| Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army | | | | | | | | | | | Date: May 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)* | | | | | R-1 Program Element (Number/Name)<br>PE 0604741A *I Air Defense Command, Control and Intelligence - Eng Dev* | | | | | | | |
| **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 | - | 33.619 | 205.432 | 28.726 | - | 28.726 | 28.320 | 14.638 | 8.674 | 0.000 | Continuing | Continuing |
| 126: *PEO Electronic Protect* | - | 0.000 | 17.076 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| 146: *Air & Msl Defense Planning Control Sys* | - | 15.157 | 23.761 | 24.306 | - | 24.306 | 24.588 | 14.466 | 8.500 | 0.000 | Continuing | Continuing |
| 149: *Counter-Rockets, Artillery & Mortar* | - | 18.462 | 20.695 | 4.420 | - | 4.420 | 3.732 | 0.172 | 0.174 | 0.000 | Continuing | Continuing |
| FG5: *Counter Unmanned Aerial Systems (CUAS)* | - | 0.000 | 143.900 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 143.900 |

**Note**

Project 126: In FY 2018 funds transitioned from PE 0604741A, Project 126 to PE 0603327A Project FG9.

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

The Advanced Electronic Protection Enhancement (AEPE) Program funds efforts to assess and initiate development of solutions to Army Air and Missile Defense (AMD) vulnerabilities from Advanced Electronic Attack (AEA). Army AMD sensors, Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) Command and Control (C2), and Radio Frequency (RF) data and voice networks will be assessed against current and postulated AEA systems and techniques. Potential Electronic Protection (EP) solutions developed by the Army will be demonstrated and assessed in live and simulated AEA environments. Similarly, EP solutions developed by the Joint services and other Agencies (e.g., the Missile Defense Agency) will also be assessed for potential incorporation into Army AMD systems.

The Air and Missile Defense Planning and Control System (AMDPCS) is an Army Objective Force System that provides integration of Air and Missile Defense (AMD) operations at all echelons. AMDPCS systems are deployed with Air Defense Artillery (ADA) brigades, Army Air and Missile Defense Commands (AAMDCs), and Air Defense and Airspace Management (ADAM) Cells at the Brigade Combat Teams (BCT's), Multi Functional Support Brigades and Divisions/Corps. AMDPCS systems also provide air defense capabilities to Homeland Defense systems. ADAM Cells provide the Commander at BCTs, Brigades and Divisions with air defense situational awareness and airspace management capabilities. They also provide the interoperability link with Joint, multinational and coalition forces. AMDPCS components are vital in the transformation of ADA units and the activation of the Air & Missile Defense (AMD) Battalions. AMDPCS has three major components: (1) The Air and Missile Defense Workstation (AMDWS) is an automated defense and staff planning tool that displays the common tactical and operational 3-dimensional air picture. AMDWS is the air picture provider for the Army, producing an integrated and correlated air picture at all tactical levels and locations. AMDWS is also an integral component of Integrated Base Defense. AMDWS provides an interoperability link to multinational air defense forces; (2) The Air Defense System Integrator (ADSI) is a communications data link processor and display system that provides near-real time, 3-dimensional, joint airspace situational awareness and fire direction command and control for AMD forces; (3) The Army Air Defense shelter configurations use automated data processing equipment, tactical communications, Common Hardware Systems, standard vehicles and tactical power to provide AMD unit commanders and staffs with the capabilities to plan missions, direct forces, and control airspace.

| Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army | Date: May 2017 |
|---|---|
| **Appropriation/Budget Activity**<br>2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)* | **R-1 Program Element (Number/Name)**<br>PE 0604741A *I Air Defense Command, Control and Intelligence - Eng Dev* |

The integration of the Cooperative Aircraft Surveillance Sensor (CASS) into sheltered systems enables AMDPCS to track self-reporting aircraft. CASS receives position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles.

The Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems (SoS) is an evolutionary, non-developmental program that detects RAM launches; provides localized warning to the defended area, with sufficient time for personnel to take appropriate action; intercepts rounds in flight, thus preventing damage to ground forces or facilities; and enhances response to and defeat of enemy forces. The C-RAM capability is comprised of a combination of multi-service fielded and non-developmental item (NDI) sensors, command and control (C2) equipment, a commercial industry-produced warning system, and a modified U.S. Navy intercept system (Land-based Phalanx Weapon System (LPWS)), all connected via a wireless local area network. The Forward Area Air Defense Command and Control (FAAD C2) system, also under the management of the C-RAM Program Directorate, provides the C-RAM C2 functionality and has been enhanced to integrate the sensors, weapons, and warning systems for the C-RAM SoS. C-RAM C2 software correlates RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. The C-RAM SoS capability is currently deployed at multiple sites in Afghanistan, Iraq, and Egypt, providing correlated air and ground pictures to the Army Mission Command and the Joint Defense Networks, and using various forms of communications to provide situational awareness and exchange of timely and accurate information to synchronize and optimize automated Shape, Sense, Warn, Intercept, Respond, and Protect decisions.

Multiple acquisition efforts are associated with the C-RAM program, including C-RAM Intercept, which fields existing LPWS guns to two Indirect Fire Protection Capability (IFPC)/Avenger composite Battalions, and RAM Warn, a horizontal technology insertion, using current C-RAM warning capability to provide early, localized warning to all Maneuver Brigade Combat Teams (BCT).

