Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 1206432SF / *Polar MILSATCOM (SPACE)*

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	0.000	123.519	112.170	67.465	0.000	67.465	26.522	10.301	0.000	0.000	0.000	339.977
654215: *EPS Recap*	0.000	123.519	112.170	67.465	0.000	67.465	26.522	10.301	0.000	0.000	0.000	339.977
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Program MDAP/MAIS Code: 121

A. Mission Description and Budget Item Justification

This program element acquires the Polar Military Satellite Communications (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 Department of Defense (DoD) began funding Enhanced Polar System (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 United States Air Force (USAF) and Norwegian Ministry of Defense signed the Arctic Memorandum of Agreement (MOA), which enforces the international collaboration with Norway to host two EPS-Recapitalization (EPS-R) payloads on Space Norway-procured spacecraft. 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 Systems Command (SSC) 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, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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 1206392SF and 1206398SF.

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)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	190.235	127.870	0.000	0.000	0.000
Current President's Budget	123.519	112.170	67.465	0.000	67.465
Total Adjustments	-66.716	-15.700	67.465	0.000	67.465
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-15.700			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-60.399	0.000			
• SBIR/STTR Transfer	-6.317	0.000			
• Other Adjustments	0.000	0.000	67.465	0.000	67.465

Change Summary Explanation

FY 2021: -66.716M: -60.399M reprogrammed for higher Space Force priorities. -6.317M SBIR transfer.
FY 2022: -15.700M Congressional directed reduction for prior year carryover.
FY 2023: +67.465M; The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Space Segment	67.982	51.689	33.366

Description: Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.

FY 2022 Plans:
Continue development, fabrication, and testing of the second EPS-R payload that was initiated in FY 2018. Ship first and second payload to space vehicle (SV) vendor for integration onto the SV. Finalize interface documentation and integration plans with international partner. Fund FY 2022 Department of the Air Force (DAF) share of Arctic MOA collaboration costs for hosting of the EPS-R payloads. Facilitate coordination between Space Norway, space vehicle vendor, and payload contractor. Provide representation, technical expertise, and assistance as necessary at Space Norway and/or space vehicle vendor facilities to support activities including payload integration and testing. Support segment and system level testing. Continue cyber certification efforts. Support development and integration for the EPS-R system strategic requirements.

FY 2023 Plans:
Continue testing of both EPS-R payloads that were initiated in FY 2018 to include on-orbit testing starting in FY 2023. Fund FY 2023 DAF share of Arctic MOA collaboration costs for hosting of the EPS-R payloads. Facilitate coordination between Space Norway, space vehicle vendor, and payload contractor. Provide representation, technical expertise, and assistance as necessary

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
at Space Norway and/or space vehicle vendor facilities to support activities including payload integration, testing, and deficiency resolution as needed. Support segment and system level testing. Continue cyber certification efforts. Support development and integration for the EPS-R system strategic requirements. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2023 funding decreased due to a shift from testing and integrating the payloads with the Satellite Vehicle to launch checkout of the payloads and on-orbit testing.			
Title: Ground Updates ***Description:*** Modify and upgrade the existing EPS Control and Planning Segment (CAPS) to provide command and control and XDR mission planning capability for the two new payloads. ***FY 2022 Plans:*** Continue CAPS upgrade to support EPS-R and EPS legacy. Deliver Software Item Qualification Test (SIQT) build and develop/ deliver additional software builds as appropriate. Complete all in-band and out-of-band Space Operations Center (SOC) hardware integration. Conduct Functional Configuration Audit and On-Orbit Activation Rehearsal. Support segment and system level testing, to include regression testing with EPS legacy payloads. Acquire Defense Information Systems Network (DISN) lines and associated equipment at various EPS-R and DISA ground nodes as appropriate to support Space Norway SOC out-of-band connectivity to the EPS-R payload as well as in-band connectivity between the various EPS-R ground nodes. Continue development, upgrades, and integration for the EPS-R system strategic requirements. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. ***FY 2023 Plans:*** Continue testing EPS CAPS to include on-orbit testing starting in FY 2023. Continue efforts with DISA on ground nodes to provide out-of-band connectivity to the EPS-R payload as well as in-band connectivity between EPS-R ground nodes. Provide representation, technical expertise, and assistance as necessary at Space Norway and/or space vehicle vendor facilities to support activities including payload integration and ground to payload testing. Support segment and system level testing. Continue cyber certification and Authority To Operate (ATO) efforts. Provide updates, fixes, and retests to ground software deficiencies found in Factory Acceptance Testing, Site Acceptance Testing, and On-orbit Testing. Support development and integration for the EPS-R system strategic requirements. 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 2022 to FY 2023 Increase/Decrease Statement:***	35.405	54.166	27.815

