COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS AND INTELLIGENCE (C^4I) SYSTEMS

U.S. Army C^4I programs and activities are the foundation for tactical digitization and service operations in the 21st century. The Army organizations with responsibilities to acquire, develop and sustain C^4I systems include the U.S. Army Communications-Electronics Command, the Communications-Electronics Research, Development and Engineering Center and the following program executive offices (PEOs): PEO Command, Control and Communications-Tactical; PEO Intelligence, Electronic Warfare and Sensors; and PEO Enterprise Information Systems.

These organizations provide and sustain advanced digital and electronic systems that support various mission areas in the tactical environment, including digital battle command, platforms and hardware support, C^4 support to air and missile defense, C^4 support to network operations, C^4 support to intelligence operations, C^4 support to fires and effects, sensors and sensor systems, current force unattended sensors, night-vision sensors, radios and communications systems.

Digital Battle Command

Project Manager (PM) Battle Command produces, deploys and sustains current and future Army battle command system (ABCS) software.

PM Battle Command provides integrated command-and-control (C^2) software, training and support to the joint land component warfighter.

Fire-support command and control includes advanced field artillery tactical data system (AFATDS), Centaur, fire-support terminal unit (FSTU), forward entry device (FED), gun display unit replacement (GDU-R), joint automated deep operations coordination system (JADOCS), lightweight forward entry device (LFED) and pocket-sized forward entry device (PFED).

Battle command sustainment support system (BCS^3) fuses sustainment information from multiple sources into a single mission-focused and tailored, map-centric visual display.

Strategic battle command is the Army battle command system component that provides Army, joint and coalition commanders with readiness reporting, force projection and situational awareness through the Global Command and Control System-Army (GCCS-A) and the Defense Readiness Reporting System-Army (DRRS-A). It is the Army's component program office for Net-Enabled Command Capability (NECC).

Tactical battle command combines multiple complex capabilities into an integrated tool set, allowing warfighters to visualize the battlespace and synchronize the elements of combat power while simultaneously collaborating and sharing data in near-real time. Maneuver Control System 6.4 provides maneuver functional and battle staff tools to commanders and staffs from battalion to Army service component command (ASCC). The command post of the future (CPOF) serves as a decision support system, providing real-time situational awareness and collaborative tools for tactical decision making, planning, rehearsal and execution management for commanders and staffs from battalion to ASCC. Battle command common services (BCCS) provides the tactical server/service infrastructure in support of network-enabled systems from battalion to ASCC.

Battle command also includes theater effect-based operations advanced concept technology demonstration (ACTD) and common software.

Battle command delivers high-quality capability, enhances warfighter performance and reduces system complexity.

Battle command rapidly adapts and fields capabilities in a dynamic environment. In designing hardware and software strategies to best support tactical, operational and strategic applications, battle command uses cutting-edge capabilities and adapts technology for the current wartime environment.

Information is a significant source of combat power. Battle command is leading change and integrating current capabilities into future innovations.

Platforms and Hardware Support

The **Standardized Integrated Command Post System (SICPS)** provides modular, interoperable and fully integrated, campaign-quality command post platforms and the C^4I physical infrastructure, with joint capabilities, to commanders and staffs—from brigade combat teams to divisions and corps. SICPS consists of various systems, specifically the SICPS command post platform (CPP), which includes the command post local area network (CP LAN) and command post communications system (CPCS); the command center system (CCS); and the trailer-mounted support system (TMSS).

The **Army Airborne Command and Control System (A^2C^2S)** provides the maneuver commander and his staff with a highly mobile, self-contained and reliable airborne digital command post. This highly mobile system allows the commanders of the units of employment and units of action to maintain situational awareness and exercise command and control, either from a temporary remote site or while on the move through the battlespace.

The **Mounted Battle Command on the Move (MBCOTM)** provides maneuver commanders and staffs with a highly mobile, self-contained and reliable combat vehicle-based digital command post, which provides maneuver commanders situational awareness and a common operational picture, which allows commanders to maintain situational understanding while on the move and physically separated from a fixed command post.

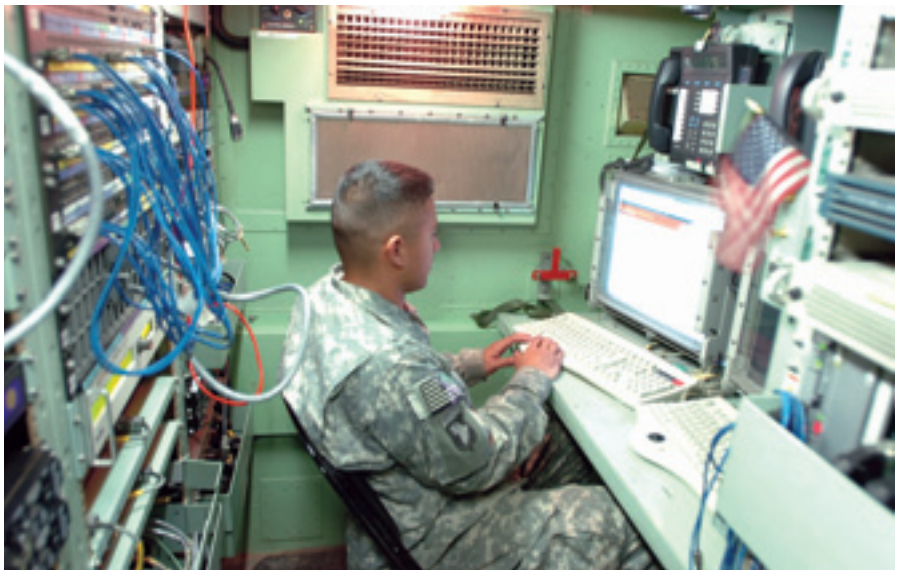
C^4 Support to Air and Missile Defense

Another representative Army battle command system (ABCS) component is the **Air and Missile Defense Workstation (AMDWS)**, the air and missile defense component of the ABCS. AMDWS serves as a battlespace awareness information management system that contributes to combat effectiveness by retrieving, fusing and distributing time-sensitive information necessary to achieve decision-cycle dominance.

