Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*				R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	23.581	17.330	15.790	-	15.790	15.058	15.401	16.121	16.418	Continuing	Continuing
475: *ELECTRONIC WARFARE COMPONENT TECHNOLOGIES (CA)*	7.859	-	-	-	-	-	-	-	-	Continuing	Continuing
906: *Tactical Electronic Warfare Applied Research*	15.722	17.330	15.790	-	15.790	15.058	15.401	16.121	16.418	Continuing	Continuing

Note

FY12 funding realigned to higher priority efforts.

A. Mission Description and Budget Item Justification

This program element (PE) designs and develops electronic warfare (EW) component technologies that deny, disrupt, or degrade the enemy's use of the electromagnetic spectrum for offensive or defensive operations. This is accomplished through the investigation of electronic support measures (ESM), countermeasures against communications systems and networks; the development of sensors used to identify and locate threat forces in an asymmetric environment; and threat warning and electronic countermeasures (ECM) against munitions sensors and targeting capabilities, missile guidance and targeting systems, and booby traps. Project 475 funds congressional special interest items. Project 906 protects high-value ground platforms, aircraft, and the Soldier from threat surveillance and tracking systems; imaging systems; and advanced radio frequency (RF)/electro-optical (EO)/infrared (IR) missiles, artillery, and smart munitions. Information fusion research addresses sensor correlation, relationship discovery, and management services through use of automated processing, as well as higher level reasoning techniques that support automated combat assessment. Project 906 also supports efforts related to research and application of key EW technologies to intercept, locate, and disrupt, current and emerging threat communications and non-communications emitters, to provide vital, quality combat information directly to users in a timely actionable manner. Specifically, its technologies focus on detecting threat sensors and emitters associated with weapon systems, targeting systems and command, control, communications, computers, and intelligence systems and networks.

Work in this PE is compliments PE 0603270A (EW Technology), PE 0602120A (Sensors and Electronic Survivability), and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology). This PE is related to and fully coordinated with PE 0603008A (Command, Control, Communications Advanced Technology) and PE 0603710A (Night Vision Advanced Technology).

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*	

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	22.303	17.330	17.806	-	17.806
Current President's Budget	23.581	17.330	15.790	-	15.790
Total Adjustments	1.278	-	-2.016	-	-2.016
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	1.591	-			
• SBIR/STTR Transfer	-0.313	-			
• Adjustments to Budget Years	-	-	-2.016	-	-2.016

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*	PROJECT 475: *ELECTRONIC WARFARE COMPONENT TECHNOLOGIES (CA)*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
475: *ELECTRONIC WARFARE COMPONENT TECHNOLOGIES (CA)*	7.859	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Electronic Warfare technology applied research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Hostile Fire Indicator for Aircraft ***Description:*** This is a Congressional Interest Item ***FY 2010 Accomplishments:*** This Congressional Interest Item developed a short-wave infra-red airborne hostile fire indicator system.	1.492	-	-
Title: Silver Fox Unmanned Aerial Vehicle - Army ***Description:*** This is a Congressional Interest Item ***FY 2010 Accomplishments:*** This Congressional Interest Item investigated experimental deployment efforts and spiral development of sensor and micro-transponder technologies using the Silver Fox and Manta unmanned aerial systems (UAS).	1.592	-	-
Title: Locating and Tracking Explosive Threats with Wireless Sensors and Networks ***Description:*** This is a Congressional Interest Item. ***FY 2010 Accomplishments:*** Developed and refined an ultra wide band radar system to detect and identify hidden/buried threats.	4.775	-	-
Accomplishments/Planned Programs Subtotals	7.859	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*	PROJECT 475: *ELECTRONIC WARFARE COMPONENT TECHNOLOGIES (CA)*

