Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	24.175	30.552	25.226	-	25.226	27.413	34.945	35.225	35.731	Continuing	Continuing
101: *Tactical Command and Control*	14.319	15.265	11.590	-	11.590	13.594	13.750	13.766	13.910	Continuing	Continuing
243: *Sensors and Signals Processing*	9.856	15.287	13.636	-	13.636	13.819	21.195	21.459	21.821	Continuing	Continuing

Note

FY 13 funding realigned to higher priority efforts

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates technologies that allow the Warfighter to effectively collect, analyze, transfer and display situational awareness information in a network-centric battlefield environment. It matures and demonstrates architectures, hardware, software and techniques that enable synchronized Command and Control (C2) during rapid, mobile, dispersed and Joint operations. Project 101 matures and develops software, algorithms, services and devices to more effectively integrate mission command across all echelons and enable more effective utilization of Warfighter resources. Project 243 matures and demonstrates signal processing and information/intelligence fusion software, algorithms, services and systems for Army sensors; radio frequency (RF) systems to track and identify enemy forces and personnel; and multi-sensor control and correlation software and algorithms to improve reconnaissance, surveillance, tracking, and target acquisition.

Work in this PE is complimentary of PE 0602120A (Sensors and Electronic Survivability), PE 0602270A (EW Technology), PE 0602705A (Electronics and Electronic Devices), PE 0602782A (Command, Control, Communications Technology), and PE 0603270A (EW Technology); and fully coordinated with PE 0602783A (Computer and Software Technology) and PE 0603008A (Electronic Warfare Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Aberdeen Proving Ground, MD.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	24.873	30.600	33.563	-	33.563
Current President's Budget	24.175	30.552	25.226	-	25.226
Total Adjustments	-0.698	-0.048	-8.337	-	-8.337
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.395	-			
• Adjustments to Budget Years	-	-	-8.337	-	-8.337
• Other Adjustments 1	-0.303	-0.048	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 101: *Tactical Command and Control*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
101: *Tactical Command and Control*	14.319	15.265	11.590	-	11.590	13.594	13.750	13.766	13.910	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates software, algorithms, services and devices that move and display timely and relevant information across the battlefield to provide commanders at all echelons with situational awareness (SA) that allows them to understand, decide and act faster than their adversaries. This project also matures and demonstrates software, algorithms and devices supporting information storage and retrieval; digital transfer and display of battlefield SA and navigation (nav), position (pos) and location information; synchronization of combined and Joint force operations; software, algorithms and services optimized for Command and Control (C2) On-the-Move (OTM) and C2 of unmanned air and ground robotic systems.

