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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>
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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	-	52.817	52.102	50.525	-	50.525	48.644	50.411	49.966	50.529	0.000	354.994
FA8: <i>Cyberspace Operations Forces and Force Support</i>	-	52.817	52.102	50.525	-	50.525	48.644	50.411	49.966	50.529	0.000	354.994

**A. Mission Description and Budget Item Justification**

Persistent Cyber Training Environment (PCTE) supports the United States Cyber Command (USCC) by enabling a critical need for the DoD Cyber Mission Force (CMF) to train at the individual, team, and force level. The service cyber components have established their own training environments, but do not have standardized capabilities or content. PCTE will provide the Department of Defense (DoD) cyber forces with a standardized training capability that utilizes shared content across the Services to include emulated network environments and has the ability to connect to other range environments.. The PCTE platform is aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition & Sustainment OUSD (A&S) 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 and the program is directed by the 2016 National Defense Authorization Act, Section 1645. With the JROC validation of the Information System - Capability Development Document (IS-CDD) on 4 November 2019, the PCTE program quickly achieved Milestone B on 6 December 2019.

FY 2021 will focus on adding capability into the platform releases while updating to support increased automation, scalability, and usability. Planned updates include an Intel capability, enhanced After Action Review (AAR), and Platform Enterprise services to increase realism of the training environment. The planned updates also include automation to refine the build out of PCTE which decreases manual processes. The PCTE platform will obtain accreditation at the Top Secret (TS) level to serve the critical need of DoD Cyber Mission Force (CMF) users to train at the TS data classification level. Platform licensing will be scaled to support the full DoD CMF user base which has resulted in a shift in funding.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	52.817	52.102	53.578	-	53.578
Current President's Budget	52.817	52.102	50.525	-	50.525
Total Adjustments	0.000	0.000	-3.053	-	-3.053
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-3.053	-	-3.053

**UNCLASSIFIED**

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<b><u>Change Summary Explanation</u></b> FY 2021 reduced to fund higher Army priorities.		

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>				<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
FA8: <i>Cyberspace Operations Forces and Force Support</i>	-	52.817	52.102	50.525	-	50.525	48.644	50.411	49.966	50.529	0.000	354.994
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Persistent Cyber Training Environment (PCTE) supports the United States Cyber Command (USCC) by enabling a critical need for the DoD Cyber Mission Force (CMF) to train at the individual, team, and force level. The service cyber components have established their own training environments, but do not have standardized capabilities or content. PCTE will provide the Department of Defense (DoD) cyber forces with a standardized training capability that utilizes shared content across the Services to include emulated network environments and has the ability to connect to other range environments. The PCTE platform is aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition & Sustainment OUSD (A&S) 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 and the program is directed by the 2016 National Defense Authorization Act, Section 1645. With the JROC validation of the Information System - Capability Development Document (IS-CDD) on 4 November 2019, the PCTE program quickly achieved Milestone B on 6 December 2019.

FY 2021 will focus on adding capability into the platform releases while updating to support increased automation, scalability, and usability. Planned updates include an Intel capability, enhanced After Action Review (AAR), and Platform Enterprise services to increase realism of the training environment. The planned updates also include automation to refine the build out of PCTE which decreases manual processes. The PCTE platform will obtain accreditation at the Top Secret (TS) level to serve the critical need of DoD Cyber Mission Force (CMF) users to train at the TS data classification level. Platform licensing will be scaled to support the full DoD CMF user base which has resulted in a shift in funding.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Event Management for Persistent Cyber Training Environment (PCTE)	23.400	25.600	37.897
<b>Description:</b> Develop event scheduling, allocation, and management function for PCTE, to include event design, planning and execution, supported by standardized training assessment tools and capabilities.			
<b>FY 2020 Plans:</b> The expansion of the fielded PCTE capabilities will include the ability to have an automated opposition force that is reactive to the trainee and the capability of using near real-time intelligence to update training scenarios, Tactics, Techniques, and Procedures (TTPs). Will also provide the material solution to support the Technical Operations Management (TOM) capability.			
<b>FY 2021 Plans:</b>			

