

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603327A I Air and Missile Defense Systems Engineering							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	58.812	46.231	15.148	0.500	15.648	27.008	31.444	0.000	0.000	Continuing	Continuing
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	58.812	46.231	15.148	0.500	15.648	27.008	31.444	0.000	0.000	Continuing	Continuing

Note

Beginning in FY 2020, the Army Long-Range Persistent Surveillance (ALPS) system efforts transition to Program Element 0604741A, Project 126.

A. Mission Description and Budget Item Justification

Funding in this Program Element (PE) supports Cyber and Electromagnetic Activities (CEMA) efforts to conduct operational realistic assessments of Army Air and Missile Defense (AMD) performance, identify system vulnerabilities, and develop mitigations against threats across the Cyber and Electromagnetic spectrum. Army AMD sensors, integrated air and missile defense mission command and fire control, Radio Frequency (RF) data and voice networks, and Positioning, Navigation, and Timing (PNT) technology will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army AMD systems, to include other Service and other Agency AMD systems as appropriate. Upon completion of CEMA demonstration analyses, funding will facilitate initial recommendations for potential mitigations and solutions to Army AMD sensors, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army AMD systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army AMD CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Additionally, virtual models of critical hardware and software are being developed and implemented to allow for destructive testing with advanced CEMA threats in a lab environment. There will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. These activities follow a time-phased roadmap that identifies the investments needed to improve the resiliency of Army AMD sensors, C2, and RF data and voice networks in contested CEMA environments.

FY 2020 funding of \$15.648 million will be used to analyze P-12 event data, provide recommendations for rapid countermeasures and potential solutions, conduct destructive CEMA lab events, continue virtualization of additional AMD system of systems architecture for future CEMA assessments against advanced destructive cyber and electromagnetic threats. Funding will also be used to initiate planning and preparation for the P-13 event.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army				Date: March 2019	
Appropriation/Budget Activity		R-1 Program Element (Number/Name)			
2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)		PE 0603327A I Air and Missile Defense Systems Engineering			
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	57.649	43.802	43.273	-	43.273
Current President's Budget	58.812	46.231	15.148	0.500	15.648
Total Adjustments	1.163	2.429	-28.125	0.500	-27.625
• Congressional General Reductions	-0.017	-0.031			
• Congressional Directed Reductions	-13.000	-17.540			
• Congressional Rescissions	-	-			
• Congressional Adds	15.000	20.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.820	-			
• Adjustments to Budget Years	-	-	-28.125	0.500	-27.625
Congressional Add Details (\$ in Millions, and Includes General Reductions)					
Project: FG9: Air and Missile Defense (AMD) Electronic Warfare					
Congressional Add: Interoperability of integrated air and missile defense.					
Congressional Add Subtotals for Project: FG9					
Congressional Add Totals for all Projects					
Change Summary Explanation					
The FY 2020 change is primarily driven by the transition of ALPS to PE 0604741 Project 126.					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering				Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	58.812	46.231	15.148	0.500	15.648	27.008	31.444	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY 2020, the Army Long-Range Persistent Surveillance (ALPS) system efforts transition to Program Element 0604741A, Project 126.

