Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	44.581	35.034	152.991	-	152.991	143.939	186.072	162.462	206.821	Continuing	Continuing
DV8: *Patriot Product Improvement*	-	44.581	35.034	152.991	-	152.991	143.939	186.072	162.462	206.821	Continuing	Continuing

The FY 2015 OCO Request will be submitted at a later date.

Note

Increase in base dollars in FY 2015 addresses Upper-Tier Debris Mitigation (UTDM), continues Software Improvement for Threat Evolution, Radar Digital Processor (RDP) development and RDP Waveform Suite, THAAD/PATRIOT Interoperability efforts, Advanced Electronic Counter Measures (AECM), Tasks 2, 6, and 7 activities, Combat ID Enhancements, Common Warfighter-Machine Interface (CWMI) efforts, Launch on Remote, SIPRNet/NIPRNet Access Point/Troposcatter (SNAP TROPO) and Flat Panel Array Concept Development for the PATRIOT Product Improvement Program (PIP).

A. Mission Description and Budget Item Justification

PATRIOT is an advanced Surface-to-Air guided missile system with a high probability of kill, capable of operation in the presence of Electronic Countermeasures (ECM) and able to conduct multiple simultaneous engagements against high performance air breathing targets and ballistic missiles likely to be encountered by U.S. Forces. The PATRIOT Product Improvement Program provides for the upgrade of the PATRIOT System through individual materiel changes. The PATRIOT Product Improvement Program upgrades the PATRIOT system to address operational lessons learned, enhancements to joint force interoperability, and other system performance improvements to provide overmatch capability with the emerging threat. Efforts will be made to expedite PATRIOT materiel solutions (e.g. Radar Digital Processor, Communications Upgrades, address Tactical Ballistic Missile (TBM) capability, Combat ID, and Advanced ECM improvements) to both enhance capability and facilitate integration into the Integrated Air and Missile Defense (IAMD) architecture. Near term efforts are modifications and FY17 initiates competitive modernization through development of the Active Electronically Scanned Array (AESA) radar and Radar on the Net.

B. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	109.978	70.053	53.963	-	53.963
Current President's Budget	44.581	35.034	152.991	-	152.991
Total Adjustments	-65.397	-35.019	99.028	-	99.028
• Congressional General Reductions	-0.066	-0.019			
• Congressional Directed Reductions	-60.000	-35.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.392	-			
• Adjustments to Budget Years	-	-	99.028	-	99.028

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army				Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*			
• Other Adjustments	-3.939	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*				Project (Number/Name) DV8 / *Patriot Product Improvement*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
DV8: *Patriot Product Improvement*	-	44.581	35.034	152.991	-	152.991	143.939	186.072	162.462	206.821	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

The FY 2015 OCO Request will be submitted at a later date.

Note

Continues effort funded in PE 0203801A (Project 036).

A. Mission Description and Budget Item Justification

Software Improvement (modification) for threat evolution: Performs necessary analysis and development efforts to maintain PATRIOT system effectiveness against evolving threat technologies and specific threat capabilities. This effort identifies evolving threats and threat characteristics that might present a challenge to PATRIOT's current capabilities and develops initial concepts to maintain system effectiveness relative to these threats.

Upper-Tier Debris Mitigation (UTDM): Implements algorithms to mitigate system impacts of debris from Upper Tier intercepts associated with operating in the Ballastic Missile Defense System (BMDS) environment. Debris from Upper Tier intercepts can cause significant radar loading effects and the potential for erroneous engagements and missile wastage on debris.

Radar Digital Processor (RDP) Development: Incorporates improvements to mitigate radar hardware obsolescence, improves Reliability, Availability and Maintainability (RAM) and improves performance of the PATRIOT Radar Set against evolving threat sets. This program includes the implementation of Identification Friend or Foe (IFF) Mode 5 Level 1 / Level 2, and a Non-Cooperative Target Recognition (NCTR) Combat ID technique to mitigate potential fratricide risk, and the development of CONOPS to incorporate the new Combat ID capabilities into system operation. The RDP also provides the necessary radar processing capability to support follow-on EDP Tasks 6 and 7 to counter emerging threats and provide data necessary to support migration to IAMD. The RDP is a pre-requisite for migration to an IAMD Netted Sensor.

RDP Waveform Suite: Develops a comprehensive set of waveforms in the RDP to improve PATRIOT radar capabilities against current and evolving threats, including support to Task 6 and 7 efforts, and also implements advanced data collection enabled by the RDP to support further system improvements. The RDP implementation allows significant radar waveform improvements necessary to counter evolving threats.

