Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force											Date: May 2017	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 1203110F / *Satellite Control Network (SPACE)*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	-	7.327	15.624	18.808	0.000	18.808	17.942	16.011	16.289	16.623	Continuing	Continuing
673276: *Satellite Control Network*	-	7.327	15.624	18.808	0.000	18.808	17.942	16.011	16.289	16.623	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY2018, PE 0305110F, Satellite Control Network efforts were transferred to PE 1203110F, Satellite Control Network due to the creation of a new Major Force Program for Space. FY2016 and FY2017 funding is now documented in the exhibits for PE 1203110F.

A. Mission Description and Budget Item Justification

The Air Force Satellite Control Network (AFSCN) is a satellite ground terminal network comprised of two communication nodes (Schriever AFB & Vandenberg AFB) and 15 antenna systems. The antennas are distributed around the globe at seven locations -- Vandenberg Tracking Station (VTS), Diego Garcia Station (DGS), Guam Tracking Station (GTS), Hawaii Tracking Station (HTS), New Hampshire Tracking Station (NHS), Thule Tracking Station (TTS) and Telemetry and Commanding Station (TCS) at RAF Oakhanger, England -- to ensure global coverage for 140 satellites in various orbits. The AFSCN conducts an average of 450 satellite contacts per day supporting Positioning, Navigation and Timing (PNT), Intelligence, Surveillance and Reconnaissance (ISR), Missile Warning, Communications, Weather, Launch Vehicle Support, and Research and Development (R&D) in support of Department of Defense (DoD), Intelligence Community (IC), and National Aeronautics and Space Administration (NASA) operations. While most of the 450 satellite contacts/day are routine command and control activities, the AFSCN is also used for satellite emergencies (e.g. tumbling satellite) because its high power antennas are often the only earthbound assets that can contact a non-responsive satellite to re-establish command & control. During FY 2016 the AFSCN supported 11 space vehicle emergencies resulting in the preservation of $2.7B worth of satellites. In addition to routine and emergency satellite operations C2, the AFSCN provides support to launch vehicle and early orbit operations, ensuring worldwide antennas receive telemetry as the rocket travels through the atmosphere and transmit commands to a newly orbiting satellite to initiate early orbit checkout. In FY 2016, the AFSCN supported 21 NSS launches delivering $9.8B worth of satellites to their operational orbits. Finally, the AFSCN provides Factory Compatibility Testing (FCT) to ensure satellites and rockets can communicate via the AFSCN before the satellite is launched. These funds are used to develop next-generation tools to improve the AFSCN and ensure the capability is available to support DoD, Intelligence, and civil users. These efforts support cybersecurity operations and systems engineering and integration (SE&I) activities as well as aligning with the evolving Space Warfighter Construct (SWC), Space Enterprise Visions (SEV), Enterprise Ground Services (EGS), and Commercial Augmentation.

REMOTE TRACKING STATION (RTS) BLOCK CHANGE (RBC) - SATELLITE ANOMALY RECOVERY AND SUPPORT UPGRADE; ENHANCED HIGH-POWER AMPLIFIER (EHPA): The Air Force will complete development testing of the Enhanced High Power Amplifier (EHPA) first article. The AFSCN is in jeopardy of losing the emergency high power satellite contact capability due to obsolete parts used in the legacy AFSCN system. The EHPA program will develop a new high power amplifier that resolves the obsolescence issue through the 2020s.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
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UNIFIED S-BAND (USB) UPLINK: The Air Force is adjusting the AFSCN for spectrum-sharing with industry by providing the capability to perform NSS spacecraft compatibility testing in both the current L-Band uplink/S-Band downlink spectrum and the industry standard Unified S-Band (USB) spectrum. RDT&E funds supported a first article integration of USB into the AFSCN baseline to begin supporting factory compatibility testing of NSS spacecraft. Development completed in FY16.

AFSCN DEFICIENCY RESOLUTION: Provides test, cyber security, requirements management, and system architecture support to the AFSCN.
ELECTRONIC SCHEDULING AND DISSEMINATION: ESD will allow satellite operators to request contact time with their satellites via the shared AFSCN antennas, automatically deconflict overlapping requests, create a schedule, and publish the schedule in real-time to all users.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	7.861	15.624	18.754	0.000	18.754
Current President's Budget	7.327	15.624	18.808	0.000	18.808
Total Adjustments	-0.534	0.000	0.054	0.000	0.054
• 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	-0.534	0.000			
• Other Adjustments	0.000	0.000	0.054	0.000	0.054

