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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)					PE 0305251A / Cyberspace Operations Forces and Force Support							
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	29.336	56.492	65.817	-	65.817	65.102	66.578	72.697	73.463	0.000	429.485
FA8: Cyberspace Operations Forces and Force Support	-	29.336	56.492	65.817	-	65.817	65.102	66.578	72.697	73.463	0.000	429.485

A. Mission Description and Budget Item Justification

Persistent Cyber Training Environment (PCTE) will provide the Department of Defense (DoD) cyber forces with a standardized training capability with access to existing Cyber Training Ranges (CTR) and available training resources and content. The current environment does not have the capacity to maintain a persistent environment and is primarily used for major exercises (i.e. Cyber Flag). The service cyber components have established their own training environments but do not have standardized capabilities or content. PCTE system approaches are aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD AT&L) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE. Program is directed by the 2016 National Defense Authorization Act, Section 1645. Prototype, integration, and testing efforts in FY19 will complete the capabilities required to meet Initial Operational Capability (IOC) per the PCTE Executive Board developed IOC definition.

B. Program Change Summary (\$ in Millions)	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>
Previous President's Budget	40.510	56.492	52.817	-	52.817
Current President's Budget	29.336	56.492	65.817	-	65.817
Total Adjustments	-11.174	0.000	13.000	-	13.000
• Congressional General Reductions	-0.015	-			
• Congressional Directed Reductions	-10.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.159	-			
• Adjustments to Budget Years	-	-	13.000	-	13.000

Change Summary Explanation

FY19 increase to address critical weapon system evaluation & hardening in response to threat cyber vulnerabilities.

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Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0305251A / Cyberspace Operations Forces and Force Support				Project (Number/Name) FA8 / Cyberspace Operations Forces and Force Support			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FA8: Cyberspace Operations Forces and Force Support	-	29.336	56.492	65.817	-	65.817	65.102	66.578	72.697	73.463	0.000	429.485
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Persistent Cyber Training Environment (PCTE) will provide the Department of Defense (DoD) cyber force with a capability that uses a combination of loosely affiliated or independent virtual environments with varied capabilities that are not scalable or extensible. The current environment constrains training capabilities and capacity, but lack a joint or standard approach consistent with a broader vision of PCTE. PCTE system approaches are aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD AT&L) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The US Army acknowledges it is the lead candidate service to perform as the Executive Agent (EA) for Cyber Training Ranges and DoD Acquisition Lead for the PCTE. Program is directed by the 2016 National Defense Authorization Act, Section 1645. Prototype, integration, and testing efforts in FY19 will complete the capabilities required to meet Initial Operational Capability (IOC) per the PCTE Executive Board developed IOC definition.

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

	FY 2017	FY 2018	FY 2019
Title: Event Management for Persistent Cyber Training Environment (PCTE)	10.495	18.600	23.400
Description: Develop event scheduling, allocation, and management function for PCTE, to include event design, planning and execution, supported by standardized training assessment tools and capabilities.			
FY 2018 Plans: Continue development and management of Event Management for PCTE, to include the physical and logical infrastructure of the training platform and core training environment that allows for automated training events at the individual and team level. It will also include instances at the unclassified, secret, and top secret classification levels. Event management is the integration of multiple applications that support a training event. The capabilities include a master control, centralized order portal, event design, event control, automated opposition force, technical support, assessments and feedback, content library and tool management repository, and a virtual classroom. FY17 included the procurement and evaluation of event management application prototypes. In FY18, those event management applications will be integrated into a PCTE platform and provided to the Service Cyber components.			
FY 2019 Plans: Event management capabilities will continue to build on previous year's efforts by introducing new capability and continuing to refine those already integrated based on Cyber Mission Forces' (CMF) evaluations. The Program Management Office will continue development, integration, and evaluation of prototype applications that will satisfy the PCTE requirement gaps and meet the			

