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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2025 Air Force **Date:** March 2024

<b>Appropriation/Budget Activity</b> 3620F: <i>Research, Development, Test &amp; Evaluation, Space Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203040SF / DCO-Space
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	-	27.235	76.003	104.088	0.000	104.088	106.673	115.036	115.648	123.470	Continuing	Continuing
673070: <i>Defensive Cyber Ops - Space</i>	-	27.235	76.003	104.088	0.000	104.088	106.673	115.036	115.648	123.470	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Defensive Cyberspace Operations (DCO-S) provides defensive cyber capabilities that protect United States Space Force (USSF) mission systems, to include their associated computer systems, software applications and sensitive operational information against unauthorized intrusion, corruption, and/or destruction. The emphasis of the program is directed toward defensive cyberspace capabilities; computer and network systems security; damage assessment and recovery; cyber threat recognition, attribution, and mitigation; and active response methodologies in response to evolving threats and changes to the cyber environment. These areas of emphasis are realized through research and development, test and acquisition in the areas of proactive defense, defensive counter cyberspace, cyberspace intelligence, surveillance and reconnaissance, command and control situational awareness, persistent network operations, as well as decision support, recovery, and digital forensics.

The development of DCO-S tools for the ground segment implements a combined Development/Security/Operations (DEVSECOPS) framework, which incorporates methodologies, technologies, and tools to deeply embed security best practices into the modern development workflow and tool-chain. This effort primarily institutes two product lines: Manticore (Detect & Identify) and Kraken (Protect & Respond). It will endeavor to identify shared/common platform, infrastructure, and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. Manticore and Kraken make use of open source and commercial tools to create the platform used to defend space mission systems with some of the content customized to address space-unique requirements such as protocol analytics. There are no commercial off-the-shelf solutions that address the threat to unique USSF systems, so tailored content is required to support the DCO-S mission. The DCO-S capabilities are developed, produced, and deployed as an agile program, leveraging a DEVSECOPS framework to facilitate rapid and timely fielding to operations.

DCO-S enables Space Delta (DEL) 6 and the mission Deltas to perform cyber-integrated space operations that identify, detect, protect against, respond to, and recover from malicious threats to space mission systems. These developments deploy both out-of-band (Manticore) and in-band (Kraken) cyber defense tool suites for the ground mission systems to Space Delta 6 (Cyber Ops) protecting the following mission sets: Protected Communications, Missile Warning, Military Strategic Communications (MILSATCOM), Position Navigation and Timing (PNT), Ballistic Missile Command and Control, Space Domain Awareness (SDA), Nuclear Command Control and Communications (NC3), and Command and Control Satellite Operations (C2 Sat Ops).

The Program Management Office is poised to execute a significantly increased Fiscal Year (FY) 2025 request to support the urgent need to field cyber defense tools to DEL 6 Cyber Squadrons. In previous cycles, primarily mission partner funding supported fielding efforts; however, centralized funding enables maturation and stability in acquisition planning. Software development must also increase and adapt to support software development to on-board classified mission systems and new data types not in the baseline software to keep pace with the cyber threat. Systems engineering and integration support must also expand to deploy Manticore systems to additional

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mission sites in a timely manner. Furthermore, the DCO-S Wide Area Network development must evolve to meet security, sustainment, and reach-back requirements for the USSF Cybersecurity Service Provider and Cyber Squadrons. Finally, initial transition of space segment DCO-S tools into mission systems and integration with Manticore and Kraken is required to provide a total solution to DEL 6 cyber units and provide comprehensive protection of USSF mission systems, necessary to outpace the threat.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>
Previous President's Budget	28.087	76.003	68.796	0.000	68.796
Current President's Budget	27.235	76.003	104.088	0.000	104.088
Total Adjustments	-0.852	0.000	35.292	0.000	35.292
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.852	0.000			
• Other Adjustments	0.000	0.000	35.292	0.000	35.292

**Change Summary Explanation**

FY 2025: +35.292M increase for additional USSF Cyber Defense tools to support cyber-enabled space operations. The FY 2025 request increased significantly to support the urgent need of cyber defense tools to be fielded to USSF Cyber Squadrons that are to be activated in Delta 6. Software development must also increase and adapt to support software development to on-board classified mission systems and new data types not in the baseline software to keep pace with the cyber threat.

FY 2025: The FY 2025 funding request was reduced by \$4.1 million to account for the availability of prior year execution balances.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Defensive Cyberspace Operations - Space (DCO-S)	27.235	76.003	104.088

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
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**Description:** Funding supports cyber hardening and Defensive Cyberspace Operations for Space (DCO-S) activities for the space enterprise. Provides space enterprise defensive cyber solutions to counter advanced persistence cyber threats, through rapid fielding of operational prototypes using agile development methods.

