| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force | | | | | | | | | | | Date: February 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | | | | | R-1 Program Element (Number/Name)<br>PE 1203110F / *Satellite Control Network (SPACE)* | | | | | | | |
| **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 | - | 14.099 | 18.808 | 17.808 | 0.000 | 17.808 | 15.891 | 16.167 | 16.503 | 16.804 | Continuing | Continuing |
| 673276: *Satellite Control Network* | - | 14.099 | 18.808 | 17.808 | 0.000 | 17.808 | 15.891 | 16.167 | 16.503 | 16.804 | Continuing | Continuing |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

**Note**

This program, BA 7, PE 1203110F, project 673276, Resilient Enterprise Ground, is a new start.

**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 over 170 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 2017 the AFSCN supported 14 space vehicle emergencies resulting in the preservation of $4.97B 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 2017, the AFSCN supported 26 launches delivering $14.2B 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 Community, and civil users. These efforts support cybersecurity operations and Systems Engineering & Integration (SE&I) activities as well as align with the evolving future space domain demands through Resilient Enterprise Ground (REG) & Enterprise Ground Services (EGS), to include transmit and receive, data transport, and cyber activities.

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 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.

AFSCN Deficiency Resolution: Provides test, cyber security, requirements management, and system architecture support to the AFSCN.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 1203110F / *Satellite Control Network (SPACE)* |

Electronic Scheduling and Dissemination (ESD): The ESD project called AFSCN Scheduling Tool (AST) 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.

Resilient Enterprise Ground (REG): Provides the means to communicate with all future spacecraft through diverse antenna networks. This effort is a New Start in FY2019.

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 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 AFSCN 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 7, Operational System Development. BA 7 includes development efforts to upgrade systems that have been fielded and anticipate production funding in the current or subsequent fiscal year.

| B. Program Change Summary ($ in Millions) | FY 2017 | FY 2018 | FY 2019 Base | FY 2019 OCO | FY 2019 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 15.624 | 18.808 | 17.942 | 0.000 | 17.942 |
| Current President's Budget | 14.099 | 18.808 | 17.808 | 0.000 | 17.808 |
| Total Adjustments | -1.525 | 0.000 | -0.134 | 0.000 | -0.134 |
| • Congressional General Reductions | 0.000 | 0.000 | | | |
| • Congressional Directed Reductions | -1.000 | 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 | -0.525 | 0.000 | | | |
| • Other Adjustments | 0.000 | 0.000 | -0.134 | 0.000 | -0.134 |

**Change Summary Explanation**

FY2017: -$1.000M Congressional reduction for underexecution.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 1203110F / *Satellite Control Network (SPACE)* |

| C. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 | FY 2019 |
|---|---|---|---|
| ***Title:*** Remote Tracking Station (RTS) Block Change (RBC) - Satellite Anomaly Recovery and Support Upgrade; Enhanced High-Power Amplifier (EHPA):<br>***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). Developmental testing and fielding of first article will occur in FY 2018 to complete this effort.<br>***FY 2018 Plans:***<br>Developmental testing and fielding of first article<br>***FY 2019 Plans:***<br>N/A<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>N/A | 3.346 | 0.339 | 0.000 |
| ***Title:*** AFSCN Deficiency Resolution<br>***Description:*** Provides test, cyber security, requirements management, and system architecture support to the AFSCN. Additionally, the Air Force is investigating multiple cyber defense tools for integration onto the AFSCN baseline<br>***FY 2018 Plans:***<br>The Air Force is pursuing more capable ground based apertures, augmenting the existing AFSCN with commercial apertures, and upgrading satellite scheduling to commercial standards in order to realize the Resilient Enterprise Ground (REG) vision.<br>***FY 2019 Plans:***<br>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.<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 decreased compared to FY 2018 by $3.105M. Justification for this decrease is described in plans above. | 4.773 | 4.105 | 1.000 |
| ***Title:*** Electronic Scheduling and Dissemination System<br>***Description:*** Develop an upgrade for the aging, increasingly-unsustainable resource scheduling system needed to coordinate and manage satellite supports using the AFSCN antennas. Analysis shows the existing legacy system will no longer support AFSCN operations beginning in Jan 2024. There is currently no viable replacement scheduler to perform day to day satellite scheduling | 4.459 | 12.748 | 8.260 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 1203110F / *Satellite Control Network (SPACE)* |