The Counter-Unmanned Aerial Systems (C-UAS) capability is being developed in response to a Joint Operational Needs Statement (JUONS) CC-0558 approved by Joint Rapid Acquisition Cell (JRAC) in June 2016. Project FG5 was created to support the identification, development, testing, evaluation and integration of technologies to provide an overall evolutionary capability to defeat small Unmanned Aerial Systems (UAS) threats. The C-UAS system will provide the capability for the warfighter to comprehensively detect, identify and defeat enemy Group 1 and 2 light weight, low altitude UAS. The C-UAS system development involves a phased development and testing approach of Counter UAS Systems.

| B. Program Change Summary ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 34.569 | 53.332 | 25.950 | - | 25.950 |
| Current President's Budget | 33.619 | 205.432 | 28.726 | - | 28.726 |
| Total Adjustments | -0.950 | 152.100 | 2.776 | - | 2.776 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.950 | - | | | |
| • Adjustments to Budget Years | 0.000 | 152.100 | 2.776 | - | 2.776 |

| Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army | Date: May 2017 |
|---|---|
| **Appropriation/Budget Activity**<br>2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)* | **R-1 Program Element (Number/Name)**<br>PE 0604741A *I Air Defense Command, Control and Intelligence - Eng Dev* |

| Congressional Add Details ($ in Millions, and Includes General Reductions) | FY 2016 | FY 2017 |
|---|---|---|
| **Project:** 149: *Counter-Rockets, Artillery & Mortar* | | |
| Congressional Add: *C-RAM Capability Enhancement - Network Security Enhancements* | 10.000 | - |
| Congressional Add Subtotals for Project: 149 | 10.000 | - |
| Congressional Add Totals for all Projects | 10.000 | - |

**Change Summary Explanation**

FY 2017 funding adjustment of $152.100 million includes an $8.200 million increase for CASS system engineering (includes cyber, data at rest, and a new IFF Response Processor (IRP) Card design), as well as a $143.900 million amended budget add to support C-UAS JUONS CC-0558 efforts to address incremental improvements to deployed capability as informed by test events at each phase. Additionally funds C-UAS to develop and test kinetic kill defeat options for integration into the Low-slow-small UAS Integrated Defeat System.

The FY 2018 funding adjustment of $2.776 million includes an increase of $8.200 to support CASS system engineering (includes cyber, data at rest, and a new IFF Response Processor (IRP) Card design), as well as decrease in the amount of ($5.809) million due to the realignment of Advanced Electronic Protection Enhancements (AEPE) funds beginning FY18 from PE 0604741A (Project 126) to PE 0603327A (Project FG9, Air and Missile Defense Electronic Warfare).

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | | Date: May 2017 |
|---|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5 | R-1 Program Element (Number/Name)<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | Project (Number/Name)<br>126 / *PEO Electronic Protect* | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 126: *PEO Electronic Protect* | - | 0.000 | 17.076 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

**Note**

In FY2018, Advanced Electronic Protection Enhancements (AEPE) funds have been realigned from PE 0604741A (Project 126) to PE 0603327A (Project FG9, Air and Missile Defense Electronic Warfare).

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

The Advanced Electronic Protection Enhancement (AEPE) Program funds efforts to assess and initiate development of solutions to Army Air and Missile Defense (AMD) vulnerabilities from Advanced Electronic Attack (AEA). Army AMD sensors, Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) Command and Control (C2), and Radio Frequency (RF) data and voice networks will be assessed against current and postulated AEA systems and techniques. Potential Electronic Protection (EP) solutions developed by the Army will be demonstrated and assessed in live and simulated AEA environments. Similarly, EP solutions developed by the Joint services and other Agencies (e.g., the Missile Defense Agency) will also be assessed for potential incorporation into Army AMD systems.

The initial assessment event was conducted in 2QFY15. Subsequent events will be conducted approximately every two (2) years. Analysis and implementation that provide AEA solutions will occur between events and will be assessed at the next event after implementation.

The following tasks were developed based on previous AEPE demonstration results and the following planned activities will assess the AEA impacts on AMD components and development of countermeasures. The tasks for AEPE are: (1) Plan and execute periodic AEPE demonstrations with Army AMD systems and perform post-demonstration analysis. Integrate Joint service and other Agency AMD systems into AEPE demonstrations as appropriate. (2) Upon completion of AEPE demonstration analyses, create EP concepts to mitigate Army AMD sensor, C2, and RF data link vulnerabilities. (3) Develop EP tools for use by Army AMD systems to improve overall system performance in AEA environments. (4) Develop effects-based AEA Modeling and Simulation (M&S) to assess Army AMD EP concepts in Hardware-In-The-Loop (HWIL) environment. (5) Continue to collaborate with United States Strategic Command (USSTRATCOM) Joint Electromagnetic Preparedness for Advanced Combat (JEPAC) to evaluate, modify, and field existing Army AMD EP Tactics, Techniques, and Procedures (TTPs) in a Joint environment. Evaluate and modify applicable Joint EP TTPs for use in Army AMD systems. (6) Continually interface with intelligence communities to maintain cognizance of emerging AEA threats and incorporate these threats in future AEPE demonstrations. (7) Develop a time-phased EP roadmap that identifies the investments needed to improve the EP capabilities of Army AMD sensors, C2, and RF data and voice networks.

The AEPE effort crosses all AMD System efforts of which only a portion is Air Defense Command and Control.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| ***Title:*** Advanced Electronic Protection Enhancements | - | 17.076 | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>126 / *PEO Electronic Protect* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| ***Description:*** Funding is provided for conduct of AEPE planning efforts, conduct of demonstrations and post-mission analysis.<br><br>***FY 2017 Plans:***<br>Funding is provided for conduct of AEPE planning efforts, conduct of demonstrations and post-mission analysis. | | | | | |
| **Accomplishments/Planned Programs Subtotals** | - | 17.076 | - | - | - |

**C. Other Program Funding Summary ($ in Millions)**

N/A

**Remarks**

Not applicable for this item.

**D. Acquisition Strategy**

Not applicable for this item.

