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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603794A / C3 Advanced Technology
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	45.168	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	45.168
EL4: <i>Tactical Comms and Networking Technology Int</i>	-	36.544	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	36.544
EL5: <i>Secure Tactical Information Integration</i>	-	8.624	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.624

Note

In Fiscal Year 2020 (FY20) this Program Element (PE) was realigned with continuity of effort to the following PEs:

- * PE 0603463A Network C3I Advanced Technology
- * PE 0603457A C3I Cyber Advanced Development

A. Mission Description and Budget Item Justification

This PE matures and demonstrates technologies to address the integrated tactical communications challenge with distributed, secure, mobile, wireless, and self-organizing communications networks and networked transceivers that must operate reliably in diverse and complex terrains and environments. Efforts demonstrate seamlessly integrated communications and information security technologies across all network tiers, ranging from unattended networks and sensors, through maneuver elements using airborne and space assets. Project EL4 matures and integrates antennas, wireless networking devices, protocols, and software; network operations tools and techniques; and combines these with current fielded networks and systems in a series of command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) network modernization demonstrations to measure their technology readiness levels and assess them against currently fielded network architectures in an operationally relevant environment. Project EL5 matures information security devices, techniques, services, software and algorithms to protect tactical wired and wireless networks against modern network attacks; generates and distributes tactical cyber situational awareness; and focuses on configuration, operation, monitoring, defense and network reconstitution in bandwidth constrained tactical environments while reducing the operator workload required to conduct these functions.

Work in this PE complements PE 0602782A (Command, Control, Communications Technology), and fully coordinated with PE 0602120A (Sensors and Electronic Survivability), PE 0602270A (Electronic Warfare Technology), PE 0602783A (Computer and Software Technology), PE 0603001A (Warfighter Advanced Technology), PE 0603270A (Electronic Warfare Technology) and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology).

FY20 realignments are due to financial restructuring in support of Army Modernization Priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by U.S. Army Futures Command (AFC).

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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	52.332	0.000	0.000	-	0.000
Current President's Budget	45.168	0.000	0.000	-	0.000
Total Adjustments	-7.164	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-5.505	-			
• SBIR/STTR Transfer	-1.659	-			

Change Summary Explanation

FY2019 decrease of \$5.505M realigned to support higher priority Army modernization efforts.

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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603794A / C3 Advanced Technology				Project (Number/Name) EL4 / Tactical Comms and Networking Technology Int			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
EL4: <i>Tactical Comms and Networking Technology Int</i>	-	36.544	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	36.544

Note

In Fiscal Year 2020 (FY20) this Project was realigned to:
 Program Element (PE) 0603463A Network C3I Advanced Technology:
 * Project AM7 Modular RF Communications Advanced Technology
 * Project AM9 Protected SATCOM Advanced Technology
 * Project AN2 Narrowband SATCOM Advanced Technology
 * Project AN4 Non Traditional Waveforms Advanced Technology
 * Project AN6 Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech
 * Project AO3 Robust Grey C3I Advanced Technology
 * Project AP6 C4ISR Integrated Demonstrations Advanced Tech
 * Project AP8 Comms Supp to CSA/Horizontal Int Fields Adv Tech
 * Project AP9 Next Generation HF Advanced Technology
 * Project AQ1 Spectrum Obfuscation Advanced Technology

A. Mission Description and Budget Item Justification

This Project matures and demonstrates key communications and mobile networking technologies, such as antennas, transceivers, transceiver components, networking software and novel techniques to provide secure, reliable, mobile network solutions that function in complex and diverse terrains. This Project concentrates on four major goals: to provide a series of technology demonstrations of new and emerging command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) technology enabled capabilities to significantly reduce risk associated with the network-of-networks concept; to lower the size, weight, power and cost of wireless networking systems deployed on Army platforms through hardware and software convergence; to provide critical improvements in the ability to communicate and move large amounts of information in radio frequency (RF) contested environments, in a seamless, integrated manner across the Army's highly mobile manned and unmanned force structure; and to assess the technology readiness level (TRL) of emerging network technologies in an operationally relevant environment.