**FY 2024 Plans:**

Enhance the development, deployment, tuning, and continued expansion of Manticore (Identify & Detect) and Kraken (Protect & Respond) to additional mission areas; build, test, and deliver valuable features at a faster pace to meet growing demands of cyber defenders. Scale development teams to increase emphasis on cyber threat recognition, information sharing, and active response methodologies to combat evolving threats and prepare for inevitable changes to the cyber domain. Augment platform, Continuous Integration/Continuous Deployment (CI/CD), and test teams to provision, manage, optimize, and secure infrastructure on premise and cloud environments (servers, networking to databases, etc.), carry out software deployments, validate the reliability of features, manage CI/CD pipelines, and ensure all tools and platforms are available for the development teams. Upgrade databases for all product-line documentation, grow infrastructure support of existing codebase and stand-up the cloud environment for Manticore.

Deploy both out-of-band (Manticore) and in-band (Kraken) cyber defense tool suites to Space Delta 6 (Cyber Ops). Additional DCO-S mission systems will be on-boarded to protect the following mission sets: Protected Communications, Missile Warning, Military Strategic Communications (MILSATCOM), Position Navigation and Timing (PNT), Ballistic Missile Command and Control, Space Domain Awareness (SDA), Nuclear Command Control and Communications (NC3), and Command and Control Satellite Operations (C2 Sat Ops). Increase Systems Engineering & Integration (SE&I) support to ensure seamless data stream integration with each new on-boarded mission system. Through AFRL Cyber Research & Development, increase efforts to develop technical documentation, perform integration activities and tuning support, and develop plans for product support and sustainment.

Establish baseline for global space cybersecurity competition to help reduce vulnerabilities within existing product lines. Fund efforts to allow independent security researchers to report security exploits, issues, and hardware flaws which increases the chances that bugs are found and reported before malicious attacks occur. Leverage other agencies' lessons learned and capability as it pertains to defending space systems.

Expand systems engineering and accreditation support to provide internal test and accreditation plans for security hardening and risk assessments to ensure product line software has optimum security features, countermeasures, and safeguards in place. Maintain modern testing methodologies based on industry best practices; embed the 47th Test Squadron into the development workflow, tool-chain, and CI/CD framework; and provide cybersecurity test support and assessments of applications and

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
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<p>environments. FFRDCs and other management services provide mission assurance oversight to identify Tactics, Techniques, and Procedures (TTPs) and provide users with space-based training while future proofing systems with the latest technology.</p> <p>Rapidly respond to threats and implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, and activities that may leverage commercial and international opportunities.</p> <p>Investigate space segment DCO-S tools for USSF mission systems with focus of integrating with Manticore and Kraken.</p> <p><b>FY 2025 Plans:</b> Expand the development, deployment, tuning, and capability of Manticore (Identify &amp; Detect) and Kraken (Protect &amp; Respond) to additional mission areas; build, test, and deliver valuable features at a faster pace to meet growing demands of cyber defenders. Scale development teams to increase emphasis on cyber threat recognition, information sharing, and active response methodologies to combat evolving threats and prepare for inevitable changes to the cyber domain. Augment platform, Continuous Integration/Continuous Deployment (CI/CD), and test teams to provision, manage, optimize, and secure infrastructure on premise and cloud environments (servers, networking to databases, etc.), carry out software deployments, validate the reliability of features, manage CI/CD pipelines, and ensure all tools and platforms are available for the development teams. Upgrade databases for all product-line documentation, grow infrastructure support of existing codebase, and stand-up the cloud environment for Manticore. Modernize Kraken (in-band) to coincide with Manticore upgrades and to ensure technical performance coincidentally matures across DCO-S toolset capability. Integrate and deploy required software changes mandated from commercial product suppliers due to baseline changes to functionality, end of manufacturing, end of support, or other necessary system changes.</p> <p>Deploy both out-of-band (Manticore) and in-band (Kraken) cyber defense tool suites to Space Delta 6 (Cyber Ops). Additional DCO-S mission systems will be on-boarded to protect the following mission sets: Protected Communications, Missile Warning, Military Strategic Communications (MILSATCOM), Position Navigation and Timing (PNT), Ballistic Missile Command and Control, Space Domain Awareness (SDA), Nuclear Command Control and Communications (NC3), and Command and Control Satellite Operations (C2 Sat Ops). Increase Systems Engineering &amp; Integration (SE&amp;I) support to ensure seamless data stream integration with each new on-boarded mission system. Through AFRL Cyber Research &amp; Development, increase efforts to develop technical documentation, perform integration activities and tuning support, and develop plans for product support and sustainment. Increase overall deployment activities to on-board additional mission systems at a faster pace to ensure complex classified systems are protected sooner. Classified mission systems will require additional engineering and deployment activities to ensure mission system network traffic is protected during transit between endpoints. Additional efforts will focus on implementing machine learning (ML) to increase the speed of threat detection and reduce the overall reaction time for defense of mission systems.</p>			
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Establish baseline for global space cybersecurity competition to help reduce vulnerabilities within existing product lines. Fund efforts to allow independent security researchers to report security exploits, issues, and hardware flaws which increases the chances that bugs are found and reported before malicious attacks occur. Leverage other agencies' lessons learned and capability as it pertains to defending space systems and expand capability to defending space systems.</p> <p>Expand systems engineering, development infrastructure, and accreditation support to provide internal test and accreditation plans for security hardening and risk assessments to ensure product line software has optimum security features, countermeasures, and safeguards in place. Maintain modern testing methodologies based on industry best practices; embed the 47th Test Squadron into the development workflow, toolchain and CI/CD framework and provide cybersecurity test support and assessments of applications and environments. FFRDCs and other management services provide mission assurance to identify Tactics, Techniques, and Procedures (TTPs) and provide users with space-based training while future proofing systems with the latest technology.</p> <p>Investigate space segment DCO-S tools for USSF mission systems with focus of integrating with Manticore and Kraken.</p> <p>Rapidly respond to threats and implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, and activities that may leverage commercial and international opportunities.</p> <p><b><i>FY 2024 to FY 2025 Increase/Decrease Statement:</i></b> The FY 2025 request increased significantly to support the urgent need to field cyber defense tools to USSF Cyber Squadrons standing up in DEL 6. Software development must also increase and adapt to on-board classified mission systems and new data types to keep pace with the cyber threat.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	27.235	76.003	104.088

