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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Army										Date: May 2017		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 0205456A I Lower Tier Air and Missile Defense (AMD) System							
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	-	61.653	73.417	78.926	-	78.926	80.314	109.222	112.614	123.007	Continuing	Continuing
EF9: System Integration and Test	-	61.653	73.417	78.926	-	78.926	80.314	109.222	112.614	123.007	Continuing	Continuing

A. Mission Description and Budget Item Justification

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against all threats that would not be possible in flight tests due to cost, target and range constraints. Flight testing is periodically required for validation of the Modeling and Simulation as well as satisfying Army Test and Evaluation Command/Director, Operational Test and Evaluation (ATEC/DOTE) requirements of segment improvements.

PATRIOT is an integral part of the overall Air and Missile Defense (AMD) Architecture and enables the incremental fielding of the system capability for Army Air and Missile Defense Battalions.

Funding provides authority to identify, analyze, design and test materiel solutions to counter cybersecurity and electronic warfare shortcomings to all elements of the Patriot Air Defense Weapon System.

FY2018 base dollars in the amount of \$78.926 million continues program development with the integration of missile and ground system software and hardware in support of complete Post Deployment Build-8.1 (PDB-8.1). Continues the testing program to support the Test and Evaluation Master Plan (TEMP) and system testing/analysis long lead activities for PDB-8.1 Development Test and Evaluation (DTE) and Initial Operational Test & Evaluation (IOT&E).

B. Program Change Summary (\$ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	64.159	69.417	79.562	-	79.562
Current President's Budget	61.653	73.417	78.926	-	78.926
Total Adjustments	-2.506	4.000	-0.636	-	-0.636
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.506	-			
• Adjustments to Budget Years	0.000	0.000	-0.636	-	-0.636

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• Amended FY2017		0.000	4.000	0.000	- 0.000
<u>Change Summary Explanation</u>					
This increase requests an additional \$4M from the PB17 request to fund the modification of PATRIOT operational test target trajectory to better replicate advanced and evolving threats.					

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Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System				Project (Number/Name) EF9 / System Integration and Test			
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
EF9: System Integration and Test	-	61.653	73.417	78.926	-	78.926	80.314	109.222	112.614	123.007	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation allows for performance assessment against all threats that would not be possible in flight tests due to cost, target, and range constraints. Flight testing is periodically required for validation of Modeling and Simulation as well as satisfying ATEC/DOTE requirements of segment improvements.

PATRIOT is an integral part of the overall Air and Missile Defense (AMD) Architecture and enables the incremental fielding of the system capability for Army Air and Missile Defense Battalions.

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

	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Program Development, Integration, and Support	25.428	31.794	32.629	-	32.629
Description: Funding is provided for the following effort:					
FY 2016 Accomplishments:					
-Continued program development.					
-Continued integration of missile and ground system hardware and software in support of PDB-8 activities.					
-Began PDB-8.05 program development activities.					
FY 2017 Plans:					
-Continues program development which includes PATRIOT program modeling and simulation (M&S) laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.					
-Continues integration of missile and ground system hardware and software to complete PDB-8 activities.					
-Continues with PDB-8.0.5 activities which include Advanced Electronic Protection (EP) improvements and Mission Tailoring Threat Data Base maintenance.					
FY 2018 Base Plans:					
-Continues program development.					
-Continues integration of missile and ground system hardware and software to complete PDB-8.1 activities.					

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Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System				Project (Number/Name) EF9 / System Integration and Test				
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Continues with PDB-8.1 activities which include Advanced EP improvements and Mission Tailoring Threat Data Base maintenance.												
Title: Testing, Targets, Modeling and Simulation								36.225	41.623	46.297	-	46.297
Description: Funding is provided for the following effort:												
FY 2016 Accomplishments: -Continued testing program to include utilization of targets/threat simulators and modeling efforts. -Continued test activities to support the TEMP. -Continued system testing/analysis for PDB-8 DTE and Initial Operational Test & Evaluation (IOT&E).												
FY 2017 Plans: -Continues the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts. -Continues test activities to support the TEMP. -Continues system testing/analysis for PDB-8/8.05 DTE and IOT&E.												
FY 2018 Base Plans: -Continues the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts. -Continues test activities to support the TEMP. -Continues system testing/analysis for PDB-8.1 DTE and IOT&E. -Continues PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.												
Accomplishments/Planned Programs Subtotals								61.653	73.417	78.926	-	78.926
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	
• PE 0605456A, Project	2.201	-	-	-	-	-	-	-	-	0.000	2.201	
PA3: PE 0605456A, Project												
PA3 PAC-3/MSE Missile												
• SSN C53101: SSN	514.946	702.201	459.040	-	459.040	499.915	540.669	523.413	524.934	Continuing	Continuing	
C53101 MSE Missile												