This project supports Army science and technology efforts in the Command Control and Communications portfolio.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command, Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Integrated Mission Command (MC) (previously titled Integrated Battle Command (BC))	8.644	8.691	8.155
Description: This effort matures and demonstrates technologies that allow forces to effectively collect, analyze, transfer, and display information in a net-centric battlefield environment. In order to manage costs and reduce duplicative efforts the Army has introduced the notion of the Common Operating Environment (COE). The COE is composed of several distinct computing environments (CEs) such as the Mobile (hand held devices) and the Mounted (vehicle based devices) CEs. Efforts in FY12 and FY13 place an emphasis on adopting and supporting the COE CEs. Technology areas include intelligent software agents, server virtualization, knowledge management, and automated query technologies. Work accomplished under PE 0602782A/project 779 compliments this effort.			
FY 2011 Accomplishments: Demonstrated dynamic agent based service orchestration to provide workflow adaptation for unexpected events; matured smart filtering services to enable extraction of structured data (graphics, numeric, and etc.) from free text; finalized and documented all software for transition to PM BC; demonstrated and assessed agent based BC services hosted at multi-echelons in a representative environment; matured additional functionality in data aggregation and alert capabilities and provided lessons			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 101: *Tactical Command and Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
learned; enhanced methods and software to improve information sharing and collaboration in network-enabled operations; enhanced configuration of Microsoft Office applications to allow the Warfighter to adapt them in the field to specific mission requirements; developed web-based gallery to support collaboration of Warfighter-developed applications. ***FY 2012 Plans:*** Validate proof-of-concept for mission context data aggregation and alert algorithm for more effective use of available information; further create and demonstrate methods to assess information sharing, decision making and collaboration in network-enabled operations to better understand how to align these technologies with Warfighter needs; demonstrate technologies that enable the software to track progress in meeting mission goals and provide mechanisms that offer the commander a real-time assessment of the mission; demonstrate technologies permitting the Warfighter to customize and/or extend decision-enabling software in response to unique and evolving mission needs; write algorithms to monitor text-based chat conversations, evaluate content meaning, and suggest information from other related chat sessions that may be applicable. ***FY 2013 Plans:*** Will code and demonstrate MC software applications for tasks such as team coordination and situational awareness for dismounted users equipped with hand held devices (a.k.a. Mobile CE) to maximize effective use of available information; code and integrate decision support software capabilities based on information sharing in the Mounted CE to assist in locating and collaborating with friendly forces using tactical communication systems; code MC software capabilities to help with mission planning, execution and tracking unit progress in meeting mission goals within the Command Post CE; code software enabling Soldiers at the company echelon to perform Soldier functions that are typically performed only at battalion and above, such as intelligence and fires; add cognitive enhancements such as question-driven input and pop-up activity-driven suggestions to improve existing MC software systems by automatically assisting users, who may have limited training, to perform at higher levels of efficiency.			
Title: Command and Control (C2) for Unmanned Systems ***Description:*** This effort designs, codes and demonstrates software services that provide coordinated dynamic battle command and tactical control of unmanned systems as well as software tool sets that enable the commander to manage teams of manned and multiple unmanned air and ground platform assets. ***FY 2011 Accomplishments:*** Matured mission planning, execution, and monitoring software services to support collaborative, teamed unmanned ground vehicle/unmanned aerial system (UGV/UAS) operations as well as provide greater battlefield awareness and situational understanding for operations in urban terrain; enhanced software algorithms for UAS/UGV perception and control technologies which facilitate increased autonomy and more complex missions; incorporated models for terrain and weather effects into	3.661	3.516	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 101: *Tactical Command and Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
planning software to enable more effective planning in complex environments; conducted experiments in modeling and simulation environments to evaluate effectiveness and establish a performance base line. ***FY 2012 Plans:*** Code user interface enhancements to facilitate manned/unmanned interaction, improve ability to monitor multiple unmanned assets, and improved visualization of vehicle status, task progression, and incoming sensor data; continue to evolve mission planning, execution and monitoring software services supporting collaborative UAS/UGV teaming; continue to enhance software algorithms for UAS/UGV perception and control technologies that potentially facilitate increased autonomy and mission complexity; continue modeling and simulation activities to evaluate software effectiveness and expand on performance base line.			
Title: Battle Space Awareness and Positioning ***Description:*** This effort demonstrates position and navigation tools to mitigate the impacts of jamming, terrain features and obstacles such as buildings that limit the performance of Global Positioning System (GPS) receivers to enhance the performance of navigation systems in a GPS denied or degraded environment. Work being accomplished under PE 0602782A/project 779 compliments this effort. ***FY 2011 Accomplishments:*** Matured an integrated pos/nav suite combining advanced small inertial sensors, advanced GPS technology and algorithms and radio based navigation technology to provide pos/location information in all terrains and environments. ***FY 2012 Plans:*** Complete integration of a pos/nav suite for a software defined radio platform (e.g., Joint Tactical Radio System) combining RF-ranging and network-assisted navigation to provide position location information in all terrains and environments as well as under GPS-degraded conditions. ***FY 2013 Plans:*** Will pursue two parallel approaches to integrating novel pos/nav capabilities, using JTRS radios for one approach and Android smartphones for the other, for both approaches, will implement sensor integration algorithms that incorporate navigation enhancements such as RF-ranging and network assisted navigation in combination with selected pos/nav sensor equipment; complete fabrication and integration of brassboard radio/sensor navigation systems for laboratory assessment of system performance.	2.014	3.058	3.435
Accomplishments/Planned Programs Subtotals	14.319	15.265	11.590

