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Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army **DATE:** February 2011

APPROPRIATION/BUDGET ACTIVITY 2040: <i>Research, Development, Test & Evaluation, Army</i> BA 5: <i>Development & Demonstration (SDD)</i>	R-1 ITEM NOMENCLATURE PE 0604820A: <i>RADAR DEVELOPMENT</i>
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COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
Total Program Element	-	-	2.890	-	2.890	3.449	1.983	1.968	2.937	Continuing	Continuing
E10: <i>SENTINEL</i>	-	-	2.890	-	2.890	3.449	1.983	1.968	2.937	Continuing	Continuing

Note

Increase in FY 12 is for restart of Sentinel Research, Development, Test and Evaluation (RDTE) line to support obsolescence, evolving threat sets, and Counter Rockets, Artillery, and Mortars (CRAM) integration. Sentinel is now scheduled to be in the field until 2030. The RDTE line keeps the Improved Sentinel Radar System viable against the evolving threat set.

A. Mission Description and Budget Item Justification

This system is an integral part of the overall Air and Missile Defense [AMD] architecture and will provide for an incrementally fielded Integrated Air and Missile Defense Fire Control System/capability for the composite Army Air and Missile Defense Brigades. The Improved Sentinel system is used with the Forward Area Air Defense Command and Control [FAAD C2] element and is a key component to the Integrated Air and Missile Defense architecture via the Integrated Air and Missile Defense Battle Command System [IBCS] to provide critical air surveillance of the forward areas.

Improved Sentinel [AN/MPQ-64A1] consists of a radar-based sensor with its prime mover/power, Identification Friend or Foe [IFF], and Forward Area Air Defense [FAAD] Command, Control and Intelligence [C2I] interfaces. The radar is deployed in both an air defense role and a force protection role for Counter Rocket, Artillery, and Mortar [CRAM] missions. The sensor is advanced three-dimensional battlefield X-Band air defense phased-array radar with an instrumented range of 75 km. The Improved Sentinel is capable of operating day or night, in adverse weather conditions, in the battlefield environments of dust, smoke, aerosols and enemy countermeasures. It provides 360-degree azimuth coverage for acquisition tracking. The Improved Sentinel contributes to the digital battlefield by automatically detecting, classifying, identifying and reporting targets [cruise missiles, unmanned aerial vehicles, rotary wing and fixed wing aircraft]. Improved Sentinel acquires targets sufficiently forward of the battle area to allow weapons reaction time and allow engagement at optimum ranges. The Improved Sentinel's integrated IFF reduces the potential for fratricide of US and Coalition aircraft.

The Research and Development funding supports Sentinel modernization/upgrades, hardware/software issue resolution, resolution of obsolescence issues, engineering studies, and cost reduction initiatives. The funding for FY12 through FY16 development activities closes the following Sentinel system capability gaps identified by the User: 1] Range Detection gap and 2] Non-Cooperative Target Recognition gap.

Battle Space Improvement addresses the Range Detection gap that currently exists with the Sentinel system. This development effort modifies the radar signal processor algorithms to reduce system processing losses. The modified algorithms will increase target acquisition and tracking range capability by a minimum of 12 percent against the threat set within the instrumented range band. This effort also develops modifications to the radar hardware by adding a common signal processing card to the radar signal processor to provide a common hardware and software processing configuration across the Sentinel radar fleet.

Addresses the Non-Cooperative Target Recognition [NCTR] gap that currently exists with the Sentinel system.

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APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 5: Development & Demonstration (SDD)		R-1 ITEM NOMENCLATURE PE 0604820A: RADAR DEVELOPMENT			
B. Program Change Summary (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	-	-	-	-	-
Current President's Budget	-	-	2.890	-	2.890
Total Adjustments	-	-	2.890	-	2.890
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	2.890	-	2.890

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COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
E10: <i>SENTINEL</i>	-	-	2.890	-	2.890	3.449	1.983	1.968	2.937	Continuing	Continuing
Quantity of RDT&E Articles											

Note

This is a new start for the Sentinel RDTE funding line. Last RDTE funding for Sentinel was in FY2008.

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This system is an integral part of the overall Air and Missile Defense [AMD] architecture and will provide for an incrementally fielded Integrated Air and Missile Defense Fire Control System/capability for the composite Army Air and Missile Defense Brigades. The Improved Sentinel system is used with the Forward Area Air Defense Command and Control [FAAD C2] element and is a key component to the Integrated Air and Missile Defense architecture via the Integrated Air and Missile Defense Battle Command System [IBCS] to provide critical air surveillance of the forward areas.

