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Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Army **Date:** February 2015

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>
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COST (\$ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
Total Program Element	-	1.796	5.221	12.309	-	12.309	11.465	10.971	12.191	30.277	Continuing	Continuing
E10: <i>Sentinel</i>	-	1.796	5.221	12.309	-	12.309	11.465	10.971	12.191	30.277	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 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 (IAMMD) architecture via the IAMMD Battle Command System (IBCS) to provide critical air surveillance of the forward areas.

The Sentinel currently consists of two primary variants: the AN/MPQ-64A1 system mounted on a High Mobility Multi-purpose Wheeled Vehicle (HMMWV), and an enhanced radar variant, the AN/MPQ-64A3 mounted on a 2.5 ton trailer and towed by an armored Family of Medium Tactical Vehicle (FMTV) platform. Sentinel also consists of 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 kilometers. 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. Sentinel contributes to the digital battlefield by automatically detecting, classifying, identifying and reporting targets (cruise missiles, unmanned aerial systems, rotary wing and fixed wing aircraft). Sentinel acquires targets sufficiently forward of the battle area to allow weapons reaction time and engagement at optimum ranges. 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 Fiscal Year (FY) 2014 through FY 2020 development activities addresses the following Sentinel system capability gaps and obsolescence issues identified by the User: 1) Target Detection gap; 2) Target Tracking gap; 3) Net Readiness gap; 4) Electronic Counter Measures (ECM) gap; and 5) Unmanned Aerial Systems (UAS) Defense 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 and 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 utilizing an upgraded 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 in an integrated air and missile defense architecture. In addition this provides significantly improved Non-Cooperative Target Recognition (NCTR) timeline and performance against all targets to include UAS, Cruise Missiles, Rotary Wing and Fixed Wing aircraft. This upgrade also enables rapid classification of cued Rockets, Artillery and Mortars (RAM), UAS, Rotary

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<p>Wing and Fixed Wing aircraft, as well as very accurate Point of Origin (POO) and Point of Impact (POI) of RAM targets and enables a robust kill assessment capability of engaged targets.</p> <p>Cross Domain Solution (CDS) Network Interface addresses net readiness and system security concerns. This effort develops a CDS interface to isolate the Sentinel radar from connected networks of lower classification levels. Allows for ongoing cyber security initiatives to be reviewed and addressed as they arise. Ensures that Information Assurance/Cyber security is part of Sentinel operations, missions and functions. Makes certain that practices necessary to ensure the protection of information and personnel are instituted.</p> <p>Electronic Attack/Electronic Protect (EA/EP) addresses the electronic countermeasures (ECM) gap. This effort conducts additional design and testing to verify initial EA/EP results and updates the database and associated software and hardware with more extensive EA/EP signatures to address evolving threats.</p> <p>Signal Data Processor (SDP)/North Finding Module (NFM) addresses the Target Detection, Target Tracking, and Electronic Countermeasures (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.</p> <p>Medium Bandwidth Waveform upgrade will address latent tracking issues that currently exist with Sentinel in certain applications. This development effort modifies firmware as well as software in the Sentinel radar. This effort will provide better target resolution and more accurate tracking in the slant range coordinate. This improved target resolution and tracking accuracy will provide improved retention of target identification and more robust tracking that addresses the latent tracking issues.</p> <p>Mode S upgrade to existing Sentinel Identification Friend or Foe (IFF) will address Sentinel's objective requirement to interrogate IFF mode S which is currently not being met. Mode S transmissions are a key component of the Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance technology being used by the Federal Aviation Administration for tracking aircraft as part of the Next Generation Air Transportation System (NextGen). In the United States, all aircraft required to have transponders (most aircraft) must transition to mode S capable units by 2020. Without the Mode S upgrade, Sentinel will have to rely on these aircraft transponders responding to the legacy mode 3/A interrogations. The data available in the mode S response will be valuable in identifying the aircraft and correlating Sentinel tracks with civil aviation tracks/data and other track data sources.</p> <p>The Active Electronic Steered Array (AESA) is the next generation of radar technology to replace the current phase and frequency scanned array used by Sentinel today. The AESA Antenna will provide increased capability including extended range for ground-based surveillance and situational awareness, faster and more accurate Non-Cooperative Target Recognition (NCTR) for clearing fires and preventing fratricide, improved Fire Control (FC) quality track accuracy, and management of larger track loads. The AESA will also provide improved operation in severe/urban clutter. The system will detect and track small targets, such as Unmanned Aerial Systems (UAS) and Cruise Missiles, in clutter and will detect and track slow targets, such as UAS and Rotary Wing (RW) aircraft, at low altitudes in clutter. The system will detect, track, and classify Rocket, Artillery, and Mortar (RAM) threats and will support Integrated Air and Missile Defense Battle Command System (IBCS) requirements and can provide sensor support for the Counter-RAM requirements for Indirect Fire Protection Capability Increment 2-Intercept Block 2 (IFPC Inc 2-I block 2) mission. The AESA will support advanced EI</p>		

