

# UNCLASSIFIED

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 1206855F I Evolved Strategic SATCOM (ESS)							
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	-	15.473	29.229	172.206	0.000	172.206	206.247	301.617	537.124	915.900	Continuing	Continuing
643725: Evolved Strategic SATCOM (ESS)	-	15.473	29.229	172.206	0.000	172.206	206.247	301.617	537.124	915.900	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

## Note

PE 1206855F, Evolved Strategic SATCOM (ESS), changed from Protected SATCOM Services (PSCS) - Aggregated.

## A. Mission Description and Budget Item Justification

The ESS system continues the strategic SATCOM mission of the Advanced Extremely High Frequency (AEHF) program by providing space and mission control segments for worldwide and arctic DoD strategic, secure, jam-resistant, nuclear-survivable communications for ground, sea, and air assets. ESS will meet the requirements for strategic communications and capability gaps identified in the Protected Satellite Communications Services (PSCS) Analysis of Alternatives (AoA), the Protected Follow-on for Resiliency (PAFR) Study and the Strategic Tiger Team. The ESS architecture and functionality will be designed in accordance with the United States Strategic Command's signed ESS Concept of Operations and the Joint Requirements Oversight Council's validated Capability Development Document (CDD) satisfying the legacy AEHF strategic requirements and mission performance with enhancements for increased resiliency and cybersecurity.

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 Military Satellite Communications (MILSATCOM) to execute the Single Integrated Operational Plan (SIOP), and command and control strategic forces at all levels of conflict. ESS will support the forecasted 2030 strategic demand in all operational environments (nuclear, contested, and benign) and will be compatible with the eXtended Data Rate (XDR) waveform. The ESS system will also satisfy emerging requirements and capabilities for enhanced resilience by accommodating on-board resilience payload(s) and incorporating improved resiliency and cybersecurity features.

For more rapid and resilient strategic capability risk reduction, the ESS Program Office is developing an acquisition strategy that leverages Section 804 of the National Defense Authorization Act of 2016 for rapid prototyping and rapid fielding to the greatest extent practical, while maintaining the continuity of the AEHF strategic mission that interfaces operationally within the existing Nuclear, Command, Control, and Communications (NC3) architecture.

Activities for the ESS ground segment acquisition includes evolving and enhancing existing ground segment, space-to-ground segment integration, and modernization in support of Enterprise Ground Services compatibility, in accordance with the approved acquisition strategy and schedule.

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

**UNCLASSIFIED**

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 1206855F I Evolved Strategic SATCOM (ESS)				
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.						
This program element may include necessary civilian pay expenses required to manage, execute, and deliver ESS 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.						
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		16.000	29.379	172.206	0.000	172.206
Current President's Budget		15.473	29.229	172.206	0.000	172.206
Total Adjustments		-0.527	-0.150	0.000	0.000	0.000
• Congressional General Reductions		0.000	-0.150			
• 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		-0.527	0.000			
• Other Adjustments		0.000	0.000	0.000	0.000	0.000
Change Summary Explanation						
In the FY 2019 budget, ESS received a Congressional rescission of \$12.000 million. The correct total for FY 2018 is \$3.473 million.						
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2018	FY 2019	FY 2020
Title: Technical Baseline and Architectural Engineering				10.006	17.537	0.000
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). Develop the technical baseline and conduct architectural engineering. Protected Tactical Waveform accommodation is not included in the current ESS CDD.						