FY20 realignments are due to financial restructuring in support of Army Modernization Priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603794A / C3 Advanced Technology	Project (Number/Name) EL4 / Tactical Comms and Networking Technology Int		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Title: Enabling C4ISR Infrastructure, formerly C4ISR On the Move (OTM)</p> <p>Description: This effort provides a venue for the demonstration of new and emerging Command, Control, Communications, computers, Intelligence, Surveillance and Reconnaissance (C4ISR) technologies. This venue performs field based risk reduction (FBRR) and technology readiness assessments (TRAs) by evaluating the Technology Readiness Levels (TRLs) of candidate Army science and technology (S&T) and best of Industry efforts to support tactical network modernization. The yearly themes for the integrated capabilities event are determined by the maturity of the tech base programs across the Army S&T command, control, communications and intelligence (C3I) portfolio. On an annual basis, those programs at or approaching TRL 6 will be solicited for participation based on their maturity to enter TRA in the FBRR environment located at Joint Base McGuire-Dix-Lakehurst (JB-MDL) (Fort Dix). Upon the completion of technology selection, themes will be developed that inform Army S&T, CERDEC Thrust Areas, Army Warfighting Challenges, Training and Doctrine Command (TRADOC) key technology imperatives, and the overall development of the Mission Command Network of 2025 and beyond.</p>		3.524	-	-
<p>Title: Communications, Adaptive Networks to Improve Maneuver Operations, formerly Networking to Improve Maneuver Operations</p> <p>Description: This effort matures and demonstrates technologies and capabilities to provide a range of robust, reliable, scalable, interoperable and resource efficient communications capabilities to expeditionary forces and troops on the move. These capabilities will allow forces to conduct maneuver operations, develop situational understanding, and sustain operations while maintaining freedom of movement.</p>		6.374	-	-
<p>Title: Communications, Robust Tactical Systems, formerly Uninterrupted Communications</p> <p>Description: This effort matures and demonstrates components, software, algorithms and technologies that enable Army tactical wireless networks to operate more efficiently in congested, contested and competitive electromagnetic environments across a multi-domain architecture for mission success. The capabilities developed in this effort provide assured uninterrupted access to critical communications and information links. Efforts will result in robust, reliable and secure terrestrial and satellite communication networks in austere, congested and hostile electromagnetic environments using cost-effective solutions while ensuring that the capability is interoperable and resource efficient. Work accomplished under PE 0602782A/Project H92 complements this effort.</p>		13.121	-	-
<p>Title: Advanced Modular Radio Frequency (RF)</p> <p>Description: This effort will enable connectivity in contested & congested spectrum environments by applying modular radio frequency (RF) technologies within an automated network to adapt and continue operation under interference signals. This</p>		13.510	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
capability will reduce the rigorous network management through intelligent selection of diverse network connections to seamlessly transmit data and maintain communications within a contested RF environment.				
Title: FY 2018 NDAA SEC 825 MDAP Cost Overrun		0.015	-	-
Description: FY 2018 NDAA SEC 825 MDAP Cost Overrun				
Accomplishments/Planned Programs Subtotals		36.544	-	-
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
N/A				

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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603794A / C3 Advanced Technology				Project (Number/Name) EL5 / Secure Tactical Information Integration			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
EL5: Secure Tactical Information Integration	-	8.624	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.624

Note

In Fiscal Year 2020 (FY20) this Project was realigned to:
 Program Element (PE) 0603463A Network C3I Advanced Technology:
 * Project AO9 Information Trust Advanced Technology
 * Project AP2 Decoy and Deterrence Advanced Technology
 PE 06034457A C3I Cyber Advanced Development:
 * Project 6CY Autonomous Cyber Advanced Technology

A. Mission Description and Budget Item Justification

This Project matures and demonstrates software, algorithms and services that focus on tactical cyber and cyberspace electromagnetic activities (CEMA) situational understanding (SU), autonomous network defense, cross domain security and encryption solutions to secure the Army's tactical network. Efforts focus on configuration, operation, monitoring, defense and network reconstitution in bandwidth constrained tactical environments while reducing the operator workload required to conduct these functions. This Project codes, optimizes, and demonstrates software based technologies for intrusion detection, high assurance internet protocol (IP) encryption, seamless communications across security boundaries, as well as information sharing across operations and intelligence functions. These capabilities to automate, protect, monitor, report and access cyber elements of the tactical network are intended to greatly reduce Soldier burden and protect the Army's tactical network by building upon enterprise solutions from commercial, Department of Defense, Department of the Army and other government agencies. This Project cumulatively builds science and technology capabilities in accordance with Army Cyber Material Development Strategy and the Office of the Secretary of Defense Cyber Community of Interest.

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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Defensive Cyber Operations, Cyber Situational Understanding	1.456	-	-
Description: This effort matures and demonstrates software and algorithms that facilitate actionable decision making through mission critical CEMA information knowledge and by applying analysis and judgment to relevant information to help determine the relationships among the operational and mission variables across cyberspace.			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: Defensive Cyber Operations, Tactical Cyber Resilient Architectures & Platforms</p> <p>Description: This effort matures and demonstrates software, architectures and frameworks to allow systems and networks to withstand cyber-attacks, sustain or recover critical functions, and dynamically reshape cyber systems as conditions/goals change to escape harm.</p>	4.459	-	-
<p>Title: Defensive Cyber Operations, Trusted Self Defending Networks & Systems, formerly Cyber/CEMA Operations, Trusted Self Defending Networks & Systems</p> <p>Description: This effort matures and demonstrates software, architectures and frameworks to support establishment of a known degree of assurance that devices, networks and cyber dependent functions perform as expected, despite attack or error and allow the Warfighter to maintain confidence in network information, resources, and identities.</p>	2.709	-	-
Accomplishments/Planned Programs Subtotals	8.624	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A