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**Exhibit R-2, RDT&E Budget Item Justification:** FY 2018 Air Force **Date:** May 2017

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 1206857F / <i>Operationally Responsive Space</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	22.123	17.921	87.577	0.000	87.577	82.805	43.063	9.112	8.890	Continuing	Continuing
64A020: <i>AF Funded ORSSats</i>	-	22.123	17.921	87.577	0.000	87.577	82.805	43.063	9.112	8.890	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

## **Note**

In FY2018, PE 0604857F, Operationally Responsive Space efforts were transferred to PE 1206857F, Operationally Responsive Space due to the creation of a new Major Force Program for Space. FY2016 and FY2017 funding is now documented in the exhibits for PE 1206857F.

## **A. Mission Description and Budget Item Justification**

The successful integration of space-based capabilities into the core of U.S. national security operations has resulted in dramatically increased demand for and dependence upon space capabilities. As a result, U.S. Strategic Command (USSTRATCOM) identified three needs: 1) to rapidly augment existing space capabilities when needed to expand operational capability; 2) to rapidly reconstitute/replenish critical space capabilities to preserve "continuity of operations" capability; 3) to rapidly exploit and infuse space technological or operational innovations to increase U.S. advantage. Operationally Responsive Space (ORS) projects are optimized for prioritized theater use and/or surge, augmentation and replenishment of traditional space capabilities. The ORS Concept of Operations (CONOPS) drives the need for satellites featuring high degrees of modularity, standard interface vehicles, and the use of plug and play payloads and buses.

ORS-1, launched 29 Jun 2011 to respond to U.S. Central Command's urgent need, validated by USSTRATCOM, to provide intelligence, surveillance, and reconnaissance (ISR) for theater warfighters out-lived its two year design life by over three years, but has finally ended. The ORS Office is responding to another USSTRATCOM validated urgent need for an interim capability addressing weather gap 1 (cloud characterization) and gap 2 (theater weather imagery) with ORS-8. If requested, the ORS Office is ready to develop, test, train, and equip urgent needs of the warfighter.

ORS projects provide a broad range of capabilities directly supporting warfighter needs. Potential missions include communications; data exfiltration; blue/friendly force situational awareness; maritime domain awareness; positioning, navigation, and timing; weather; missile warning; and battlefield ISR. The highest priorities of the ORS Office are development and launch of the ORS-5 USSTRATCOM validated urgent need for space situational awareness, development and launch of the ORS-6 Compact Ocean Wind Vector Radiometer (COWVR) technology demonstration, and the low cost automated manufacturing initiative, ORS-7. The remaining priorities for the ORS office are to satisfy the high priority needs for augmentation and reconstitution, such as Missile Warning, Wideband Protected Communication, Narrowband Communication, Space Situational Awareness, and Electro-Optical/Infrared (EO/IR) imagery.

Additional ORS Office efforts include maturing enabling elements which are transitioned as appropriate across the National Space Enterprise and allows the ORS Office to meet the USSTRATCOM specified responsiveness timelines and the 2007 NDAA goal (\$40M satellites/\$20M launches). This includes authenticating commercial space parts, confirming automated assembly lines, validating digital mission assurance processes, developing a modular open system architecture employing plug and play standards, and providing assembly, integration & test in the Rapid Response Space Works. It also includes integrating with the Multi-Mission Satellite Operations

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3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		PE 1206857F I Operationally Responsive Space				
Center (MMSOC) and Enterprise Ground Service (EGS) to proliferate common satellite command and control. Additional developments include visionary, tailored, and future Space/Cyber projects to special operations forces (SOF).						
This program is in Budget Activity 04, Advanced Component Development and Prototypes, because the 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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget		18.437	7.921	8.253	0.000	8.253
Current President's Budget		22.123	17.921	87.577	0.000	87.577
Total Adjustments		3.686	10.000	79.324	0.000	79.324
• 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		3.686	0.000			
• SBIR/STTR Transfer		0.000	0.000			
• Other Adjustments		0.000	10.000	79.324	0.000	79.324
Congressional Add Details (\$ in Millions, and Includes General Reductions)						
Project: 64A020: AF Funded ORSSats						
Congressional Add: Operational Capabilities, Development, and Integration						
Congressional Add: Rapid Assembly, Integration, & Test (Tier-2)						
Congressional Add: ORS Development (1)						
Congressional Add: ORS: Cross Cutting						
Congressional Add Subtotals for Project: 64A020						
Congressional Add Totals for all Projects						
Change Summary Explanation						
FY2016: +\$0.943M Added to complete ORS-4						
FY2016: +\$2.743M Added to help fund ORS-6						

