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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	13.769	-	13.769	18.795	21.441	22.298	22.381	0.000	98.684
6CY: Autonomous Cyber Advanced Technology	-	0.000	0.000	6.000	-	6.000	6.000	8.000	9.059	9.319	0.000	38.378
7CY: Decoy and Deterrence Advanced Technology	-	0.000	0.000	2.135	-	2.135	4.527	4.525	3.002	2.975	0.000	17.164
8CY: Information Trust Advanced Technology	-	0.000	0.000	2.203	-	2.203	3.500	4.199	4.998	4.956	0.000	19.856
9CY: Network Access and Effects Advanced Technology	-	0.000	0.000	1.431	-	1.431	2.768	2.717	3.239	3.109	0.000	13.264
CB4: Offensive Cyber Operations (OCO) Mirror Adv Tech	-	0.000	0.000	2.000	-	2.000	2.000	2.000	2.000	2.022	0.000	10.022
<b>Note</b> In Fiscal Year (FY) 2020 this Program Element (PE) was previously funded, with continuity of effort realigned from the following PEs: * 0603270A Electronic Warfare Technology * 0603794A C3 Advanced Technology												
<b>A. Mission Description and Budget Item Justification</b> This PE matures and demonstrates technologies for offensive and defensive cyber operations in tactical environments. Efforts optimize devices, techniques, services, software and algorithms to enable cyber situational understanding and Cyber Electromagnetic Activities (CEMA). For offensive cyber, efforts demonstrate integrated electronic attack (EA) and CEMA hardware and software to execute force protection (FP), EA, electronic surveillance (ES), signals intelligence (SIGINT), electronic warfare (EW) and cyber missions in a dynamic, distributed and coordinated fashion. For defensive cyber, efforts demonstrate hardware and software to protect tactical wired and wireless networks against modern cyber attacks and focuses on configuration, operation, monitoring, data integrity, and defense in bandwidth constrained tactical environments while reducing the operator workload required to conduct these functions.  All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.  The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.												

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army				Date: March 2019	
Appropriation/Budget Activity		R-1 Program Element (Number/Name)			
2040: Research, Development, Test & Evaluation, Army I BA 3: Advanced Technology Development (ATD)		PE 0603457A I C3I Cyber Advanced Development			
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	13.769	-	13.769
Total Adjustments	0.000	0.000	13.769	-	13.769
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	13.769	-	13.769
Change Summary Explanation					
FY20 increase due to Science & Technology portfolio restructure. Efforts in this PE were previously funded elsewhere.					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019			
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development				Project (Number/Name) 6CY / Autonomous Cyber Advanced Technology				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
6CY: Autonomous Cyber Advanced Technology	-	0.000	0.000	6.000	-	6.000	6.000	8.000	9.059	9.319	0.000	38.378	
Note In Fiscal Year (FY) 2020 this Project was realigned from: Program Element (PE) 06030794A C3 Advanced Technology, Project: * EL5 Secure Tactical Information Integration													
A. Mission Description and Budget Item Justification This Project will demonstrate defensive effects to adversarial use of artificial intelligence (AI) and machine learning (ML) to avoid detection and deceive our automated technologies driving the network decisions. This Project provides cyber autonomy through science & technology advancements.  All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.  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 Project is performed by the U.S. Army Futures Command.													
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020		
Title: Autonomous Cyber									-	-	6.000		
Description: This effort will develop proof-of-concept sensors that can adapt to and autonomously react to adversary cyber-attack and develop a cyber response course of action decision aid for cyber defenders to validate correctness of actions and to speed response decisions.													
FY 2020 Plans: Will develop proof-of-concept sensors that can adapt to and autonomously react to adversary cyber-attack; develop a cyber response course of action decision aid for cyber defenders to validate correctness of actions and to speed response decisions.													
FY 2019 to FY 2020 Increase/Decrease Statement: This Effort is realigned from PE0603794/Project EL5 in FY20 as part of the financial restructure and supports the Army's Modernization Priorities.													
Accomplishments/Planned Programs Subtotals									-	-	6.000		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development	Project (Number/Name) 6CY / Autonomous Cyber Advanced Technology
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy N/A		
E. Performance Metrics N/A		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development				Project (Number/Name) 7CY / Decoy and Deterrence Advanced Technology			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
7CY: Decoy and Deterrence Advanced Technology	-	0.000	0.000	2.135	-	2.135	4.527	4.525	3.002	2.975	0.000	17.164
Note In Fiscal Year (FY) 2020 this Project was realigned from: Program Element (PE) 0603794A C3 Advanced Technology: * Project EL5 Secure Tactical Information Integration												
A. Mission Description and Budget Item Justification This Project demonstrates disruption of enemy cyber attacked through the use of cyber decoy applications with realistic user behavior algorithms, such as software that creates fake users, applications, systems, documents, networks, and communication traffic. Work in this Project complements PE 0602213A C3I Applied Cyber \ Project CY9 Decoy and Deterrence Technology.  All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.  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 Project is performed by the U.S. Army Futures Command (AFC).												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Decoy and Deterrence Advanced Technology									-	-	2.135	
Description: This Project demonstrates disruption of enemy cyber attacked through the use of cyber decoy applications with realistic user behavior algorithms, such as software that creates fake users, applications, systems, documents, networks, and communication traffic.  FY 2020 Plans: Will continue development of techniques incorporating application diversity to control and vary the network attack surface to inhibit the cyber attacker's ability to detect and exploit pre-placed cyber decoys.  FY 2019 to FY 2020 Increase/Decrease Statement: This Effort is realigned from PE 0603794 C3 Advanced Technology/ Project EL5 in FY 2020.												
Accomplishments/Planned Programs Subtotals									-	-	2.135	

