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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Development</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	-	237.393	202.364	259.823	0.000	259.823	256.961	242.740	232.599	237.271	Continuing	Continuing
646008: <i>US Cyber Command Technology Development</i>	-	237.393	202.364	259.823	0.000	259.823	256.961	242.740	232.599	237.271	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY2020, elements of PE 0306250F, Cyber Operations Technology Development, Project Joint Common Services efforts were transferred to PE 0208097F, Joint Cyber Command and Control, in order to increase clarity and delineation from other activities.

A. Mission Description and Budget Item Justification

US Cyber Command's (USCYBERCOM) mission is to deter or defeat strategic threats to US interests and infrastructure, provide mission assurance for the operations and defense of the Department of Defense information environment, and support the achievement of Joint Force Commander objectives.

USCYBERCOM in conjunction with the Services and National Agencies will develop and expand infrastructure architectures and capabilities/tools to support Cyber Mission Forces (CMF). Focus is on four broad program areas: Common Services, Access Platforms, Tools, and Sensors.

The specific details and aspects of these cyber activities are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	246.502	198.864	245.293	0.000	245.293
Current President's Budget	237.393	202.364	259.823	0.000	259.823
Total Adjustments	-9.109	3.500	14.530	0.000	14.530
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	3.500			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-9.107	0.000			
• Other Adjustments	-0.002	0.000	14.530	0.000	14.530

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Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 646008: *US Cyber Command Technology Development*
Congressional Add: *Cloud Communications Validation Pilot*

	FY 2019	FY 2020
Congressional Add Subtotals for Project: 646008	-	3.500
Congressional Add Totals for all Projects	-	3.500

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Joint Common Services</p> <p>Description: Progressed the Joint Cyber Warfighting Architecture (JCWA) to enable split-based offensive and defensive operations.</p> <p>Provided enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Continued development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Established an enterprise platform-as-a-service cloud platform capability to provide end-user access, central services, networking, security services, governance, and a certification and accreditation strategy for all projects and capabilities deployed within USCYBERCOM Cloud environment on the Unclassified network.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.</p> <p>FY 2020 Plans: Continue the development of the Joint Cyber Warfighting Architecture (JCWA) as the common joint capability to enable split-based, offensive and defensive operations.</p> <p>Continue development of USCYBERCOM cross-domain solutions that enable automated data flow from access platforms to data repositories and enable enrichment of data and reporting across security domains. Expand Cross domain solution to provide additional hardware capacity and continuity of operations.</p>	48.462	36.389	46.257	0.000	46.257

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Expand the enterprise platform-as-a-service cloud platform capability to provide end-user access, central services, networking, security services, governance, and a certification and accreditation strategy for all projects and capabilities deployed within USCYBERCOM Cloud environments, to include SECRET and TOP SECRET Networks. Expand the common services offered and improve security posture through increased Cloud Defense.</p> <p>Continue development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Provide enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Drive standards and interoperability of JCWA.</p> <p>Provide critical support to a developing and maturing Acquisition and Contracting entities and improve the efficiency and effectiveness of program management and acquisition processes.</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p>FY 2021 Base Plans: Will continue the development of the JCWA as the common joint capability to enable split-based, offensive and defensive operations.</p> <p>Will continue development of USCYBERCOM cross-domain solutions that enable automated data flow from access platform to data repository and enable enrichment of data and reporting across security domains.</p> <p>Will continue development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Provide enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Drive standards and interoperability of JCWA.</p>					

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Provide critical support to a developing and maturing Acquisition and Contracting entities and improve the efficiency and effectiveness of program management and acquisition processes.</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to alignment of resources within JCWA capability areas.</p>					
<p>Title: Joint Access Platforms</p> <p>Description: Completed Infrastructure Capabilities Based Assessment(CBA) identifying 11 capability gaps to inform formal requirements documentation in order to formally establish program of record a joint cyber access program (JCAP).</p> <p>Completed a Robust Infrastructure study to inform FY20 resourcing decision to transition from legacy on-net fixed site infrastructures to one JCAP solution in order to save time and resources in future year investments.</p> <p>Continued development and deployment of the on-net operations infrastructure used to conduct Title 10 cyberspace operations.</p> <p>Continued development of capabilities to enable systems to provide client/server architecture to deliver multiple mission-based cyber effects.</p> <p>Continued development of operational system that delivers distributed denial of service (DDoS) capabilities on the DODIN.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.</p> <p>FY 2020 Plans: Continue development and deployment of on-net operations infrastructure.</p>	84.249	68.679	72.792	0.000	72.792