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Remote Tracking Station (RTS) Block Change (RBC) - Satellite Anomaly Recovery and Support Upgrade; Enhanced High-Power Amplifier (EHPA):	3.491	4.602	0.339
Description: RBC development replaces outdated, unique RTS equipment with standardized equipment and technology to reduce failures and enhance sustainability. Provides Advisory and Assistance Services (A&AS) to execute the RBC upgrade effort. Effort accomplished under Satellite Control Network Contract (SCNC).			
FY 2016 Accomplishments: Completed amplifier vendor hardware and software development, vendor acceptance testing, and software qualification testing.			
FY 2017 Plans: Complete vendor deficiency resolution and execute state side mitigation testing and ship EHPA to site for final integration. Continue and complete Developmental & Operational testing 4Q FY 2017.			
FY 2018 Plans:			

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Complete Contractor and Government Developmental testing 1Q FY2018 and Field First Article 3Q FY 2018.			
Title: Unified S-band (USB) uplink ***Description:*** Develop First Article Demonstration of USB uplink transmitter to enable commanding of satellites using USB frequency in addition to the legacy L-band frequency uplink commanding. Also provides Federally Funded Research and Development Center (FFRDC) support. ***FY 2016 Accomplishments:*** Completed software installation, integration and checkout, vendor acceptance test, qualification test. Prepared core system component to meet Factory Compatibility Test 4Q FY 2016.	0.346	-	-
Title: AFSCN Deficiency Resolution ***Description:*** Provide test, cybersecurity, requirements management, and system architecture support to the AFSCN. ***FY 2017 Plans:*** Provide cybersecurity solutions and testing in support of 92 Information Operations Squadron (92nd IOS), Space Security and Defense Program (SSDP), Cyber computer network defense (CND), HQ AFSPC Cyber Team, and Red/Blue Team-discovered requirements, monitor, analyze and resolve RTS performance (low/high power signal response and power measurement accuracy, inconsistent range performance, and low data rate deficiencies). In addition, develop and document an enterprise architecture (EA) using the views prescribed in the Department of Defense Architecture Framework (DoDAF). Future activities include: AFSCN Test Bed (ATB) replacements, Range Automation and Multi-band/Phased Array antenna studies, and work package planning for RBC electronics core activities. Further, monitor and analyze RTS performance at RBC sites, continue future requirements development, and update AFSCN architecture roadmap. ***FY 2018 Plans:*** Continue independent SE&I efforts as required to integrate modernization and sustainment efforts into future sites. Provide systems and subsystem level definition, baseline, architecture, integration planning and support for the AFSCN. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc.	-	2.690	4.105
Title: Electronic Scheduling and Dissemination System (ESD) ***Description:*** Develop an upgrade for the aging, increasingly-unsustainable resource scheduling system needed to coordinate and manage satellite supports using the AFSCN antennas. Also provides FFRDC support. The Air Force completed the first ESD operational confidence test in 3Q FY 2016, however significant system deficiencies were discovered. These deficiencies are being resolved and re-tested in FY 2017. In parallel, the Air Force is exploring other technologies and tools that could be used to meet system requirements.	3.490	5.658	12.748

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: Corrected critical software deficiency reports (DRs) identified during Initial Developmental Tests and risk-reduction testing. Conducted initial Developmental Testing Phase (DTP) during 3Q FY 2016. Conducted user training to support entry into DTP. ***FY 2017 Plans:*** Complete Minimal Capability Testing (MCT) for three viable vendors and downselect for fielding an AFSCN scheduling tool. ***FY 2018 Plans:*** Make a final fielding selection, complete final design review, MCT deficiency resolution and start contractor developmental testing.			
Title: Enterprise Systems Engineering and Integration ***Description:*** SE&I manages the government controlled system and subsystem level baseline requirements including analysis of future changes to the fielded baseline. SE&I provides "government as the integrator" engineering support to ensure multiple separate modernizations and the sustainment baseline are synchronized. SE&I will develop and recommend investment strategies to keep the AFSCN operating well beyond the FYDP. ***FY 2017 Plans:*** Conduct independent SE&I efforts as required to integrate modernization and sustainment efforts into future sites. Provide systems and subsystem level definition, baseline, architecture, integration planning and support for the AFSCN. Award RN Enterprise SE&I contract. ***FY 2018 Plans:*** Continue Program Office Support and independent SE&I efforts as required to integrate modernization and sustainment efforts into future sites. Provide systems and subsystem level definition, baseline, architecture, integration planning and support for the AFSCN.	-	2.674	1.616
Accomplishments/Planned Programs Subtotals	7.327	15.624	18.808

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SPAF: BA01: Line Item # AFSCOM:: *AF Satellite Comm System*	74.673	42.375	57.516	0.000	57.516	44.507	47.924	48.785	49.663	Continuing	Continuing

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
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D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

Remarks

Procures the mission critical electronics and telecommunications equipment to upgrade the aging AFSCN Range and Network Operations segments.