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>FY 2019 Plans:</b> Finalize system requirements and the CDD 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 and other related support activities that may include, but are not limited to studies, technical analysis, etc.				
<b>FY 2020 Plans:</b> N/A				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 decreased compared to FY 2019 by \$17.537M. Justification for the decrease is described in plans above.				
<b>Title:</b> Acquisition Strategy and Space Segment Prototyping Preparation Activities		5.467	5.846	4.329
<b>Description:</b> This major thrust was formerly known as Acquisition Strategy and Source Selection. In accordance with these concept and architecture studies, ESS is conducting market research and working with Air Force Space Command (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. Finalize space segment acquisition activities for rapid, competitive prototyping with capability demonstration for up to three contractors leading up to, but not including, contract awards.				
<b>FY 2019 Plans:</b> 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.				
<b>FY 2020 Plans:</b> Includes changes due to updated Section 804 acquisition approach and re-alignment of activities. Finalize space segment acquisition efforts in support of prototyping and capability demonstration. Plan for the Space Segment End Cryptographic Unit (ECU) Request for Proposal, source selection, and contract award. Activities include, but not limited to: Continued engagements with potential space contractors; technical evaluations; contractor selections and negotiations; and other activities leading to, but not including, prototyping contract awards. Plan and provide any program office support, government-furnished equipment, studies or technical analyses, information or resources in support of prototyping activities. Federally Funded Research Development Center (FFRDC) and University Affiliated Research Center (UARC) studies and technical support will assist with				

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b> requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 decreased compared to FY 2019 by \$1.517M. Justification for the decrease is described in plans above.		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<b>Title:</b> Space Segment Prototyping  <b>Description:</b> Award up to three competitive rapid-prototyping contracts. Invest in technology and demonstrations that enables continued development of modernized, strategic XDR-processed payload prototypes. Enables long-term return on investment and energizes industrial base for Strategic SATCOM, increased competition, promotion of innovation, and increased resiliency. Actively manage contractors through prototyping, demonstration and requirements/criteria needed for contractors to competitively bid on the ESS follow-on. Continues the prototyping and development of risk reduction efforts as previously described under FY 2019 President's Budget "ESS Development" major thrust.  <b>FY 2019 Plans:</b> N/A.  <b>FY 2020 Plans:</b> All efforts related to the design, development and build of components for early integrated testing of prototypes for up to three contractors. Efforts for each contract may include, but are not limited to, long-lead parts planning and purchase, procurement of contractor and government provided test equipment, manufacturing prototypes, and manpower ramp-up. Includes all required cryptography, cyber and resiliency support for each contract and Government contractor support for oversight and integration of up to three contracts. 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. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 increased compared to FY 2019 by \$136.885M. Justification for the increase is described in plans above.		0.000	0.000	136.885
<b>Title:</b> ESS Ground Segment and Space-to-Ground Integration  <b>Description:</b> Develop and field the ESS ground segment. Provide for space-to-ground integration for the ESS system. Refine the development efforts previously included under FY 2019 President's Budget "ESS Development" major thrust.  <b>FY 2019 Plans:</b>		0.000	5.846	30.992

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Air Force		<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<p>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.</p> <p><b>FY 2020 Plans:</b> Includes changes due to updated Section 804 acquisition approach and re-alignment of activities. Continue acquisition activities in support of the ground segment and space-to-ground integration in accordance with the approved ESS Acquisition Strategy and schedule. Includes all program office and its contractor support for: Industry engagement; technical analysis/studies; RFP documentation preparation; technical evaluations; and contract awards. Plan and provide any government-furnished equipment or resources in support of future fielding and testing of ESS. Includes all required cryptography, cyber and resiliency activities required and Government contractor support for management and oversight. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 increased compared to FY 2019 by \$25.146M. Justification for the increase is described in plans above.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		15.473	29.229	172.206
<b>D. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
In the FY 2019 budget, ESS received a Congressional rescission of \$12.000 million. The correct total for FY 2018 is \$3.473 million.				
<b>E. Acquisition Strategy</b>				
<p>The Milestone Decision Authority (MDA) designated ESS as an FY2016 National Defense Authorization Act Section 804 Rapid Prototyping activity and approved the ESS acquisition strategy on 14 December 2018. The Air Force plans to utilize FY2016 National Defense Authorization Act Section 804 (Public Law 114-92) Rapid Prototyping Authority for ESS. A rapid prototyping phase effectively replaces the Technology Maturation and Risk Reduction phase from a traditional acquisition under Department of Defense 5000 series Directives and Instructions. This approach allows up to three contractors to focus on reducing space segment risks with the objective of maximizing ESS demonstrated capability for a XDR-processed payload and other key technologies. An ESS Program Office-led RFP and source selection will eventually determine which space prototyping contractor, via their performance during the rapid prototyping phase, is best positioned for the follow-on contract award. The space prototyping contractors will be carried through the follow-on source selection to continue momentum until the follow-on contract is awarded.</p>				

