Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 5: *Development & Demonstration (SDD)*				R-1 ITEM NOMENCLATURE PE 0604820A: *RADAR DEVELOPMENT*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	-	2.885	3.486	-	3.486	1.966	1.948	2.972	3.022	Continuing	Continuing
E10: *SENTINEL*	-	2.885	3.486	-	3.486	1.966	1.948	2.972	3.022	Continuing	Continuing

A. Mission Description and Budget Item Justification

This system is a supporting program 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 (C-RAM) missions. The sensor is an 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 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 FY 2012 through FY 2017 development activities addresses the following obsolescence issues and Sentinel system capability gaps identified by the User: 1) Target Detection gap; 2) Target Tracking gap; 3) Net Readiness; and 4) Electronic Counter Measures (ECM) gap.

Battle Space Improvement addresses the Target 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.

Stop, Stare and Track addresses the Target Tracking gap. This development effort provides direct Fire Control Radar (FCR) support to a suitable Unmanned Aerial System (UAS) and/or Rockets, Artillery and Mortars (RAM) capability such as the Tamir missile. In addition this provides significantly improved Non-Cooperative Target Recognition (NCTR) timeline and performance against all targets. It also enables rapid classification of cued RAM, as well as very accurate Point of Origin (POO) and Point of Impact (POI), and enables a robust Kill Assessment capability of engaged targets.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army	DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 5: *Development & Demonstration (SDD)*	R-1 ITEM NOMENCLATURE PE 0604820A: *RADAR DEVELOPMENT*

Cross Domain Solution (CDS) Network Interface addresses net readiness and system security concerns. This effort develops a CDS interface to isolate the Improved Sentinel from connected networks of lower classification levels.

Electronic Counter Counter Measures (ECCM) addresses the ECM gap. This effort conducts additional testing to verify initial ECCM results and updates the database with more extensive ECCM signatures of evolving threats.

Signal Data Processor (SDP)/North Finding Module (NFM) addresses the Target Detection, Target Tracking, and ECM capability gaps and funds the mitigation of the SDP and NFM obsolescence issues. SDP cards are estimated to go obsolete every four to six years.

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	-	2.890	3.449	-	3.449
Current President's Budget	-	2.885	3.486	-	3.486
Total Adjustments	-	-0.005	0.037	-	0.037
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-0.005	0.037	-	0.037

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
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*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
E10: *SENTINEL*	-	2.885	3.486	-	3.486	1.966	1.948	2.972	3.022	Continuing	Continuing
Quantity of RDT&E Articles											

A. Mission Description and Budget Item Justification

This system is a supporting program 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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Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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*

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Signal Data Processor (SDP)/North Finding Module (NFM) addresses the Target Detection, Target Tracking, and ECM capability gaps and funds the mitigation of the SDP and NFM obsolescence issues. SDP cards are estimated to go obsolete every four to six years.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2011	FY 2012	FY 2013
Title: Product Development	-	2.472	2.553
Articles:		0	
Description: Funding is provided for the following efforts: ***FY 2012 Plans:*** Define requirements and functionality for battle space improvement and stop, stare and track capability. Develop new software code and/or modify radar signal processor algorithms. Add common signal processing card to radar signal processor. Perform technical assessments, concept studies, cost reduction, risk reduction, threat analysis, and required documentation. ***FY 2013 Plans:*** Integrate firmware, software and hardware. Build prototype subsystems/components for testing. Complete software code coding and modification of the system search and track logic, clutter mapping, and waveforms. Characterize performance, design & replace firmware, software and hardware. Perform technical assessments, concept studies, cost reduction, risk reduction, threat analysis, and required documentation.			
Title: Test & Evaluation	-	0.172	0.658
Articles:		0	
Description: Funding is provided for the following efforts: ***FY 2012 Plans:*** Plan and test new and modified radar signal processor algorithms. ***FY 2013 Plans:*** Conduct software qualification test and hardware verification testing, field testing against representative targets. Prepare Logistics products and required documentation for material release of software and hardware upgrades.			
Title: Management Support	-	0.241	0.275