The **Forward Area Air Defense Command and Control (FAAD C^2)** is the engagement operations piece of the AMD-

The Army airborne command and control system (A^2C^2S)

Joint network node (JNN)



CCS. FAAD C^2 collects, stores, digitally processes, displays and disseminates real-time tactical cueing and tracking information, the common tactical air picture, and command, control and intelligence information to all short-range air defense weapons.

The **Air and Missile Defense Planning and Control System (AMDPCS)** is the hardware component of the Army's air and missile C^2 system. It consists of an assemblage of modular and reconfigurable shelters, unique air and missile defense hardware/software, standardized automated data processing equipment and communications suites.

C^4 Support to Network Operations

The **Joint Network Management System (JNMS)** is a software system consisting of modules for planning and engineering, monitoring, control and reconfiguration, spectrum management and security (information assurance/communication security). It provides the commanders, combatant commands, joint task forces and service component headquarters a common, automated planning and management tool that will plan, monitor and control the joint communications and data backbone associated with a joint task force/joint special operations task force.

The **Integrated System Control (ISYSCON) V(1), V(2), V(4)** provides the signal commander and staff with a centralized automated planning and control capability to assist in managing tactical communication systems in support of combat forces, weapons systems and battlefield automated systems. It functions as the battlefield signal command-and-control management system at division through theater echelons or in support of independent task force operations. The **ISYSCON V(4)** is the S6's tool to provide network management to the local area network (LAN) at division, brigade and battalion tactical operation centers (TOCs) and command posts (CPs). The ISYSCON V(4) gives the signal soldier the capability to manage the Tactical Internet (TI), perform Force XXI Battle Command Brigade and Below ($FBCB^2$) network and security administration functions, and monitor the enhanced position location reporting system (EPLRS) network.

Information Dissemination Management-Tactical (IDM-T) is a suite of tools that enables tactical users to distribute mission-critical information to commanders, allowing them to streamline the decision-making process on the battlefield.

Joint Network Node (JNN) network commercial technology insertion will provide the Army with a high-speed and high-capacity backbone communications network focused on rapidly moving information in a manner that supports commanders, staffs, functional units and capabilities-based formations. JNN is now WIN-T Increment 1, a joint compatible communications package that allows the warfighter to use advanced networking capabilities, retain interoperability with current force systems, and keep in step with future increments of WIN-T. It is a rapidly deployable, early entry system housed in an S-250 shelter and mounted on a Humvee expanded capacity vehicle.

C^4 Support to Intelligence Operations

The **Common Ground Station (CGS)** is a rapidly deployable and mobile tactical data processing and evaluation center that integrates imagery and signals intelligence, surveillance and reconnaissance data products into a single visual presentation of the battlefield, providing commanders with near-real-time situational awareness and enhanced battle management and targeting capabilities. CGS links multiple air and ground sensors, including the Joint Surveillance/Target Attack Radar System (JSTARS) aircraft, to the Army battle command system at various nodes, such as echelons above corps, corps, division and brigade. JSTARS is a multiservice battle management and targeting system with an airborne multimodal radar incorporating an electronically scanned antenna. The radar combines moving-target indicator (MTI) and fixed-target indicator and synthetic aperture radar (SAR) functions and is carried aboard an E-8 (militarized Boeing 707) aircraft. Radar data are broadcast to the Army CGS through an omnidirectional data link and over ultrahigh frequency (UHF) satellite communications, which can also be received from other air platforms, such as unmanned aerial vehicles (UAVs). In addition to being the Army's premier radar MTI ground station, CGS has evolved into a multisensor ground station that receives, processes and displays sensor data from the Predator UAV, tactical UAV (TUAV), airborne reconnaissance low, U-2, Guardrail Common Sensor and the integrated broadcast service, while maintaining a small footprint. CGS capabilities are being channeled into a distributed common ground system-A (DCGS-A) through preplanned product improvements, which will be disseminated in a network-centric environment. CGS, with its JSTARS and other sensor feeds, fulfills an urgent Air-Land battlefield requirement by providing an Army/Air Force sensor and attack control capability designed to locate, track, classify and assist in attacking moving and stationary targets beyond the forward line of troops. CGS is the only wide-area surveillance system that has the resolution and real-time capability to provide the commander with the data necessary to be effective in the future sensor-oriented battle management process.

The **All-Source Analysis System (ASAS)** provides combat leaders with the fused intelligence needed to view the battlefield and more effectively conduct the land battle from battalion to echelons above corps.

ASAS encompasses a family of systems that includes the compartmented all-source workstation in the analysis control element (ACE) found at division, corps and echelons above corps (EAC); the collateral laptop configuration called ASAS-Light, issued down to the battalion level; the Humvee-mounted intelligence fusion station (IFS) with integrated communications called the analysis control team-enclave (ACT-E), which is found at brigade level; and the communications control set (CCS) found at division, corps and EAC.