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B. Accomplishments/Planned Programs (\$ in Millions)			FY 2017	FY 2018	FY 2019
IOC definition. This includes training package development, event scheduling and event execution. Through this, Cyber Mission Forces will be provided the ability to plan, design, execute and assess training.					
FY 2018 to FY 2019 Increase/Decrease Statement: Additional funding required to support the integration of capabilities into drops, developmental and operational testing, and accreditation.					
Title: Environment operations and management for Persistent Cyber Training Environment (PCTE)			9.536	14.130	13.400
Description: Develop PCTE with realistic vignettes/scenarios as part of a system (syllabus) of individual and collective training that includes certification and real-world mission rehearsals.					
FY 2018 Plans: Provides for the creation of a robust cloud network connecting participating cyber training ranges and the ability for the PCTE to utilize resources and content at the participating cyber ranges. This eliminates the need to replicate those environments for every PCTE instantiation. The environment includes the emulation of blue, red, green, and gray networks as well as the ability to replicate Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition (SCADA) environments. These environments provide the "maneuver" space and training grounds for Cyber Mission Forces (CMF). FY18 will provide the virtual connections with the PCTE in order for the CMF trainee to choose the maneuver environment while establishing the training event. This will also include the ability to "clean" after the completion of training so that the next student has a neutral environment. This will also include the ability to use current threat information and intelligence to ensure that the environments remain current and relevant providing a realistic training environment.					
FY 2019 Plans: FY19 continues building emulated environments and the hybrid cloud environment with the participating cyber ranges to support team/group, and force level training events. The emulated environments includes the emulation of blue, red, green, and gray networks as well as the ability to replicate Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition (SCADA) environments. These environments provide the "maneuver" space and training grounds for Cyber Mission Forces (CMF). FY19 funds the virtual connections with the PCTE in order for the CMF trainee to choose the maneuver environment while establishing the training event. This will also include the ability to sanitize the environment at the completion of training so that the next student has a neutral environment. This will include the ability to use current threat information and intelligence to ensure that the environments remain current and relevant providing a realistic training environment.					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Decrease due to change in requirements from the creation of PCTE environments in FY18 to the modification of existing environments in FY19.				
<p>Title: Physical and Virtual Connectivity for the Persistent Cyber Training Environment (PCTE)</p> <p>Description: On-Demand reliable, secure physical and virtual global access from wherever participants are geographically located. A core cyber exercise network and event management platform with access to the full suite of DoD, Service, Interagency, Multinational, and State distributed systems.</p> <p>FY 2018 Plans: Provides for the connectivity at multiple security levels and the compute and storage requirements to support the processing of the PCTE and required data. FY18 will provide robust connectivity to the cyber ranges defined in the PCTE Initial Capability Document, in support of Section 1645 of the 2016 NDAA. The new sites will support the establishment of the cloud environment and provide the access to the resources and content from the participating cyber training ranges and the Service Cyber components.</p> <p>FY 2019 Plans: Will continue to build and refine on the initial connectivity established in prior years to include establishing a robust hybrid cloud environment and expanding to access multiple training facilities within one geographic location. Current connections to the CMF sites will be optimized to reduce latency and efficiency on the existing persistent backbone transport bandwidth. This will include providing network nodes at training sites and cyber ranges directly supporting PCTE.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decreased funding due to the majority of connectivity requirements satisfied with FY18 dollars.</p>		9.305	19.780	10.500
<p>Title: Government Program Managment for Persistent Cyber Training Environment (PCTE)</p> <p>FY 2018 Plans: Will provide program management, engineering and technical oversight, contract support and travel for the PCTE program.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Decrease due to Department of Army civilian labor costs moved to Operations & Maintenance, Army appropriation.</p>		-	2.300	-
<p>Title: Persistent Cyber Training Environment (PCTE) Test and Evaluation</p> <p>FY 2018 Plans:</p>		-	1.682	5.517