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 243: *Sensors and Signals Processing*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
243: *Sensors and Signals Processing*	9.856	15.287	13.636	-	13.636	13.819	21.195	21.459	21.821	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates improved radar, sensor fusion, and correlation software, services, devices and systems for wide area reconnaissance, surveillance, tracking and targeting of platforms and individuals in all terrains, including complex and urban environments. Sensor fusion efforts mature and demonstrate software, algorithms and services for sensor management, data correlation, and relationship discovery for a multi-intelligence fusion system. Sensor and simulated sensor candidates may include moving-target-indicator/synthetic aperture radar, electro-optical/infrared (EO/IR), signals intelligence (SIGINT), measurements and signatures intelligence (MASINT), human intelligence (HUMINT) and biometrics.

This project supports Army science and technology efforts in the Command Control and Communications, Ground and Air portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command, Communications - Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Foliage Penetrating (FOPEN) Radar for Unmanned Aerial Systems (UASs)	2.871	-	-
Description: This effort matures and demonstrates a FOPEN radar capability to meet the size, weight, and power (SWaP) requirements for a Class IV UAS. Advancements in both hardware and exploitation processing software enable increased radar performance to include ground and non-metallic building penetration for detection of hidden roadside target/weapons caches. Two demonstrators with spares are being fabricated and flight assessed, the first completed in FY10 and the second in FY11. ***FY 2011 Accomplishments:*** Completed second FOPEN system radar integration on target UAS and conducted UAS flight assessment on second system.			
Title: Measurement and Signature Intelligence Technologies (MASINT) for clandestine tagging, tracking and locating (TTL)	1.894	2.352	2.870
Description: This effort matures and demonstrates MASINT sensors and software techniques capable of detecting, tracking, and/or identifying human activities and/or infrastructures. The emphasis is to identify appropriate technical approaches, demonstrate embedded processing, and mature algorithms for multi-mode fusion of sensor data. Candidate technologies include: fiber optic seismic/magnetic sensors, highly sensitive for detection of walking personnel with/without weapons and/or tunneling detection; air			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
deployable (air droppable) networked sensor system for a jungle environment (integration of seismic/acoustic sensor with jungle canopy relay); human infrastructure detection technologies (algorithms, sensors, etc); radio frequency MASINT detector, ultra-light multi-target indicator radar for unattended ground sensors and unmanned air vehicles. Work accomplished under PE 0602120A/ project H16 compliments this effort. ***FY 2011 Accomplishments:*** Demonstrated/assessed brassboard for potential spiral transition to the user community; investigated new TTL technologies to address emerging TTL user requirements. ***FY 2012 Plans:*** Designed and fabricated contactless identification sensors that enable clandestine tagging and observation of targets from a distance, extended operational persistence and range of the sensors and designed and coded forward based fusion and processing software and algorithms. ***FY 2013 Plans:*** Will design and fabricate an extended range facial recognition sensor and optimize code of associated facial-matching algorithms; demonstrate the positive identification of an individual as a person-of-interest and the tracking of that individual throughout a forward operating area using a network of unattended facial recognition sensors communicating with intelligence/biometrics databases over a secure network in near real time.			
Title: Weapon-Locating (Ground) radar technologies ***Description:*** This effort matures and demonstrates medium-range sensor technologies for locating indirect fire weapons and extending traditional counter-fire target acquisition to shooters operating into or from within natural and urban canyons and firing in improvised fashions (tracks rocket, artillery and mortar targets). ***FY 2011 Accomplishments:*** Developed improved clutter mitigation and discrimination algorithms to accommodate increased occurrence of ground clutter expected with additional radar coverage area. ***FY 2012 Plans:*** Complete brassboard weapon-locating radar system hardware; conduct component and system level engineering and performance assessment against rocket, artillery and mortar targets fired at non-traditional trajectories; integrate mature radar and components under the PM Radars Lightweight Counter Mortar Radar (LCMR(V)3) pre-planned product inprovement program and into new radar developments.	2.546	4.435	-
Title: Collaborative ISR Sensors, previously named Multi-Function Networked RADAR Technologies.	-	-	4.701