SIPRNet/NIPRNet Access Point/Troposcatter (SNAP/TROPO): Provides hardware interfaces to support extended range communications within the battalion (TROPO) and Force Operations interfaces to satellite for access to SIPR/NIPR worldwide communication networks.

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

THAAD/PATRIOT Interoperability: Implements improvements to THAAD/PATRIOT Interoperability and addresses Joint Defense Network (JDN) deficiencies that impact Tactical Ballistic Missile (TBM) battle management and force/engagement operations. Efforts will be concentrated on joint, collaborative force operations (defense design and planning) and enhanced Tactical Digital Information Link - Joint (TADIL J) interoperability.

Advanced Electronic Counter Measures (AECM): This task investigates the implications of advanced technology Digital Radio Frequency Memory (DRFM) available on airborne platforms that enables new ECM techniques which could adversely affect Air and Missile Defense System effectiveness.

Internet Protocol Commo Phase 1 Force Modification: Replacement of the current KG-194A encryptors in PATRIOT requires redesign of the basic PATRIOT shelter communications architecture to incorporate new hardware which interfaces the existing Integrated Digital Operator Control System (IDOCS) to new KIV-7M encryptors and provides an IP base backbone for range extension and over the air IP communications tunneling for Force Operations message traffic without impacting the Engagement Operations traffic.

Task 2: Implements improved ground system and interceptor capabilities (PATRIOT Advanced Capability-2 / Guidance Enhanced Missiles(PAC-2/GEM), PATRIOT Advanced Capability-3 (PAC-3), and Missile Segment Enhancement (MSE) to counter stressing TBM threats.

Task 6: Software improvements enhance discrimination of higher altitude TBM Re-entry Vehicles (RVs) from associated objects to support the full engagement capabilities of the interceptor. Longer-range detection and track, and improved high-altitude discrimination are required to achieve the required lethality performance against the RV and to mitigate missile wastage against separation debris. This task leverages the signal processing capabilities of the RDP, and supports the high altitude engagements required by the PATRIOT Advanced Capability-3 (PAC-3) and PAC-3 Missile Segment Enhancement (MSE) missiles.

Task 7: Software improvements analyze existing and evolving TBM countermeasures and their effects on PATRIOT system effectiveness. Develop concepts to address countermeasure effects and ensure the PATRIOT system maintains its effectiveness. Develop detailed system requirements to implement concepts; design/ code/test software implementation leveraging RDP, Modernized Adjunct Processor (MAP), Enhanced Weapons Control Computer - Emulator (EWCC-E) and Flight Solution Computer - Redesign (FSC-R) processing capabilities.

Combat ID Enhancements: Develop and implement improvements to the RDP-C Combat ID capabilities and additional NCTR technique to further mitigate misclassification and fratricide risk, and to provide the Warfighter with improved situational awareness.

Common Warfighter-Machine Interface (CWMI): Leverage modern manstation capabilities to implement CWMI concepts to improve training commonality and cost-efficiency, and to provide better situational awareness.

PAC-3 Launch on Remote (LOR) is a software upgrade to the PATRIOT ground and missile systems that extends the capability of the PATRIOT system to engage Tactical Ballistic Missiles (TBM). LOR utilizes targeting data from existing fire control radars such as THAAD AN/TPY-2 and AEGIS AN/SPY-1 to launch a PAC-3 Missile Segment Enhancement (MSE) missile against challenging TBM threats before the PATRIOT radar can detect the incoming target. This allows for a significantly expanded PATRIOT defended area against TBMs when using the MSE missile and the Radar Digital Processor.