| C. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 | FY 2019 |
|---|---|---|---|
| operations. The Air Force is assessing multiple potential technologies and tools, to include the use of a Small Business Innovative Research (SBIR) solution and virtualization of the legacy system, that could be used to meet system requirements to address the scheduling system obsolescence.<br><br>***FY 2018 Plans:***<br>Continue development of software solution, conduct preliminary design reviews, and start contractor developmental testing.<br><br>***FY 2019 Plans:***<br>Select technology and tools for final system design, complete final design review, complete major software development, and prepare for testing/fielding/deployment.<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 decreased compared to FY 2018 by $4.488M. Justification for this increase is described in plans above. | | | |
| ***Title:*** Resilient Enterprise Ground<br><br>***Description:*** Provide the means to communicate with all future spacecraft through diverse antenna networks including government and commercial, ensuring continued operation through a range of threats.<br><br>***FY 2019 Plans:***<br>Initiate Multi Band Multi Mission and Advanced Planning and Scheduling System Development Programs. Begin initiation of service level agreements for commercial augmentation services.<br><br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>N/A | - | - | 3.628 |
| ***Title:*** Enterprise Systems Engineering and Integration<br><br>***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.<br><br>***FY 2018 Plans:***<br>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 | 1.521 | 1.616 | 4.920 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force | Date: February 2018 |
|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 1203110F / *Satellite Control Network (SPACE)* |

| C. Accomplishments/Planned Programs ($ in Millions) | FY 2017 | FY 2018 | FY 2019 |
|---|---|---|---|
| the AFSCN. Additionally, SE&I will provide support to SMC initiatives such as logistics and sustainment planning for Enterprise Ground Services (EGS).<br>***FY 2019 Plans:***<br>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. Additionally, SE&I will provide support to Space & Missile Center (SMC) initiatives such as logistics and sustainment planning for EGS.<br>***FY 2018 to FY 2019 Increase/Decrease Statement:***<br>FY 2019 increased compared to FY 2018 by $3.304M. Justification for this decrease is described in plans above. | | | |
| **Accomplishments/Planned Programs Subtotals** | 14.099 | 18.808 | 17.808 |

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SPAF 01 Line Item AFSCOM: *AF Satellite Comm System* | 37.281 | 57.516 | 35.400 | - | 35.400 | 56.298 | 48.376 | 49.359 | 50.284 | Continuing | Continuing |

**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: PB 2019 Air Force | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600 / 7 | **R-1 Program Element (Number/Name)**<br>PE 1203110F / *Satellite Control Network (SPACE)* | **Project (Number/Name)**<br>673276 / *Satellite Control Network* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Satellite Control Network Contract (SCNC) | Various | KBR Wylie : Colorado Springs, CO | - | 3.112 | Oct 2016 | 10.868 | Oct 2017 | - | | - | | - | Continuing | Continuing | - |
| Electronic Scheduling and Dissemination (ESD)/ AFSCN Scheduling Tool (AST) | C/TBD | TBD : TBD | - | - | | 0.000 | | 6.658 | Jun 2019 | - | | 6.658 | Continuing | Continuing | - |
| Consolidated Air Force Satellite Control Network (AFSCN) Modifications, Maintenance, and Operations (CAMMO) | Various | CACI : Colorado Springs, CO | - | 5.113 | Mar 2018 | 4.218 | Jul 2018 | 4.602 | Jul 2019 | - | | 4.602 | Continuing | Continuing | - |
| Small Business Innovative Research (SBIR) | Various | AFRL : Dayton, OH | - | 4.147 | Mar 2018 | 0.000 | | - | | - | | - | Continuing | Continuing | - |
| Enterprise Systems Engineering and Integration | C/CPIF | ENSCO : Colorado Springs, CO | - | 1.415 | Nov 2016 | 1.191 | Nov 2017 | 3.966 | Nov 2018 | - | | 3.966 | Continuing | Continuing | - |
| Technical Mission Analysis | RO | Aerospace Corp : El Segundo, CA | - | - | | 1.336 | Oct 2017 | 1.376 | Oct 2018 | - | | 1.376 | Continuing | Continuing | - |
| | | **Subtotal** | - | 13.787 | | 17.613 | | 16.602 | | - | | 16.602 | Continuing | Continuing | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test & Evaluation | C/T&M | Leidos : El Segundo, CA | - | 0.000 | Jan 2017 | - | | - | | - | | - | Continuing | Continuing | - |
| | | **Subtotal** | - | 0.000 | | - | | - | | - | | - | Continuing | Continuing | N/A |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force | | | Date: February 2018 |
|---|---|---|---|
| Appropriation/Budget Activity<br>3600 / 7 | R-1 Program Element (Number/Name)<br>PE 1203110F / *Satellite Control Network (SPACE)* | Project (Number/Name)<br>673276 / *Satellite Control Network* | |