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 funding decreased due to a shift from testing, payload integration with the satellite vehicles and terminal installation to on-orbit testing and transition to sustainment.			
Title: Gateway Updates ***Description:*** Modify and upgrade the existing EPS Gateway to support the two new payloads. ***FY 2022 Plans:*** Continue EPS Gateway upgrades, segment and system integration testing. Continue installation efforts and testing for a second telemetry and control terminal as well as a fourth Navy Multiband Terminal (NMT) to support dual EPS/EPS-R operations to the extent EPS legacy remains operational. Upgrade additional telemetry and control terminals as necessary to support EPS-R. Support risk reduction/development, upgrades, and integration for the EPS-R system strategic requirements including required Family of Advanced Beyond-Line-Of-Sight Terminals (FAB-T) software modifications. ***FY 2023 Plans:*** Continue EPS Gateway upgrades, segment, and system integration testing. Complete terminals installation efforts and continue testing for a second telemetry and control terminal as well as a fourth NMT to support dual EPS/EPS-R operations to the extent EPS legacy remains operational. Prepare for two FAB-T terminals to replace two aging Telemetry & Control Terminals (T&C-T). Continue to support risk reduction, development upgrades, and integration for the EPS-R system strategic requirements to include any modification required for the FAB-T software as needed. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** FY 2023 funding decreased due to early installation of NMT and T&C-T as well as a phased contracting approach for FAB-T modifications, updates, and testing.	20.132	6.315	6.284
Accomplishments/Planned Programs Subtotals	123.519	112.170	67.465

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

Awarded payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiated fabrication of two EPS functional-equivalent payloads in FY 2018. 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

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2023 Air Force	**Date:** April 2022
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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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	**R-1 Program Element (Number/Name)** PE 1206432SF / *Polar MILSATCOM (SPACE)*	**Project (Number/Name)** 654215 / *EPS Recap*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
EPS-R Tactical Payloads 1-2	SS/CPIF	NGAS : Redondo Beach, CA	0.000	53.184	Nov 2020	40.925	Nov 2021	25.354	Nov 2022	-		25.354	0.000	119.463	487.309
Control and Planning Segment Upgrades	SS/CPIF	NGMS : Redondo Beach, CA	0.000	27.698	Nov 2020	42.887	Nov 2021	21.136	Nov 2022	-		21.136	21.477	113.198	88.377
Gateway Upgrades	Various	Various : Various, CA	0.000	15.750	Nov 2020	5.000	Nov 2021	4.775	Nov 2022	-		4.775	6.500	32.025	68.895
Technical Mission Analysis	RO	Aerospace : El Segundo, CA	0.000	5.880	Nov 2020	5.900	Nov 2021	5.940	Nov 2022	-		5.940	1.500	19.220	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	18.027	Nov 2020	13.558	Nov 2021	7.050	Nov 2022	-		7.050	3.211	41.846	-
		Subtotal	0.000	120.539		108.270		64.255		-		64.255	32.688	325.752	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	RO	Aerospace : El Segundo, CA	0.000	0.755	Oct 2020	0.606	Oct 2021	0.630	Nov 2022	-		0.630	0.600	2.591	-
A&AS	Various	Various : Various	0.000	2.075	Oct 2020	3.144	Oct 2021	2.480	Oct 2022	-		2.480	3.435	11.134	-
Other Support	Various	Various : Various	0.000	0.150	Oct 2020	0.150	Oct 2021	0.100	Oct 2022	-		0.100	0.100	0.500	-
		Subtotal	0.000	2.980		3.900		3.210		-		3.210	4.135	14.225	N/A