C^4 Support to Fires and Effects

The **Advanced Field Artillery Tactical Data System (AFATDS)** provides automated fire-support command, control and communications for the Army, Navy and Marine Corps including target-weapon pairing for optimum use of fire-support assets and automated planning, coordination and control of all fire-support assets. AFATDS performs the attack analysis necessary to determine the optimal weapon-target pairing to provide maximum use of the fire-support assets (field artillery, mortars, close air support, naval gunfire, attack helicopters and offensive electronic warfare). AFATDS automatically implements detailed commander's guidance in the automation of operational planning, movement control, targeting, target value analysis and fire-support planning.

A critical capability for the warfighter is a battlefield radar that can detect, classify and locate enemy mortar, artillery, rocket and missile systems within seconds of their firing, allowing immediate responses. The Firefinder family (AN/TPQ-36 and AN/TPQ-37) are mortar and artillery locating systems that, with the Lightweight Countermortar Radars (AN/TPQ-48(V)2), have been used extensively in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) with great success and are credited with forcing the enemy to radically change its tactics.

The **AN/TPQ-36(V)8 Firefinder** is a lightweight, small, highly mobile, phased array radar that automatically locates hostile mortar, short-range launched rockets and other high-trajectory weapons. The radar has the capability of locating weapons firing simultaneously from different locations. The radar can automatically detect, verify and track projectiles in flight launched at any angle within selected 90-degree azimuth sectors over 360 degrees of coverage and extrapolate to both the firing positions and the impact points. Once a projectile is detected, the weapon location is computed and used to direct counterbattery fires. The AN/TPQ-36(V)8 will shortly undergo a modification work order (MWO) to replace the existing Northrop Grumman Corporation radar processor (RP) with the new Thales Raytheon Systems RP in the AN/TPQ-36 (V)8 Radar Set. Once the MWO is complete, the nomenclature will become AN/TPQ-36(V)10 Radar Set. The MWO also includes an upgrade to the ethernet switch to increase the data transfer capacity to 1 GB, which greatly improves system operability for the user by increasing the probability of target location, increasing location accuracy in a benign and clutter environment, and addressing parts obsolescence.

The **AN/TPQ-37(V)8 Firefinder** is a mobile, phased-array, artillery-locating radar system. It is larger than the AN/TPQ-36, and its target acquisition range is greater. The system uses a combination of radar techniques and computer-controlled functions to detect and accurately locate enemy artillery and rocket weapons to permit rapid engagement with counterfire. The AN/TPQ-37(V)8 consists of an operations control group mounted on an M-3S-series truck and the MEP-lISA 60-kilowatt, 400-hertz generator set mounted on a 5-ton truck. This truck also tows the antenna transceiver group consisting of the phased-array antenna, transmitter, receiver and associated electronics mounted on the M-I048 trailer, a 6-ton four-wheel flatbed cargo trailer. The AN/TPQ-37(V)8 upgrade program incorporates mechanical enhancements to improve reliability, availability and maintainability. It improves transportability, mobility, survivability and commonality with the AN/TPQ-36. Software improvements include reduced false locations and incorporation of a long-range mode. Special features include a new, improved cooler, C-130 transportability kit, MAPS self-survey and a separate tape for long-range missile detection software. The system is designed to be strategically deployable and operable at all levels of conflict.

The AN/TPQ-36 and AN/TPQ37 are assigned to the target acquisition battery of each division. Both the AN/TPQ-36 and AN/TPQ-37 Firefinder radars continue to be a success in OIF and OEF. They were lauded for their ability to acquire enemy mortars and artillery, allowing quick and effective counterbattery fire.

The **AN/TPQ-48 Lightweight Counter-Mortar Radar (LCMR)** fills a critical gap in the protection of ground-based forces. It addresses indirect fire threats, automatically locating mortar weapons in a 360-degree area of cover. The system can rapidly detect, track and locate mortar rounds at ranges out to the effective range of most mortar weapons, which allows the enemy to be neutralized through combat air support or counterfire. These systems have been deployed with Army Special Forces, conventional Army and Marine units and as part of the counterrocket, artillery and mortars (C-RAM) system of systems in Iraq and Afghanistan. The LCMR detects and locates mortar positions automatically over 360 degrees by detecting and tracking the mortar shell and then backtracking to the weapon position. When a mortar is detected, the LCMR sends a warning message indicating a round is incoming. After sufficient data is collected to enable an accurate weapon location, the weapons location is transmitted. LCMR successfully demonstrates the concept of a light-weight, manportable radar weighing approximately 120 pounds, transportable by a

crew of two, and is digitally connected to fire-support and command-and-control networks. Its lightweight modular design speeds employment and displacement, providing the warfighter with enhanced target location accuracy and projectile classification capability. The radar can be battery powered and requires less than 300 watts of prime power. It can also run off of vehicle power and is shipped with an AC adapter to allow use of generator or commercial power. The LCMR mitigates close-combat radar coverage gaps and complements the current AN/TPQ-36 and -37 Firefinder radars, fully supporting modular and fires brigade operations. The LCMR program is continuing through a developmental effort for the LCMR AN/TPQ-48(V)3 system and will provide improved operational and physical functionality over the existing LCMR radar systems. The (V)3 LCMR will have increased accuracy and range, maintain its high mobility and two-man transportability, have improved emplacement capabilities and be ruggedized for today's battlefield. An additional developmental effort for the LCMR system has been initiated to mitigate the stress of continuous deployment and also to insert technology developed under other LCMR programs. Upgrades include: increasing system accuracy, providing hardware improvements of the single board computer, automatic survey and alignment, tripod and gain stage adjustments. Also included is a redesign of the transport cases, the addition of a fiber-optic interface and software improvements.

