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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force										Date: February 2018		
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)					PE 1206855F I Protected SATCOM Services (PSCS) - Aggregated							
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	0.000	16.000	29.379	0.000	29.379	172.206	206.247	301.617	537.124	Continuing	Continuing
643725: Evolved Strategic SATCOM (ESS)	-	0.000	16.000	29.379	0.000	29.379	172.206	206.247	301.617	537.124	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Protected Satellite Communications Services (PSCS) Analysis of Alternatives (AoA) evaluated alternative space and control segment architectures, along with the associated user segments, to address the required protected satellite communications capabilities in the nuclear, contested, and benign operating environments. The PSCS AoA Follow-on for Resiliency (PAFR) Study and Strategic Tiger Team further defined the need for strategic space resiliency.

To meet the requirements for strategic communications and capability gaps identified in these studies, the Evolved Strategic SATCOM (ESS) system will provide space and mission control segments for worldwide and polar DoD strategic, secure, jam-resistant, nuclear-survivable communications for ground, sea, and air assets. It will include on-board resilience features with enhanced survivability and potentially provide a Protected Tactical Waveform (PTW) capability. PTW is a waveform designed to mitigate the effects of advanced jamming in Anti-Access/Area Denial environments. PTW will ensure delivery of protected tactical SATCOM to the joint and coalition warfighters in these contested, degraded environments.

ESS will support strategic mission requirements such as Presidential and National Voice Conferencing (PNVC), Nuclear Command and Control (NC2) strategic networks, terminal report back, and Emergency Action Message (EAM) dissemination. The program will provide the National Command Authority (NCA) and Combatant Commanders with highly-reliable, secure MILSATCOM to execute the Single Integrated Operational Plan (SIOP), and command and control strategic forces at all levels of conflict. ESS will support 2030 strategic demand in all operational environments (nuclear, contested, and benign) and will be backwards compatible with the eXtended Data Rate (XDR) waveform. The space vehicles will be designed to accommodate hosted payloads as required. The ESS system will also satisfy emerging requirements and capabilities for enhanced resilience by accommodating on-board resilience payload(s), providing maneuver capability, and incorporating improved cybersecurity.

RDT&E funding is required for continued program office and other related support activities that may include, but are not limited to: architectural development, acquisition strategy development, system requirements and system trades analysis, technology maturation, risk reduction activities, system and operational concept development, design activities, prototyping, engineering, manufacturing, developing, testing and evaluating of the ESS systems and segments.

The current and future space domain demands that space systems be responsive to new and changing threats, and can rapidly integrate new capabilities to make our warfighting force more resilient in a contested battlespace. This agility, survivability, and rapid reconstitution must extend through the entire space warfighting enterprise, to include how we learn about the threat; develop solutions; acquire, test, deploy, train, operate and integrate new systems into the greater system of systems; and ensure our space mission force is ready to defeat a thinking adversary in a complex, multi-domain battlespace. The enterprise will use all of its elements to accelerate

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decision-making, prototype potential solutions, rapidly integrate decision-making tools and sustain a war-winning capability by delivering multi-domain effects in, from, and through space and cyberspace enabling battle management and resilience options to "fight through."						
This program element may include necessary civilian pay expenses required to manage, execute, and deliver Protected SATCOM services (PSCS-Aggregated) 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.						
This program is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototypes in a high fidelity and realistic operating environment.						
B. Program Change Summary (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget		0.000	16.000	214.885	0.000	214.885
Current President's Budget		0.000	16.000	29.379	0.000	29.379
Total Adjustments		0.000	0.000	-185.506	0.000	-185.506
• 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	-185.506	0.000	-185.506
Change Summary Explanation						
FY 2019: -\$185.506M: -\$185.285M to align funding profile to program office estimate based on a one year ESS launch delay from 2029 to 2030, -\$0.221M inflation adjustment						
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2017	FY 2018	FY 2019
Title: Technical Baseline and Architectural Engineering				0.000	5.062	17.661
Description: The PSCS AoA, PAFR study, and Space Enterprise Vision study further defined the need for a more resilient, protected space architecture. ESS will support 2030 strategic demand in all operational environments (nuclear, contested, and benign), as well as supporting tactical user demands through a hostable PTW payload. As such, continued development of the technical baseline and further architecture engineering is required.						
FY 2018 Plans:						