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2011	FY 2012	FY 2013
Articles:		0	
Description: Funding is provided for the following efforts: ***FY 2012 Plans:*** Provides business management, contract management, financial management, and security management for active development projects in FY 2012. ***FY 2013 Plans:*** Provides business management, contract management, financial management, and security management for active development projects in FY 2013.			
Accomplishments/Planned Programs Subtotals	-	2.885	3.486

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• PE 0604869A: *Proj M06, Patriot/ MEADS Combined Aggregate Program (CAP)*	450.584	389.630	400.861		400.861					Continuing	Continuing
• PE 0605456A: *Proj PA3, PAC-3/ MSE MISSILE*	121.475	88.909	69.029		69.029		130.348	63.975	65.771	Continuing	Continuing
• SSN C53101: *MSE Missile*		74.953	12.850		12.850		505.084	596.387	566.757	Continuing	Continuing
• PE 0102419A: *Proj E55, JLENS*	399.477	327.338	190.422		190.422		32.480	24.130	24.612	Continuing	Continuing
• PE 0605455A: *Proj S35, SLAMRAAM*	18.358	1.529								Continuing	Continuing
• SSN C81002: *SLAMRAAM Launcher*	2.355									Continuing	Continuing
• PE 0604319A: *Proj DU3, IFPC2 (FY 20II /2012 PE0603305A IFPC II- Intercept)*	4.143	9.269	76.039		76.039		122.355	146.463	151.769	Continuing	Continuing
• SSN WK5053: *FAAD GBS*	258.413	3.958	7.980		7.980					Continuing	Continuing
• PE 0605457A,: *Proj S40, Army Integrated Air and Missile Defense (AIAMD)*	246.691	270.180	262.211		262.211		394.260	210.580	135.072	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• SSN BZ5075: *Army IAMD Battle Command System (IBCS)*							103.051	281.828	426.582	Continuing	Continuing
• PE 0208053: *Proj 635, JOINT TACT GRD STATION-P3I (MIP)*	12.005	27.586	31.738		31.738		8.006	8.134	8.314	Continuing	Continuing
• SSN BZ8401: *Joint Tactical Ground Station (JTAGS)*	9.227	1.199	2.680		2.680		4.432	4.496	4.768	Continuing	Continuing
• PE 0604820A: *Proj E10, SENTINEL*		2.885	3.486		3.486		1.948	2.972	3.022	Continuing	Continuing

D. Acquisition Strategy

Battle Space Improvement: The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to update and modify the radar signal processor algorithms. The updated software will be tested, documented and released for installation.

Stop, Stare and Track: The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to develop new and/or modify existing Sentinel software. The updated software will be tested, documented and released for installation.

Cross Domain Solution Interface: The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to develop an interface solution to isolate Improved Sentinel transmission from connected networks of lower classifications. The updated software will be tested, documented and released for installation in the field.

Electronic Counter Counter Measures (ECCM): The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to verify the initial ECCM Database and update the database with more extensive ECCM signatures of evolving threats. The updated database will be tested, documented and released for installation.

Signal Data Processor (SDP)/North Finding Module (NFM): The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to mitigate the Signal Data Processor and North Finding Module obsolescence. The updated SDP and NFM hardware will be tested, documented and released for installation in the field.