**UNCLASSIFIED**

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>PCTE capabilities will be scaled to support the full DoD Cyber Mission Force (CMF) user base. New capabilities, as prioritized by the United States Cyber Command (USCC) and CMF feedback, will include enhanced After Action Review (AAR), Intel capabilities and improved Opposing Force Campaigns.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding was increased to support the full DoD Cyber Mission Force user base.</p>				
<p><b>Title:</b> Environment Operations and Management for Persistent Cyber Training Environment (PCTE)</p> <p><b>Description:</b> 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.</p> <p><b>FY 2020 Plans:</b> Will continue to build and host persistent virtual environments that DoD Cyber Mission Forces use as their training maneuver terrain. These high fidelity virtual environments allow realistic and relevant training on demand that are representative of actual network or system environments. FY 2020 also continues to add more blue environments, red environments, Industrial Control System (ICS), and Supervisory Control and Data Acquisitions (SCADA) virtualizations to support multiple simultaneous training events. Additional environments will be created based on priority per the validated Initial Capability Document (ICD) that include telepresence, battlefield systems (blue and red), and commercial mobile.</p> <p><b>FY 2021 Plans:</b> PCTE virtual environments will be maintained, with limited expansion due to the increase in platform capabilities to support the full DoD Cyber Mission Force (CMF) user base. PCTE will continue to integrate virtual environments training resources which will include minor enhancements prioritized by user feedback.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding was reprioritized to support the increased scale of PCTE Event Management capabilities to support the full DoD Cyber Mission Force user base.</p>		13.400	13.400	4.244
<p><b>Title:</b> Physical and Virtual Connectivity for the Persistent Cyber Training Environment (PCTE)</p> <p><b>Description:</b> PCTE has procured, installed and is maintaining Regional Compute and Storage (RCS) nodes which enable on-demand, reliable, and secure virtual access from wherever participants are geographically located. Additionally, the PCTE RCS infrastructure create a core cyber exercise network and event management platform to support Cyber Mission Force (CMF) training at the Unclassified, Secret, and Top Secret data classification levels.</p> <p><b>FY 2020 Plans:</b></p>		10.500	10.600	6.592

**UNCLASSIFIED**

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Connectivity will continue to extend the PCTE capabilities to more regional or base training facilities. This also includes extending the PCTE services to the National Guard and Reserve Cyber Mission Forces (CMF) teams, expansion to Government or commercial cloud capabilities, and expansion onto DoD enterprise transport capabilities to improve the reach of selected PCTE services.</p> <p><b>FY 2021 Plans:</b> Will maintain the current build out of the PCTE Regional Compute and Storage (RCS) nodes while leveraging DoD enterprise transport services spanning multiple classification levels (Top Secret to Unclassified) to perform training.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding was reprioritized to support the increased scale of PCTE Event Management capabilities to support the full DoD Cyber Mission Force user base.</p>				
<p><b>Title:</b> Persistent Cyber Training Environment (PCTE) Test and Evaluation</p> <p><b>Description:</b> Persistent Cyber Training Environment (PCTE) integration, development, and operational testing that will include validation and verifications (V&amp;V), limited user assessments (LUA), and testing in association with cyber training exercises and incorporated throughout the Product Manager (PM) Development Operations (DevOps) process. An Operational Test Authority (OTA) has been incorporated, in coordination with the Director, Operational Test and Evaluation (DOT&amp;E), to conduct operational testing leveraging DevOps testing processes.</p> <p><b>FY 2020 Plans:</b> Testing will continue in FY 2020 through integration testing, validation and verifications, limited user assessments, and exercises serving as PCTE operational testing. Testing is essential in FY 2020 to ensure that any fielded capability drop does not break the existing PCTE platform and training capabilities. Testing will also focus more on the ability to conduct multiple training events and the team/group and force levels.</p> <p><b>FY 2021 Plans:</b> Testing will continue in FY 2021 with integration, verification and validation testing of the PCTE capability. The focus for FY 2021 is on verifying the modification of existing capability and the successful integration of new capability through developmental testing and operational assessments. PCTE will be transitioning from DevOps into a more formal Development Security Operations (DevSecOps) process, ensuring security testing is incorporated at the lowest level to enable reliability and responsiveness.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding was reprioritized to support the increased scale of PCTE Event Management capabilities to support the full DoD Cyber Mission Force user base.</p>		5.517	2.502	1.792
<b>Accomplishments/Planned Programs Subtotals</b>		52.817	52.102	50.525

**UNCLASSIFIED**

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>			<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• B65010: <i>Persistent Cyber Training Environment</i>	3.000	3.000	0.000	-	0.000	-	-	-	-	0.000	6.000

**Remarks**

B65010-OPA2 -  
Beginning FY 2021, OPA funds reprogrammed to Operations and Maintenance Army (OMA) (APE 151251000, MDEP VLWA) for software licensing for cyber training applications. PCTE has procured and installed the appropriate hardware infrastructure footprint to enable the platform to serve the Cyber Mission Force user base.