The **Enhanced AN/TPQ-36 Radar (EQ-36)** is the next-generation counterfire radar for the U.S. Army. It encompasses the latest in radar technology and processing, providing the latest edge in protecting warfighters. The EQ-36 will represent a significant upgrade from the currently fielded Firefinder radars' 90-degree capability, adding a 360-degree continuous coverage capability to its arsenal to fill a paramount need of the warfighter in theater. In addition, EQ-36 will offer greater mobility, flexibility, ease of use, range and supportability. EQ-36 will provide the necessary situational awareness and targeting capability tomorrow's commander requires to combat an adaptive enemy threat operating in an asymmetric environment. The EQ-36 represents a vast improvement in both range and accuracy over existing counterfire radars. It has shown the ability to operate through extreme clutter and features a probability-of-location rate that performed with a higher accuracy level.

The **AN/TMQ-41** and **AN/TMQ-41A Meteorological Measuring Set (MMS)** is an upper air meteorological system that uses state-of-the-art technology to make vertical profiles of the Earth's atmosphere. The MMS sounds the atmosphere with a balloon-borne radiosonde, which measures the meteorological (MET) parameters of temperature, pressure, relative humidity, wind speed and wind direction. This information is processed by the MMS computer and is available in STANAG, WMO and FATDS formats. Typical users include: Field Artillery, Corps of Engineers, Chemical Corps, target acquisition elements, NATO and USAF weather forecasters. Messages may be disseminated by radio (voice or digital), landline (telephone or teletype), or hand-delivered, hard-copy printouts.

The MMS has the flexibility to operate anywhere in the world and allows the user to select the mode of operation most suitable for his situation. Multiple methods of determining winds are available through the use of radio direction-finding (RDF) techniques or navigational aids (NAVAID), such as LORAN or GPS.

The **AN/TMQ-52 A/B Meteorological Measure Set-Profiler (MMS-P)** is a replacement for the AN/TMQ-41 Meteorological Measuring Set. Profiler uses a suite of meteorological sensors and MET data from Air Force weather satellites along with an advanced weather model to provide highly accurate MET data at much greater ranges than MMS. The MMS-P provides accurate temperature, atmospheric pressure, relative humidity, wind direction and speed, and other MET data to determine necessary adjustments to standard firing data to increase indirect fire system accuracy.

Profiler uses this information to build a four-dimensional MET model (height, width, depth and time) that includes terrain effects.

By providing accurate MET messages, Profiler enables the artillery to have a greater probability of first-round hit with indirect fire. This capability increases the lethality of all field artillery platforms such as the multiple launch rocket system (MLRS) and self-propelled or towed howitzers. In addition, the increased accuracy attributed to Profiler MET data reduces the risk of friendly-fire fratricide.

The **Initial Fire-Support Automated System (IFSAS)** is an automated fire-support command-and-control system located at the corps fire-support element, division artillery fire-support element, field artillery brigade fire-support element and field artillery battalion echelons. IFSAS provides the commander with an automated command-and-control decision-making capability for using cannon, rocket and missile delivery systems.

The **Battery Computer System (BCS)** is an automated fire-support command-and-control system located at field artillery battery echelons. BCS provides the commander with an automated command-and-control decision-making capability for using cannon delivery systems. BCS performs automated fire missions, fire planning, fire unit status, ammunition accounting, and meteorological and geometry processing in support of the field artillery missions.

Sensors and Sensor Systems

The **Guardrail Common Sensor (GRCS)** system is the Army's corps-level airborne signal intelligence (SIGINT) collection, location and dissemination system providing tactical commanders near-real-time targeting information. There are currently four GRCS systems fielded worldwide, providing support to U.S. Forces Korea, U.S. Army Europe and supporting Operations Enduring Freedom and Iraqi Freedom. The GRCS systems consist of seven to 12 aircraft, depending on the system, that normally fly operational missions in sets of two or three aircraft providing near-real-time SIGINT and targeting to tactical commanders with emphasis on deep battle and follow-on forces attack support.

Key features include integrated communications intelligence (COMINT) and elec-

The Enhanced AN/TPQ-36 (EQ-36) radar system

Prophet systems

tronic intelligence (ELINT) reporting, enhanced signal classification and recognition, near-real-time direction finding, precision emitter location and an advanced integrated cockpit. Primary capabilities include integrated signals exploitation, enhanced signal classification and recognition, fast direction finding, precision emitter location and advanced integrated avionics. Interoperable data links provide microwave connectivity between the aircraft and the Guardrail Ground Baseline (GGB).

The **Prophet** system (three-block acquisition approach: Blocks I, II and III) is the division, brigade combat team (BCT), Stryker brigade combat team (SBCT) and armored cavalry regiment (ACR) principal ground tactical signals intelligence (SIGINT) and electronic warfare (EW) system that has been designed to support the Army vision, transformation and unit of action battlespace.

