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 I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 1206855SF *I Evolved Strategic SATCOM (ESS)*							
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	71.395	0.000	71.395	172.018	536.952	915.616	816.215	Continuing	Continuing
643725: *Evolved Strategic SATCOM (ESS)*	-	0.000	0.000	71.395	0.000	71.395	172.018	536.952	915.616	816.215	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206855F, Evolved Strategic SATCOM (ESS) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206855SF, Evolved Strategic SATCOM (ESS) from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

The ESS system continues the strategic SATCOM mission of the Advanced Extremely High Frequency (AEHF) program by providing space and mission control segments for worldwide and arctic DoD strategic, secure, jam-resistant, survivable communications for ground, sea, and air assets. ESS will meet the requirements for strategic communications and capability gaps identified in the Protected Satellite Communications Services (PSCS) Analysis of Alternatives (AoA), the Protected Follow-on for Resiliency (PAFR) Study and the Strategic Tiger Team. The ESS architecture and functionality will be designed in accordance with the United States Strategic Command's signed ESS Concept of Operations and the Joint Requirements Oversight Council's validated Capability Development Document (CDD) satisfying the legacy AEHF strategic requirements and mission performance with enhancements for increased resiliency and cybersecurity.

ESS will support strategic mission requirements to provide the National Command Authority (NCA) and Combatant Commanders with highly-reliable, secure Military Satellite Communications. ESS will support the forecasted strategic demand in all operational environments and will be compatible with the existing architectures. The ESS system will satisfy emerging requirements using modular open system approaches to support incremental enhancements.

For more rapid and resilient strategic capability risk reduction, the ESS Program Office is executing its approved Space Segment acquisition strategy that leverages Middle Tier Acquisition authorities from the National Defense Authorization Act of 2016 for rapid prototyping, while maintaining the continuity of the AEHF strategic mission.

Activities for the ESS ground segment acquisition includes evolving and enhancing existing ground segment, space-to-ground segment integration, and modernization in support of Enterprise Ground Services compatibility, in accordance with the acquisition strategies and schedules.

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 repurpose capabilities.

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This program element may include necessary civilian pay expenses required to manage, execute, and deliver ESS 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 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)	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	71.395	0.000	71.395
Total Adjustments	0.000	0.000	71.395	0.000	71.395
• 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	71.395	0.000	71.395

Change Summary Explanation

FY 2021: $71.395M transferred from RDT&E, Air Force to RDT&E, Space Force; total includes a reduction of $134.852M for higher Department priorities.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Space Segment Prototyping	0.000	0.000	46.540
Description: Award up to three competitive rapid-prototyping contracts. Invest in technology and demonstrations that enables continued development of modernized, strategic payload and other key technology prototypes, risk reduction, and space segment design. Enables long-term return on investment and energizes industrial base for Strategic SATCOM, increased competition, promotion of innovation, and increased resiliency. Actively manage contractors through prototyping, demonstration and requirements/criteria needed for contractors to competitively bid on the ESS space segment Build, Integration and Test (I&T) and Delivery follow-on.			
FY 2020 Plans: N/A			
FY 2021 Plans:			

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
Execute for up to three contractors, for the continuation of rapid prototyping and demonstrations of the payload and other key technologies, risk reduction, space segment design, delivery of contract items, and completion of planned milestone reviews and/or demonstrations. Each of the three contracts, awarded in FY 2020, will have varying prototyping and demonstration plans and schedules, depending on the specific contractor. Includes all necessary program office, cyber, resiliency, and security support and equipment, Government contractor support for oversight and integration. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, and ESS testing assets. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Title: ESS Ground Segment and Space-to-Ground Integration ***Description:*** Develop and field the ESS ground segment, to include Mission Planning, Command and Control and other architecture and activities required to support the ESS space segment. Includes interoperability with the existing architectures and interfaces for EGS compatibility. Provide for space-to-ground (system) and mission integration for the ESS system. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Complete acquisition planning for ground segment Phase 2 Mission Planning architectural design. Continue ground segment Phase 1 of up to five Broad Agency Announcement contracts for Mission Planning technology readiness. Continue ground segment In-Band and Out-of-Band Command and Control studies with design and development to best evolve these systems that are currently under sustainment. Procure and provide any government-furnished equipment or resources in support of design, integration and testing of the ESS system. Includes all required cryptography, cyber, resiliency, and security activities required and Government contractor support for management and oversight. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets. Continue development activities in support of the ground segment and system/mission integration schedules. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A	0.000	0.000	16.903
Title: Space Segment Payload End-Cryptographic Unit (ECU) ***Description:*** Develop and deliver the National Security Agency (NSA)-certified ECUs required for secure strategic communications encryption in the ESS payloads and payload test terminals in accordance with the approved ECU acquisition	0.000	0.000	7.952

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
strategy and schedule. Upon development completion, production ECU units will be delivered as government-furnished equipment for integration and testing with the ESS payloads and payload test terminals. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** Execute the approved space segment payload and payload test terminals ECU acquisition strategy, to include early definition and development that supports future delivery of the ECUs that meet the ESS control documents. Provide for NSA support on encrypted ECU requirements and standards. Plan and provide program office support, government-furnished equipment, studies or technical analyses, information or resources in support of prototyping activities. Includes all required cyber, resiliency, and security activities required and Government contractor support for management and oversight. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, and ESS testing assets. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	0.000	0.000	71.395

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

The Milestone Decision Authority (MDA) designated ESS Space Segment as an FY 2016 National Defense Authorization Act Middle Tier Acquisition (Rapid Prototyping) activity and approved the ESS acquisition strategy on 14 December 2018. A rapid prototyping phase effectively replaces the Technology Maturation and Risk Reduction phase from a traditional acquisition under Department of Defense 5000 series Directives and Instructions. This approach will award up to three contracts in FY 2020 to focus on reducing space segment risks with the objective of maximizing ESS demonstrated capability for the payload and other key technologies. An ESS Program Office-led RFP and source selection will determine which space prototyping contractor, via their performance during the rapid prototyping phase, is positioned for the space segment Build, I&T and Delivery follow-on. The space prototyping contractors will be carried through the follow-on (Build, I&T and Delivery) source selection to continue momentum until the follow-on contract is awarded.

