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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	385.665	0.000	0.000	0.000	0.000	-	-	-	-	-	-
654215: <i>EPS Recap</i>	0.000	385.665	0.000	0.000	0.000	0.000	-	-	-	-	-	-

Program MDAP/MAIS Code: 121

Note

In FY 2020, Project 654215, EPS Recap, efforts were transferred from PE 1206434F, Midterm Polar MILSATCOM System, Project 643720, EPS Recapitalization, in order to better align with the Enhanced Polar System (EPS) program.

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206432F, Polar MILSATCOM (Space) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206432SF, Polar MILSATCOM (Space) from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

This program element acquires the Polar MILSATCOM system that provides protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region.

In FY 2006, the DoD began funding EPS. The host spacecraft and the polar communications packages took advantage of the Advanced Extremely High Frequency (AEHF) technology including the eXtended Data Rate (XDR) waveform. The EPS Capability Development Document (CDD), approved by the Joint Requirements Oversight Council in September 2006, is based on a two-package, hosted XDR program with operational availability in CY 2015 and CY 2017. EPS is comprised of four segments: Payload, Ground Control, Gateway, and Terminal (acquired by each Service's Terminal Program Office). Milestone B review was completed April 2, 2014.

In FY 2019, the USAF and Norwegian Ministry of Defence signed the Arctic Memorandum of Agreement, which enforces the international collaboration with Norway to host two EPS-Recapitalization (EPS-R) payloads on Space Norway-procured spacecraft. Beginning FY 2020, the EPS-R effort transferred from Program Element 1206434F, Midterm Polar MILSATCOM System to Program Element 1206432F, Polar MILSATCOM (SPACE). In FY 2022, EPS-R continues to develop and acquire two Extremely High Frequency (EHF) payloads hosted on Space Norway-procured spacecraft and continues to upgrade/modify the existing EPS Ground Control and Gateway.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed 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 Polar MILSATCOM weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

Funding in this exhibit was previously budgeted in PE 0605432F, Polar MILSATCOM (SPACE), and PE 1206434F, Midterm Polar MILSATCOM System.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	412.400	0.000	0.000	0.000	0.000
Current President's Budget	385.665	0.000	0.000	0.000	0.000
Total Adjustments	-26.735	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	-13.000	0.000			
• SBIR/STTR Transfer	-13.735	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206432F / Polar MILSATCOM (SPACE)			Project (Number/Name) 654215 / EPS Recap				
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
654215: <i>EPS Recap</i>	0.000	385.665	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2020, Project 654215, EPS Recap, efforts were transferred from PE 1206434F, Midterm Polar MILSATCOM System, Project 643720, EPS Recapitalization, in order to better align with the Enhanced Polar System (EPS) program.

A. Mission Description and Budget Item Justification

This program element acquires the Polar MILSATCOM system (EPS) and the continuation effort, EPS Recapitalization (EPS-R) providing protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region and prevents a gap in Arctic MILSATCOM coverage in the mid to late 2020s.

In FY 2018, via PE 1206434F the DoD funded EPS-R to develop and acquire 1) two Extremely High Frequency (EHF) payloads, using Advanced EHF's (AEHF's) eXtended Data Rate (XDR) waveform, on hosted spacecraft, 2) upgrades/modifications to the existing 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 Department of Defense Information Networks (DODIN). EPS-R will host the payloads on a Space Norway-procured bus scheduled to launch in FY 2023. EPS-R will reuse EPS Gateway and ground control elements to the greatest extent feasible.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Title: Space Segment</p> <p>Description: Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>	332.445	0.000	0.000
<p>Title: Ground Updates</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 2021 Plans: N/A</p> <p>FY 2022 Plans:</p>	41.920	0.000	0.000

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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	Project (Number/Name) 654215 / <i>EPS Recap</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
N/A			
Title: Gateway Updates	11.300	0.000	0.000
Description: Modify and upgrade the existing EPS Gateway to support the two new payloads.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	385.665	0.000	0.000

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

N/A

Remarks

D. Acquisition Strategy

Awarded payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiated fabrication of two EPS functional equivalent payloads in FY 2018 (PE 1206434F). In FY 2019, the USAF and Norwegian Ministry of Defence signed the Arctic Memorandum of Agreement, which enforces the international collaboration with Norway to host the two EPS-Recapitalization (EPS-R) payloads on the Space Norway-procured spacecraft. 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 initiates 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 2022 Air Force **Date:** May 2021

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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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/CPPIF	NGAS : Redondo Beach, CA	0.000	292.682	Nov 2019	-		-		-		-	-	-	414.329
Control and Planning Segment Upgrades	SS/CPPIF	NGMS : Redondo Beach, CA	0.000	36.906	Dec 2019	-		-		-		-	-	-	86.930
Gateway Upgrades	Various	Various : Various, CA	0.000	9.948	Jan 2020	-		-		-		-	-	-	68.895
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	6.000	Dec 2019	-		-		-		-	-	-	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	23.743	Jan 2020	-		-		-		-	-	-	-
Subtotal			0.000	369.279		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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	0.850	Jan 2020	-		-		-		-	-	-	-
A&AS	Various	Various : Various	0.000	15.386	Jan 2020	-		-		-		-	-	-	-
Other Support	Various	Various : Various	0.000	0.150	Oct 2019	-		-		-		-	-	-	-
Subtotal			0.000	16.386		-		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	0.000	385.665	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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

Space Segment	
Payload Design/Build	
International Collaboration w/ Norway	
Ground and Gateway Upgrades/ Modifications	
Risk Reduction Activities/Studies	
Ground Critical Design Review (CDR)	
Acquire Telemetry and Control Terminals	
Upgrades/Modifications	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Space Segment				
Payload Design/Build	1	2020	4	2020
International Collaboration w/ Norway	1	2020	4	2020
Ground and Gateway Upgrades/Modifications				
Risk Reduction Activities/Studies	1	2020	4	2020
Ground Critical Design Review (CDR)	3	2020	4	2020
Acquire Telemetry and Control Terminals	1	2020	4	2020
Upgrades/Modifications	1	2020	4	2020