E. Acquisition Strategy

RDT&E efforts focus on completing upgrades as well as future architectures and studies to ensure the best use of investment funding. The SE&I contractor maintains the DoD Architecture Framework (DoDAF) architecture and requirements baseline for Government approval and may perform studies to determine Government options. Limited RDT&E will be applied to the Consolidated Air Force Satellite Control Network (AFSCN) Modifications, Maintenance, and Operations (CAMMO) contract when sustaining engineering expertise is needed to finalize Government-approved architectures. FFRDC technical depth and breadth will be leveraged to ensure AFSCN modernization efforts are compatible with mission rules and do not pose a risk to safe and cost-effective satellite contacts.

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.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1203110F / *Satellite Control Network (SPACE)*	**Project (Number/Name)** 673276 / *Satellite Control Network*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Satellite Control Network Contract (SCNC)	Various	Honeywell : Colorado Springs, CO	-	3.938	Dec 2015	4.900	Oct 2016	10.868	Oct 2017	0.000		10.868	Continuing	Continuing	-
Consolidated Air Force Satellite Control Network (AFSCN) Modifications, Maintenance, and Operations (CAMMO)	Various	CACI : Colorado Springs, CO	-	0.000		3.120	Jun 2017	4.218	Jun 2018	0.000		4.218	Continuing	Continuing	-
Air Force Research Laboratory (AFRL)	MIPR	AFRL : Dayton, OH	-	1.038	Aug 2016	3.111	Jan 2017	0.000		0.000		0.000	Continuing	Continuing	-
Enterprise Systems Engineering and Integration	C/CPIF	ENSCO : Colorado Springs, CO	-	0.000	Jan 1901	2.088	Nov 2016	1.191	Nov 2017	0.000		1.191	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	1.037	Oct 2015	1.297	Oct 2016	1.336	Oct 2017	0.000		1.336	Continuing	Continuing	-
		Subtotal	-	6.013		14.516		17.613		0.000		17.613	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		-		-		-	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation	C/T&M	Leidos : El Segundo, CA	-	0.331	Oct 2015	0.000	Jan 1901	0.000		0.000		0.000	Continuing	Continuing	-
		Subtotal	-	0.331		0.000		0.000		0.000		0.000	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force		Date: May 2017
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	0.983	Oct 2015	1.108	Oct 2016	1.195	Oct 2017	0.000		1.195	Continuing	Continuing	-
		Subtotal	-	0.983		1.108		1.195		0.000		1.195	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	7.327		15.624		18.808		0.000		18.808	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1203110F / *Satellite Control Network (SPACE)*	**Project (Number/Name)** 673276 / *Satellite Control Network*

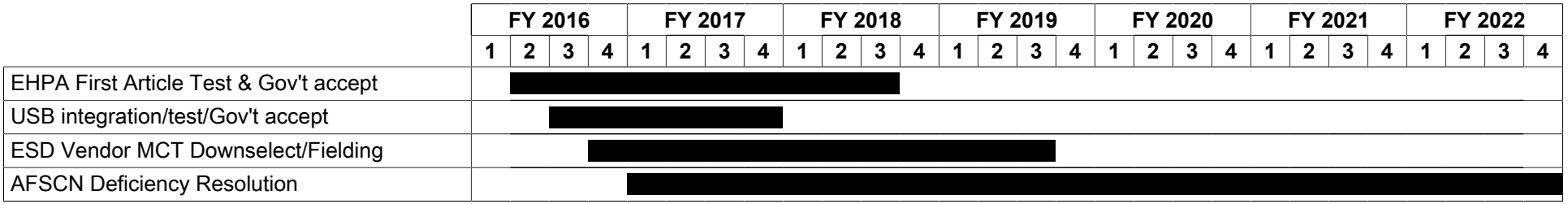

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1203110F / *Satellite Control Network (SPACE)*	**Project (Number/Name)** 673276 / *Satellite Control Network*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
EHPA First Article Test & Gov't accept	2	2016	3	2018
USB integration/test/Gov't accept	3	2016	4	2017
ESD Vendor MCT Downselect/Fielding	4	2016	3	2019
AFSCN Deficiency Resolution	1	2017	4	2022