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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 1206434F / <i>Midterm Polar MILSATCOM System</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	66.122	370.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	436.475
643720: <i>EPS Recapitalization</i>	66.122	370.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	436.475
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	

Program MDAP/MAIS Code: 121

Note
In FY 2020, Project 643720, EPS Recapitalization, funds transferred to PE 1206432F, Polar MILSATCOM (SPACE), Project 654215, EPS Recap, in order to better align with the Enhanced Polar System program.

A. Mission Description and Budget Item Justification
The Enhanced Polar System Recapitalization (EPS-R) program will provide continuous, protected, Low Probability of Intercept/Low Probability of Detection communications to tactical and strategic warfighters in the North Polar Region in benign and contested environments. EPS-R will develop and acquire 1) two Extremely High Frequency (EHF) payloads, using Advanced EHF's eXtended Data Rate (XDR) waveform, on hosted spacecraft, 2) upgrades/modifications to the existing Enhanced Polar System (EPS) Control and Planning Segment (CAPS) to provide command and control and XDR mission planning capability, and 3) upgrades/modifications to the existing EPS gateway to provide connectivity between polar and midlatitude users through the Global Information Grid.

The EPS-R program is timed to prevent a gap in Arctic Military Satellite Communications (MILSATCOM) coverage after EPS end of life. To ensure polar MILSATCOM continuity beyond FY 2025, the DoD has begun funding activities to bridge the gap between the current EPS program and future protected systems being planned for the late 2020s. The EPS-R program has examined performance, mission needs, schedules, and costs to avoid a mission gap. EPS-R intends to host the payloads on a Space Norway bus, which is scheduled to launch in FY 2023. EPS-R will reuse EPS Gateway and ground control elements to the greatest extent feasible.

To meet the warfighter requirements for protected tactical and strategic polar MILSATCOM, RDT&E funding is required to continue program office and other related support activities that may include, but are not limited to studies, technical analysis, architectural development, acquisition strategy development, system requirements and system trades analysis, risk reduction activities, technology maturation, system engineering, integration and test of all polar MILSATCOM segments and hosted payloads.

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 EPS-R capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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	383.113	0.000	0.000	0.000	0.000
Current President's Budget	370.353	0.000	0.000	0.000	0.000
Total Adjustments	-12.760	0.000	0.000	0.000	0.000
• 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	-12.760	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Title: Payload</p> <p>Description: Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.</p> <p>FY 2020 Plans: Effort has transitioned to PE 1206432F.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>	329.070	0.000	0.000
<p>Title: Ground Upgrades</p> <p>Description: Modify and upgrade the existing EPS CAPS to provide command and control and XDR mission planning capability for the two new payloads.</p> <p>FY 2020 Plans:</p>	30.247	0.000	0.000

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Effort has transitioned to PE 1206432F. FY 2021 Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: N/A			
Title: Gateway Upgrades Description: Modify and upgrade the existing EPS Gateway Segment to support the two new payloads. FY 2020 Plans: Effort has transitioned to PE 1206432F. FY 2021 Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: N/A	11.036	0.000	0.000
Accomplishments/Planned Programs Subtotals	370.353	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
			Base	OCO	Total						
• RDTE 05 PE 1206432F: <i>Polar MILSATCOM (Space)</i>	25.480	412.400	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	437.880

Remarks
Other Program Funding above for PE 1206432F includes two projects. FY19 funds Project 657105, Polar Satellite Communications, aka Enhanced Polar System (EPS). FY20 funds Project 654215, EPS Recap.

E. Acquisition Strategy
Awarded payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiated fabrication of two EPS functional equivalent payloads in FY 2018. Conducted market research to identify industry capabilities and acquisition concepts. Awarded CAPS contract for EPS ground upgrade. Gateway updates will be accomplished by Naval Information Warfare Center Pacific, the EPS Gateway Segment developer. The program office initiated the procurement of a replacement terminal for the Telemetry and Command Terminal. This acquisition strategy updates the EPS Ground Segment to accommodate the EPS functional equivalent payloads and extend operations and sustainment beyond 2028. The U.S. Government will retain the system integrator role, as it was for EPS program of record.

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

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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			
EPS-R Tactical Payloads 1-2	SS/CPIF	NGAS : Redondo Beach, CA	66.099	292.224	Oct 2018	-		-		-		-	0.000	358.323	-
Control and Planning Segment Upgrades	SS/CPIF	NGMS : Redondo Beach, CA	0.000	26.860	May 2019	-		-		-		-	0.000	26.860	-
Gateway Upgrades	Various	Various : CA	0.000	9.800	May 2019	-		-		-		-	0.000	9.800	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	4.325	Nov 2018	-		-		-		-	0.000	4.325	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	23.589	Nov 2018	-		-		-		-	0.000	23.589	-
Subtotal			66.099	356.798		-		-		-		-	0.000	422.897	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			
FFRDC	MIPR	Aerospace : El Segundo, CA	0.000	0.790	Nov 2018	-		-		-		-	0.000	0.790	-
A&AS	Various	Various : Various	0.000	12.615	Nov 2018	-		-		-		-	0.000	12.615	-
Other Support	Various	Various : Various	0.023	0.150	Oct 2018	-		-		-		-	0.000	0.173	-
Subtotal			0.023	13.555		-		-		-		-	0.000	13.578	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			66.122	370.353	0.000	-	-	-	0.000	436.475	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

<i>Payload</i>	
Long Lead Parts	
Payload Segment Design/Build	
Preliminary Design Review (PDR)	
International Collaboration w/ Norway	
Critical Design Review (CDR)	
<i>Ground and Gateway Upgrades/ Modifications</i>	
Risk Reduction Activities/Studies	
Upgrades/Modifications	
Control and Planning Segment Upgrades, Contract Award	

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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>Payload</i>				
Long Lead Parts	1	2019	4	2019
Payload Segment Design/Build	1	2019	4	2019
Preliminary Design Review (PDR)	1	2019	1	2019
International Collaboration w/ Norway	2	2019	4	2019
Critical Design Review (CDR)	4	2019	4	2019
<i>Ground and Gateway Upgrades/Modifications</i>				
Risk Reduction Activities/Studies	1	2019	4	2019
Upgrades/Modifications	1	2019	4	2019
Control and Planning Segment Upgrades, Contract Award	3	2019	3	2019