (TOC)
Tactical Radio Report (TRR)
Tactical Server Infrastructure (TSI)
Transportable Tactical Command Communications (T2C2)
Tactical Theater Signal Brigade (TTSB)
Tri-band Line of Sight (TRILOS)
Tobyhanna Army Depot (TYAD)
Troposcatter Transmission (TROPO)
- U** Ultra High Frequency (UHF)
Unified Network Operations (UNO)
Unified Trouble Ticketing System (UTTS)
Unit Reference File (URN)
Unit Task Organization (UTO)
Unit Task Reorganization (UTR)
United States Message Text Format (USMTF)
Unmanned Aircraft System (UAS)
- V** Variable Message Format (VMF)
Vehicle Integration for C4ISR/EW Interoperability (VICTORY)
Vehicle Wireless Package (VWP)
Very Small Aperture Terminal (VSAT)
Voice over Internet Protocol (VoIP)
- W** Wideband Global SATCOM (WGS)
Wideband Networking Waveform (WNW)
Warfighter Information Network-Tactical (WIN-T)
Warfighter Initialization Tool (WIT)



FOR MORE INFORMATION

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