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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 1206434F I Midterm Polar MILSATCOM System							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	6.000	60.123	383.113	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	449.236
643720: EPS Recapitalization	6.000	60.123	383.113	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	449.236
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Program MDAP/MAIS Code: 121												
<p>Note</p> <p>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.</p> <p>A. Mission Description and Budget Item Justification</p> <p>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.</p> <p>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 CY 2022. EPS-R will reuse EPS Gateway and ground control elements to the greatest extent feasible.</p> <p>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.</p> <p>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.</p>												

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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.							
In FY 2018, Midterm Polar MILSATCOM System was a New Start.							
As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.							
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Previous President's Budget		63.092	383.113	446.461	0.000	446.461	
Current President's Budget		60.123	383.113	0.000	0.000	0.000	
Total Adjustments		-2.969	0.000	-446.461	0.000	-446.461	
• Congressional General Reductions		-0.891	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		-2.078	0.000				
• Other Adjustments		0.000	0.000	-446.461	0.000	-446.461	
Change Summary Explanation							
FY 2020: -\$446.461M transferred to PE 1206432F, Polar MILSATCOM (SPACE), Project 654215, EPS Recap.							
C. Accomplishments/Planned Programs (\$ in Millions)					FY 2018	FY 2019	FY 2020
Title: Payload					60.123	333.667	0.000
Description: Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.							
FY 2019 Plans:							

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Continue development, production, and testing of the two payloads that were initiated in FY 2018. Conduct payload Critical Design Review. Develop interface documentation and integration plans with Space Norway. Continue program office support and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. FY 2020 Plans: Effort has transitioned to PE 1206432F. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of \$333.667M due to PE 1206432F, Polar MILSATCOM (SPACE) transition.				
Title: Ground Upgrades Description: Modify and upgrade the existing EPS CAPS to provide command and control and XDR mission planning capability for the two new payloads. FY 2019 Plans: Continue studies/risk reduction efforts on EPS CAPS Segment, issue Request For Proposal for tactical ground modifications, and award contract. FY 2020 Plans: Effort has transitioned to PE 1206432F. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of \$29.163M due to PE 1206432F, Polar MILSATCOM (SPACE) transition.		0.000	29.163	0.000
Title: Gateway Upgrades Description: Modify and upgrade the existing EPS Gateway Segment to support the two new payloads. FY 2019 Plans: Continue studies/risk reduction efforts, and begin EPS Gateway Segment upgrades. Make preparations for installing a second telemetry and control terminal. Purchase additional telemetry and control terminals to recapitalize fleet that is becoming obsolete. FY 2020 Plans: Effort has transitioned to PE 1206432F. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of \$20.283M due to PE 1206432F, Polar MILSATCOM (SPACE) transition.		0.000	20.283	0.000
Accomplishments/Planned Programs Subtotals		60.123	383.113	0.000

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D. Other Program Funding Summary (\$ in Millions)												
	<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
	• RDTE 05 PE 1206432F: <i>Polar MILSATCOM (Space)</i>	32.536	27.337	-	-	-	-	-	-	-	0.000	59.873
Remarks												
E. Acquisition Strategy												
Award payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiate production of two EPS functional equivalent payloads in FY 2018. Conduct market research to identify industry capabilities and acquisition concepts. Award CAPS contract to Northrop Grumman Mission Systems (NGMS) for EPS ground upgrade. Gateway updates will be accomplished by Space and Naval Warfare Systems Command-Pacific, the EPS Gateway developer. The program office will initiate 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.												
F. Performance Metrics												
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.												

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 1206434F / Midterm Polar MILSATCOM System				Project (Number/Name) 643720 / EPS Recapitalization					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
EPS-R Tactical Payloads 1-2	SS/ Various	NGAS : Redondo Beach, CA	6.000	60.100	Feb 2018	295.768	Oct 2018	-		-		-	0.000	361.868	-
Control and Planning Segment Upgrades	TBD	NGMS : Redondo Beach, CA	0.000	-		25.851	May 2019	-		-		-	0.000	25.851	-
Gateway Upgrades	Various	Various : CA	0.000	-		17.979	Dec 2018	-		-		-	0.000	17.979	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	-		6.256	Nov 2018	-		-		-	0.000	6.256	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	-		27.384	Nov 2018	-		-		-	0.000	27.384	-
Subtotal			6.000	60.100		373.238		-		-		-	0.000	439.338	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	MIPR	Aerospace : El Segundo, CA	0.000	-		1.564	Nov 2018	-		-		-	0.000	1.564	-
A&AS	Various	Various : Various	0.000	-		8.151	Nov 2018	-		-		-	0.000	8.151	-
Other Support	Various	Various : Various	0.000	0.023	Feb 2018	0.160	Oct 2018	-		-		-	0.000	0.183	-
Subtotal			0.000	0.023		9.875		-		-		-	0.000	9.898	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			6.000	60.123		383.113		-		-		-	0.000	449.236	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force			Date: February 2019		
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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																												
Contract Initiation/Definitization																												
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 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206434F / Midterm Polar MILSATCOM System	Project (Number/Name) 643720 / EPS Recapitalization	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Payload				
Long Lead Parts	2	2018	4	2019
Contract Initiation/Definitization	2	2018	4	2018
Payload Segment Design/Build	2	2018	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
Ground and Gateway Upgrades/Modifications				
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