A. Mission Description and Budget Item Justification

Funding in this program supports Cyber and Electromagnetic Activities (CEMA) efforts to conduct operational realistic assessments of Army Air and Missile Defense (AMD) performance, identify system vulnerabilities, and develop mitigations against threats across the Cyber and Electromagnetic spectrum. Army AMD sensors, integrated air and missile defense mission command and fire control, Radio Frequency (RF) data and voice networks, and Positioning, Navigation, and Timing (PNT) technology will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army AMD systems, to include other Service and other Agency AMD systems as appropriate. Upon completion of CEMA demonstration analyses, funding will facilitate initial recommendations for potential mitigations and solutions to Army AMD sensors, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army AMD systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army AMD CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Additionally, virtual models of critical hardware and software are being developed and implemented to allow for destructive testing with advanced CEMA threats in a lab environment. There will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. These activities follow a time-phased roadmap that identifies the investments needed to improve the resiliency of Army AMD sensors, C2, and RF data and voice networks in contested CEMA environments.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Advanced Electronic Protection Enhancements and ALPS Development/Integration	43.812	24.743	15.148	0.500	15.648
Description: Provides Cyber and Electromagnetic Activities (CEMA) planning, conducts CEMA demonstrations and post-mission analysis, and develops/integrates Army Long-Range Persistent Surveillance (ALPS).					
FY 2019 Plans:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: March 2019		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering		Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding is provided for continued planning and preparation and to conduct the P-12 event. Funding will also be used to continue the Cyber and Electromagnetic Activities (CEMA) roadmap and strategy that ensures coordination and execution of prioritized goals. Virtualize IAMD and PATRIOT components, validate the models, and assess them in a contested environment. Continue virtualization of additional IAMD sensors and launchers. Continue ALPS development and integration of ALPS into the Army AMD architecture. FY 2020 Base Plans: Funding will be provided for continued system analysis to identify and recommend rapid mitigation concepts following the P-12 event; initial planning and preparation activities for P-13; conduct a CEMA lab event (C Series) with a virtualized AIAMD systems of systems architecture to measure system and mission performance against advanced destructive cyber and electromagnetic threats; continue development of algorithm based solutions to identify, characterize, and mitigate performance impacts of CEMA threats; update the Cyber and Electromagnetic Activities (CEMA) roadmap and strategy to ensure coordination and execution of prioritized goals; and to continue virtualization of additional AIAMD sensors, launchers, C2, and supporting architecture. FY 2020 OCO Plans: Funds will be used to continue an operational assessment of ALPS prototype systems in support of a Combatant Commander identified need. FY 2019 to FY 2020 Increase/Decrease Statement: The funding reduction from FY 2019 to FY 2020 is driven by the transition of ALPS to PE 0604741A, Project 126.						
Title: FY 2019 SBIR/STTR Transfer FY 2019 Plans: FY 2019 SBIR/STTR Transfer. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer		-	1.488	-	-	-
Accomplishments/Planned Programs Subtotals		43.812	26.231	15.148	0.500	15.648
		FY 2018	FY 2019			
Congressional Add: Interoperability of integrated air and missile defense.		15.000	20.000			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering	Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare	
		FY 2018	FY 2019
FY 2018 Accomplishments: Interoperability of integrated air and missile defense.			
FY 2019 Plans: Interoperability of integrated air and missile defense.			
Congressional Adds Subtotals		15.000	20.000
C. Other Program Funding Summary (\$ in Millions) N/A			
Remarks			
D. Acquisition Strategy Assessment events will be conducted approximately every two years in live and simulated CEMA environments. In addition to Government planning and conduct of assessments, funding will also be provided through various contracts for subject matter expertise.			
E. Performance Metrics N/A			

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering						Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare			
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Various	Various : Various	-	2.831	Nov 2017	1.688	Nov 2018	0.949	Nov 2019	-		0.949	Continuing	Continuing	Continuing
Subtotal			-	2.831		1.688		0.949		-		0.949	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Integration Assessment	Various	Various : Various	-	1.538	Dec 2017	2.840	Nov 2018	2.715	Nov 2019	-		2.715	Continuing	Continuing	Continuing
ALPS Development/ Integration	Various	Various : Various	6.100	22.731	Jan 2018	7.495	Jan 2019	0.000		0.500	Jan 2020	0.500	0.000	36.826	-
Interoperability of Integrated AMD	SS/CPFF	Various : Various	-	15.000	Aug 2018	20.000	Feb 2019	-		-		-	0.000	35.000	-
FY 2019 SBIR/STTR Transfer	TBD	Army Budget Office : Pentagon, Washington, DC	-	-		1.488		-		-		-	0.000	1.488	-
Subtotal			6.100	39.269		31.823		2.715		0.500		3.215	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Component Assessments & Research and Trade Studies	Various	Various : Various	-	12.512	Feb 2018	5.850	Feb 2019	8.481	Feb 2020	-		8.481	Continuing	Continuing	Continuing
Subtotal			-	12.512		5.850		8.481		-		8.481	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019		
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering				Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare				

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Demonstration Planning and Execution	Various	Various : Various	-	4.200	Nov 2017	6.870	Nov 2018	3.003	Nov 2019	-		3.003	Continuing	Continuing	Continuing
Subtotal			-	4.200		6.870		3.003		-		3.003	Continuing	Continuing	N/A