E. Performance Metrics

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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2013 Army			DATE: February 2012
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)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2012 Cost	FY 2012 Award Date	FY 2013 Base Cost	FY 2013 Base Award Date	FY 2013 OCO Cost	FY 2013 OCO Award Date	FY 2013 Total 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	-	0.079		0.088		-		0.088	0.000	0.167	0.000
Stop, Stare and Track	SS/CPFF	Thales Raytheon:Fullerton, CA	-	0.162		0.187		-		0.187	0.000	0.349	0.000
		Subtotal	12.567	0.241		0.275		-		0.275			0.000

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2012 Cost	FY 2012 Award Date	FY 2013 Base Cost	FY 2013 Base Award Date	FY 2013 OCO Cost	FY 2013 OCO Award Date	FY 2013 Total 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	-	0.725		0.827		-		0.827	0.000	1.552	0.000
Stop, Stare, and Track	SS/CPFF	Thales Raytheon & Government:Fullerton, CA / Huntsville, AL	-	1.747		1.726		-		1.726	0.000	3.473	0.000
		Subtotal	123.549	2.472		2.553		-		2.553			0.000

Exhibit R-3, RDT&E Project Cost Analysis: PB 2013 Army			DATE: February 2012
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2012 Cost	FY 2012 Award Date	FY 2013 Base Cost	FY 2013 Base Award Date	FY 2013 OCO Cost	FY 2013 OCO Award Date	FY 2013 Total 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)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2012 Cost	FY 2012 Award Date	FY 2013 Base Cost	FY 2013 Base Award Date	FY 2013 OCO Cost	FY 2013 OCO Award Date	FY 2013 Total 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	-	0.086		0.086		-		0.086	0.000	0.172	0.000
Stop, Stare and Track	SS/CPFF	Thales Raytheon:Fullerton, CA	-	0.086		0.572		-		0.572	0.000	0.658	0.000
		Subtotal	36.930	0.172		0.658		-		0.658			0.000

	Total Prior Years Cost	FY 2012		FY 2013 Base		FY 2013 OCO		FY 2013 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	190.328	2.885		3.486		-		3.486			0.000

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2013 Army		DATE: February 2012
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*

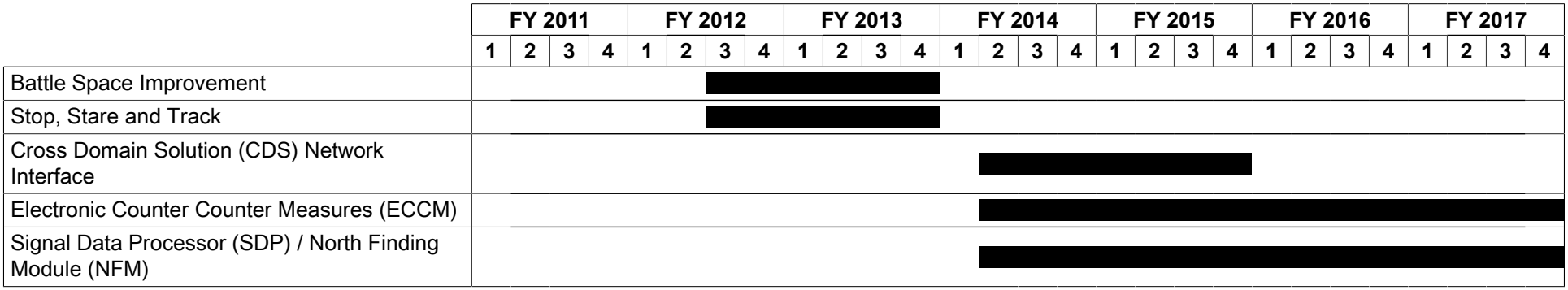

Exhibit R-4A, RDT&E Schedule Details: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 5: *Development & Demonstration (SDD)*	**R-1 ITEM NOMENCLATURE** PE 0604820A: *RADAR DEVELOPMENT*	**PROJECT** E10: *SENTINEL*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Battle Space Improvement	3	2012	4	2013
Stop, Stare and Track	3	2012	4	2013
Cross Domain Solution (CDS) Network Interface	2	2014	4	2015
Electronic Counter Counter Measures (ECCM)	2	2014	4	2017
Signal Data Processor (SDP) / North Finding Module (NFM)	2	2014	4	2017