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development	Project (Number/Name) 7CY I Decoy and Deterrence Advanced Technology
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy N/A		
E. Performance Metrics N/A		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development				Project (Number/Name) 8CY / Information Trust Advanced Technology			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
8CY: Information Trust Advanced Technology	-	0.000	0.000	2.203	-	2.203	3.500	4.199	4.998	4.956	0.000	19.856
Note In Fiscal Year (FY) 2020 this Project was realigned from: Program Element (PE) 0603794A C3 Advanced Technology: * Project EL5 Secure Tactical Information Integration												
A. Mission Description and Budget Item Justification This Project demonstrates enhanced awareness of the information's "provenance" from originator to consumer (e.g. sensor to shooter) in the presence of cyber attacks, such as an attempt to manipulate data traversing the network. Work in this Project complements PE 06022213A C3I Applied Cyber \ Project 2CY Information Trust Technology.  All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.  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 Project is performed by the U.S. Army Futures Command (AFC).												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Information Trust Advanced Technology									-	-	2.203	
Description: This project demonstrates enhanced awareness of the information's "provenance" from originator to consumer (e.g. sensor to shooter) in the presence of cyber attacks, such as an attempt to manipulate data traversing the network.												
FY 2020 Plans: Will develop a suitable trust score architecture that can provide real time analytics of the data through distributed processing and minimization of network traffic.												
FY 2019 to FY 2020 Increase/Decrease Statement: This Effort is realigned from PE 0603794 C3 Advanced Technology / Project EL5 in FY 2020.												
Accomplishments/Planned Programs Subtotals									-	-	2.203	

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development	Project (Number/Name) 8CY / Information Trust Advanced Technology
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy N/A		
E. Performance Metrics N/A		



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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development				Project (Number/Name) 9CY / Network Access and Effects Advanced Technology			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9CY: Network Access and Effects Advanced Technology	-	0.000	0.000	1.431	-	1.431	2.768	2.717	3.239	3.109	0.000	13.264
Note In Fiscal Year (FY) 2020 this Project was realigned from: Program Element (PE) 060270A C3 Advanced Technology: * Project CY3 Offensive Cyber Operations Mirror Adv Tech												
A. Mission Description and Budget Item Justification This Project matures and demonstrates advanced mission management tools and workflows, to promote efficient selection and sequencing of effects to support the agile deployment and execution of Offensive Cyber Operations(OCO) / Radio Frequency (RF) Enabled capabilities.  All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.  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 Project is performed by the U.S. Army Futures Command (AFC).												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Offensive Cyber Enabling Mission Support									-	-	1.431	
Description: This effort matures and demonstrates advanced mission management tools and workflows, to promote efficient selection and sequencing of effects to support the agile deployment and execution of Offensive Cyber Operations(OCO)/Radio Frequency(RF) Enabled capabilities.												
FY 2020 Plans: Will mature and demonstrate protocol-based access and Deny, Degrade, and Disrupt, Destroy, and manipulate (D4M) off-net techniques from tactical Radio Frequency (RF) enabled platforms against emerging hybrid commercial/military technologies used for Adversary Command, Control, Communication, Computers, and Intelligence (AC4I); mature decision aid tools for selection and optimization of RF enabled techniques in support of the Commander's desired intent.												
FY 2019 to FY 2020 Increase/Decrease Statement: This Effort is realigned from PE060270 C3 Advanced Technology/Project CY3 in FY20.												
Accomplishments/Planned Programs Subtotals									-	-	1.431	

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development	Project (Number/Name) 9CY / Network Access and Effects Advanced Technology
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy N/A		
E. Performance Metrics N/A		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army									Date: March 2019			
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603457A / C3I Cyber Advanced Development				Project (Number/Name) CB4 / Offensive Cyber Operations (OCO) Mirror Adv Tech			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
CB4: Offensive Cyber Operations (OCO) Mirror Adv Tech	-	0.000	0.000	2.000	-	2.000	2.000	2.000	2.000	2.022	0.000	10.022
Note In Fiscal Year (FY) 2020 this Project is realigned from: Program Element (PE) 0603270A Electronic Warfare Technology, Project: * CY3 Offensive Cyber Operations Mirror Adv Tech												
A. Mission Description and Budget Item Justification This Project matures and demonstrates methods, tools and techniques to enable rapid instantiation of an operationally relevant cyberspace environment supporting critical Offensive Cyber Operations (OCO) mission functions to include but not limited to development, exercise, mission rehearsal and provide technical reach back to units during operations.  All FY20 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.  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 Project is performed by the U.S. Army Futures Command.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020	
Title: Offensive Cyber Operations (OCO) Mirror									-	-	2.000	
Description: This effort will mature and demonstrate technologies and real world behavioral models of sufficient fidelity to replicate Offensive Cyber Operations environments (for cyber development, deployment, exercises, and mission rehearsal) to reduce risk for critical offensive cyber mission functions.												
FY 2020 Plans: Mature and demonstrate technologies and real world behavioral models of sufficient fidelity to replicate Offensive Cyber Operations environments (for cyber development, deployment, exercises, and mission rehearsal) to reduce risk for critical offensive cyber mission functions.												
FY 2019 to FY 2020 Increase/Decrease Statement:												

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army		<b>Date:</b> March 2019	
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603457A / C3I Cyber Advanced Development	<b>Project (Number/Name)</b> CB4 / Offensive Cyber Operations (OCO) Mirror Adv Tech	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>
This Effort is realigned from PE0603270/Project CY3 in FY 2020 as part of the financial restructure and supports the Army's Modernization Priorities.			
<b>Accomplishments/Planned Programs Subtotals</b>		-	2.000
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A <b>Remarks</b>  <b>D. Acquisition Strategy</b> N/A  <b>E. Performance Metrics</b> N/A			