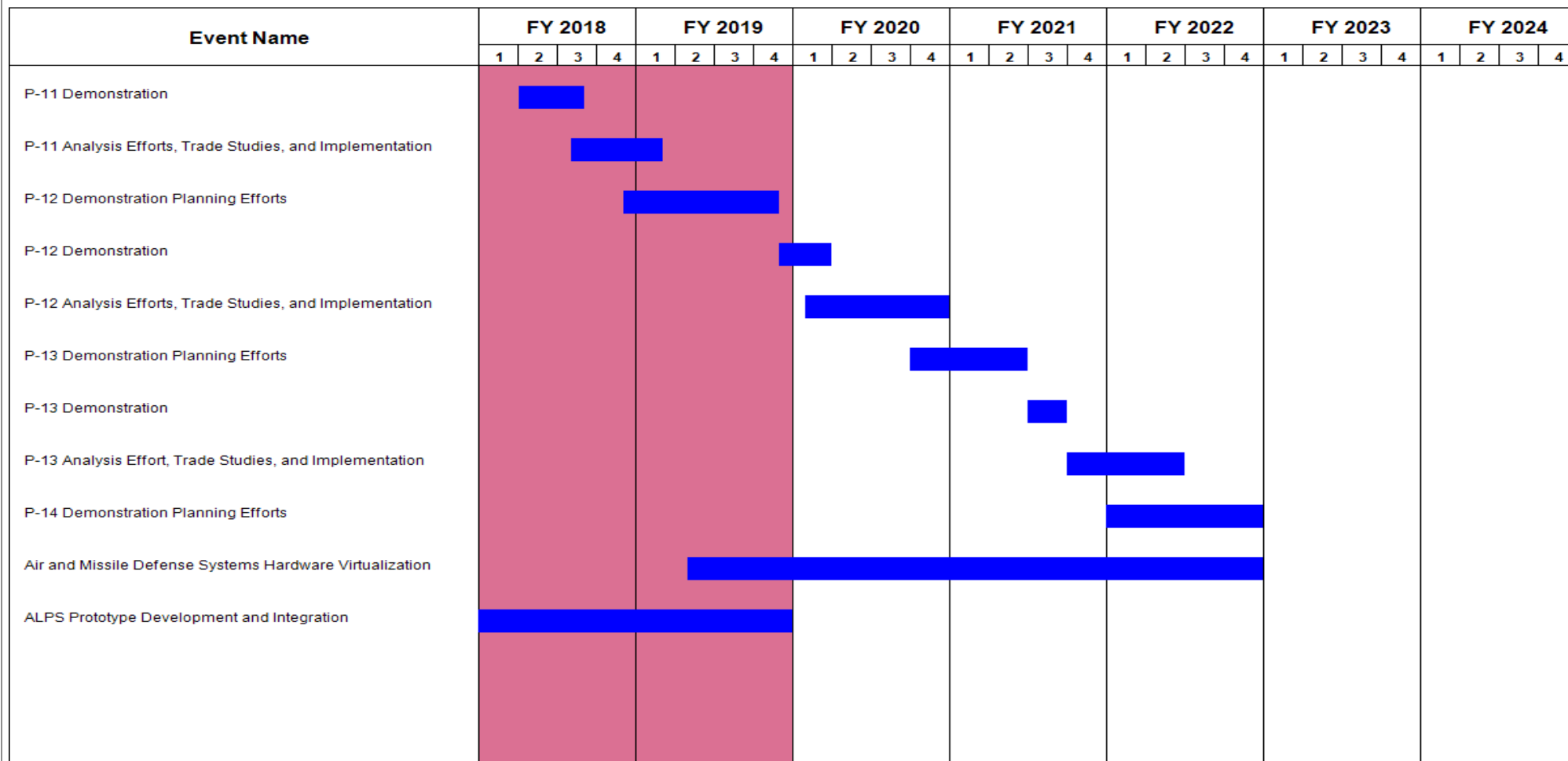
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.100	58.812		46.231		15.148		0.500		15.648	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering	Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare
--	--	---



UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603327A / Air and Missile Defense Systems Engineering	Project (Number/Name) FG9 / Air and Missile Defense (AMD) Electronic Warfare	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
P-11 Demonstration	2	2018	3	2018
P-11 Analysis Efforts, Trade Studies, and Implementation	3	2018	1	2019
P-12 Demonstration Planning Efforts	4	2018	4	2019
P-12 Demonstration	4	2019	1	2020
P-12 Analysis Efforts, Trade Studies, and Implementation	1	2020	4	2020
P-13 Demonstration Planning Efforts	4	2020	2	2021
P-13 Demonstration	3	2021	3	2021
P-13 Analysis Effort, Trade Studies, and Implementation	4	2021	2	2022
P-14 Demonstration Planning Efforts	1	2022	4	2022
Air and Missile Defense Systems Hardware Virtualization	2	2019	4	2022
ALPS Prototype Development and Integration	4	2017	4	2019