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
Currently, DCO-S is being acquired as an enterprise architecture prototype. The latest DCO-S acquisition strategy is committed to using a modular contracting strategy for fast, agile, and adaptable approaches in order to successfully develop defensive cyber applications and deploy them to the space enterprise and next generation systems. These efforts implement a combined Development/Security/Operations (DEVSECOPS) framework which incorporates methodologies, technologies, and

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**Appropriation/Budget Activity**  
3620F: *Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development*

**R-1 Program Element (Number/Name)**  
PE 1203040SF / *DCO-Space*

tools to deeply embed security best practices into the modern development workflow and tool-chain. USSF plans to leverage new prototyping techniques, previous Government investments in Federally Funded Research and Development Center (FFRDC), and efforts from Government labs as part of those development activities.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Air Force** **Date:** March 2024

<b>Appropriation/Budget Activity</b> 3620F / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203040SF / DCO-Space	<b>Project (Number/Name)</b> 673070 / Defensive Cyber Ops - Space
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<b>Product Development (\$ in Millions)</b>				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
DCO-S Suite Development	Various	Various : Various	-	5.267	Nov 2022	22.181	Oct 2023	31.246	Oct 2024	-		31.246	Continuing	Continuing	-
Product Line Integration	Various	Various : Various	-	7.781	Nov 2022	31.351	Nov 2023	45.771	Nov 2024	-		45.771	Continuing	Continuing	-
Systems Engineering/ Accreditation	Various	Various : Various	-	4.800	Nov 2022	1.926	Oct 2023	2.838		-		2.838	0.000	9.564	-
Technical Mission Analysis	MIPR	Analysis/Tech Guidance : Various	-	0.479	Oct 2022	0.654	Oct 2023	0.393	Oct 2024	-		0.393	Continuing	Continuing	-
SBIR/STTR	Allot	Not specified. : TBD	-	0.000	Oct 2022	2.263	Oct 2023	3.887	Oct 2024	-		3.887	Continuing	Continuing	-
<b>Subtotal</b>			-	18.327		58.375		84.135		-		84.135	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
Developmental Test	PO	Test and Eval : San Antonio, TX	-	0.249	Nov 2022	1.019	Oct 2023	0.988	Oct 2024	-		0.988	Continuing	Continuing	-
<b>Subtotal</b>			-	0.249		1.019		0.988		-		0.988	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 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			
FFRDC	RO	Various : El Segundo, CA	-	5.009	Nov 2022	9.532	Nov 2023	6.227	Nov 2024	-		6.227	Continuing	Continuing	-
A&AS	Various	Various : Various	-	3.119	Nov 2022	6.827	Nov 2023	12.344	Nov 2024	-		12.344	Continuing	Continuing	-
Other	Various	Various : Various	-	0.531	Oct 2022	0.250	Oct 2023	0.394	Oct 2024	-		0.394	Continuing	Continuing	-
<b>Subtotal</b>			-	8.659		16.609		18.965		-		18.965	Continuing	Continuing	N/A

			Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	27.235	76.003	104.088	-	104.088	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2025 Air Force	<b>Date:</b> March 2024
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	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
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<u>Remarks</u>									
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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2025 Air Force</b>		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 3620F / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203040SF / <i>DCO-Space</i>	<b>Project (Number/Name)</b> 673070 / <i>Defensive Cyber Ops - Space</i>

FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029			
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

<b>DCO-S</b>	
DCO-S Product Line Development and Integration	
DCO-S Deployments	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2025 Air Force		<b>Date:</b> March 2024
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>DCO-S</i></b>				
DCO-S Product Line Development and Integration	1	2023	4	2029
DCO-S Deployments	1	2023	4	2029