**E. Performance Metrics**

N/A

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | | Date: May 2017 |
|---|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5 | R-1 Program Element (Number/Name)<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | Project (Number/Name)<br>146 / *Air & Msl Defense Planning Control Sys* | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 146: *Air & Msl Defense Planning Control Sys* | - | 15.157 | 23.761 | 24.306 | - | 24.306 | 24.588 | 14.466 | 8.500 | 0.000 | Continuing | Continuing |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

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

The Air and Missile Defense Planning and Control System (AMDPCS) is an Army Objective Force System that provides integration of Air and Missile Defense (AMD) operations at all echelons. AMDPCS systems are deployed with Air Defense Artillery (ADA) brigades, Army Air and Missile Defense Commands (AAMDCs), and Air Defense and Airspace Management (ADAM) Cells at the Brigade Combat Teams (BCT's), Multi Functional Support Brigades and Divisions/Corps. AMDPCS systems also provide air defense capabilities to Homeland Defense systems. ADAM Cells provide the Commander at BCTs, Brigades and Divisions with air defense situational awareness and airspace management capabilities. They also provide the interoperability link with Joint, multinational and coalition forces. AMDPCS components are vital in the transformation of ADA units and the activation of the AMD Battalions. AMDPCS has three major components: (1) The Air and Missile Defense Workstation (AMDWS) is an automated defense and staff planning tool that displays the common tactical and operational three dimensional air picture. AMDWS is the air picture provider for the Army, producing an integrated and correlated air picture at all tactical levels and locations. AMDWS is also an integral component of Integrated Base Defense. AMDWS provides an interoperability link to multinational air defense forces; (2) The Air Defense System Integrator (ADSI) is joint data link communications processor and display system that provides near-real time, three dimensional, joint airspace situational awareness and fire direction command and control for AMD forces; (3) The Army Air Defense shelter configurations use automated data processing equipment, tactical communications, Common Hardware Systems, standard vehicles and tactical power to provide AMD unit commanders and staffs with the capabilities to plan missions, direct forces, and control airspace. The integration of the Cooperative Aircraft Surveillance Sensor (CASS) into sheltered systems enables AMDPCS to track self-reporting aircraft. CASS receives position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles.

FY18 funds the development, software engineering, testing and certification of AMDWS and CASS software; Engineering, development, test and evaluation of the AMDPCS Family of Shelter (FoS) subsystems; and Software system certification testing, accreditation, and approval of authority-to-operate (ATO).

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| ***Title:*** AMDWS Software Development | 11.520 | 12.332 | 13.295 | - | 13.295 |
| ***Description:*** AMDWS development and support of LandWarNet as well as various Common Operating Environments (COEs). AMDWS software engineering and development are consistent with COE requirements, evolving the air and missile defense planning and control requirements to a net-centric environment, and fulfilling the air defense force operations capabilities identified in the AMD TRADOC capabilities requirement list. Virtualize AMDWS software development and rehost onto COE Real-Time Computing Environment common | | | | | |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>146 / *Air & Msl Defense Planning Control Sys* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| hardware systems. Support the evolving development of the Force Operations portion of the Integrated Air and Missile Defense (IAMD) System of Systems.<br><br>***FY 2016 Accomplishments:***<br>Began AMDWS software engineering consistent with Capability Set 17-18 / COE v3 requirements. Supported test of COE product. Worked user requirements from 32nd, 94th, and 10th AAMDCs and ADA Brigades.<br>***FY 2017 Plans:***<br>Completed AMDWS software engineering consistent with Capability Set 17-18 / COE v3 requirements. Integrated COE AMDWS version, which is the initial Server-client Capability. Integrated the COE AMDWS with the ADAM. Updated Air Force interfaces.<br>***FY 2018 Base Plans:***<br>Continue AMDWS software engineering consistent with Capability Set 17-18 / COE v3 requirements. Integrate COE AMDWS version, which is the initial Server-client Capability. Integrate the COE AMDWS with the ADAM. Implement interface to the Cooperative Aircraft Surveillance System (CASS) in support of commercial aircraft de-confliction. | | | | | |
| ***Title:*** Cooperative Aircraft Surveillance Sensor (CASS)<br><br>***Description:*** CASS receives position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles.<br><br>***FY 2017 Plans:***<br>Began system engineering which includes cyber, data at rest, and a new IFF Response Processor (IRP) Card design. This non-recurring engineering effort supports the development of the fielded product for the AMDPCS and Integrated Air and Missile Defense Battle Command Systems (IBCS). CASS components such as the IRP Card will be used to resolve obsolescence issues on the TPX family of Identification Friend or Foe (IFF) interrogators fielded with Patriot, Sentinel, and Air Traffic Navigation and Control Systems (ATNAVICS).<br>***FY 2018 Base Plans:***<br>Continue system engineering which includes cyber, data at rest, and a new IFF Response Processor (IRP) Card design. This non-recurring engineering effort will support the development of the fielded product for the AMDPCS and Integrated Air and Missile Defense Battle Command Systems (IBCS). CASS components such | - | 8.200 | 8.200 | - | 8.200 |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>146 / *Air & Msl Defense Planning Control Sys* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| as the IRP Card will be used to resolve obsolescence issues on the TPX family of Identification Friend or Foe (IFF) interrogators fielded with Patriot, Sentinel, and Air Traffic Navigation and Control Systems (ATNAVICS). | | | | | |
| ***Title:*** ADSI Software Engineering and Development<br>***Description:*** ADSI software engineering and development of next software baseline (post-v15.0.4), including testing and certification of capabilities for TacView Situational Awareness, with air control support, scenario generation and three dimensional display across various tactical data links. Version 15.0.4 software upgrades the ADSI OS to use Windows 7 and Red Hat Linux. FY17 completes ADSI version 15.0.4 software development and test activities, including certification.<br>***FY 2016 Accomplishments:***<br>Continued development of ADSI version 15.0.4 software.<br>***FY 2017 Plans:***<br>Completed ADSI version 15.0.4 software development. Completed version 15.0.4 test activities, including certification. | 0.758 | 0.516 | - | - | - |
| ***Title:*** Engineering, Development, Test and Evaluation<br>***Description:*** Engineering, development, test, and evaluation of the AMDPCS Family of Shelter (FoS) subsystems objective configuration; evaluation and finalization of the AMDPCS tactical communications, data processing and vehicle/shelter/power generation/environmental system block upgrade program for fielded systems.<br>***FY 2016 Accomplishments:***<br>Continued evaluation of emerging technologies for future application in AMDPCS. Supported IBCS-ADAM COE configurations at NIE 16.1 and 16.2. Continued to work closely with PM IAMD to identify the ADAM cell configuration to support IBCS Fire Control Network (FCN).<br>***FY 2017 Plans:***<br>Continued evaluations of emerging technologies. Continued support of IBCS-ADAM COE configurations and CASS evaluations at NIE 17.1 and 17.2.<br>***FY 2018 Base Plans:*** | 1.970 | 1.856 | 1.918 | - | 1.918 |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>146 / *Air & Msl Defense Planning Control Sys* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| Continue evaluations of emerging technologies and obsolescence. Continue support and development of IBCS-ADAM COE configurations and CASS integration/testing at NIE 18.1, 18.2, 19.1 and 19.2. | | | | | |
| ***Title:*** Software System Certification Testing, Accreditation, and Approval of Authority-to-Operate (ATO)<br>***Description:*** Software system certification testing, accreditation, and approval of ATOs for the various software systems, pursuit of approval of the Host Based Security System (HBSS), SolidCore or other authorized / approved G6 software; Army and Joint integration and interoperability assessments.<br>***FY 2016 Accomplishments:***<br>Continued software systems certification testing, accreditation, and approval of ATOs as required by the DOD Risk Management Framework process. Continued Army and Joint integration and interoperability assessments.<br>***FY 2017 Plans:***<br>Continued software systems certification testing, accreditation, and approval of ATOs as required by the DOD Risk Management Framework process. Continued Army and Joint integration and interoperability assessments.<br>***FY 2018 Base Plans:***<br>Continue software systems certification testing, accreditation, and approval of ATOs as required by the DOD Risk Management Framework process. Continue Army and Joint integration and interoperability assessments. | 0.909 | 0.857 | 0.893 | - | 0.893 |
| **Accomplishments/Planned Programs Subtotals** | 15.157 | 23.761 | 24.306 | - | 24.306 |