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The Research and Development funding supports Sentinel modernization/upgrades, hardware/software issue resolution, resolution of obsolescence issues, engineering studies, and cost reduction initiatives. The funding for FY12 through FY16 development activities closes the following Sentinel system capability gaps identified by the User: 1] Range Detection gap and 2] Non-Cooperative Target Recognition gap.

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B. Accomplishments/Planned Programs (\$ in Millions)										FY 2010	FY 2011	FY 2012
Title: Product Development Description: Funding is provided for the following effort: FY 2012 Plans: Modify radar signal processor algorithms and add common signal processing card to radar signal processor. Integrate non-cooperative target recognition technology with Improved Sentinel and tailor signal processing. Perform technical assessments, concept studies, cost reduction, risk reduction, threat analysis, and required documentation.										-	-	2.790
Title: Test & Evaluation Description: Funding is provided for the following effort: FY 2012 Plans: Plan and test the modified radar signal processor algorithms.										-	-	0.100
Accomplishments/Planned Programs Subtotals										-	-	2.890
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost	
• PE 0604869A: Patriot/MEADS Combined Aggregate Program (CAP)	570.831	467.139	406.605		406.605					Continuing	Continuing	
• PE 0605456A: PAC-3/MSE MISSILE		62.500	88.993		88.993		68.938	63.468	64.215	Continuing	Continuing	
• SSN C53101: SSN C53101, MSE Missile			74.953		74.953		532.540	487.049	560.099	Continuing	Continuing	
• SSN C53201: SSN C53201, PATRIOT/MEADS GSE												
• PE 0102419A: PE 0102419A, Proj E55, JLENS	317.132	372.493	344.655		344.655		58.124	19.717	19.726	Continuing	Continuing	
• SSN BZ0525: SSN BZ0525, JLENS Production							501.459	454.966	416.888	Continuing	Continuing	
• PE 0604802A: PE 0604802A, Proj S23, SLAMRAAM	56.441									Continuing	Continuing	

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C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost	
• PE 0605455A: PE 0605455A, Proj S35 SLAMRAAM		23.700	19.931		19.931					Continuing	Continuing	
• SSN C81002: SSN C81002, SLAMRAAM Launcher		116.732								Continuing	Continuing	
• SSN C81004: SSN C81004, SLAMRAAM Missile												
• PE 0603305A: PE 0603305A, Proj TR7, Indirect Fire Protection Capability II - Intercept		4.296	21.126		21.126		89.021	92.999	142.738	Continuing	Continuing	
• SSN WK5053: SSN WK5053, FAAD GBS		91.467	7.958		7.958					Continuing	Continuing	
• PE 0603327A: PE 0603327A, Proj S34, AMD System of System Engineering and Integration	164.719									Continuing	Continuing	
• PE 0605457A: PE 0605457A, Proj S40, Army Integrated Air and Missile Defense (AIAMD)		251.124	270.607		270.607		346.341	298.869	275.651	Continuing	Continuing	
• SSN BZ5075: SSN BZ5075, Army IAMD Battle Command System (IBCS)							23.587	100.560	256.855	Continuing	Continuing	
• PE 0208053: PE 0208053, Proj 635, JOINT TACT GRD STATION- P3I (MIP)	13.189	12.403	27.630		27.630		14.109	7.912	8.039	Continuing	Continuing	
• SSN BZ8401: SSN BZ8401, Joint Tactical Ground Station (JTAGS)	6.682	9.279	1.199		1.199		9.740	4.432	4.496	Continuing	Continuing	
• PE 0604820A: PE 0604820A, Proj E10, SENTINEL			2.890		2.890		1.983	1.968	2.937	Continuing	Continuing	
	25.783		41.657		41.657		48.418	46.613	46.463	Continuing	Continuing	