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>
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B. Program Change Summary (\$ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	1.548	5.224	12.213	-	12.213
Current President's Budget	1.796	5.221	12.309	-	12.309
Total Adjustments	0.248	-0.003	0.096	-	0.096
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.299	-			
• SBIR/STTR Transfer	-0.051	-			
• Adjustments to Budget Years	-	-	0.096	-	0.096
• FFRDC	-	-0.003	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Army										Date: February 2015		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>				Project (Number/Name) E10 / <i>Sentinel</i>			
COST (\$ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
E10: <i>Sentinel</i>	-	1.796	5.221	12.309	-	12.309	11.465	10.971	12.191	30.277	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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Battle Space Improvement addresses the Target Detection gap that currently exists with the Sentinel system. This development effort modifies the radar signal processor algorithms and 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 utilizing an upgraded common signal processing card to the radar signal processor to provide a common hardware and software processing configuration across the Sentinel radar fleet.

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Cross Domain Solution (CDS) Network Interface addresses net readiness and system security concerns. This effort develops a CDS interface to isolate the Sentinel radar from connected networks of lower classification levels. Allows for ongoing cyber security initiatives to be reviewed and addressed as they arise. Ensures that Information Assurance/Cyber security is part of Sentinel operations, missions and functions. Makes certain that practices necessary to ensure the protection of information and personnel are instituted.

Electronic Attack/Electronic Protect (EA/EP) addresses the electronic countermeasures (ECM) gap. This effort conducts additional design and testing to verify initial EA/EP results and updates the database and associated software and hardware with more extensive EA/EP signatures to address evolving threats.

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Medium Bandwidth Waveform upgrade will address latent tracking issues that currently exist with Sentinel in certain applications. This development effort modifies firmware as well as software in the Sentinel radar. This effort will provide better target resolution and more accurate tracking in the slant range coordinate. This improved target resolution and tracking accuracy will provide improved retention of target identification and more robust tracking that addresses the latent tracking issues.

Mode S upgrade to existing Sentinel Identification Friend or Foe (IFF) will address Sentinel's objective requirement to interrogate IFF mode S which is currently not being met. Mode S transmissions are a key component of the Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance technology being used by the Federal Aviation Administration for tracking aircraft as part of the Next Generation Air Transportation System (NextGen). In the United States, all aircraft required to have transponders (most aircraft) must transition to mode S capable units by 2020. Without the Mode S upgrade, Sentinel will have to rely on these aircraft transponders responding to the legacy mode 3/A interrogations. The data available in the mode S response will be valuable in identifying the aircraft and correlating Sentinel tracks with civil aviation tracks/data and other track data sources.