Prophet detects, identifies and locates enemy electronic emitters and provides enhanced situational awareness and actionable 24-hour information for the warfighter throughout the division, ACR and BCT areas of operations. Prophet is made up of a vehicular SIGINT receiver mounted on a Humvee on the battlefield, plus a dismounted manpack SIGINT version for airborne insertion or early entry into the battlespace to support rapid reaction contingency and antiterrorist operations.

The Block II/III Prophet is vehicle-mounted on the heavy Humvee with electronic attack (EA), is manportable and will also provide on-the-move (OTM) lines of bearing and reporting capabilities. This OTM capability is a first for tactical SIGINT operations at the brigade level and will provide on-demand actionable information (or force protection) to the commander.

Current Force Unattended Sensors

The uses of multiple mission sensor capabilities have proven to be significant factors in operations; however, managing these numerous sensors can be challenging. Efforts are ongoing in the development and enhancement of these capabilities, specifically in networking unmanned aerial vehicles, unmanned ground vehicles and unattended battlefield sensors.

Persistent threat detection system (PTDS)

The **AN/PPS-5D Ground Surveillance Radar** is manportable and capable of being used for force protection, fire support, intelligence operations, and cordon search-and-raid operations. It is currently being used for detecting and audio-classifying personnel and wheeled and tracked vehicles. Dramatic improvements have been achieved in performance, reliability and maintainability while reducing size, weight and power consumption.

The **AN/GSR-8 Remotely Monitored Battlefield Sensor System-II (REMBASS-II)** is the only fully militarized unattended ground sensor (UGS) system in the world that detects, classifies and provides direction of travel of targets. This worldwide deployable, all weather, day/night, line-of-sight system provides early warning, surveillance and force protection capability in support of battlefield commanders in all types of terrain. It is half the weight and volume of its predecessor, REMBASS-I, with equivalent classification, detection and low false-alarm performance.

REMBASS-II systems are being fielded to Stryker brigade combat teams in support of ongoing intelligence, security, surveillance and force protection operations around the globe. This tamper-proof, electronics support measures/electronic countermeasures-resistant system is the leading U.S. Army remotely controlled, unattended ground sensor system.

OmniSense is a UGS system that provides all-weather, 24-hour, area surveillance, force protection and remote intrusion detection to support the battlefield commander. OmniSense provides target classification, recognition, identification and target location, direction and speed. OmniSense consists of an activity detection unit (seismic-acoustic, magnetic and passive infrared sensors), an imager and a handheld programmer monitor.

The **Unattended Transient Acoustic Measurement and Signature Intelligence (MASINT) System (UTAMS)** is an acoustic sensor consisting of sensor stations linked via radio to a base station. In its current configuration, UTAMS detects and locates any loud event such as mortar or rocket firings, munitions impacts and other explosive events.

The **Persistent Threat Detection System (PTDS)** is a deployed, quick-reaction capability that was designed to meet the urgent surveillance needs of the warfighter. The system is composed of a tethered aerostat equipped with a high-resolution electro-optic/infrared (EO/IR) payload that provides a cue-to-slew capability. PTDS is integrated with existing IR and radar sensors that cue the aerostat camera to provide near-real-time "eyes on target."

Unmanned Aerial Vehicle (UAV) Payloads are essential in many areas of operation and have proven to be key combat

multipliers in military operations. In support of Operation Iraqi Freedom (OIF), the AN/APY-8 Lynx I radar was installed in deployed I-GNAT unmanned air vehicles (UAVs) to augment EO/IR payload capabilities. Three Lynx I radars were installed in three I-GNAT UAVs. The Lynx I is a multifunction radar that operates in synthetic aperture radar (SAR) and ground moving-target indicator (GMTI) modes. SAR modes consist of a spotlight mode and two strip-map modes. High-resolution SAR and GMTI data is processed on board and is data-linked to a ground station for exploitation. The data obtained can be used for coherent change detection (CCD) and amplitude change detection (ACD), both post-processing capabilities. CCD provides the ability to discern extremely small changes in scenery over time. Lynx I/I-GNAT systems completed more than 2,000 hours of operation supporting OIF.

The AN/DPY-1 Lynx II is also a multifunction SAR/GMTI radar that has the same performance as the Lynx I, but in a smaller, lighter package. High-resolution SAR and GMTI data is processed on board a UAV and is data-linked to a ground station for exploitation. The Lynx II consists of a radar electronics assembly (REA) and an antenna/gimbal assembly. SAR modes operate in less than 0.3 meters to 3.0 meters resolution. In the GMTI mode, the radar detects moving targets at speeds of 10 to 70 kilometers per hour and overlays their locations on a digital map. It enhances survivability and improves situational awareness for the UA and brigade/division.

The airborne surveillance, target acquisition and minefield detection system (ASTAMIDS) is being developed to fly on the Class IV RQ-8B Firescout UAV. ASTAMIDS will combine both countermine and RSTA functions in one 75-pound turret so that retasking can be accomplished in flight without having to land and swap out payloads. ASTAMIDS sensors include a MWIR FLIR, a color EO camera, a multispectral imager (MSI) that divides the vis-NIR band into four sub-bands, an 808-nanometer laser illuminator that provides night capability for the MSI sensor, and a lightweight laser designator that also has eyesafe rangefinding capability. The sensors will be housed in a gimbaled turret that has step-stare technology to allow rapid search of wide areas.