**C. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • AD5070: *AD5070, AMDPCS* | 28.176 | 126.539 | 26.635 | 9.100 | 35.735 | 17.960 | 6.366 | 32.397 | - | Continuing | Continuing |
| • PE 0604741A, Proj 149: *PE 0604741A, Proj 149, Counter-Rockets, Artillery & Mortar* | 18.462 | 20.695 | 4.420 | - | 4.420 | 3.732 | 0.172 | 0.174 | - | Continuing | Continuing |
| • SSN H30503: *SSN H30503, Rocket, Artillery, Mortar (RAM) Warn (Parent is IFPC Family of Systems: BZ0501)* | 42.458 | 29.680 | 11.380 | - | 11.380 | 3.470 | - | 0.712 | - | 0 | 87.700 |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>146 / *Air & Msl Defense Planning Control Sys* |

**C. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SSN H30504: *SSN H30504, C-RAM Enhancements (Parent is IFPC Family of Systems: BZ0501)* | 18.221 | 62.687 | - | - | - | 12.237 | - | - | - | 0 | 93.145 |
| • PE 06043019A, Proj DU3: *PE 06043019A, Proj DU3, IFPC (FY12 PE0603305A IFPC II - Intercept)* | 149.222 | - | 31.303 | - | 31.303 | 52.604 | 239.305 | 259.804 | 316.104 | Continuing | Continuing |
| • SSN BZ5075: *SSN BZ5075, IAMD Battle Command System* | 20.917 | 204.969 | - | - | - | - | 326.928 | 387.026 | 513.464 | Continuing | Continuing |
| • PE 060482A, Proj E10: *PE 0604820A, Proj E10, Sentinel* | 11.821 | 15.983 | 32.968 | - | 32.968 | 31.761 | 51.897 | 72.562 | 81.351 | Continuing | Continuing |
| • PE 0604741A, Proj FG5: *PE 0604741A, Proj FG5, Counter Unmanned Aerial Systems (C-UAS)* | - | 143.900 | - | - | - | - | - | - | - | 0 | 143.900 |
| • SSN H30505: *SSN H30505, Counter Unmanned Aerial Systems (C-UAS)* | - | 174.640 | 10.000 | 57.500 | 67.500 | - | - | - | - | 0 | 242.140 |

**Remarks**

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

**D. Acquisition Strategy**

The acquisition strategy relies on non-development items (NDI) and evolutionary software development to rapidly meet the demands of air defense battle management command, control, communications, computers, and intelligence (BM/C4I) requirements and to keep pace with automated information technologies. The concept of evolutionary software development will be accomplished in a series of AMDWS Block releases and upgrades. AMDPCS is being developed for both the Army's Active and Reserve components.

AMDWS software development is contracted Sole Source (SS)/Cost Plus Fixed Fee (CPFF) to Northrop Grumman. CASS development will be competitively awarded.

AMDWS is a prime component of C-RAM. It provides the Forward Operating Base (FOB) commander with clearance of fires display and enemy munitions flight paths.

**E. Performance Metrics**

N/A

| Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>146 / *Air & Msl Defense Planning Control Sys* |

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Program Management Administration | Various | Various : Various | 28.131 | 1.683 | Dec 2015 | 1.811 | Dec 2016 | 1.823 | Dec 2017 | - | | 1.823 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 28.131 | 1.683 | | 1.811 | | 1.823 | | - | | 1.823 | - | - | - |

**Remarks**

Not Applicable

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AMDWS Software Development and Engineering | SS/CPFF | Northrop Grumman : Huntsville AL | 120.755 | 11.281 | Oct 2015 | 11.828 | Oct 2016 | 12.153 | Oct 2017 | - | | 12.153 | Continuing | Continuing | Continuing |
| CASS Development Engineering | C/TBD | Raytheon : Aberdeen Proving Ground, MD | 0.000 | - | | 6.696 | May 2017 | 6.806 | Jan 2018 | - | | 6.806 | Continuing | Continuing | Continuing |
| ADSI Software Development and Engineering | SS/T&M | Ultra Electronics : Austin, TX | 6.731 | 0.080 | Feb 2016 | 0.076 | Feb 2017 | - | | - | | - | 0.000 | 6.887 | 0.000 |
| Developmental Engineering | Various | Various : Various | 37.550 | 1.986 | Dec 2015 | 3.089 | Dec 2016 | 3.160 | Dec 2017 | - | | 3.160 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 165.036 | 13.347 | | 21.689 | | 22.119 | | - | | 22.119 | - | - | - |