The Active Electronic Steered Array (AESA) is the next generation of radar technology to replace the current phase and frequency scanned array used by Sentinel today. The AESA Antenna will provide increased capability including extended range for ground-based surveillance and situational awareness, faster and more accurate Non-Cooperative Target Recognition (NCTR) for clearing fires and preventing fratricide, improved Fire Control (FC) quality track accuracy, and management of larger track loads. The AESA will also provide improved operation in severe/urban clutter. The system will detect and track small targets, such as Unmanned Aerial Systems (UAS) and Cruise Missiles, in clutter and will detect and track slow targets, such as UAS and Rotary Wing (RW) aircraft, at low altitudes in clutter. The system will detect, track, and classify Rocket, Artillery, and Mortar (RAM) threats and will support Integrated Air and Missile Defense Battle Command System (IBCS) requirements and can provide sensor support for the Counter-RAM requirements for Indirect Fire Protection Capability Increment 2-Intercept Block 2 (IFPC Inc 2-I block 2) mission.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2014	FY 2015	FY 2016
Title: Product Development	-	3.557	8.733
Description: Funding is provided for the following efforts:			

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Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>		Project (Number/Name) E10 / <i>Sentinel</i>
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015	FY 2016
<p>FY 2015 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.</p> <p>FY 2016 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.</p>				
<p>Title: Test & Evaluation</p> <p>Description: Funding is provided for the following efforts:</p> <p>FY 2014 Accomplishments: Conduct system verification test and system qualification test on software upgrades.</p> <p>FY 2015 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.</p> <p>FY 2016 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.</p>		1.637	1.103	2.491
<p>Title: Management Support</p> <p>Description: This funds Government and technical support.</p> <p>FY 2014 Accomplishments: Provides government management, technical and administrative support in FY 2014.</p> <p>FY 2015 Plans: Provides government management, technical and administrative support in FY 2015.</p> <p>FY 2016 Plans: Provides government management, technical and administrative support in FY 2016.</p>		0.159	0.561	1.085
Accomplishments/Planned Programs Subtotals		1.796	5.221	12.309

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>FY 2016</u> <u>Base</u>	<u>FY 2016</u> <u>OCO</u>	<u>FY 2016</u> <u>Total</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• PE 0605456A: Proj PA3, PAC-3/MSE MISSILE	86.223	34.991	2.272	-	2.272	-	-	-	-	-	123.486
• SSN C53101: MSE Missile	690.401	532.605	414.946	-	414.946	430.622	462.676	493.613	569.488	Continuing	Continuing
• PE 0205456: Proj EF9, System Integration and Test	-	78.720	64.159	-	64.159	60.214	58.722	75.315	96.392	Continuing	Continuing
• SSN C50016: Lower Tier Air and Missile Defense (AMD)	-	110.300	115.075	-	115.075	130.366	113.676	123.582	151.421	Continuing	Continuing
• PE 0102419A: Proj E55, Joint Aero Stat Program - EMD Effort	57.976	-	-	-	-	-	-	-	-	-	57.976
• PE 0604319A: Proj DU3, IFPC2 (FY12 PE0603305A IFPC II - Intercept)	76.559	96.131	155.361	-	155.361	90.323	58.562	13.384	109.495	Continuing	Continuing
• SSN C62001: INDIRECT FIRE PROTECTION CAPABILITY, INC 2-1 Block 1 System	-	-	-	-	-	19.920	48.076	139.362	175.738	Continuing	Continuing
• SSN C62002: INDIRECT FIRE PROTECTION CAPABILITY, INC 2-1 Block 1 Missile	-	-	-	-	-	-	73.552	123.106	186.480	Continuing	Continuing
• PE 0605457A: Proj S40, Army Integrated Air and Missile Defense (AIAMD)	358.192	152.516	214.099	-	214.099	227.103	169.575	153.451	33.424	Continuing	Continuing
• SSN BZ5075: IAMD Battle Command System	-	-	20.917	-	20.917	204.513	296.361	375.763	443.637	Continuing	Continuing
• PE 0604741A: Proj 126, 146, 149; Air Defense C2I Eng Dev	38.412	15.898	24.569	-	24.569	27.131	20.524	20.018	18.082	Continuing	Continuing
• SSN AD5070: Air & MSL Defense Planning & Control Sys	13.090	27.374	28.176	-	28.176	32.443	32.690	33.032	13.366	Continuing	Continuing
• SSN WK5057: Sentinel Mods	27.983	44.305	43.285	-	43.285	46.979	38.727	41.484	42.484	Continuing	Continuing
• PE 0202429A: Proj EP8, JLENS COCOM EXERCISE	22.659	43.248	40.565	-	40.565	46.371	6.746	-	-	-	159.589