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FY2017: +\$10.000M is required to address emergency warfighting readiness requirements. Funding is for the ORS-8 solution to the USSTRATCOM validated urgent need for an interim capability addressing weather gap 1 (cloud characterization) and gap 2 (theater weather imagery). FY2018: +\$79.300M added for ORS-8				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017	FY 2018
Title: ORS Development  Description: Rapidly exploit and infuse space technological or operational innovations to increase U.S. advantage.  FY 2016 Accomplishments: Completed ORS-6 (COWVR) Systems Requirements Review (SRR) and Interim Design review #1. Closed out ORS-4 anomaly investigation. Completed proof of concept for Responsive Manufacturing. Prepared ORS-5 ground support in readiness for FY17 launch.  FY 2017 Plans: Continue preparation of ORS-5 ground support in readiness for FY17 launch. Develop ORS-8 as the interim capability addressing weather gap 1 (cloud characterization) and gap 2 (theater weather imagery).  FY 2018 Plans: Continue to develop ORS-8 as an end-to-end program as an interim capability to provide continuous un-cued EO/IR environmental cloud data at the dawn/dusk terminator region to address weather gap-1 (cloud characterization) and support weather gap-2 (theater weather imagery). If requested, develop, test, train, and equip urgent needs of the warfighter.		5.316	12.000	79.300
Title: ORS: Cross Cutting  Description: Provide systems engineering and program management support across all the ORS activities. Perform modeling, simulation, analysis, and assess alternative concepts and requirements. Support response to USSTRATCOM tasking and future mission development to meet Joint Force Commander (JFC) and warfighter needs.  FY 2016 Accomplishments: Continued ORS-1 Mission Operations and Lessons Learned studies. Continued ongoing systems engineering support of future mission development. Refined ORS CONOPS, Enterprise and Architecture, and Systems Engineering Processes. Led, participated in, and supported, as appropriate, the solidification of space doctrine.  FY 2017 Plans: Complete ORS-1 Mission Operations and Lessons Learned studies. Continue ongoing systems engineering support of future mission development to support Joint Force Commander (JFC) need #7, as directed by USSTRATCOM to assess the feasibility of three mission areas as the next JFC urgent need (JFC-7). USSTRATCOM and the ORS Executive Committee approved the urgent need to cover weather gaps 1 (cloud characterization) and 2 (theater weather imagery) with ORS-8. Refine ORS		4.807	5.921	8.277

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017	FY 2018
CONOPS, Enterprise and Architecture, and Systems Engineering Processes. Lead, participate in, and support, as appropriate, the solidification of space doctrine.  FY 2018 Plans: Continue ongoing systems engineering support of future mission development. Refine ORS CONOPS, Enterprise and Architecture, and Systems Engineering Processes. Lead, participate in, and support, as appropriate, the solidification of space doctrine. Continue to support Combatant Commands. Investigate options and implement technology, procedures, and concepts for reducing costs and shortening satellite deployment times. Execute approved ORS-8 program in support of JFC need #7. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc.				
Accomplishments/Planned Programs Subtotals		10.123	17.921	87.577
		FY 2016	FY 2017	
Congressional Add: Operational Capabilities, Development, and Integration  FY 2016 Accomplishments: Executed urgent needs as identified by USSTRATCOM by assessing the feasibility of three mission areas to support JFC need #7. Continued to support Service war games; re-started support to Combatant Command exercises. Integrated ORS capabilities and concepts, including resiliency, into operations plans of the combatant commands, tactics, techniques and procedures of the military departments, and exercises, demonstrations, and war games.		0.135	-	
Congressional Add: Rapid Assembly, Integration, & Test (Tier-2)  FY 2016 Accomplishments: Completed Proof of concept for Responsive Manufacturing and 6-Unit sized cubesats (ORS-7), to include development of factory environment, integration with Digital Assurance architecture, transportation and factory flow requirements, standard, high-definition, and machine readable camera requirements. It also includes the proof of concept for Responsive Space Satellites (RSPSats).		2.340	-	
Congressional Add: ORS Development (1)  FY 2016 Accomplishments: Continued ORS-5 space vehicle system integration and testing. Continued Responsive Space Parts/Spacecraft Design. Continued Digital Assurance integration to Spacecraft object build and flight software iteration.		5.553	-	
Congressional Add: ORS: Cross Cutting  FY 2016 Accomplishments: Continued ORS-1 Mission Operations and Lessons Learned studies. Continue ongoing systems engineering support of future mission development. Refined ORS CONOPS, Enterprise and Architecture, and Systems Engineering Processes. Led, participated in, and supported, as appropriate, the		3.972	-	

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> FY 2018 Air Force	<b>Date:</b> May 2017
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<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 1206857F <i>I Operationally Responsive Space</i>
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	<b>FY 2016</b>	<b>FY 2017</b>
solidification of space doctrine.		
<b>Congressional Adds Subtotals</b>	12.000	-

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>FY 2018</u> <u>Base</u>	<u>FY 2018</u> <u>OCO</u>	<u>FY 2018</u> <u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE: BA04: 1206422F: <i>Weather System Follow-On</i>	46.307	118.953	112.088	0.000	112.088	153.391	101.921	36.907	37.662	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

Expediently award contracts through ORS Office or partner organizations.