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Continue to develop improvements for client/server platforms that delivers multiple mission-based cyber effects.</p> <p>Continue development of operational system that delivers distributed denial of service (DDoS) capabilities on the Department Of Defense Information Network (DODIN).</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 667-812-0814.</p> <p>FY 2021 Base Plans: Will continue development and deployment of on-net operations infrastructure.</p> <p>Will continue to develop improvements for client/server platforms that delivers multiple mission-based cyber effects.</p> <p>Will continue development of operational system that delivers distributed denial of service (DDoS) capabilities on the Department Of Defense Information Network (DODIN).</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 667-812-0814.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY21 funding level is a result of a FY20 re-phasing to properly align funding with development effort timelines.</p>					
<p>Title: Joint Tools</p> <p>Description: Delivered foundational components of unique toolkit capability packages with multiple components designed to support Service Cyber Component (SCC) Offensive Cyber Operations (CO) activities, while initiating the development of additional toolkits in support of Cyber National Mission Force operations.</p> <p>Completed delivery of new exploitation frameworks and provided new exploitation capabilities available for integration into the frameworks for specified CO.</p>	98.520	86.388	117.974	0.000	117.974

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Integrated Foundational Tools, which are awaiting Operational Evaluation.</p> <p>Continued the support to research signature diversity and further develop signature measurement capabilities.</p> <p>Installed equipment to support Personal Security Product (PSP) Testing Services.</p> <p>Maintained the Unified Cyber Analysis Portal (UCAP) while gathering and refining requirements in support of ROBOTICKNIGHT, which will provide USCYBERCOM with an organic cyberspace intelligence platform for malware cataloging, analysis, and reverse engineering.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.</p> <p>FY 2020 Plans: Continue to deliver organically developed exploitation frameworks to the Cyber Mission Force (CMF) and provide for the integration of exploitation capabilities into the delivered framework.</p> <p>Continue to procure, discover, and integrate new exploitation capabilities as a service for the CMF.</p> <p>Continue to develop, deliver and integrate Foundational Tools into the Cyber Command architecture that will provide operational agility for CMF cyberspace operations.</p> <p>Perform Operational Evaluation and Acceptance testing of Foundational Tools.</p> <p>Transfer operationally accepted tools to the respective services for operational use, maintenance and sustainment.</p> <p>Continue to measure signatures on each spiral tool delivery to verify uniqueness of tools.</p> <p>Continue to support research of signature diversity and further develop signature measurement capabilities. Develop and update Personal Security Protection Testing Services to ensure they support current test needs.</p> <p>Continue to develop and deliver specialized tools and exploits to CMF.</p>					

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Some aspects of the efforts are classified and will be provided on a need to know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p>FY 2021 Base Plans: Will continue to enhance and sustain exploitation frameworks supporting CMF operations based on evolving operations requirements.</p> <p>Will continue the research, development, integration, and procurement of mission-focused exploit capabilities as a service to support CMF operations.</p> <p>Will Continue to update Personal Security Protection Testing Services to ensure they support current test needs.</p> <p>Will continue to perform Operational Evaluation and Acceptance testing of Foundational Tools.</p> <p>Will continue to develop and deliver additional foundational tools suites to incrementally achieve a full complement of required capabilities. The foundational tool suites will provide operational agility for CMF cyberspace operations.</p> <p>Will continue to measure signatures on each spiral of delivered tools to verify uniqueness of tools.</p> <p>Will continue to develop and deliver specialized tools and exploits to CMF.</p> <p>Some aspects of the efforts are classified and will be provided on a need to know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY21 funding level is a result of a FY20 re-phasing to properly align funding with development effort timelines.</p> <p>Title: Joint Sensors</p> <p>Description: Supported creation and development of Advanced Data Analytics that provide big data analysis tools and techniques, assist with developing target folders (to include target analysis, target system analysis,</p>					
	6.162	7.408	22.800	0.000	22.800

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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and network analysis), provide technical expertise on data query strategies, provide technical continuity for development efforts.

Hunt Forward Operations provided the Cyber National Mission Forces (CNMF) unique access to networks inside adversary 2+3 actors' spheres of influence in order to enable defense and impose costs.

Hunt Forward kits were delivered across the Cyber Protection Team forces by the Services and provided the means to better assess and defend the DoDIN.

The origin, details and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.

FY 2020 Plans:
Continue development and sustainment of Advanced Frameworks and accompanying Data Analytics for cyber operations.

Conduct pilot activities to expedite implementation and operationalization of sensing capabilities, analytic capabilities, and ensure persistent defense of select Nuclear Command, Control, and Communications (NC3) mission systems along a defined mission thread. Results of the pilot will inform future operations, activities, and investments to enable persistent cyber defense of the entire NC3 enterprise.