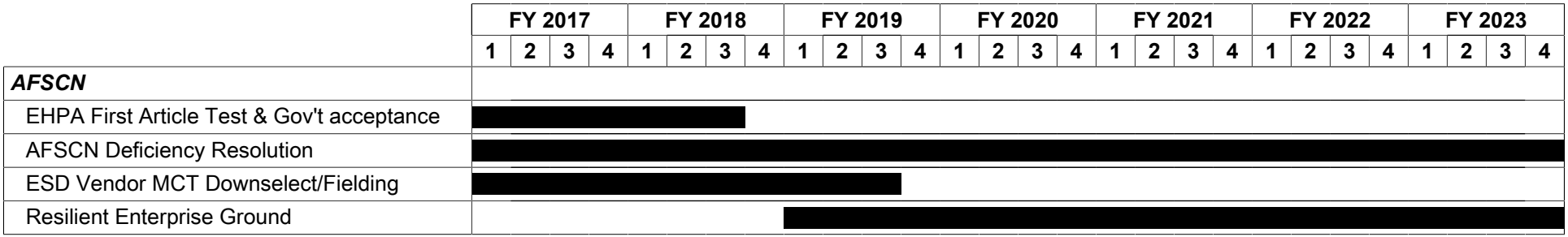
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2017 Cost | FY 2017 Award Date | FY 2018 Cost | FY 2018 Award Date | FY 2019 Base Cost | FY 2019 Base Award Date | FY 2019 OCO Cost | FY 2019 OCO Award Date | FY 2019 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FFRDC | RO | Aerospace Corp : El Segundo, CA | - | 0.312 | Oct 2016 | 1.195 | Oct 2017 | 1.206 | Oct 2018 | - | | 1.206 | Continuing | Continuing | - |
| | | **Subtotal** | - | 0.312 | | 1.195 | | 1.206 | | - | | 1.206 | 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** | - | 14.099 | | 18.808 | | 17.808 | | - | | 17.808 | Continuing | Continuing | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600 / 7 | **R-1 Program Element (Number/Name)**<br>PE 1203110F / *Satellite Control Network (SPACE)* | **Project (Number/Name)**<br>673276 / *Satellite Control Network* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force | | Date: February 2018 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600 / 7 | **R-1 Program Element (Number/Name)**<br>PE 1203110F / *Satellite Control Network (SPACE)* | **Project (Number/Name)**<br>673276 / *Satellite Control Network* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***AFSCN*** | | | | |
| EHPA First Article Test & Gov't acceptance | 1 | 2017 | 3 | 2018 |
| AFSCN Deficiency Resolution | 1 | 2017 | 4 | 2023 |
| ESD Vendor MCT Downselect/Fielding | 1 | 2017 | 3 | 2019 |
| Resilient Enterprise Ground | 1 | 2019 | 4 | 2023 |