The **Persistent Surveillance and Dissemination System of Systems (PSDS²)** is a system of systems to provide persistent surveillance and rapid dissemination of actionable intelligence. Its purpose is to catch enemy activity in a timelier manner by having sensors cue other sensors and disseminate target location and description data to the appropriate response elements.

Night-Vision Sensors

U.S. Army night-vision and sensor programs and activities include day/night, all-weather mobility and engagement sensors; all-weather imagery; passive and radar target acquisition sensors; artillery and mortar-locating radars; and advanced sensors for the Army's Future Force. These systems provide critical, on-the-ground, direct support to U.S. forces deployed in Operation Enduring Freedom and Operation Iraqi Freedom. One key area is thermal sensors, which dramatically increase the lethality and survivability of U.S. Army soldiers. These sensors read the heat signature from distant objects, such as personnel or vehicles, day or night, penetrating smoke, fog and obscurants.

The **First-Generation Forward-Looking Infrared Systems (FLIR)** are currently used in the pilotage and targeting thermal imaging systems in the AH-64A attack helicopter, M1A1 and M60 tanks, Bradley fighting vehicles and TOW and TOW II missile systems.

The **Second-Generation Forward-Looking Infrared (FLIR)** provides an integrated high-performance second-generation thermal sensor to the Army's premier ground-

based battlefield platforms. The second-generation FLIR is a long-wavelength scanning system with advanced digital image processing. The detector for this assembly is the Army's Standard Advanced Dewar Assembly, type II, using a cryogenically cooled Mercury Cadmium Telluride (MCT) focal plane array. The program produces a common FLIR sensor (B-kit), which is integrated into each specific platform application through the use of a unique A-kit.

The second-generation FLIR has been successfully integrated and tested in the Abrams M1A2 Systems Enhancement Package (SEP) Thermal Imaging System (TIS); the M1A2 SEP Commander's Independent Thermal Viewer (CITV); the M2A3 Improved Bradley Acquisition System; the M2A3 Commander's Independent Viewer (CIV); and the Long-Range Advanced Scout Surveillance System (LRAS3).

Second-generation FLIRs are currently supporting operations in Iraq and Afghanistan with more than 7,500 units fielded to date.

The **AN/VAS-5 Driver's Vision Enhancer (DVE)** is a passive, uncooled thermal imaging system for drivers of combat and tactical wheeled vehicles. It allows continuous vehicle operations by day or night and in the presence of natural and man-made obscurants such as smoke, fog and dust. The DVE's sensor module contains a second-generation thermal imager that provides standard analog video to a high-quality flat-panel display and control module (a militarized commercial active matrix liquid crystal display).

The DVE video imagery can also be distributed to other vehicle crew displays. The display provides an additional input port for display maps and digitized battlefield information.

The **Long-Range Advanced Scout Surveillance System (LRAS3)** provides the U.S. Army with real-time acquisition, target detection, recognition, identification and far-target location information. LRAS3 provides scout forces with a sensor system that operates outside the range of currently fielded threat direct-fire and sensor systems. This long-range target acquisition capability will improve the survivability of the scout force and increase the lethality and force effectiveness of combat units.

The LRAS3 sensor can be operated in both mounted and dismounted configurations, providing 24-hour and adverse weather target acquisition capability. The system is composed of a second-generation horizontal technology integration (HTI) FLIR thermal imager, a day video camera, an eye-safe laser rangefinder, long-range common aperture reflective optics and a GPS interferometer subsystem. The LRAS3 design also includes a digital port, which allows it to interface with battlefield command and control.

Radios & Communications Systems

The **Joint Tactical Radio System (JTRS)** was initiated in early 1997 in response to the services' pursuit of separate solutions to a programmable, modular, multimode, multiband radio to replace existing legacy radios in the Department of Defense inventory. Over time, the JTRS program evolved from a radio replacement program to a mobile ad hoc networking program designed to support the Global Information Grid.

The **Joint Tactical Terminal (JTT)** provides the joint warfighter with seamless, near-real-time tactical intelligence, targeting and situational awareness information. It provides the critical data link to battle managers, intelligence centers, air defense, fire support and aviation nodes across all services. JTT allows Army, Air Force, Navy, Marine Corps and other agency users to exploit current intelligence broadcast networks, including the tactical reconnaissance intelligence exchange system, tactical information broadcast system, tactical related applications data dissemination system, tactical data information exchange system-B, secondary imagery dissemination system and the evolving integrated broadcast service architecture.

PEO Command, Control and Communications-Tactical (C^3T) also coordinates development and fielding of the radio products that form the heart of the Tactical Internet. The **Enhanced Position Location Reporting System (EPLRS)** provides data distribution and position/navigation services in near-real time for the warfighter at brigade and below in support of the battlefield functional areas and the $FBCB^2$ program.

The **Near-Term Data Radio (NTDR) System** supports the upper portion of the Tactical Internet by providing the command-center-to-command-center data communications backbone for the Army's digitized division. The NTDR is the Army data communication backbone for platoon to brigade. It is one of the five major elements that provide a seamless digital communication capability throughout the fighting force for the digital battlefield of the 21st century.

The **AN/AYD-1 Personnel Locator System** consists of the PRC-112 radio (General Dynamics Decision Systems), ARS-6 personnel locator (Cubic Corp.) and KY-913 program loader (General Dynamics Decision Systems). The ARS-6 sends out interrogation bursts during combat search-and-rescue missions looking for PRC-112 radios. If the frequency and ID code of the ARS-6 burst is correct, the PRC-112 sends back a 0.4-second reply to the ARS-6 that provides range and steering information to the pilot. The PRC-112 uses unencrypted voice, beacon and transponder modes, but there is also a PRC-112A used by the "black world" that has built-in COMSEC.