## Test and Evaluation ($ in Millions)

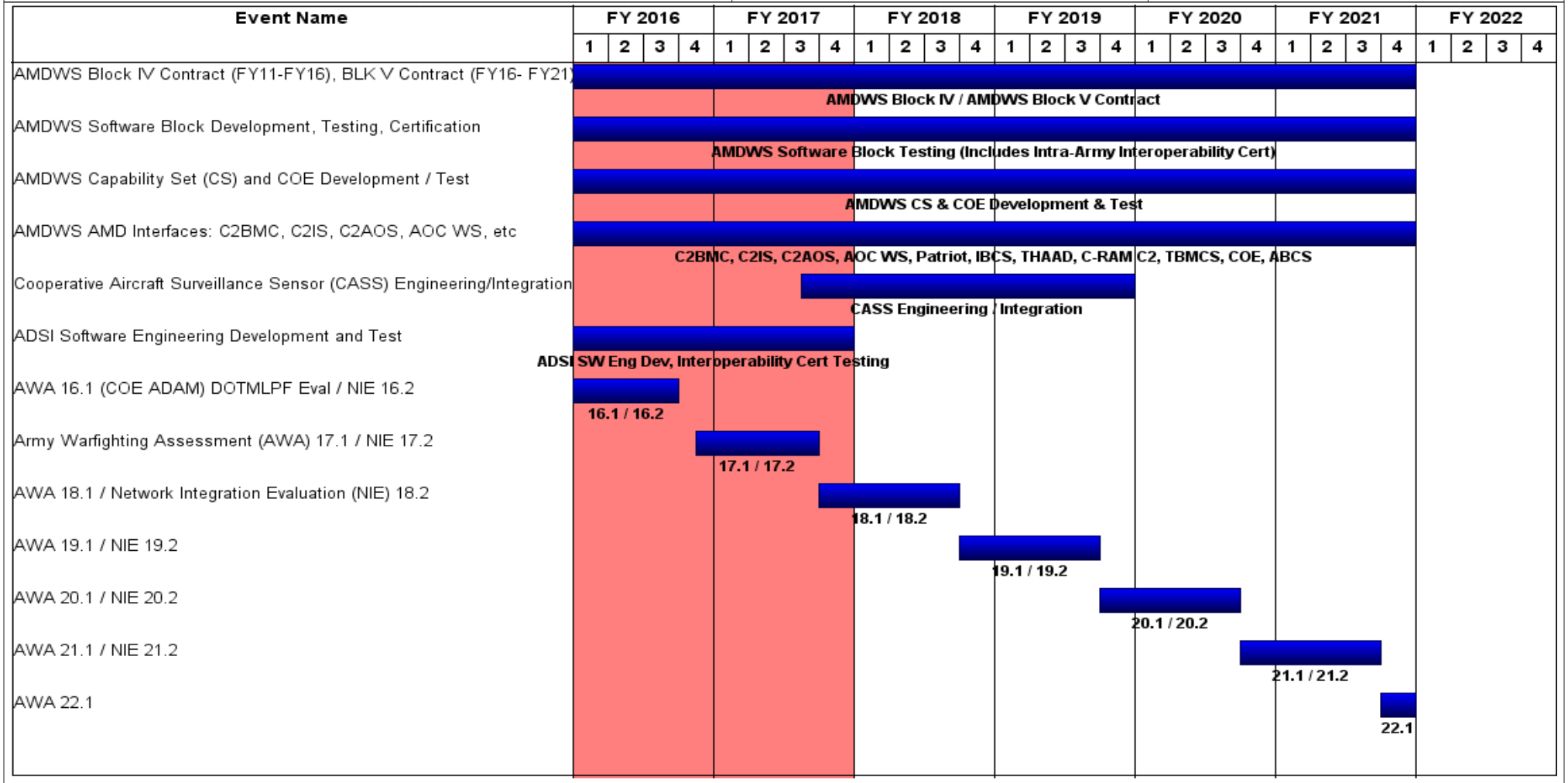
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2016 Cost | FY 2016 Award Date | FY 2017 Cost | FY 2017 Award Date | FY 2018 Base Cost | FY 2018 Base Award Date | FY 2018 OCO Cost | FY 2018 OCO Award Date | FY 2018 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Certification/Testing | Various | JITC : Ft Huachuca, AZ | 1.074 | 0.053 | Feb 2016 | 0.119 | Feb 2017 | 0.170 | Feb 2018 | - | | 0.170 | Continuing | Continuing | Continuing |
| Interoperability Assessment | Various | CTSF : Ft Hood, TX | 1.412 | 0.074 | May 2016 | 0.142 | May 2017 | 0.194 | May 2018 | - | | 0.194 | Continuing | Continuing | Continuing |
| | | **Subtotal** | 2.486 | 0.127 | | 0.261 | | 0.364 | | - | | 0.364 | - | - | - |

| Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Army | | | Date: May 2017 |
|---|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5 | R-1 Program Element (Number/Name)<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | Project (Number/Name)<br>146 / *Air & Msl Defense Planning Control Sys* | |

| | 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** | 195.653 | 15.157 | | 23.761 | | 24.306 | | - | | 24.306 | - | - | - |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>146 / *Air & Msl Defense Planning Control Sys* |