	Prior Years	FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	123.519		112.170		67.465		-		67.465	36.823	339.977	N/A

Remarks

Exhibit R-4, **RDT&E Schedule Profile:** PB 2023 Air Force		**Date:** April 2022
Appropriation/Budget Activity 3620F / 5	**R-1 Program Element (Number/Name)** PE 1206432SF / *Polar MILSATCOM (SPACE)*	**Project (Number/Name)** 654215 / *EPS Recap*

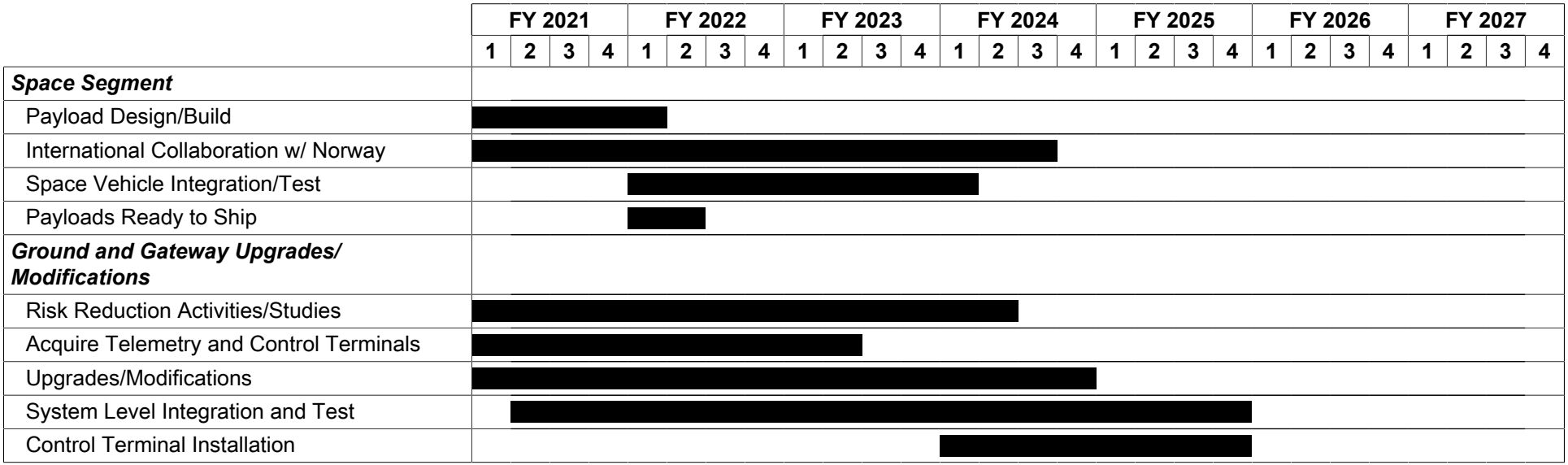

Exhibit R-4A, **RDT&E Schedule Details:** PB 2023 Air Force		**Date:** April 2022
Appropriation/Budget Activity 3620F / 5	**R-1 Program Element (Number/Name)** PE 1206432SF / *Polar MILSATCOM (SPACE)*	**Project (Number/Name)** 654215 / *EPS Recap*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Space Segment				
Payload Design/Build	1	2021	1	2022
International Collaboration w/ Norway	1	2021	3	2024
Space Vehicle Integration/Test	1	2022	1	2024
Payloads Ready to Ship	1	2022	2	2022
Ground and Gateway Upgrades/Modifications				
Risk Reduction Activities/Studies	1	2021	2	2024
Acquire Telemetry and Control Terminals	1	2021	2	2023
Upgrades/Modifications	1	2021	4	2024
System Level Integration and Test	2	2021	4	2025
Control Terminal Installation	1	2024	4	2025