Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 1203110SF / *Satellite Control Network (SPACE)*							
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	-	0.000	0.000	75.480	0.000	75.480	53.679	44.013	39.356	34.380	Continuing	Continuing
673276: *Satellite Control Network*	-	0.000	0.000	75.480	0.000	75.480	53.679	44.013	39.356	34.380	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1203110F, Satellite Control Network (SPACE) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203110SF Satellite Control Network (SPACE) from Appropriation 3600, Budget Activity 07 due to the creation of a new Appropriation for Space Force.

The Air Force Satellite Control Network (AFSCN) is a satellite ground terminal network comprised of two communication nodes (Schriever AFB & Vandenberg AFB) and 15 antenna systems. The antennas are distributed around the globe at seven locations -- Vandenberg Tracking Station (VTS), Diego Garcia Station (DGS), Guam Tracking Station (GTS), Hawaii Tracking Station (HTS), New Hampshire Tracking Station (NHS), Thule Tracking Station (TTS) and Telemetry and Commanding Station (TCS) at RAF Oakhanger, England -- to ensure global coverage for over 170 satellites in various orbits. The AFSCN conducts an average of 450 satellite contacts per day supporting Positioning, Navigation and Timing (PNT), Intelligence, Surveillance and Reconnaissance (ISR), Missile Warning, Communications, Weather, Launch Vehicle Support, and Research and Development (R&D) in support of Department of Defense (DoD), Intelligence Community (IC), and National Aeronautics and Space Administration (NASA) operations. While most of the 490 satellite contacts/day are routine command and control activities, the AFSCN is also used for satellite emergencies (e.g. tumbling satellite) because its high power antennas are often the only earthbound assets that can contact a non-responsive satellite to re-establish command & control. During FY 2019 the AFSCN supported 11 space vehicle emergencies resulting in the preservation of $4.1B worth of satellites. In addition to routine and emergency satellite operations C2, the AFSCN provides support to launch vehicle and early orbit operations, ensuring worldwide antennas receive telemetry as the rocket travels through the atmosphere and transmit commands to a newly orbiting satellite to initiate early orbit checkout. In FY 2019, the AFSCN supported 19 launches delivering $13.7B worth of satellites to their operational orbits. Finally, the AFSCN provides Factory Compatibility Testing (FCT) to ensure satellites and rockets can communicate via the AFSCN before the satellite is launched. These funds are used to develop next-generation tools to improve the AFSCN and ensure the capability is available to support DoD, Intelligence Community, and civil users. These efforts support cyber hardening, Defensive Cyberspace Operations (DCO-S) and and Systems Engineering & Integration (SE&I) activities for the space enterprise, as well as align with the evolving future space domain demands through Ground Enterprise Next (GEN) to include transmit and receive, and data transport.

AFSCN Deficiency Resolution: Provides test, cyber security, requirements management, and system architecture support to the AFSCN.

Ground Enterprise Next (GEN): Provides the means to communicate with all future spacecraft through diverse communication networks. The program is pursuing more capable ground based antennas, space based communication links, augmenting the existing ASFCN with commercial and civil antennas, upgrading satellite scheduling to commercial standards, and developing infrastructure for long haul communications driven by increase in antennas, cyber security and resilience requirements.

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In FY 2021, Defensive Cyber Operations Space (DCO-S) funds in PE 1203614F JSpOC Mission System moved to PE 1203110F Satellite Control Network to consolidate Space Force Space DCO-S development activities.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing 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, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or re-purpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AFSCN weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	75.480	0.000	75.480
Total Adjustments	0.000	0.000	75.480	0.000	75.480
• 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	0.000	0.000			
• Other Adjustments	0.000	0.000	75.480	0.000	75.480

Change Summary Explanation

FY 2021: +$75.480M; Funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force. This total includes a $59.263M increase for Multi-Band, Multi Mission antennas and a classified requirement.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: AFSCN Deficiency Resolution	0.000	0.000	3.183