Remarks

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Army	Date: February 2015
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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D. Acquisition Strategy

Sentinel was procured from Thales Raytheon Systems (TRS) as a non-development item. TRS owns the Technical Data Package (TDP) and therefore no other contractor has the technical ability to modify the Sentinel radar or Sentinel software.

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 Sentinel transmission from connected networks of lower classifications. The updated software will be tested, documented and released for installation in the field.

Electronic Attack/Electronic Protect (EA/EP): The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to verify the initial EA/EP Database and update the database, software and hardware with more extensive EA/EP signatures to address evolving threats. The updated database will be tested, documented and released for installation.

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

Medium Bandwidth Waveform: The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to address latent tracking issues that currently exist with Sentinel in certain applications. The effort modifies firmware as well as software in the Sentinel radar. The updated medium bandwidth waveform software and firmware will be tested, documented and released for installation in the field.

Mode S: The Sentinel Product Office will contract with Thales Raytheon Systems (TRS) to address Sentinel's objective requirement to interrogate Identification Friend or Foe (IFF) mode S on board commercial aircraft. The updated software will be tested, documented and released for installation in the field.

Active Electronic Steered Array (AESA): The Cruise Missile Defense Systems (CMDS) Project Office will support requirement documentation and conduct design analysis to include Analysis of Alternatives (AoA), decision review preparation, and contract package development for acquisition of a Short-to-Medium-Range Radar to replace the Sentinel. CMDS will issue a competitive RFP for development of a follow-on radar. The software and hardware will be tested, documented and released for installation in the field.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Army **Date:** February 2015

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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Management Services (\$ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Improved Sentinel Development	Various	Cruise Missile Defense Systems Project Office : Huntsville, AL	11.398	-		-		-		-		-	-	11.398	-
System of Systems Mod Development & Integration	Various	Cruise Missile Defense Systems Project Office : Huntsville, AL	1.169	-		-		-		-		-	-	1.169	-
Battle Space Improvement	Various	Cruise Missile Defense Systems Project Office : Huntsville, AL	0.170	0.049		0.050		-		-		-	-	0.269	-
Stop, Stare and Track	Various	Cruise Missile Defense Systems Project Office : Huntsville, AL	0.373	0.110		0.050		-		-		-	-	0.533	-
Electronic Attack/ Electronic Protect	Various	Cruise Missile Defense Systems Project Office : Huntsville, AL	0.000	-		0.313		0.310		-		0.310	Continuing	Continuing	-
Cross Domain Solution Network Interface / Cyber Security	Various	Cruise Missile Defense Systems Project Office : Huntsville, AL	0.000	-		0.030		0.278		-		0.278	Continuing	Continuing	-
Signal Data Processor North Finding Module	Various	Cruise Missile Defense Systems Project Office : Huntsville, AL	0.000	-		0.118		0.268		-		0.268	Continuing	Continuing	-
Medium Bandwidth Waveform	Various	Thales Raytheon Systems & Various : Fullerton, CA	0.000	-		-		0.229		-		0.229	Continuing	Continuing	-
Subtotal			13.110	0.159		0.561		1.085		-		1.085	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Army **Date:** February 2015