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort fabricates multi-function ISR sensors and sensor management systems that act collaboratively to improve their individual performance and increase the effectiveness and action-ability of battlespace awareness/intelligence data in an area of operations. Efforts focus on existing, modified and emerging radar technologies in support of area/base camp protection. This effort implements an open architecture that is extensible to multiple base sizes and environments and allows growth for future ISR sensors. Work being accomplished under PE 62270/906 complements this effort. ***FY 2013 Plans:*** Will code, demonstrate and assess software algorithms that allow existing radar systems to track targets and perform air surveillance simultaneously; integrate software algorithm into counter target acquisition systems (LCMR) to improve the accuracy of target recognition, identification and classification; code software and firmware to correlate data from existing short range (LCMR) and long range (EQ-36) radar systems to more accurately validate and verify threats at increased ranges and combine targeting information into a single display.			
Title: Omni-directional Situational Awareness (SA) (Airborne) radar technologies ***Description:*** This effort matures and demonstrates low power multi-function SA sensors for small unmanned aerial systems (UAS) and other aircraft to improve sensing and detection capabilities in support of wide-area persistent surveillance. ***FY 2011 Accomplishments:*** Matured sensor payload to reduce size weight and power requirements; matured antenna design and processing techniques to support multi-sensor capability. ***FY 2012 Plans:*** Fabricate networking radar-EO/IR sensor pairs using ad-hoc methods; analyze and assess network bandwidth and security requirements for downlink from UAS; further mature antenna design and processing techniques to support multi-sensor capability and cross-cue to narrower fields of view and auto-tracker; modify sensor payload to reduce size, weight and power; harden antenna and electronics design for field environment; design and code application for radar command, control, and data display on handheld device (PDA, smart-phone, or similar).	2.545	3.500	-
Title: Advanced All Source Fusion ***Description:*** This effort develops software technologies for intelligence/battle command (Intel/BC) mission collaboration to provide faster and higher quality decision making support for the Commander and his key staff. Specific efforts focus on integrating intelligence, surveillance and reconnaissance (ISR) planning and execution at the task force/battalion through troop-level, as well as efforts that provide the capability to identify, fuse, and trace/track specific targets in an asymmetric environment. Work accomplished under PE 0602270A/project 906 compliments this effort.	-	5.000	6.065

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2012 Plans: Analyze, assess and design a common data model that provides integrity for all data types to include data inter-relationships (time, locations, links, etc) that provide source-agnostic extraction and exploitation capabilities; integrate software products for extracting data, identifying, fusing, and tracking of specific entities into the Intelligence Enterprise (DCGS-A, INSCOM, JIEDDO); code entity extractors, relational reasoning engines, and visualization products; integrate human assisted extraction, interactive correlation and data mining techniques to enable the data fusion process and assist intel analysts with activity and relationship discovery; integrate these technologies into DCGS-A Systems Integration Laboratory (SIL) and architecture; integrate biometric data matching and fusion algorithms for use in non-cooperative intelligence collection environment. ***FY 2013 Plans:*** Will compose, code and assess automated exploitation and fusion analysis tools, applications, and services that provide advanced planning, execution and assessment capabilities to support the tactical edge user; code and demonstrate applications and services to generate actionable intelligence in support of simultaneous offense, defense, stability, and civil support missions; define new data fields and associated values necessary to improve action-ability of tactical intelligence products; code and assess new correlation and pattern analysis algorithms that incorporate these new data fields; code and assess complex analysis and prediction software to aid the decision making process.			
Accomplishments/Planned Programs Subtotals	9.856	15.287	13.636

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.