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C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
<ul style="list-style-type: none"> • SSN WK5057: <i>SSN WK5057, SENTINEL MODS</i> 											
D. Acquisition Strategy											
<p>Battle Space Improvement: The Sentinel Product Office will contract with Thales Raytheon Systems [TRS] in the 2nd quarter of FY12 to update and modify the radar signal processor algorithms. The updated software will be tested in FY13, documented, and released for installation.</p> <p>Non-Cooperative Target Recognition (NCTR): The Sentinel Product Office will contract with the Aviation and Missile Command Research and Development Engineering Center [AMRDEC] Prototype Integration Facility [PIF] to develop, test, and integrate the NCTR capability into the Sentinel fleet. The development effort is 57 months and will be initiated with an industry survey via a Request for Information and draft specifications. Follow-on briefings will be held over a two month period followed by a two month verification and validation test. Upon completion of testing, a full and open or limited participant Competitive Acquisition will be conducted, concluding with a contract award for a 42 month development and test effort.</p>											
E. Performance Metrics											
<p>Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.</p>											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2012 Army										DATE: February 2011			
APPROPRIATION/BUDGET ACTIVITY 2040: Research, Development, Test & Evaluation, Army BA 5: Development & Demonstration (SDD)				R-1 ITEM NOMENCLATURE PE 0604820A: RADAR DEVELOPMENT				PROJECT E10: SENTINEL					
Management Services (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Improved Sentinel Development	SS/CPFF	Thales Raytheon:Fullerton, CA	11.398	-		-		-		-	Continuing	Continuing	0.000
System of Systems Mod Development & Integration	SS/CPFF	Thales Raytheon:Fullerton ,CA	1.169	-		-		-		-	Continuing	Continuing	0.000
Battle Space Improvement	SS/CPFF	Thales Raytheon & Government:Fullerton, CA / Huntsville, AL	-	-		0.053		-		0.053	Continuing	Continuing	0.000
Non-Cooperative Target Recognition	SS/CR	Thales Raytheon & Government:Fullerton, CA / Huntsville, AL	-	-		0.077		-		0.077	Continuing	Continuing	0.000
Subtotal			12.567	-		0.130		-		0.130			0.000
Product Development (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Improved Sentinel Development	SS/CPFF	Thales Raytheon:Fullerton, CA	102.729	-		-		-		-	Continuing	Continuing	0.000
System of Systems Mod Development & Integration	SS/CPFF	Thales Raytheon:Fullerton, CA	20.820	-		-		-		-	Continuing	Continuing	0.000
Battle Space Improvement	SS/CPFF	Thales Raytheon & Government:Fullerton,CA / Huntsville, AL	-	-		1.130		-		1.130	Continuing	Continuing	0.000
Non-Cooperative Target Recognition	SS/CPFF	Thales Raytheon & Government:Fullerton, CA / Huntsville, AL	-	-		1.530		-		1.530	Continuing	Continuing	0.000
Subtotal			123.549	-		2.660		-		2.660			0.000

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Support (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Improved Sentinel Development	SS/CPFF	Thales Raytheon:Fullerton, CA	16.930	-		-		-		-	Continuing	Continuing	0.000
System of Systems Mod Development & Integration	SS/CPFF	Thales Raytheon:Fullerton, CA	0.352	-		-		-		-	Continuing	Continuing	0.000
Subtotal			17.282	-		-		-		-			0.000

Test and Evaluation (\$ in Millions)				FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Improved Sentinel Mod Development	SS/CPFF	Thales Raytheon:Fullerton CA	34.599	-		-		-		-	Continuing	Continuing	0.000
System of Systems Mod Development & Integration	SS/CPFF	Thales Raytheon:Fullerton, CA	2.331	-		-		-		-	Continuing	Continuing	0.000
Battle Space Improvement	SS/CPFF	Thales Raytheon & Government:Fullerton, CA / Huntsville, AL	-	-		0.100		-		0.100	Continuing	Continuing	0.000
Non-Cooperative Target Recognition	SS/CPFF	Thales Raytheon & Government:Fullerton, CA / Huntsville, AL	-	-		-		-		-	Continuing	Continuing	0.000
Subtotal			36.930	-		0.100		-		0.100			0.000

			Total Prior Years Cost	FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			190.328	-		2.890		-		2.890			0.000

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2012 Army			DATE: February 2011		
APPROPRIATION/BUDGET ACTIVITY		R-1 ITEM NOMENCLATURE		PROJECT	
2040: Research, Development, Test & Evaluation, Army		PE 0604820A: RADAR DEVELOPMENT		E10: SENTINEL	
BA 5: Development & Demonstration (SDD)					

	FY 2010				FY 2011				FY 2012				FY 2013				FY 2014				FY 2015				FY 2016			
	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
Battle Space Improvement																												
Non-Cooperative Target Recognition (NCTR)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2012 Army

DATE: February 2011

APPROPRIATION/BUDGET ACTIVITY

2040: *Research, Development, Test & Evaluation, Army*
BA 5: *Development & Demonstration (SDD)*

R-1 ITEM NOMENCLATURE

PE 0604820A: *RADAR DEVELOPMENT*

PROJECT

E10: *SENTINEL*

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Battle Space Improvement	1	2012	3	2013
Non-Cooperative Target Recognition (NCTR)	1	2012	3	2016

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