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Product Development (\$ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Improved Sentinel Development	SS/CPFF	Thales Raytheon Systems : Fullerton, CA	102.729	-		-		-		-		-	-	102.729	-
System of Systems Mod Development & Integration	SS/CPFF	Thales Raytheon Systems : Fullerton, CA	20.820	-		-		-		-		-	-	20.820	-
Battle Space Improvement	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	1.601	-		-		-		-		-	-	1.601	-
Stop, Stare, and Track	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	3.604	-		-		-		-		-	-	3.604	-
Electronic Attack/ Electronic Protect	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	0.000	-		2.046		3.037		-		3.037	Continuing	Continuing	-
Cross Domain Solution Network Interface / Cyber Security	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	0.000	-		0.216		2.400		-		2.400	Continuing	Continuing	-
Signal Data Processor/ North Finding Module	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	0.000	-		1.295		2.353		-		2.353	Continuing	Continuing	-
Medium Bandwidth Waveform	Various	Thales Raytheon Systems & Various : Fullerton, CA	0.000	-		-		0.943		-		0.943	Continuing	Continuing	-
Subtotal			128.754	-		3.557		8.733		-		8.733	-	-	-

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Support (\$ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Improved Sentinel Development	SS/CPFF	Thales Raytheon Systems : Fullerton, CA	16.930	-		-		-		-		-	-	16.930	-
System of Systems Mod Development & Integration	SS/CPFF	Thales Raytheon Systems : Fullerton, CA	0.352	-		-		-		-		-	-	0.352	-
Subtotal			17.282	-		-		-		-		-	-	17.282	-

Test and Evaluation (\$ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Improved Sentinel Mod Development	SS/CPFF	Thales Raytheon Systems : Fullerton, CA	34.599	-		-		-		-		-	-	34.599	-
System of Systems Mod Development & Integration	SS/CPFF	Thales Raytheon Systems : Fullerton, CA	2.331	-		-		-		-		-	-	2.331	-
Battle Space Improvement	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	0.421	0.448		0.450		-		-		-	-	1.319	-
Stop, Stare and Track	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	0.658	1.189		0.450		-		-		-	-	2.297	-
Electronic Attack/ Electronic Protect	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	0.000	-		0.203		0.600		-		0.600	Continuing	Continuing	-
Cross Domain Solution Network Interface / Cyber Security	Various	Thales Raytheon Systems & Various : Fullerton, CA / Various	0.000	-		-		0.832		-		0.832	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2016 Army **Date:** February 2015

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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Event Name	FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020			
	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	[Redacted]								Battle Space																			
Stop, Stare and Track (SS&T)	[Redacted]								SS&T																			
Cross Domain Solution (CDS) Network Interface / Cyber Security	[Redacted]								[Redacted]				[Redacted]				CDS											
Signal Data Processor (SDP) / North Finding Module (NFM)	[Redacted]								[Redacted]				[Redacted]				SDP/NFM											
Electronic Attack/Electronic Protect (EA/EP)	[Redacted]								[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Medium Bandwidth	[Redacted]								[Redacted]				[Redacted]				[Redacted]				Med Bdwth							
Mode S	[Redacted]								[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Active Electronic Steered Array (AESA)	[Redacted]								[Redacted]				[Redacted]				[Redacted]				[Redacted]							

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Exhibit R-4A, RDT&E Schedule Details: PB 2016 Army **Date:** February 2015

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Battle Space Improvement	4	2012	4	2015
Stop, Stare and Track (SS&T)	4	2012	4	2015
Cross Domain Solution (CDS) Network Interface / Cyber Security	2	2015	4	2017
Signal Data Processor (SDP) / North Finding Module (NFM)	2	2015	4	2017
Electronic Attack/Electronic Protect (EA/EP)	2	2015	4	2020
Medium Bandwidth	2	2016	4	2018
Mode S	2	2018	4	2020
Active Electronic Steered Array (AESA)	2	2019	1	2024