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force		Date: February 2019
<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1206855F / Evolved Strategic SATCOM (ESS)	
Return on investment from space prototyping will energize the industrial base and increase competition in strategic SATCOM; inject innovative technical, process and integration approaches; burn down risk early and identify/correct issues as early as possible; and decrease traditional fielding timelines to support a more resilient and responsive architecture against emerging threats. Success in the competitive rapid-prototyping determines and informs follow-on fielding.		
<b>F. Performance Metrics</b> 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.		

## UNCLASSIFIED

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 1206855F / Evolved Strategic SATCOM (ESS)				Project (Number/Name) 643725 / Evolved Strategic SATCOM (ESS)					
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
Space Segment Prototyping	C/TBD	TBD : TBD	-	-		-		104.705	Feb 2020	-		104.705	Continuing	Continuing	-
Ground Segment and Space-to-Ground Integration	TBD	TBD : TBD	-	-		2.799	Feb 2019	26.951	Nov 2019	-		26.951	Continuing	Continuing	-
Requirement Definition	Various	Various : Various	-	2.825	Jan 2018	4.550	Nov 2018	-		-		-	Continuing	Continuing	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	-		2.767	Nov 2018	3.812	Nov 2019	-		3.812	Continuing	Continuing	-
Enterprise SE&I	C/CPAF	Linquest : Los Angeles, CA	-	0.607	Jan 2018	11.604	Nov 2018	13.952	Nov 2019	-		13.952	Continuing	Continuing	-
FY 2018 Congressional rescission	Various	Not specified. : TBD	-	12.000		-		-		-		-	0.000	12.000	-
Subtotal			-	15.432		21.720		149.420		-		149.420	Continuing	Continuing	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	Various	Various : Various	-	-		5.138	Nov 2018	8.610	Nov 2019	-		8.610	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.041	Jan 2018	0.200	Oct 2018	0.400	Oct 2019	-		0.400	Continuing	Continuing	-
A&AS	Various	Various : Various	-	-		2.171	Nov 2018	13.776	Nov 2019	-		13.776	Continuing	Continuing	-
Subtotal			-	0.041		7.509		22.786		-		22.786	Continuing	Continuing	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			-	15.473		29.229		172.206		-		172.206	Continuing	Continuing	N/A
Remarks															

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>		<b>Project (Number/Name)</b> 643725 / <i>Evolved Strategic SATCOM (ESS)</i>	

	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
<b>ESS Development</b>																												
Ground Segment and Space-to-Ground Integration																												
Space Segment Prototyping - Planning																												
Acquisition Strategy Approval																												
Space Segment Prototyping - Contract Awards (up to 3 contractors)																												
Space Segment Prototyping - Execution (up to 3 contractors)																												
Space Follow-On - Request for Proposal																												
Space Follow-On - Contract Award																												
Space Follow-On - Execution																												



**UNCLASSIFIED**

<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force			<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>	<b>Project (Number/Name)</b> 643725 / <i>Evolved Strategic SATCOM (ESS)</i>	

**Schedule Details**

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
<b><i>ESS Development</i></b>				
Ground Segment and Space-to-Ground Integration	4	2018	4	2024
Space Segment Prototyping - Planning	4	2018	1	2020
Acquisition Strategy Approval	1	2019	1	2019
Space Segment Prototyping - Contract Awards (up to 3 contractors)	2	2020	2	2020
Space Segment Prototyping - Execution (up to 3 contractors)	2	2020	3	2023
Space Follow-On - Request for Proposal	3	2023	3	2023
Space Follow-On - Contract Award	3	2024	3	2024
Space Follow-On - Execution	3	2024	4	2024