| Exhibit R-4A, RDT&E Schedule Details: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>146 / *Air & Msl Defense Planning Control Sys* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events** | **Quarter** | **Year** | **Quarter** | **Year** |
| AMDWS Block IV Contract (FY11-FY16), BLK V Contract (FY16- FY21) | 2 | 2011 | 4 | 2021 |
| AMDWS Software Block Development, Testing, Certification | 3 | 2007 | 4 | 2021 |
| AMDWS Capability Set (CS) and COE Development / Test | 1 | 2013 | 4 | 2021 |
| AMDWS AMD Interfaces: C2BMC, C2IS, C2AOS, AOC WS, etc | 4 | 2012 | 4 | 2021 |
| Cooperative Aircraft Surveillance Sensor (CASS) Engineering/Integration | 3 | 2017 | 4 | 2019 |
| ADSI Software Engineering Development and Test | 1 | 2005 | 4 | 2017 |
| AWA 16.1 (COE ADAM) DOTMLPF Eval / NIE 16.2 | 4 | 2015 | 3 | 2016 |
| Army Warfighting Assessment (AWA) 17.1 / NIE 17.2 | 4 | 2016 | 3 | 2017 |
| AWA 18.1 / Network Integration Evaluation (NIE) 18.2 | 4 | 2017 | 3 | 2018 |
| AWA 19.1 / NIE 19.2 | 4 | 2018 | 3 | 2019 |
| AWA 20.1 / NIE 20.2 | 4 | 2019 | 3 | 2020 |
| AWA 21.1 / NIE 21.2 | 4 | 2020 | 3 | 2021 |
| AWA 22.1 | 4 | 2021 | 4 | 2021 |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | | Date: May 2017 |
|---|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5 | R-1 Program Element (Number/Name)<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | Project (Number/Name)<br>149 / *Counter-Rockets, Artillery & Mortar* | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 149: *Counter-Rockets, Artillery & Mortar* | - | 18.462 | 20.695 | 4.420 | - | 4.420 | 3.732 | 0.172 | 0.174 | 0.000 | Continuing | Continuing |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

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

The Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems (SoS) is an evolutionary, non-developmental program that detects RAM launches; provides localized warning to the defended area, with sufficient time for personnel to take appropriate action; intercepts rounds in flight, thus preventing damage to ground forces or facilities; and enhances response to and defeat of enemy forces. The C-RAM capability is comprised of a combination of multi-service fielded and non-developmental item (NDI) sensors, command and control (C2) equipment, a commercial industry-produced warning system, and a modified U.S. Navy intercept system (Land-based Phalanx Weapon System (LPWS)), all connected via a wireless local area network. The Forward Area Air Defense Command and Control (FAAD C2) system, also under the management of the C-RAM Program Directorate, provides the C-RAM C2 functionality and has been enhanced to integrate the sensors, weapons, and warning systems for the C-RAM SoS. C-RAM C2 software correlates RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. The C-RAM SoS capability is currently deployed at multiple sites in Afghanistan, Iraq, and Egypt, providing correlated air and ground pictures to the Army Mission Command and the Joint Defense Networks, and using various forms of communications to provide situational awareness and exchange of timely and accurate information to synchronize and optimize automated Shape, Sense, Warn, Intercept, Respond, and Protect decisions.

The deployment of the C-RAM SoS was accomplished through an incremental acquisition process driven by urgent operational needs, theater priorities, and emerging capability requirements to provide a counter-RAM capability to combat forces. The C-RAM SoS approach was initially validated by a Proof of Principle demonstration in December 2004 and has undergone more than 25 Army Test and Evaluation Command (ATEC)-supported operational assessments to incorporate multiple improvements in response to changes in threat tactics and lessons learned. C-RAM capabilities are currently deployed to locations in support of Operation Freedom's Sentinel (OFS), Operation Inherent Resolve (OIR), and Task Force Sinai (TFS). Continuing C-RAM SoS improvement efforts, required to meet emerging theater requirements, include C2 and LPWS software upgrades as well as integration and deployment of Ku band Radio Frequency System (KuRFS) radars for an enhanced detection capability against stressing threats. Base RDTE funding for FY 2015 and beyond supports maintenance of C-RAM C2 basic Air Defense functionality. Support of the existing C-RAM SoS capability deployed in theater has been through the Overseas Contingency Operations (OCO) process.

Recent directed enhancements to the C-RAM SoS capability included use of Army tactical communications rather than commercial systems; integration of Warn functionality into the C2 workstation to reduce complexity and footprint; and integration with Unmanned Aircraft Systems (UAS) Universal Ground Control Station (UGCS) for enhanced situational awareness, combat identification, and response options. FY16-17 enhancements include testing and upgrade of dynamic clearance of unplanned fires (DCUF) in conjunction with the Advanced Field Artillery Tactical Data System (AFATDS) V2 for rapid and enhanced response, integration of sensor communications and legacy systems, development and integration of C-RAM network security enhancements, and completion of an LPWS cruise missile capability study and modification development effort.

FY 2018 Base RDT&E dollars in the amount of $4.420 million provide C-RAM C2 development and upgrades.

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>149 / *Counter-Rockets, Artillery & Mortar* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| ***Title:*** C-RAM C2 Software Development and Enhancements<br><br>***Description:*** Funds system-of-systems development and upgrades based on changes in threat, integration of emerging requirements from external PMs (Mission Command) and other Services/agencies, technology insertions (IP-based communications), and interoperability requirements (Joint interoperability, MIL Standard), and provides development and regression testing to ensure C-RAM C2 enhancements do not negatively impact the performance of the other C-RAM pillars (Shape, Sense, Warn, Intercept, Respond, and Protect). Includes Host Based Security System (HBSS)/SolidCore (Information Assurance compliance).<br><br>***FY 2016 Accomplishments:***<br>Completed integration into C-RAM architecture for demonstration of MML capability. Incorporated LPWS advanced battle management upgrades, supported C-RAM C2 v5.5C Materiel Release, and initiated C-RAM convergence with Integrated Air and Missile Defense (IAMD). Initiated C-RAM C2 v5.6 software development.<br><br>***FY 2017 Plans:***<br>Enable C-UAS electronic and kinetic defeat interoperability, expand coalition communications, and perform Integrated Air and Missile Defense (IAMD) convergence systems engineering.<br><br>***FY 2018 Base Plans:***<br>Test and validate C-UAS interoperability requirements, implement IAMD convergence, and incorporate cyber security updates. | 4.377 | 4.465 | 4.420 | - | 4.420 |
| ***Title:*** Dynamic Clearance of Unplanned Fires (DCUF)<br><br>***Description:*** Software enhancement within C-RAM C2 that provides automated airspace assessments to the Advanced Field Artillery Tactical Data System (AFATDS), enabling safer and more rapid clearance of artillery fires at the Brigade level. DCUF enables more effective engagements of unplanned targets, while reducing the risk of aerial fratricide in the prosecution of fire missions.<br><br>***FY 2016 Accomplishments:***<br>Funded DCUF participation within the Maneuver Fires Integration Experiment (MFIX) for the purpose of demonstrating the effectiveness of the DCUF contribution to the BCT warfight and informing the TRADOC requirements generation process.<br><br>***FY 2017 Plans:*** | 4.085 | 6.701 | - | - | - |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>149 / *Counter-Rockets, Artillery & Mortar* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| Complete DCUF software development and Materiel Release activities based on the DCUF requirements established during FY16. | | | | | |
| ***Title:*** C-RAM Capability Enhancement - LPWS Cruise Missile Capability Study<br>***Description:*** Funds capability enhancements to increase the overall effectiveness of the C-RAM system-of-systems through completion of an LPWS cruise missile capability study and modification development efforts.<br>***FY 2017 Plans:***<br>Complete LPWS cruise missile capability study and modification development efforts. | - | 9.529 | - | - | - |
| **Accomplishments/Planned Programs Subtotals** | 8.462 | 20.695 | 4.420 | - | 4.420 |