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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 C50016: SSN C50016, Lower-Tier Air and Missile Defense (AMD)	130.275	126.470	140.826	-	140.826	125.161	144.243	119.282	121.825	Continuing	Continuing	
• PE 0604319A, Project DU3, IFPC2: PE 0604319A, Project DU3, IFPC2 (FY12 PE 0603305A IFPC II - Intercept)	149.222	-	31.303	-	31.303	52.604	239.305	259.804	316.104	Continuing	Continuing	
• SSN C62002: SSN C62002, IFPC Inc 2-I Block 1 System	-	19.319	57.742	-	57.742	31.641	191.830	315.025	277.500	Continuing	Continuing	
• SSN C62001: SSN C62001, IFPC Inc 2-I Block 1 Missile	-	-	-	-	-	157.406	144.740	100.400	14.600	Continuing	Continuing	
• PE0604820A, Project E10: PE0604820A, Project E10 SENTINEL	11.821	15.983	32.968	-	32.968	31.761	51.897	72.562	81.351	Continuing	Continuing	
• PE 0605457A, Project S40: PE 0605457A, Project 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 (IBCS)	20.917	204.969	-	-	-	-	274.494	375.026	513.464	Continuing	Continuing	
• PE0604741A, Project 146, 149: PE0604741A, Project 146, 149; Air Defense C21 Eng Dev	33.619	61.532	28.726	-	28.726	28.320	14.638	8.674	-	0	175.509	
• SSN AD5070: SSN AD5070 Air & Missile Defense Planning & Control Sys	28.176	126.539	26.635	24.100	50.735	17.960	6.366	32.397	-	0	262.173	
• PE 0202429A: PE 0202429A Proj EP8, JLENS COCOM EXERCISE	10.171	45.482	6.749	-	6.749	0.001	-	-	-	0	62.403	
• PE 0604114A: PE 0604114A Proj EX2; Lower Tier Air Missile Defense (LTAMD) Capability	-	35.132	76.728	-	76.728	67.088	83.195	114.185	142.000	Continuing	Continuing	