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Expand technical baseline development and system requirements, previously funded under the MILSATCOM Space Modernization Initiative (PE 0605431F BPAC 657104), to include the integration of a PTW payload. Conduct system architecture development. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc. FY 2019 Plans: Finalize system requirements and Capability Development Document to include focus on risk reduction studies. Continue analyses on system design/trade-offs and affordability trades. Continue the development of technical baseline products, and other documents and product requirements, system engineering and integration plans, launch and early-orbit test plans, operational test and evaluation plans required for concept development and future efforts. Continue program office support and other related support activities. 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, prototyping, etc. FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 increased compared to FY 2018 by \$12.599M. Justification for the increase is described in plans above.				
Title: Acquisition Strategy and Source Selection Description: In accordance with these concept and architecture studies, ESS is conducting market research and working with AFSPC to define system requirements in support of acquisition strategy development. Increase in program office support for developing documentation and planning for activities leading up to and including a draft and final Request for Proposal (RFP) release and source selection. FY 2018 Plans: Mature acquisition strategy. Develop documentation necessary to comply with statutory and regulatory requirements to achieve DoD. 5000.02 milestones. Partner with Industry for contract activities. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc. FY 2019 Plans: Release Development RFP and conduct source selection in preparation for ESS Development Contract Authority To Proceed. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, market research, acquisition strategy development, RFP development, source selection, etc. FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 decreased compared to FY 2018 by \$4.738M. Justification for the decrease is described in plans above.		0.000	10.938	6.200
Title: ESS Development		0.000	0.000	5.518

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C. Accomplishments/Planned Programs (\$ in Millions)										FY 2017	FY 2018	FY 2019
Description: Develop and acquire the space and ground architecture for the ESS System FY 2018 Plans: ESS Development contract was previously included in Major Thrust "Technical Baseline and Architectural Engineering" FY 2019 Plans: Conduct studies and analyses to determine contractor capabilities to meet the requirements in preparation for Development Contract Award. Continue to define the space and ground architecture. Continue program office support and other related support activities. 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, prototyping, etc. FY 2018 to FY 2019 Increase/Decrease Statement: FY2019 increased compared to FY2018 by \$5.518M. Justification for the increase is described in plans above.												
Accomplishments/Planned Programs Subtotals										0.000	16.000	29.379
D. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost	
• RDTE 05 PE 1206431F: Advanced EHF MILSATCOM (Space)	6.000	-	-	-	-	-	-	-	-	0.000	6.000	
• RDTE 04 PE 1206761F: Protected Tactical Service (PTS)	0.000	24.201	29.776	-	29.776	173.694	253.392	263.096	461.058	Continuing	Continuing	
Remarks												
E. Acquisition Strategy												
Multiple acquisition strategy Course of Actions (COAs) are being evaluated. The current cost estimates for ESS assume a full-and-open competition for the ESS Development Contract. Federally Funded Research Development Center (FFRDC) studies and University Affiliated Research Center (UARC) studies will assist to refine required capabilities and develop recommended architectural options prior to Milestone B.												
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 2019 Air Force												Date: February 2018			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 1206855F / Protected SATCOM Services (PSCS) - Aggregated				Project (Number/Name) 643725 / Evolved Strategic SATCOM (ESS)					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
ESS Development	TBD	Not specified. : TBD	-	-		0.000		5.518	Nov 2018	-		5.518	Continuing	Continuing	-
Requirement Definition	Various	Various : Various	-	-		4.766	Jan 2018	5.600	Nov 2018	-		5.600	Continuing	Continuing	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	-		1.714	Jan 2018	2.950	Nov 2018	-		2.950	Continuing	Continuing	-
Enterprise SE&I	C/CPAF	Linquest : Los Angeles, CA	-	-		4.762	Jan 2018	9.111	Nov 2018	-		9.111	Continuing	Continuing	-
Subtotal			-	-		11.242		23.179		-		23.179	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	Various	Various : Various	-	-		3.428	Jan 2018	3.700	Nov 2018	-		3.700	Continuing	Continuing	-
Other Support	Various	Various : Various	-	-		0.050	Jan 2018	0.150	Oct 2018	-		0.150	Continuing	Continuing	-
A&AS	Various	Various : Various	-	-		1.280	Jan 2018	2.350	Nov 2018	-		2.350	Continuing	Continuing	-
Subtotal			-	-		4.758		6.200		-		6.200	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		16.000		29.379		-		29.379	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force			Date: February 2018		
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	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
ESS Development																												
Acquisition Strategy Approval																												
Draft Capability Development Document (CDD)																												
Final CDD Approval																												
Draft Development Release Request for Proposal (RFP)																												
Final Development RFP Release																												
Source Selection																												
ESS Development Contract																												
System Requirements Review (SRR)																												
Preliminary Design Review (PDR)																												
Milestone B																												
Initiate Engineering and Manufacturing Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206855F / <i>Protected SATCOM Services (PSCS) - Aggregated</i>	Project (Number/Name) 643725 / <i>Evolved Strategic SATCOM (ESS)</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
ESS Development				
Acquisition Strategy Approval	3	2018	3	2018
Draft Capability Development Document (CDD)	1	2018	3	2018
Final CDD Approval	3	2018	2	2019
Draft Development Release Request for Proposal (RFP)	4	2018	4	2018
Final Development RFP Release	2	2019	2	2019
Source Selection	3	2019	2	2020
ESS Development Contract	2	2020	4	2022
System Requirements Review (SRR)	1	2021	1	2021
Preliminary Design Review (PDR)	2	2022	2	2022
Milestone B	4	2022	4	2022
Initiate Engineering and Manufacturing Development	1	2023	1	2023