Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force											Date: March 2023	
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 1203040SF / *DCO-Space*							
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	-	6.156	28.087	76.003	0.000	76.003	68.796	62.979	67.608	51.320	Continuing	Continuing
673070: *Defensive Cyber Ops - Space*	-	6.156	28.087	76.003	0.000	76.003	68.796	62.979	67.608	51.320	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 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 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, but much of the content used by that platform is bespoke and includes a large amount of custom software and hardware. There are no commercial off-the-shelf solutions that address the threat to individual 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 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 FY 2024 request increased significantly to support the urgent need of cyber defense tools to be fielded to USSF Mission Defense Teams that are to be activated in Delta 6 in FY23. In previous cycles, primarily mission partner funding supported fielding efforts. 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 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 Mission Defense Teams. 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.

The USSF Strategic Cyber Vision, 20 Nov 20, provides guidance in implementing the DCO-S program, including responses to the DoD Strategic Cybersecurity Program. Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Command (SSC) has transformed the organization and implementation of space acquisition to an enterprise approach, to increase innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program /project priorities according to an integrated unclassified /classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or re-purpose existing capabilities.

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. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	2.150	28.162	28.249	0.000	28.249
Current President's Budget	6.156	28.087	76.003	0.000	76.003
Total Adjustments	4.006	-0.075	47.754	0.000	47.754
• Congressional General Reductions	0.000	-0.075			
• 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	4.006	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	47.754	0.000	47.754

Change Summary Explanation

FY 2022: +4.006M Above Threshold Reprogramming for DCO-S Development and Integration activities

FY 2023: -0.075M FY 2023 mark, Undistributed FFRDC Reduction - Sec 8026(e)

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FY 2024: -0.186M to realign funding to APPN 3410, PE 1207804SF (SAG 13C), for fiscal policy compliance as Space Systems Command (SSC) establishes Headquarters functions and a Chief Information Office (CIO) for integrated cybersecurity.

FY 2024: +0.340M inflation increase for non-pay and non-fuel purchases.

FY 2024: +47.600 increase to DCO-S to mitigate cyber risk and continue to protect the network enclaves of USSF mission systems against unauthorized intrusion, corruption, and/or destruction. Funding increased to offset reduction in mission partner funding, grow software factory pipeline, systems engineering and integration, and onboard additional legacy and new USSF mission systems in support of the Strategic Cybersecurity Program DCO requirements.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Defensive Cyberspace Operations - Space (DCO-S)	6.156	28.087	76.003

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 2023 Plans:
Develop and integrate Manticore (Identify & Detect) and Kraken (Protect & Respond) DCO-S capabilities to new mission areas; build, test and deliver new features to keep pace with growing threat demands. 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 and accreditation support to develop cyber technology risk reduction, test and accreditation plans and perform modeling and analysis for common platform, infrastructure and data layers that ground and communication systems can build upon. Perform Security Test and Evaluation (ST&E) and issue fact-based risk assessments for developed DCO-S capabilities to promote the fielding of interoperable systems with optimum security features, countermeasures and safeguards in place. Explore using existing state-of-the-art commercial defensive applications to inform and drive improvements to military cyber defense capabilities that will protect infused sensor and artificially intelligent systems, as part of the Joint All Domain Command Control initiative.

Employ modern testing methodologies based on industry best practices; embed the 47th Test Squadron into the Continuous Integration / Continuous Deployment framework and provide persistent cybersecurity test support and cybersecurity assessments

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
of applications and environments. FFRDC and other management services provide mission assurance oversight to ensure capabilities meet operational need. ***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 as well as 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 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.			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Continue to rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. These activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc. Investigate space segment DCO-S tools for USSF mission systems with focus of integrating with Manticore and Kraken. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY 2024 funding increased to offset reduction in mission partner funding and to expand DCO-S objectives to include the protection of additional space mission systems, advance future development of product lines and expand cybersecurity to meet both ground and space segment.			
Accomplishments/Planned Programs Subtotals	6.156	28.087	76.003

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 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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203040SF / *DCO-Space*	Project (Number/Name) 673070 / *Defensive Cyber Ops - Space*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DCO-S Suite Development	Various	Various : Various	-	4.083	Apr 2022	6.416	Nov 2022	22.181	Oct 2023	-		22.181	Continuing	Continuing	-
SBIR/STTR	Various	Various : Various	-	-		0.986	May 2023	2.263	May 2024	-		2.263	Continuing	Continuing	-
Product Line Integration	Various	Various : Various	-	0.717	Jul 2022	5.732	Nov 2022	31.351	Nov 2023	-		31.351	Continuing	Continuing	-
Systems Engineering/ Accreditation	Various	Various : Various	-	-		2.386	Nov 2022	1.926	Oct 2023	-		1.926	Continuing	Continuing	-
Technical Mission Analysis	MIPR	Analysis/Tech Guidance : Various	-	-		0.580	Oct 2022	0.654	Oct 2023	-		0.654	Continuing	Continuing	-
		Subtotal	-	4.800		16.100		58.375		-		58.375	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test	PO	Test and Eval : San Antonio, TX	-	0.000		0.994	Nov 2022	1.019	Oct 2023	-		1.019	Continuing	Continuing	-
		Subtotal	-	0.000		0.994		1.019		-		1.019	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	MIPR	Various : El Segundo, CA	-	1.356		6.810	Nov 2022	9.532	Nov 2023	-		9.532	Continuing	Continuing	-
A&AS	Various	Various : Various	-	-		3.816	Nov 2022	6.827	Nov 2023	-		6.827	Continuing	Continuing	-
Other	Various	Various : Various	-	-		0.367	Oct 2022	0.250	Oct 2023	-		0.250	Continuing	Continuing	-
		Subtotal	-	1.356		10.993		16.609		-		16.609	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	6.156		28.087		76.003		-		76.003	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force			Date: March 2023
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	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
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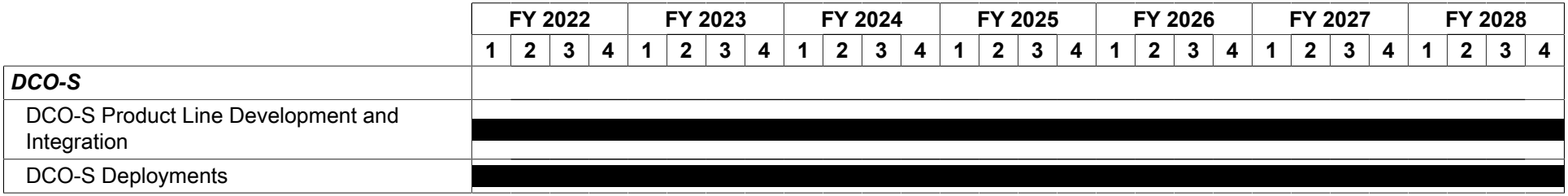

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
DCO-S				
DCO-S Product Line Development and Integration	1	2022	4	2028
DCO-S Deployments	1	2022	4	2028