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Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System				Project (Number/Name) EF9 / System Integration and Test			
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 C62004: SSN C62004, IFPC Inc 2-1 Block 2 Missile	-	-	-	-	-	-	-	-	12.300	Continuing	Continuing
• PE 0605052A: PE 0605052A, EY7; IFPC Increment 2 - Block 1	-	83.995	155.169	-	155.169	133.406	52.300	24.700	-	Continuing	Continuing
Remarks This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.											
D. Acquisition Strategy The ongoing design and developmental activities enable modeling and simulation infrastructure maintenance and upgrades coupled with end to end testing of the Lower Tier architecture against the evolving threat as an element of an integrated Air and Missile Defense system. This strategy minimizes technological risks and provides a means of enhancing system capability through planned upgrades of deployed systems. Lower Tier system development efforts enable further improvement of system capabilities against emerging and reactive threats. Developing, fabricating and testing hit to kill surface to air missile and associated ground support equipment provides essential increases in battle space, accuracy, lethality and firepower to counter and destroy evolving air defense threats. These state of the art capabilities and enhancements require ongoing demonstration through a series of flight tests and modeling and simulation activities.											
E. Performance Metrics N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Army												Date: May 2017			
Appropriation/Budget Activity 2040 / 7						R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System				Project (Number/Name) EF9 / System Integration and Test					
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	MIPR	Various : Huntsville, Alabama	1.150	1.158	Dec 2015	0.964	Dec 2016	1.156	Dec 2017	-		1.156	Continuing	Continuing	0.000
PAC-3 Product Office	RO	Project Office : Huntsville, AL	0.165	1.100	Oct 2015	1.051	Oct 2016	1.188	Oct 2017	-		1.188	Continuing	Continuing	0.000
Subtotal			1.315	2.258		2.015		2.344		-		2.344	-	-	0.000
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Integration MSE LMMFC	Various	Lockheed Martin Missiles and Fire Control (LMMFC) : Dallas, Texas	0.000	12.300	Feb 2016	16.641	Feb 2017	15.456	Feb 2018	-		15.456	Continuing	Continuing	0.000
MSE/PAC-3 Raytheon	Various	Raytheon : Waltham, Massachusetts	4.450	3.800	Jan 2016	4.569	Feb 2017	5.598	Jan 2018	-		5.598	Continuing	Continuing	0.000
SETA Contracts	Various	Multiple : Multiple	3.083	1.850	Feb 2016	0.889	Feb 2017	1.069	Feb 2018	-		1.069	Continuing	Continuing	0.000
U.S. Other Government Agencies (OGAs)	MIPR	Various : Huntsville, Alabama	4.310	5.220	Dec 2015	7.680	Dec 2016	7.677	Dec 2017	-		7.677	Continuing	Continuing	0.000
Subtotal			11.843	23.170		29.779		29.800		-		29.800	-	-	0.000
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Targets/Threats Simulators	MIPR	Various : Huntsville, Alabama	25.345	22.188	Feb 2016	30.345	Feb 2017	33.637	Feb 2018	-		33.637	Continuing	Continuing	0.000
Modeling and Simulation	MIPR	Various : Huntsville, Alabama	3.724	3.000	Jan 2016	3.065	Jan 2017	3.685	Jan 2018	-		3.685	Continuing	Continuing	0.000
Contractor T&E	Various	Multiple : Multiple	8.425	4.952	Feb 2016	1.625	Feb 2017	1.953	Feb 2018	-		1.953	Continuing	Continuing	0.000
Other T&E funding	MIPR	Various : WSMR, NM	3.550	2.585	May 2016	2.822	May 2017	3.190	May 2018	-		3.190	Continuing	Continuing	0.000

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Army												Date: May 2017			
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Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Mobile Flight Mission Simulator (MFMS)	SS/FPIF	Raytheon : Massachusetts	8.300	1.600	Jan 2016	1.226	Jan 2017	0.948	Jan 2018	-		0.948	Continuing	Continuing	0.000
PDB-8	MIPR	Various : WSMR, NM	1.331	1.900	Feb 2016	2.540	Feb 2017	3.369	Feb 2018	-		3.369	Continuing	Continuing	0.000
PDB-8 DT/OT	MIPR	Various : WSMR, NM	14.887	-		-		-		-		-	Continuing	Continuing	0.000
Subtotal			65.562	36.225		41.623		46.782		-		46.782	-	-	0.000

	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	78.720	61.653		73.417		78.926		-		78.926	-	-	-

Remarks

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Army																				Date: May 2017																	
Appropriation/Budget Activity 2040 / 7										R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System								Project (Number/Name) EF9 / System Integration and Test																			
Event Name										FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
										1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PATRIOT System Testing, Integration and Evaluation																																					
Program Development, Integration, and Support																																					
Testing, Targets, Modeling and Simulation																																					
PDB-8.0.5 Agile Build																																					
PDB-8 Fielding																																					
(1) PDB-8 IOC																																					

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Army			Date: May 2017
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / <i>Lower Tier Air and Missile Defense (AMD) System</i>	Project (Number/Name) EF9 / <i>System Integration and Test</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PATRIOT System Testing, Integration and Evaluation	1	2015	4	2022
Program Development, Integration, and Support	1	2015	4	2022
Testing, Targets, Modeling and Simulation	1	2015	4	2022
PDB-8.0.5 Agile Build	2	2016	4	2022
PDB-8 Fielding	2	2018	4	2022
PDB-8 IOC	2	2018	2	2018