The **AN/GRC-240 Have Quick (HQ) II UHF-AM Radio Set** is an M998/M1038 Humvee vehicle-mounted radio system providing antijam electronic counter-countermeasures (ECCM) ultra high frequency (UHF)-AM voice communications. The radio can operate on single-channel normal mode or in the frequency-hopping active mode. Transmitting output power is selectable at 2, 10 or 30 watts. All U.S. armed forces have HQ capability.

The **AN/VRC-83 Radio Set** is tunable in 25-kilohertz steps in the UHF band (225.000 to 399.975 megahertz [Mhz], equaling 7,000 UHF channels). The application of the very high frequency (VHF)/UHF antenna relay kit permits VHF AM communications (116.000 MHz to 149.975 MHz, 1,360 VHF channels). VHF operation is limited to single-channel, non-HQ communications. The operator can simultaneously monitor guard frequency 243.000 MHz while operating in single-channel or HQ mode. Certain applications require improved precise lightweight global positioning system receiver (PLGR) satellite reception; a PLGR remote antenna kit is available.

The **AN/TRC-170 (V)2** and **(V)3 Troposcatter Radio Terminals** are air or ground transportable radio terminals. They provide secure digital long-

DRS Technologies

Driver's vision enhancer (DVE) display and control module

haul radio trunking among major nodes of area common user (ACU) system communications networks and interface with other ACU systems, such as digital group multiplexers or various switching facilities. The terminals may be used in standalone applications as transmission links not associated with switching facilities. The terminals transmit and receive digital voice and other data over a nominal 150-mile path for the (V)2 radio and a nominal 100-mile path for the (V)3 radio by means of troposcatter.

The **AN/PRC-126 Radio Set** is a short-range, handheld tactical radio for use primarily at the squad and platoon levels. The AN/PRC-126 is a lightweight militarized transceiver that provides two-way voice communications. The radio covers the frequency range of 30 MHz to 87.975 MHz. Its nominal range for reliable communications over rolling, slightly wooded terrain is 3,000 meters. The radio is capable of interoperating with the AN/VRC-12, AN/PRC-77 and SINCGARS families of radios in the fixed frequency mode. The AN/PRC-126 enables small-unit leaders to control the activities of subordinate elements during operations.

The **AB-1386/U Quick-Erect Antenna Mast (QEAM)** is designed to accommodate the AS-3166/GRC, AS-4292, AS-4225 and A30045068 VHF antennas and a wide range of other antennas in other frequency bands.

The **AN/USC-28(V) Satellite Communications Set (Ground)** is an advanced spread-spectrum modulation system that operates with defense satellite communications system (DSCS) terminals to provide jam-resistant satellite communication (SATCOM) network control and digital user communications.

The **AN/TSC-85B&C** and **AN/TSC-93 B&C Tactical Satellite Communications Terminals** are superhigh frequency (SHF) systems that provide reliable multichannel satellite communications. The C-model terminal contains new modems and converters. All Army terminals have been upgraded to the C-model.

The **AN/GSC-52(V) Satellite Communications Terminal** is a high-capacity, medium-size, superhigh frequency satellite communications terminal designed to operate in the DSCS satellite network. While not an Army system per se, the Army has been assigned the acquisition and sustainment mission for the equipment. The terminals are operated by the various services under the operational control of the Defense Information Systems Agency. The AN/GSC-52(V) modernization program upgrades aging electronics and provides a new control monitor alarm subsystem for all the DSCS terminals (including the AN/FSC-78 and AN/GSC-39). The AN/GSC-52 (V) includes a 38-foot OE-371/G antenna.

The **AN/PSN-13 Defense Advanced Global Positioning System (GPS) Receiver (DAGR)** began fielding in November 2004. It is a handheld, pocket-stored Navstar GPS receiver, incorporating Selective Availability Anti-Spoofing Module (SAASM), and supports military combat operations as well as military and civilian use for operations other than war. DAGR is the follow-on to the currently fielded AN/PSN-11 PLGR and provides an enhanced graphical user interface (GUI) and decreases in size, weight and power consumption. The DAGR can also acquire and provide continuous P(Y)-code tracking of the GPS L1 and L2 frequencies transmitted from all satellites in view.

The **High-Capacity Communications Capability (HC3)** is a joint above-2 ghz high-capacity communications capability for the joint tactical ground domain. It provides secure ground-to-ground, ground-to-airborne and ground-to-satellite communications for joint on-the-move and at-the-halt platforms, and it uses wideband space architecture in a single common architecture and multiband and network (IP) capable terminals.

The **AN/TSC-156 Phoenix Superhigh Frequency (SHF) Terminal** provides multi-

band capability in the SHF range and operates over commercial and military SHF satellites. The terminal provides high-capacity inter- and intratheater range extension support at selected echelons-above-corps and corps signal units and is designed to be the warfighter's primary means of reach-back communication.

The **Lightweight High-Gain X-Band Antenna (LHGXA)** is an X-Band-only antenna, consisting of a 16-foot reflector mounted on a reinforced trailer. The efficient reflector design results in an RF gain that exceeds the gain of the 20-foot quick-reaction satellite antenna (QRSA). The LHGXA is designed to work with the GMF AN/TSC-85/93 B, C, D.