**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: FY 2018 Air Force												Date: May 2017			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 1206857F / <i>Operationally Responsive Space</i>				Project (Number/Name) 64A020 / <i>AF Funded ORSSats</i>					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
Operational Capabilities, Development, and Integration	Various	Various : Various	-	0.135	Dec 2015	0.000		0.000		0.000		0.000	Continuing	Continuing	-
Rapid AI&T	C/CPFF	Millennium Engineering : Albuquerque, NM	-	0.909	Dec 2015	0.000		0.000		0.000		0.000	Continuing	Continuing	-
ORS-6 (COWVR)	C/CPFF	Millennium Engineering : Albuquerque, NM	-	2.744	Jul 2016	0.000		0.000		0.000		0.000	Continuing	Continuing	-
ORS-5 Acquisition	SS/CPFF	MIT/LL : Boston, MA	-	3.886	Feb 2016	2.000	Oct 2016	0.000		0.000		0.000	Continuing	Continuing	-
ORS-5 Launch	C/FPIF	Orbital : Chandler, AZ	-	2.785	Dec 2015	0.000		0.000		0.000		0.000	Continuing	Continuing	-
ORS-8 (Weather gaps 1&2)	TBD	TBD : TBD	-	0.000		10.000	Aug 2017	79.300	Oct 2017	0.000		79.300	Continuing	Continuing	-
MSV Modular Bus/Open Manufacturing (ORS-7)	C/CPFF	Raytheon : Tucson, AZ	-	2.340	Mar 2016	0.000		0.000		0.000		0.000	Continuing	Continuing	500.000
Responsive Launch Capability (ORS-4)	SS/CPFF	U. of HI : Honolulu, HI	-	0.546	Oct 2015	0.000		0.000		0.000		0.000	Continuing	Continuing	-
ORS Enterprise System Engineering and Integration	C/T&M	GSA : San Antonio, TX	-	0.000		0.000		0.000		0.000		0.000	Continuing	Continuing	-
Technical Mission Analysis	PO	Aerospace : Albuquerque, NM	-	0.000		0.000		0.000		0.000		0.000	Continuing	Continuing	-
Subtotal			-	13.345		12.000		79.300		0.000		79.300	-	-	-
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
Subtotal			-	-		-		-		-		-	-	-	-

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: FY 2018 Air Force</b>													<b>Date:</b> May 2017		
<b>Appropriation/Budget Activity</b> 3600 / 4						<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Operationally Responsive Space</i>						<b>Project (Number/Name)</b> 64A020 / <i>AF Funded ORSSats</i>			

  

<b>Test and Evaluation (\$ in Millions)</b>				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-

  

<b>Management Services (\$ in Millions)</b>				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 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
Advisory & Assistance Services	Various	Various : Various	-	7.112	Dec 2015	4.421	Dec 2016	6.577	Dec 2017	0.000		6.577	Continuing	Continuing	-
FFRDC	Various	Various : Various	-	1.666	Dec 2015	1.500	Dec 2016	1.700	Dec 2017	0.000		1.700	Continuing	Continuing	-
<b>Subtotal</b>			-	8.778		5.921		8.277		0.000		8.277	-	-	-

  

			Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	22.123		17.921		87.577		0.000		87.577	-	-	-

  

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: FY 2018 Air Force</b>			<b>Date: May 2017</b>		
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Operationally Responsive Space</i>			<b>Project (Number/Name)</b> 64A020 / <i>AF Funded ORSSats</i>

	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	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
Operational Capabilities Development and Integration																												
ORS-1 (CENTCOM Urgent Need)																												
Rapid AI&T (RRSW)																												
ORS-6 (COWVR)																												
ORS-5 Acquisition and Launch																												
ORS-5 Space Situational Awareness Operations																												
ORS-8 Weather gaps 1&2																												
MSV Modular Bus/Open Manufacturing (ORS-7)																												
ORS-4 Super Strydi																												
Cross-Cutting Activities: Modeling, Sim, Analysis; JFC Needs																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> FY 2018 Air Force			<b>Date:</b> May 2017
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Operationally Responsive Space</i>	<b>Project (Number/Name)</b> 64A020 / <i>AF Funded ORSSats</i>	

**Schedule Details**

<b>Events</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
Operational Capabilities Development and Integration	1	2016	4	2017
ORS-1 (CENTCOM Urgent Need)	1	2016	1	2017
Rapid AI&T (RRSW)	1	2016	4	2016
ORS-6 (COWVR)	1	2016	4	2020
ORS-5 Acquisition and Launch	1	2016	3	2017
ORS-5 Space Situational Awareness Operations	4	2017	3	2019
ORS-8 Weather gaps 1&2	2	2017	4	2022
MSV Modular Bus/Open Manufacturing (ORS-7)	1	2016	3	2018
ORS-4 Super Strypi	1	2016	2	2016
Cross-Cutting Activities: Modeling, Sim, Analysis; JFC Needs	1	2016	4	2022