| | FY 2016 | FY 2017 |
|---|---|---|
| ***Congressional Add:*** C-RAM Capability Enhancement - Network Security Enhancements<br>***FY 2016 Accomplishments:*** Integrated sensor communications and legacy systems. Developed and integrated C-RAM network security enhancements. | 10.000 | - |
| **Congressional Adds Subtotals** | 10.000 | - |

**C. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SSN H30503: *SSN H30503, Rocket, Artillery, Mortar (RAM) Warn (Parent is IFPC Family of Systems: BZ0501)* | 42.458 | 29.680 | 11.380 | - | 11.380 | 3.470 | - | 0.712 | - | 0.000 | 87.700 |
| • SSN H30504: *SSN H30504, C-RAM Enhancements (Parent is IFPC Family of Systems: BZ0501)* | 18.221 | 62.687 | - | - | - | 12.237 | - | - | - | 0.000 | 93.145 |
| • PE 0604741A, Proj 146: *PE 0604741A, Proj 146, Air & Missile Defense Planning and Control System* | 15.157 | 23.761 | 24.306 | - | 24.306 | 24.588 | 14.466 | 8.500 | - | Continuing | Continuing |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | | Date: May 2017 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>149 / *Counter-Rockets, Artillery & Mortar* | |

**C. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SSN AD5070: *SSN AD5070, Air & Missile Defense Planning and Control System* | 28.176 | 126.539 | 26.635 | 9.100 | 35.735 | 17.960 | 6.366 | 32.397 | - | Continuing | Continuing |
| • PE 0604319A, Proj DU3: *PE 0604319A, Proj DU3, IFPC2 (FY12 PE0603305A IFPC II - Intercept)* | 149.222 | - | 11.303 | - | 11.303 | 52.604 | 239.305 | 259.804 | 316.104 | Continuing | Continuing |
| • PE 0605457A, Proj S40: *PE 0605457A, Proj S40, Army Integrated Air and Missile Defense (AIAMD)* | 222.074 | 272.811 | 336.420 | - | 336.420 | 290.250 | 190.600 | 117.470 | 64.510 | Continuing | Continuing |
| • SSN BZ5075: *SSN BZ5075, IAMD Battle Command System* | 20.917 | 204.969 | - | - | - | - | 326.928 | 387.026 | 513.464 | Continuing | Continuing |
| • PE 060482A, Proj E10: *PE 060482A, Proj E10, Sentinel* | 11.821 | 15.983 | 32.968 | - | 32.968 | 31.761 | 51.897 | 72.562 | 81.351 | Continuing | Continuing |
| • PE 0604823A, Proj L86: *PE 0604823A, Proj L86, Lightweight Counter Mortar Radar (LCMR)* | 2.850 | 3.187 | 2.136 | - | 2.136 | 4.239 | 4.970 | 5.442 | 3.500 | Continuing | Continuing |
| • PE 0604823A, Proj L88: *PE 0604823A, Proj L88, Enhanced AN/TPQ-36* | - | 6.048 | 7.469 | - | 7.469 | 6.784 | 8.515 | 9.196 | 9.422 | Continuing | Continuing |
| • SSN B05201: *SSN B05201, Lightweight Counter Mortar Radar (LCMR)* | 63.472 | 130.730 | 20.459 | - | 20.459 | 9.618 | - | - | 8.427 | Continuing | Continuing |
| • SSN B05310: *SSN B05310, Enhanced AN/TPQ-36* | 198.379 | 314.509 | 329.057 | - | 329.057 | 148.700 | 28.400 | 7.110 | 7.443 | Continuing | Continuing |
| • PE 0604741A, Proj FG5: *PE 0604741A, Proj FG5, Counter Unmanned Aerial Systems (C-UAS)* | - | 143.900 | - | - | - | - | - | - | - | Continuing | Continuing |
| • SSN H30505: *SSN H30505, Counter Unmanned Aerial Systems (C-UAS) Efforts* | - | 174.640 | 10.000 | 57.500 | 67.500 | - | - | - | - | Continuing | Continuing |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>149 / *Counter-Rockets, Artillery & Mortar* |

**C. 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**

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

**D. Acquisition Strategy**

The C-RAM program is following an evolutionary acquisition strategy for rapid fielding of mature technology to the user. The objective of the strategy is to balance needs, available technology, and resources to quickly provide a robust capability to engage RAM threats. Both C-RAM Intercept (LPWS) and RAM Warn have transitioned to acquisition programs and continue to capitalize on RDTE investments (e.g., reuse/repurpose of Navy interceptor, Future Combat Systems (FCS) sensor technology development for Ku band Radio Frequency System (KuRFS) radar, etc.). Development and upgrade of C-RAM C2 software, to include enhanced capability to support emerging Mission Command requirements, technology insertion, and interoperability, is accomplished through a five-year CPIF contract awarded in April 2015 to Northrop Grumman Mission Systems.