It also interfaces with the U.S. Air Force and U.S. Marine Corps lightweight multiband satellite terminal, Trojan Spirit II and USC-60A.

The **Lightweight Multiband Satellite Terminal (LMST)** is a tri-band superhigh frequency terminal available in various trailer and transit case configurations. The terminal is contained on a single trailer or in transit case enclosures and operates full duplex over C-, X-, Ku- and Ka-bands (receive only).

The **Secure Enroute Communications Package-Improved (SECOMP-I)** system is a standardized, secure, interoperable and integrated command, control, communications, computers and intelligence (C^4I) information system to support force projection operations. The SECOMP-I system provides VHF/UHF line-of-sight and UHF single-channel tactical satellite (SCTACSAT) beyond-line-of-sight data and voice capabilities to the mission commander and staff while deploying to an area of operations aboard U.S. Air Force C-130 and C-17 aircraft.

The **AN/PSQ-17 Communication Planning System (CPS)** provides communications and management of MILSTAR extremely high frequency (EHF) satellite resources at all echelons. It provides the capability for EHF network planning, EHF terminal image generation, resource monitoring, network operations and terminal support. It supports real-time mission planning and management of all EHF resources in support of joint-service EHF terminal deployment and resides within the Army's SYSCON environment to facilitate centralized planning and management functionality.

'Watch what you say. I think he's carrying a bug!'

The **Secure Mobile Anti-jam Reliable Tactical Terminal (SMART-T)** will provide tactical users with secure, mobile, survivable, anti-jam satellite communications in a Humvee configuration. This equipment will communicate/process data and voice communications at both low and medium EHF data rates.

The **Deployable Ku-Band Earth Terminal (DKET)** is an INTELSAT E2 designator capable of supporting 24 T1 data rate 4.6-meter tracking antenna with 125-mph wind survivability, redundant RF electronics and auto uplink power control. It is an environmentally controlled shelter with redundant HVACs; a remote monitor and control system with pager notification; and redundant generators for critical components. A digital fiber-optic interface system (FOIS) connects to a user baseband up to 2 kilometers. It has a commercial one-year warranty.

The **Joint Network Terminal Communications (JNTC)** consists of a 3.6-meter satellite antenna with satellite and baseband equipment housed in an enclosure mounted on a prime mover. The hub terminal is capable of supporting 24 T1 data rate circuits through the 3.6-meter tracking antenna with 125-mph wind survivability, redundant electronics remote monitor and control; auto uplink power control is contained in the environmentally controlled shelter. Both terminals are Ka-band upgradable. A commercial one-year warranty is provided.

The **Flyaway Tri-Band Satellite Terminal (FTSAT)** is a commercial off-the-shelf nondevelopmental item. The highly transportable, tri-band, transit-case-packaged satellite communications terminal is capable of supporting a variety of worldwide missions. The FTSAT operates over DSCS III, NATO III/IV, INTELSAT, EUTELSAT, PANAMSAT and DOMSAT satellite systems. The terminal modem is interoperable with the GMF, MCIS (AN/TSC-85/93/94/100) and the DSCS Gateway modems and baseband subsystems, and is available in point-point, GMF spoke and GMF hub variants.

FTSAT provides X-, C- and Ku-band satellite communications with local and remote operations. Setup/teardown time is 30 minutes.

The **National Guard Bureau Tri-Band HUB Terminal (NGB-THT)** is a transit-cased transportable flyaway satellite terminal capable of supporting C-, X- and Ku-band frequencies. The THT is capable of using the lightweight high-gain X-band antenna (LHGXA), commercial 2.4-meter or 3.7-meter gigaSAT tracking antenna; supports FDMA and TDMA satellite network topologies; is ground mobile force (GMF) and joint network transformational communications interoperable; and includes a remote monitor and control sys-

tem. A commercial two-year warranty is provided.

THT provides tri-band satellite communications capable of supporting a variety of worldwide missions and is interoperable with all tri-band satellite terminals and teleport earth terminals. Setup/teardown time is 30 minutes.

The **USARPAC Tri-Band Satellite Terminal (U-TST)** is a Humvee (M1113) prime mover-mounted satellite terminal hub, capable of supporting C-, X- and Ku-band frequencies. The U-TST is capable of using the LHGXA tracking antenna and tows a tactical quiet generator (TQG), and supports GMF as well as C^4ISR communications when operating with the single shelter switch base-band suite of equipment.

The **Mobile Deployable Ku-Band Earth Terminal (DKET)** is a commercial off-the-shelf nondevelopmental item Ku-band prime mover-mounted satellite communications terminal capable of supporting a variety of worldwide missions. The DKET operates with INTELSAT, EUTELSAT, PANAMSAT and DOMSAT.

DKETs provide high-bandwidth inter/intratheater links over commercial satellites, appropriate for camp, base or station where heavy use of voice, data and video services is required.

Warfighter Information Network-Tactical (WIN-T)

Warfighter Information Network-Tactical (WIN-T) is the Army's communications system for reliable, secure and seamless video, data, imagery and voice services that enables decisive combat actions. It is focused on moving information in a manner that supports commanders, staffs, functional units and capabilities-based formations. It is optimized for offensive and joint operations so that the theater combatant commander will have the capability to perform multiple missions simultaneously with campaign quality.