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B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019		
<p>Persistent Cyber Training Environment is the integration of multiple applications and environments as well as connectivity to the existing Cyber Ranges. These funds will provide for required significant testing. This funding will be used for integration testing, field evaluations, and operational testing.</p> <p>FY 2019 Plans: Continue to complete multi-levels of evaluation and testing on individual products, integrated capabilities, and capability drops. This includes integration testing, field evaluations, and operational testing. Execute formal validation and verifications events prior to release of capability drops assuring capabilities perform as expected.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Increased testing required to validate PCTE IOC capabilities.</p>											
<p>Title: Cyber Operational Risk Assessment-Programs (CORA-P)</p> <p>Description: CORA-P is the Army's response to 2016 and 2017 NDAA which directed the DoD to evaluate threat cyber vulnerabilities of major weapon systems. The project aligns with NDAA language establishing PCTE mandating the utilization of cyber capabilities across testing and training. Efforts will focus on threat cyber vulnerability assessments of weapon systems post Milestone C, provide input to the DoD effort to understand mission thread risk, and facilitate effective threat cyber training.</p> <p>FY 2019 Plans: In FY19, CORA-P will complete assessments of the remaining systems tasked to the Department, as well as, establish the enduring program as directed to remediate threat cyber vulnerabilities. CORA-P will assess the operational risk from threat cyber vulnerabilities of major weapon systems from a peer or near-peer adversary profile.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY19 funds increased to build upon the ongoing PCTE development for distributed capabilities to continuously assess threat cyber vulnerabilities to Army systems, operational environments, and leverage assessment findings to ensure threat cyber defenders are properly trained to face the latest emerging cyber threats.</p>							-	-	13.000		
Accomplishments/Planned Programs Subtotals							29.336	56.492	65.817		
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• OMA 121251000: <i>Cyberspace Operations Forces and Force Support</i>	-	6.300	9.082	-	9.082	9.040	9.294	9.245	9.358	0.000	52.319

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C. Other Program Funding Summary (\$ in Millions)											
			<u>FY 2019</u>	<u>FY 2019</u>	<u>FY 2019</u>					<u>Cost To</u>	
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>Base</u>	<u>OCO</u>	<u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Complete</u>	<u>Total Cost</u>
• B65010: <i>Persistent Cyber Training Environment</i>	-	4.000	3.000	-	3.000	3.000	3.000	3.000	3.000	0.000	19.000
Remarks											
D. Acquisition Strategy											
<p>The Persistent Cyber Training Environment (PCTE) program will employ an incremental acquisition strategy. The strategy leverages the use of existing cyber contract and Other Transaction Authorities (OTA) vehicles in FY17 and FY18 to provide high priority capabilities. PCTE will provide iterative capability in prototypes provided to the Cyber Mission Forces (CMF) in drops for further evaluation. These capability drops will be based on requirements contained and further developed as part of the PCTE Information System Capability Development Document (IS CDD). Efforts in FY19 focus on expanding access, developing, integrating, and evaluation prototype capability drops. In addition, limited capabilities provided in prior years will continue to be improved and developed. A full and open competitive contract will be awarded in FY20 for further integration of new or refinement of existing capabilities, hardware refreshes, accreditation, and software licensing.</p>											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	TBD	Various : Various	-	-		2.300		-		-		-	Continuing	Continuing	Continuing
Subtotal			-	-		2.300		-		-		-	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PCTE Development and Integration	Option/ CPFF	Various : Various	-	29.336	Sep 2017	52.509	May 2018	47.300	Feb 2019	-		47.300	Continuing	Continuing	Continuing
Cyber Operational Risk Assessment	Option/ CPFF	Various : Various	-	-		-		13.000	Feb 2019	-		13.000	Continuing	Continuing	Continuing
Subtotal			-	29.336		52.509		60.300		-		60.300	Continuing	Continuing	N/A
Remarks															
FY18 funds will be placed as an option on the FY17 contract.															
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PCTE Government Test and Evaluation	Various	Various : To Be Determined	-	-		1.683	Mar 2018	5.517	Mar 2019	-		5.517	Continuing	Continuing	Continuing
Subtotal			-	-		1.683		5.517		-		5.517	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	29.336		56.492		65.817		-		65.817	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>		Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Event Management	<div></div>																											
	Event Management																											
Environment	<div></div>																											
	Environment																											
Connectivity	<div></div>																											
	Connectivity																											
Training Sites	<div></div>																											
	Training Sites																											
Test and Evaluation									Test and Evaluation																			
Cyber Operational Risk Assessment													Cyber Operational Risk Assessment															

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) FA8 / <i>Cyberspace Operations Forces and Force Support</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Event Management	1	2017	4	2023
Environment	1	2017	4	2023
Connectivity	1	2017	4	2023
Training Sites	1	2017	4	2023
Test and Evaluation	2	2018	4	2023
Cyber Operational Risk Assessment	2	2019	4	2023