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Description: Provides test, cyber security, requirements management, and system architecture support to the AFSCN. Additionally, the Space Force is investigating multiple cyber defense tools for integration onto the AFSCN baseline. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Address deficiencies in fielded systems to include Remote Tracking Station Block Change (RBC), Enhanced Power Amplifier (EHPA) and AFSCN Scheduling Tool. Rapidly respond to 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, etc. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Title: Satellite Operations Transmit and Receive ***Description:*** Provide enterprise transmit, receive and resource management solutions to enable continuous satellite operations (SATOPS) during contested, degraded and operationally denied environment. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Release Request for Proposal and award Technical Maturation and Risk Reduction (TMRR) for Multi-Band Multi-Mission antennas to multiple vendors. Complete CAS development activities and begin development/operational testing. Begin requirement development for Advance Planning Scheduling System (APSS). Rapidly respond to 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, etc. Award Commercial Augmentation Services and Civil Augmentation development and integration contracts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A	0.000	0.000	65.577
Title: Defensive Cyberspace Operations - Space (DCO-S)	0.000	0.000	2.137

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
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. This effort 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 will institute four product lines: Manticore (detect), Pegasus (protect), Chimera (identify), and Kraken (respond). The DCO-S capabilities are developed and deployed as an agile program, leveraging a DEVSECOPS framework to facilitate rapid and timely fielding to operations. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Continue to enhance Defensive Cyber Operations for Space (DCO-S) enterprise-wide, through development and integration of Defensive Cyber Operations tools, including Manticore, Pegasus, Chimera, and Kraken product lines. Manticore will continue to develop, integrate and field endpoint and network data collection, and data extraction and fusion analytic capabilities. Pegasus will continue to address hardware and software supply chain risk management (HW/SW SCRM), enterprise crypography, and cyber hardening activities. Chimera will continue to develop threat identification through system characterization, vulnerability mapping, and cyber/intelligence integration. Kraken will continue to develop capability for incident management, forensics, and tailored response. Collectively these tool capabilities will fill cyber deficiencies across the space enterprise. Continue to plan and deploy DCO-S product line capabilities to the following mission systems: AFSCN, GPS OCS, AEHF, Enterprise Ground Services (EGS), GEN and Eastern/Western Ranges. Rapidly respond to 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, etc. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Title: Enterprise Systems Engineering and Integration	0.000	0.000	4.583
Description: SE&I manages the government controlled system and subsystem level baseline requirements including analysis of future changes to the fielded baseline. SE&I provides "government as the integrator" engineering support to ensure multiple			

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
separate modernizations and the sustainment baselines are synchronized. SE&I will develop and recommend investment strategies to keep the AFSCN operating well beyond the Future Years Defense Plan. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Continue Program Office support and independent SE&I efforts as required to integrate development and modernization across the AFSCN. Provide systems and subsystem level definition, baseline, architecture, integration planning and support for the AFSCN. Additionally, SE&I will provide support to Space & Missile Systems Center (SMC) initiatives supporting Ground Enterprise Next (GEN) activities. Rapidly respond to 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, etc. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	0.000	0.000	75.480

D. Other Program Funding Summary ($ in Millions)

Line Item	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
• SPAF 01 Line Item AFSCOM: *AF Satellite Comm System*	35.326	56.298	-	-	-	-	-	-	-	Continuing	Continuing
• RDTE 07 1203182SF: *Spacelift Range System (SPACE)*	20.168	10.837	-	-	-	-	-	-	-	Continuing	Continuing
• SPSF 01 Line Item AFSCOM: *AF Satellite Comm System*	-	-	48.326	0.000	48.326	49.317	50.231	51.136	52.075	Continuing	Continuing

Remarks

Procures the mission critical electronics and telecommunications equipment to upgrade the aging AFSCN Range and Network Operations segments.

E. Acquisition Strategy

RDT&E efforts focus on completing upgrades as well as future architectures and studies to ensure the best use of investment funding. The SE&I contractor maintains the DoD Architecture Framework (DoDAF) architecture and requirements baseline for Government approval and may perform studies to determine Government options. Limited RDT&E will be applied to the Consolidated AFSCN Modifications, Maintenance, and Operations (CAMMO) contract when sustaining engineering expertise is

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needed to finalize Government-approved architectures. Federally Funded Research and Development Corporation technical depth and breadth will be leveraged to ensure AFSCN modernization efforts are compatible with mission rules and do not pose a risk to safe and cost-effective satellite contacts.