Return on investment from space prototyping will energize the industrial base and increase competition in strategic SATCOM; inject innovative technical, process and integration approaches; burn down risk early and identify/correct issues as early as possible; and decrease traditional fielding timelines to support a more resilient and responsive architecture against emerging threats. Success in the competitive rapid-prototyping determines and informs follow-on Build, I&T and Delivery.

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The initial Ground Segment Acquisition Strategy was approved by the Program Executive Officer (PEO) in 4th Quarter FY 2019 to begin early technology readiness studies for ESS Phase 1 Mission Planning in FY 2020. Final approval for Mission Planning to begin architectural design and development/production may require additional approval and authority designation by the MDA. In-Band and Out-of-Band Command and Control studies are underway to best evolve these systems that are currently under sustainment.

A Space Segment Payload ECU acquisition strategy will be delivered to the PEO for approval in FY 2020.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1206855SF / *Evolved Strategic SATCOM (ESS)*	**Project (Number/Name)** 643725 / *Evolved Strategic SATCOM (ESS)*

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
Space Segment Prototyping	C/TBD	TBD : TBD	-	-		-		22.013	Oct 2020	-		22.013	Continuing	Continuing	-
Ground Segment and Space-to-Ground Integration	TBD	TBD : TBD	-	-		-		5.630	Nov 2020	-		5.630	Continuing	Continuing	-
Space Segment Payload End Cryptographic Unit (ECU)	TBD	TBD : TBD	-	-		-		4.630	Dec 2020	-		4.630	Continuing	Continuing	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	-		-		12.068	Nov 2020	-		12.068	Continuing	Continuing	-
Enterprise SE&I	C/CPAF	Linquest : Los Angeles, CA	-	-		-		15.246	Nov 2020	-		15.246	Continuing	Continuing	-
		Subtotal	-	-		-		59.587		-		59.587	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	Various : Various	-	-		-		5.596	Nov 2020	-		5.596	Continuing	Continuing	-
Other Support	Various	Various : Various	-	-		-		0.500	Oct 2020	-		0.500	Continuing	Continuing	-
A&AS	Various	Various : Various	-	-		-		5.712	Nov 2020	-		5.712	Continuing	Continuing	-
		Subtotal	-	-		-		11.808		-		11.808	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	-	-		0.000		71.395		-		71.395	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1206855SF / *Evolved Strategic SATCOM (ESS)*	**Project (Number/Name)** 643725 / *Evolved Strategic SATCOM (ESS)*

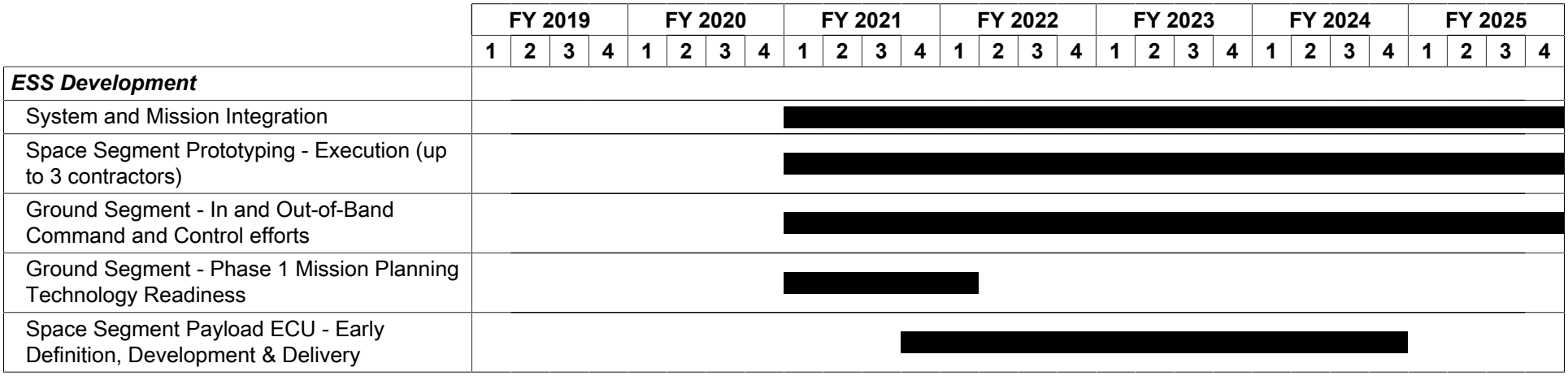

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1206855SF / *Evolved Strategic SATCOM (ESS)*	**Project (Number/Name)** 643725 / *Evolved Strategic SATCOM (ESS)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ESS Development				
System and Mission Integration	1	2021	4	2025
Space Segment Prototyping - Execution (up to 3 contractors)	1	2021	4	2025
Ground Segment - In and Out-of-Band Command and Control efforts	1	2021	4	2025
Ground Segment - Phase 1 Mission Planning Technology Readiness	1	2021	1	2022
Space Segment Payload ECU - Early Definition, Development & Delivery	4	2021	4	2024