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

Flat Panel Array Concept Development: This task provides studies for initial concepts and performance capabilities related to the implementation of an Active Electronically Scanned Array (AESA) transmitter/antenna into the PATRIOT radar. These assessments are needed to refine user community expectations and requirements, and to prepare a viable set of requirements to support a competitive modernization competition.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2013	FY 2014	FY 2015
Title: PATRIOT Product Improvement	44.581	35.034	152.991
Articles:	-	-	-
Description: Software Improvement for Threat Evolution ***FY 2013 Accomplishments:*** Continued Software Improvement for Threat Evolution, Radar Digital Processor (RDP) development, THAAD/PATRIOT interoperability efforts, Advanced Electronic Counter Measures (AECM), Tasks 2 and 6, Actively Electronically Scanned Array (AESA) and Internet Protocol Commo Phase 1 Force Modernization. ***FY 2014 Plans:*** Continues Software Improvement for Threat Evolution. Radar Digital Processor (RDP) continues development to support U.S. FY 2016 fielding. Supports improvements for Advanced Electronic Counter Measures (AECM), SIPRNet/NIPRNet Access Point/ Troposcatter (SNAP/TROPO), Combat ID Enhancements, and Task 6 efforts for PATRIOT Product Improvement Program. ***FY 2015 Plans:*** Continues Software Improvement for Threat Evolution. Radar Digital Processor development continues efforts to support U.S. FY 2016 fielding, providing the field with additional capability and growth potential to counter stressing threats. Begins RDP Waveform Suite development. Continues efforts and Advanced Electronic Counter Measures (AECM). Increase in base dollars in FY 2015 addresses Upper-Tier Debris Mitigation (UTDM), THAAD/PATRIOT Interoperability efforts, Tasks 2, 6, and 7 activities, Combat ID Enhancements, Common Warfighter-Machine Interface (CWMI) efforts, Flat Panel Array Concept Development and Launch on Remote (LOR) for the PATRIOT Product Improvement Program (PIP).			
Accomplishments/Planned Programs Subtotals	44.581	35.034	152.991

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

The improvements/enhancements developed through the PATRIOT Product Improvement Program (PIP) are procured and installed under the MSLS (procurement) appropriation PATRIOT Mods (C50700).

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

D. Acquisition Strategy

The design objective of the PATRIOT system was to provide a baseline system capable of modification to cope with continuing threat evolution. This program minimizes technological risks and provides a means of enhancing system capability through planned upgrades of deployed systems. The PATRIOT Product Improvement Program upgrades the PATRIOT system to address operational lessons learned, enhancements to joint force interoperability and communications, and other system performance improvements to provide overmatch capability against the emerging threat. Upgrades are implemented through individual hardware and software materiel changes and fielded incrementally. This program encompasses several changes which will require the use of a variety of acquisition methods to develop, test, procure and field.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*	Project (Number/Name) DV8 / *Patriot Product Improvement*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2013 Cost	FY 2013 Award Date	FY 2014 Cost	FY 2014 Award Date	FY 2015 Base Cost	FY 2015 Base Award Date	FY 2015 OCO Cost	FY 2015 OCO Award Date	FY 2015 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Various	RSA, AL : MIPR	0.000	0.538	Oct 2012	0.416	Oct 2013	0.320	Oct 2014	-		0.320	Continuing	Continuing	-
U.S. Contracts	C/FFP	Intuitive Research and Technology Corp. (IRTC) : Huntsville, AL	0.000	0.361	Jan 2013	0.250	Feb 2014	1.450	Feb 2015	-		1.450	Continuing	Continuing	-
		Subtotal	0.000	0.899		0.666		1.770		-		1.770	-	-	-