**D. Acquisition Strategy**

The Persistent Cyber Training Environment (PCTE) program will employ an incremental acquisition strategy. The current strategy leverages the use of existing cyber contracts and Other Transaction Authority (OTA) vehicles to provide specified capabilities that will be integrated into a cohesive training platform. The next step in the acquisition strategy is developing a long term contract vehicle that will continue enabling the PCTE platform to achieve scalability, optimization, innovation, and quality standards to meet the dynamic needs of the Cyber Mission Force (CMF) user base. The PM is in the process of awarding a Single Award Indefinite Delivery/Indefinite Quantity (ID/IQ) contract to serve PCTE as well as other cyber community customers called the Cyber Training, Readiness, Integration, Delivery, and Enterprise Technology (TRIDENT) contract in Q2FY2021. CYBER TRIDENT enables PCTE to provide iterative capability provided to the Cyber Mission Forces (CMF) in Capability Drops (CDs) that either improve or add features. These CDs will be based on requirements contained and further developed as part of the PCTE Information System - Capability Development Document (IS-CDD).

**UNCLASSIFIED**

**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> FA8 / <i>Cyberspace Operations Forces and Force Support</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	TBD	Various : Various	2.300	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			2.300	-		-		-		-		-	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PCTE Development and Integration	C/IDIQ	Various : Various	81.424	47.388	Feb 2019	49.602	Feb 2020	1.636	Feb 2021	-		1.636	Continuing	Continuing	Continuing
PCTE Cyber Training, Readiness, Integration, Delivery, and Enterprise Technology (TRIDENT)	C/IDIQ	Various : Various	-	-		-		16.000	Feb 2021	-		16.000	Continuing	Continuing	Continuing
PCTE Development and Integration - Other Transactional Authority	Option/FFP	Various : Various	-	-		-		31.097	Oct 2020	-		31.097	Continuing	Continuing	Continuing
<b>Subtotal</b>			81.424	47.388		49.602		48.733		-		48.733	Continuing	Continuing	N/A

**Remarks**  
PCTE will utilize existing contracts in order to provide the best capabilities available within the market until the base contract is awarded in FY2020.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PCTE Government Test and Evaluation	Various	Various : Various	1.683	5.429	Mar 2019	2.500	Mar 2020	1.792	Mar 2021	-		1.792	Continuing	Continuing	Continuing
<b>Subtotal</b>			1.683	5.429		2.500		1.792		-		1.792	Continuing	Continuing	N/A

**UNCLASSIFIED**

**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army** **Date:** February 2020

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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
 Validation and Verification tests will be conducted with every capability drop utilizing Cyber Mission Force operators and representatives from the Operational Test Authority. PCTE will host limited excursions during cyber exercises in order to provide an operational evaluation ultimately building up to hosting a major force level exercise event.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	85.407	52.817	52.102	50.525	-	50.525	Continuing	Continuing	N/A

**Remarks**




**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
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Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
Prototype Releases (A-C)	Prototype Releases (A-C)																											
PCTE vB	1																											
PCTE vC				2																								
Platform Releases (v1.0 – vX.0)					Platform Releases (v1.0 – vX.0)																							
PCTE v1.0					3																							
PCTE v2.0						4																						
PCTE v3.0									5																			
PCTE v4.0										6																		
PCTE v5.0											7																	
PCTE v6.0												8																
PCTE v7.0													9															
PCTE v8.0														10														
PCTE v9.0																									11			

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date: February 2020</b>		
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Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
PCTE v10.0																									 PCTE v10.0			
PCTE v11.0																									 PCTE v11.0			
PCTE v12.0																									 PCTE			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Prototype Releases (A-C)	4	2018	4	2019
PCTE vA	4	2018	4	2018
PCTE vB	2	2019	2	2019
PCTE vC	4	2019	4	2019
Platform Releases (v1.0 ? vX.0)	2	2020	4	2025
PCTE v1.0	2	2020	2	2020
PCTE v2.0	4	2020	4	2020
PCTE v3.0	2	2021	2	2021
PCTE v4.0	4	2021	4	2021
PCTE v5.0	2	2022	2	2022
PCTE v6.0	4	2022	4	2022
PCTE v7.0	2	2023	2	2023
PCTE v8.0	4	2023	4	2023
PCTE v9.0	2	2024	2	2024
PCTE v10.0	4	2024	4	2024
PCTE v11.0	2	2025	2	2025
PCTE v12.0	4	2025	4	2025