Ground Enterprise Next (GEN) activities will leverage existing prototypes and risk reduction activities. The Space Force plans to pursue the use of Other Transaction Authority for Resilient Enterprise Ground for Multi Band Multi Mission (MBMM) and Commercial Augmentation Segmentation (CAS).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Ground Enterprise Next Scheduling	Various	Stottler-Henke : Colorado Springs, CO	-	-		-		1.540	Jan 2021	-		1.540	Continuing	Continuing	-
AFSCN Deficiency Resolution	Various	Various : Colorado Springs, CO	-	-		-		3.184	Jul 2021	-		3.184	Continuing	Continuing	-
Ground Enterprise Next Commercial Augmentation	MIPR	AFRL : Kirtland AFB, NM	-	-		-		30.000	Dec 2020	-		30.000	Continuing	Continuing	-
Ground Enterprise Next Multi-Band Multi-Mission	MIPR	DIU : Mountain View, CA	-	-		-		30.765	Aug 2021	-		30.765	Continuing	Continuing	-
Defensive Cyberspace Operations - Space (DCO-S)	Various	TBD : Colorado Springs	-	-		-		2.137	Dec 2020	-		2.137	Continuing	Continuing	-
Enterprise Systems Engineering and Integration	C/CPIF	ENSCO : Colorado Springs, CO	-	-		-		4.583	Nov 2020	-		4.583	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	-		-		1.460	Oct 2020	-		1.460	Continuing	Continuing	-
		Subtotal	-	-		-		73.669		-		73.669	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	Various	Aerospace Corp, : El Segundo, CA	-	-		-		0.901	Apr 2021	-		0.901	Continuing	Continuing	-
A&AS	Various	Gartner : Colorado Springs, CO	-	-		-		0.910	Apr 2021	-		0.910	Continuing	Continuing	-
		Subtotal	-	-		-		1.811		-		1.811	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
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	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	-	-		0.000		75.480		-		75.480	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 7	**R-1 Program Element (Number/Name)** PE 1203110SF / *Satellite Control Network (SPACE)*	**Project (Number/Name)** 673276 / *Satellite Control Network*

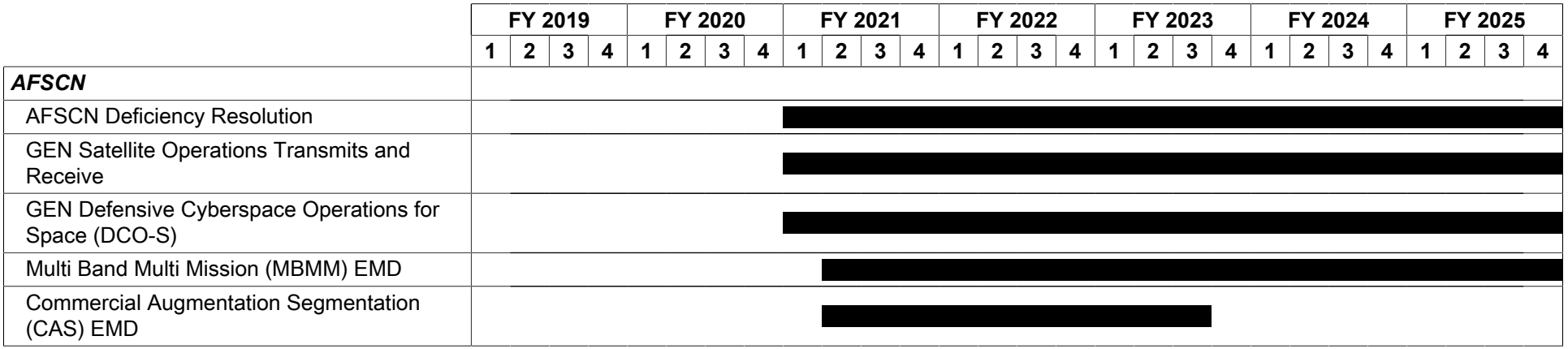

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
AFSCN				
AFSCN Deficiency Resolution	1	2021	4	2025
GEN Satellite Operations Transmits and Receive	1	2021	4	2025
GEN Defensive Cyberspace Operations for Space (DCO-S)	1	2021	4	2025
Multi Band Multi Mission (MBMM) EMD	2	2021	4	2025
Commercial Augmentation Segmentation (CAS) EMD	2	2021	3	2023