Many aspects of the effort are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM at 443-634-7769.

FY 2021 Base Plans:
Will continue development and sustainment of Advanced Frameworks and accompanying Data Analytics for cyber operations.

Leverage findings of FY20 pilot activities to implement sensors, monitoring, and analytic capabilities to enable mission owners to rapidly gain situational awareness and direct defense of NC3 networks.

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Many aspects of the effort are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM at 443-634-7769.					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in resources to build initial cyber defense capabilities for Nuclear Command, Control and Communications (NC3) networks.					
Accomplishments/Planned Programs Subtotals	237.393	198.864	259.823	0.000	259.823

	FY 2019	FY 2020
Congressional Add: Cloud Communications Validation Pilot	-	3.500
FY 2020 Plans: Funding will acquire a capability to use transport layer identity management with non-interactive authentication at the first packet of a TCP/IP request to validate machine-to-machine communications. Such capability will "cloak" (i.e., render invisible) the existence of government networks and cloud deployments from our adversaries, while simultaneously authenticating the communication.		
Congressional Adds Subtotals	-	3.500

D. Other Program Funding Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 834320: C3 Countermeasures	-	-	11.986	-	11.986	9.990	5.994	5.994	5.994	Continuing	Continuing

Remarks

E. Acquisition Strategy
Facilitate the delivery of technology capabilities to the Cyber Mission Forces, by applying innovative solutions for existing and emerging technologies. Contracts are awarded under full and open competition whenever possible. Variations of both Fixed Price (FP) and Cost Plus (CP) contracting vehicles and the use of Other Transactional Authority (OTA) will be implemented leveraging USCYBERCOM Acquisition authorities. USCYBERCOM will also rely on various Service Component, Combatant Command and National Security Agency contracting offices for procurement of cyber capabilities and contractor support.

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

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Development</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>
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Product Development (\$ 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			
Product Development	C/Various	Not specified. : NV	-	-		-		-		-		-	Continuing	Continuing	-
Joint Common Services	Various	Multiple Agencies : Various	-	47.512	Apr 2019	35.607	Jan 2020	45.350	Apr 2021	0.000		45.350	Continuing	Continuing	-
Joint Access Platforms	Various	Multiple Agencies : Various	-	83.290	Apr 2019	67.897	Jan 2020	71.963	Apr 2021	0.000		71.963	Continuing	Continuing	-
Joint Tools	Various	Multiple Agencies : Various	-	97.628	Apr 2019	85.606	Jan 2020	116.906	Apr 2021	0.000		116.906	Continuing	Continuing	-
Joint Sensors	Various	Multiple Agencies : Various	-	5.514	Apr 2019	6.629	Jan 2020	20.402	Apr 2021	0.000		20.402	Continuing	Continuing	-
Cloud Communication Validation Pilot	TBD	TBD : TBD	-	-		3.500	Jun 2020	-		-		-	Continuing	Continuing	-
Subtotal			-	233.944		199.239		254.621		0.000		254.621	Continuing	Continuing	N/A

Management Services (\$ 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			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
PMA	Various	Various : Various	-	3.449	Apr 2019	3.125	Jan 2020	5.202	Apr 2021	0.000		5.202	Continuing	Continuing	-
Subtotal			-	3.449		3.125		5.202		0.000		5.202	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	237.393	202.364	259.823	0.000	259.823	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

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	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

10. Foundational tool suites (spirals annual) - (Joint Tools, formerly Combatant Command Support and Operate and Defend the DODIN)																											
11. Analytics development (Joint Analytic, formerly Combatant Command Support and Operate and Defend the DODIN)																											
12. Cloud Communication Validation Pilot																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Cyber Operations Technology Development</i>				
1. Data analytics platform next GEN (Joint Common Services)	1	2019	2	2020
2. CYBERCOM access platform IOC (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2019
3. CYBERCOM access platform build out capacity (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2024
4. Cyber data flow cross domain solution (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2019
5. Mission-based platform FOC (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	3	2022
6. DDoS for DODIN sustain (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2019
7. DDoS for DODIN spiral development (Joint Access Platforms)	1	2019	4	2025
8. Cyber UCAP spiral development - 1 (Tools)	3	2019	2	2021
9. Exploitation framework spiral development (annual) - (Joint Tools, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2025
10. Foundational tool suites (spirals annual) - (Joint Tools, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2025
11. Analytics development (Joint Analytic, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2025
12. Cloud Communication Validation Pilot	3	2020	3	2021