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 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*	PROJECT 906: *Tactical Electronic Warfare Applied Research*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
906: *Tactical Electronic Warfare Applied Research*	15.722	17.330	15.790	-	15.790	15.058	15.401	16.121	16.418	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project designs, develops, and applies key electronic warfare (EW)/information operations technologies to enhance platform survivability (to include ground combat vehicles, aircraft, and the dismounted Soldier) and to intercept and locate current and emerging threat communications and non-communications emitters. This project applies recent advances in radio frequency (RF), infrared (IR), and electro-optical (EO) sensor and jamming sources to detect, locate, deceive, and jam threats (to include radar directed target acquisition systems, target-tracking sensors, surface-to-air missiles (SAMs), air-to-air missiles (AAMs), top attack weapons, and electronically fuzed munitions), This project also pursues the ability to neutralize booby traps. This project develops information systems to provide vital, quality combat information directly to users in a timely actionable manner in accordance with concepts for future force intelligence operations. This project investigates RF collection and mapping technologies to offer real time emitter detection, location, and identification. In addition, this project enables a remote capability to disrupt, deny, or destroy threat communication signals and enables fusion (automated assimilation and synthesis) of battlefield intelligence data to enable interpretation of current and future enemy activities. This allows commanders to develop operational courses of action in time to act decisively and in a pre-emptive manner.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Multi-Intelligence Data Fusion and Targeting	5.466	6.915	4.090
Description: This effort investigates and develops software technologies for advanced intelligence/mission command enterprise collaboration that enable the enterprise to identify, fuse, and trace/track specific human targets in an asymmetric environment. Work being accomplished under PE 0602120A/project H15 and PE 0603772A/project 243 compliments this effort.			
FY 2010 Accomplishments: Developed advanced data ingestion (throughput of high volume and non-traditional data types), data alignment/conversion (normalization), and correlation and data engineering management techniques.			
FY 2011 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*	PROJECT 906: *Tactical Electronic Warfare Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Integrate additional fusion algorithms, data, sensor and message types, temporal enhancements, as well as integrated extraction, visualization, and conceptualization tools into a fusion & exploitation framework for improved target tracking and identification; conduct metrics study in support of non-cooperative biometrics for single and multi-modality matching and fusion algorithms. ***FY 2012 Plans:*** Will investigate biometric data matching and fusion algorithms for use in non-cooperative intelligence collection environment; will investigate standards of ingestion to facilitate addition of non-cooperatively collected biometrics (partial iris scans, scents, three dimensional (3D) face, thermal face, etc.) into biometrics database; will code enhanced algorithms to conduct near-real-time matching and fusion of cooperative and non-cooperative biometric intelligence into enhanced biometric intelligence products; will finalize data collection process, generate candidate templates, and conduct non-cooperative sensor data collection to assess the process and templates.			
Title: Offensive Information Operations Technologies ***Description:*** This effort investigates and develops techniques that identify and capture data traversing targeted networks for the purpose of information operations or otherwise countering adversary communications. ***FY 2010 Accomplishments:*** Defined distributed communications schema that allows software algorithms to communicate and migrate between nodes; began development of interception and countermeasure capabilities against network traffic flows of interest; developed network operations techniques against relevant high priority protocols; researched methods to link this computer network operations (CNO) framework to previously developed EW frameworks. ***FY 2011 Plans:*** Develop capability for identification and capture of protocols of interest; implement algorithms to allow for surgical and coordinated exploitation amongst nodes; develop traffic analysis techniques to discriminate amongst individual data sessions; develop communication and coordination capabilities between CNO and EW systems. ***FY 2012 Plans:*** Will refine techniques to perform computer network manipulation to include, traffic redirection, data-in-transit, and network situational awareness; will develop comprehensive visualization interface that takes into account CNO and EW missions; will assess feasibility of integrating next-generation EW systems with tactical CNO capabilities to maximize effects on targets and minimize the training requirements on operator to executing a CNO mission; will develop anti-tamper and adapted offensive components, networking resource mutation for network manipulation, and virtualization/virtual-machine monitors for isolation.	3.678	3.770	4.671
Title: Multispectral Threat Warning	3.180	3.068	3.500

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*	PROJECT 906: *Tactical Electronic Warfare Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Description: This effort investigates the benefits of augmenting the currently fielded ultra-violet (UV)-based Common Missile Warning System (CMWS) threat detection capability with IR and acoustic sensors to improve the probability of detection of Man-Portable Air Defense System (MANPADS)-like threats; reduce atmospheric clutter and, thereby, the false alarm rate, and add detection of ball ammunition to the current CMWS tracer-only capability. ***FY 2010 Accomplishments:*** Integrated acoustic signals into UV-based hostile fire indication (HFI) algorithms; evaluated acoustic array hardware concepts with regard to algorithm design and began correlation of acoustic and UV-based HFI data based on hardware integration concepts. ***FY 2011 Plans:*** Finalize IR and UV sensor integration algorithms; experiment with integration concept of these multispectral sensors and their affect on detection and false alarm in a laboratory environment; determine effectiveness of acoustic sensor in enhancing HFI algorithms. ***FY 2012 Plans:*** Will investigate countermeasure techniques against next-generation man-portable air-defense systems employing digital imaging seekers; will use modeling and simulation and limited hardware-in-the-loop methods to investigate potential effectiveness of current platform-resident infrared focal plane arrays, likely tracking algorithms, digital IR counter measure lasers and available imaging sources against these advanced seekers.			
Title: Passive and Active Targeting Techniques ***Description:*** This effort investigates passive and active techniques and software algorithm development for three dimensional detection, identification, and precision geolocation of next-generation wireless communication threats and improved situational awareness. This effort also addresses operational conditions such as dense, co-channel, and multipath RF environments. ***FY 2010 Accomplishments:*** Assessed and selected precision geolocation techniques and analyzed performance results in the presence of jamming and under varying environmental conditions; designed software to implement selected techniques on commercial based software defined radio representative hardware; evaluated techniques for feasibility of implementation on representative hardware. ***FY 2011 Plans:*** Enhance geolocation techniques based on results of representative hardware analysis; perform additional simulation and laboratory validation of these enhancements utilizing synthesized and outdoor wireless RF data collected in relevant field	3.398	3.577	3.529

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602270A: *Electronic Warfare Technology*	PROJECT 906: *Tactical Electronic Warfare Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
environments; transition executable software package, software model and associated engineering analysis quantifying technique performance and effectiveness to applicable follow-on technology demonstration, program of record or quick reaction capability. ***FY 2012 Plans:*** Will investigate techniques to improve the resolution of conventional non-cooperative time-difference-of-arrival (TDoA) based geolocation techniques; will investigate techniques to overcome multipath effects such as reflection, absorption and diffraction found in complex urban environments that cannot be resolved by traditional TDoA and angle of arrival techniques utilizing electromagnetic propagation mapping tools.			
Accomplishments/Planned Programs Subtotals	15.722	17.330	15.790

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.