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2013 Cost	FY 2013 Award Date	FY 2014 Cost	FY 2014 Award Date	FY 2015 Base Cost	FY 2015 Base Award Date	FY 2015 OCO Cost	FY 2015 OCO Award Date	FY 2015 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Improvement for Threat Evolution	Various	Multiple : Multiple	0.000	5.370	Jan 2013	8.600	Jan 2014	10.000	Jan 2015	-		10.000	Continuing	Continuing	-
Upper Tier Debris Mitigation (UTDM)	Various	Multiple : Multiple	0.000	-		-		4.800	Jan 2015	-		4.800	-	4.800	-
Radar Digital Processor (RDP) Development	Various	Multiple : Multiple	0.000	23.300	Jan 2013	18.800	Jan 2014	8.700	Jan 2015	-		8.700	-	50.800	-
SNAP/TROPO	Various	Multiple : Multiple	0.000	-		0.500	Feb 2014	-		-		-	-	0.500	-
RDP Waveform Suite	Various	Multiple : Multiple	0.000	-		-		6.500	Jan 2015	-		6.500	-	6.500	-
THAAD PATRIOT Interoperability	Various	Multiple : Multiple	0.000	1.200	Jan 2013	-		5.600	Jan 2015	-		5.600	-	6.800	-
Advanced Electronic Counter Measures (AECM)	Various	Multiple : Multiple	0.000	3.700	Jan 2013	3.000	Jan 2014	24.522	Jan 2015	-		24.522	Continuing	Continuing	Continuing
Internet Protocol Commo Phase 1 Force Modernization	Various	Multiple : Multiple	0.000	2.400	Jan 2013	0.300	Jan 2014	-		-		-	-	2.700	-
Task 2	Various	Multiple : Multiple	0.000	5.200	Jan 2013	-		14.184	Jan 2015	-		14.184	Continuing	Continuing	Continuing
Task 6	Various	Multiple : Multiple	0.000	2.100	Jan 2013	2.000	Feb 2014	18.944	Jan 2015	-		18.944	Continuing	Continuing	Continuing
Task 7	Various	Multiple : Multiple	0.000	-		-		17.310	Jan 2015	-		17.310	-	17.310	-
Combat ID Enhancements	Various	Multiple : Multiple	0.000	-		0.800	Feb 2014	28.464	Jan 2015	-		28.464	-	29.264	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2015 Army		Date: March 2014
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2013 Cost	FY 2013 Award Date	FY 2014 Cost	FY 2014 Award Date	FY 2015 Base Cost	FY 2015 Base Award Date	FY 2015 OCO Cost	FY 2015 OCO Award Date	FY 2015 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Common Warfighter-Machine Interface (CWMI)	Various	Multiple : Multiple	0.000	-		-		5.000		-		5.000	-	5.000	-
Launch on Remote (LOR)	Various	Multiple : Multiple	0.000	-		-		5.700	Jan 2015	-		5.700	-	5.700	-
Flat Panel Array Concept Development	Various	Multiple : Multiple	0.000	-		-		1.000	Jan 2015	-		1.000	-	1.000	-
		Subtotal	0.000	43.270		34.000		150.724		-		150.724	-	-	-

Remarks

The contract method type Sole Source/Various is Fixed Price Level of Effort which includes Cost Plus Fixed Fee for material, ODC, and travel.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2013 Cost	FY 2013 Award Date	FY 2014 Cost	FY 2014 Award Date	FY 2015 Base Cost	FY 2015 Base Award Date	FY 2015 OCO Cost	FY 2015 OCO Award Date	FY 2015 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RDEC and Other Govt Agencies	Various	RSA, AL : MIPR	0.000	0.412	Jan 2013	0.368	Jan 2014	0.497	Jan 2015	-		0.497	Continuing	Continuing	-
		Subtotal	0.000	0.412		0.368		0.497		-		0.497	-	-	-

	Prior Years	FY 2013		FY 2014		FY 2015 Base		FY 2015 OCO		FY 2015 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	44.581		35.034		152.991		-		152.991	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

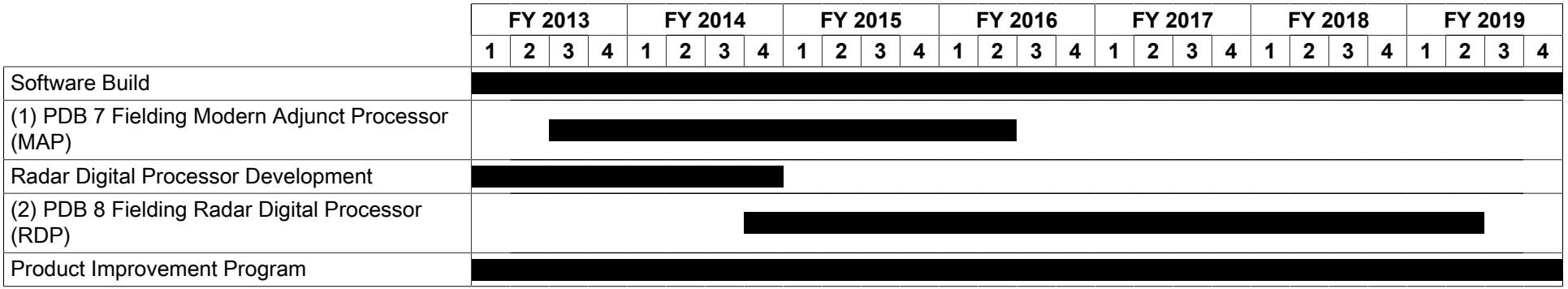

Exhibit R-4A, RDT&E Schedule Details: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Software Build	4	2005	4	2019
(1) PDB 7 Fielding Modern Adjunct Processor (MAP)	3	2013	2	2016
Radar Digital Processor Development	1	2012	4	2014
(2) PDB 8 Fielding Radar Digital Processor (RDP)	4	2014	2	2019
Product Improvement Program	1	2013	4	2019