**E. Performance Metrics**

N/A

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | | Date: May 2017 |
|---|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5 | R-1 Program Element (Number/Name)<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | Project (Number/Name)<br>FG5 / *Counter Unmanned Aerial Systems (CUAS)* | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FG5: *Counter Unmanned Aerial Systems (CUAS)* | - | 0.000 | 143.900 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 143.900 |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

**Note**

Project FG5 has been created for transparency and in support of the Counter Unmanned Aerial System (C-UAS) Joint Operational Needs (JUONS) CC-0558.

FY17 Overseas Contingency Operations (OCO) December 2016 Amendment in the amount of $78.700 million supports Joint Urgent Operational Need (JUON) CC-0558 addressing incremental improvements to deployed capability as informed by test events at each phase.

FY17 Overseas Contingency Operations (OCO) March 2017 Amendment in the amount of $65.200 million supports Joint Urgent Operational Need (JUON) CC-0558 to develop and test kinetic kill defeat options for integration into the Low-slow-small UAS Integrated Defeat System.

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

For transparency and in support of the Counter Unmanned Aerial System (C-UAS) Joint Operational Needs (JUONS) CC-0558, Project FG5 was created to support the identification, development, testing, evaluation and integration of technologies to provide an overall evolutionary capability to defeat small Unmanned Aerial Systems (UAS) threats. The C-UAS effort will provide the capability for the warfighter to comprehensively detect, identify and defeat enemy Group 1 and 2 light weight, low altitude UAS. The C-UAS effort involves a phased development and testing approach of Counter UAS Systems. The incremental approach provides interim standalone capability within the first few months and achieves a full networked capability by end of two-year JUON period.

Rapid Acquisition Authority (RAA) approved for the first quarter FY 2017 research and development efforts in the amount of $65.500 million was sourced by FY 2017 OCO Operations and Maintenance (OMA) funds. These funds are being used in support of system engineering, testing, integration, and logistics.

Rapid Acquisition Authority (RAA) approved for research and development efforts in the amount of $76.000 million starting in late first quarter FY2017 was sourced by FY 2017 OCO Operations and Maintenance (OMA) funds. These funds are being used for development and integration of mobile and expeditionary Low-slow-small UAS Integrated Defeat Systems.

FY17 Overseas Contingency Operations (OCO) December 2016 Amendment in the amount of $78.700 million supports Joint Urgent Operational Need (JUON) CC-0558 addressing incremental improvements to deployed capability as informed by test events at each phase.

FY17 Overseas Contingency Operations (OCO) March 2017 Amendment in the amount of $65.200 million supports Joint Urgent Operational Need (JUON) CC-0558 to develop and test kinetic kill defeat options for integration into the Low-slow-small UAS Integrated Defeat System.

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>FG5 / *Counter Unmanned Aerial Systems (CUAS)* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total |
|---|---|---|---|---|---|
| ***Title:*** Counter Unmanned Aerial System Engineering and Dismounted Options<br>***Description:*** Perform system engineering, testing, integration, and overall support of the C-UAS JUON. Supports test events to inform modifications to deployed and planned systems as well as inform procurement decisions for dismounted systems.<br>***FY 2017 Plans:***<br>Develop radar modifications to support improved C-UAS capability; conduct test events to assess performance of emerging and available C-UAS systems; conduct system engineering to integrate components and systems into the Low-slow-small UAS Integrated Defeat System (LIDS) architecture; conduct post-test analysis to inform ongoing development efforts; and test and assess dismounted CUAS systems for inclusion into the CUAS family of systems. | - | 78.700 | - | - | - |
| ***Title:*** Counter Unmanned Aerial System Kinetic Kill Defeat Options<br>***Description:*** Development, Integration, and Test of kinetic kill defeat options for integration into the Low-small-small UAS Integrated Defeat System.<br>***FY 2017 Plans:***<br>Develop, integrate, and test kinetic, or hard kill, defeat solutions into the Low-slow-small Unmanned Aerial System (UAS) Integrated Defeat System (LIDS): 1) integrate the Compact Laser Weapon System with Counter-Rocket, Artillery, Mortar (C-RAM) command and control, increases power from 2kW to 5kW of the laser subsystem, and support Phase 1a testing; 2) integrate the Coyote warhead, proximity fuze, and midcourse guidance for Block 1 and Block 2, and support Phase 1a and Phase 2 testing; and 3) develop the Vehicle Mounted Gun System fire control solution capability for UAS targets, and support Engineering, Fire Control, and Phase 2 testing. | - | 65.200 | - | - | - |
| **Accomplishments/Planned Programs Subtotals** | - | 143.900 | - | - | - |

**C. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • Rapid Acquisition Authority (RAA) 1: *Rapid Acquisition* | - | 65.500 | - | - | - | - | - | - | - | 0 | 65.500 |

| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army | | Date: May 2017 |
|---|---|---|
| **Appropriation/Budget Activity**<br>2040 / 5 | **R-1 Program Element (Number/Name)**<br>PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev* | **Project (Number/Name)**<br>FG5 / *Counter Unmanned Aerial Systems (CUAS)* |

**C. 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Authority (RAA) 1 for Baseline Plan. Source: FY 2017 OCO OMA* | | | | | | | | | | | |
| • Rapid Acquisition Authority (RAA) 2: *Rapid Acquisition Authority (RAA) 2 for Acceleration Plan. Source: FY 2017 OCO OMA* | - | 76.000 | - | - | - | - | - | - | - | 0 | 76.000 |
| • SSN H30505: *SSN H30505, C-UAS OPA OCO* | - | 174.640 | 10.000 | 57.500 | 67.500 | - | - | - | - | 0 | 242.140 |

**Remarks**

All funding supports Counter Unmanned Aerial System (C-UAS) Joint Operational Needs (JUONS) CC-0558.

**D. Acquisition Strategy**

The C-UAS program is executing an acquisition strategy for rapid fielding of emerging technology and initial fielding to selected sites in Phase 1. In Phase 1a testing of mature solutions and down selecting will be made for participation in Phase 2 which will test fully networked, fixed/mobile capability, sustainable solution and deploy full capability to all locations. C-UAS is rapidly developing, integrating and deploying the solution through a contract awarded January 2017 to Syracuse Research Corporation.

**E. Performance Metrics**

N/A