Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army											Date: February 2018	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604820A / *Radar Development*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	15.368	32.968	39.338	-	39.338	91.534	96.427	80.394	43.874	0.000	399.903
E10: *Sentinel*	-	15.368	32.968	39.338	-	39.338	91.534	96.427	80.394	43.874	0.000	399.903

A. Mission Description and Budget Item Justification

This system is a component 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 (IAMD) architecture via the IAMD Battle Command System (IBCS) to provide critical air surveillance of the forward areas.

The Sentinel currently consists of two primary variants: the enhanced radar variant AN/MPQ-64A3 system mounted on a High Mobility Multi-purpose Wheeled Vehicle (HMMWV) and the AN/MPQ-64A3 mounted on a 2.5 ton trailer and towed by an armored Family of Medium Tactical Vehicle (FMTV) platform to meet force protection and IBCS system requirements. The fielding of the FMTV configuration AN/MPQ-64A3 assets will be complete in FY19. 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) 2017 through FY 2023 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; 5) Unmanned Aircraft Systems (UAS) Defense gap; and 6) Rockets, Artillery & Mortars (RAM) gap.

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. Addresses further EP modifications and methods to be determined based on analysis of results.

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. Provides for new SDP kit to address obsolescence issues and allow for additional Electronic Protect capability.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604820A *I Radar Development*

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. Develops the Resiliency and Software Assurance Modification (RSAM) software to address the delayed Mode M Global Positioning System (GPS) capability requirement with the new interrogator.

The Active Electronically Scanned Array (AESA) (Sentinel A4) 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 Aircraft 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 contribute sensor support for mitigating current and future Indirect Fire Protection Capability Increment 2 mission requirements.

Sentinel System of Systems: Software Development in support of a system of systems architecture (IAMD and IFPC Inc 2-I) for a required simulation capability. The simulation capability will add a high fidelity representation of Sentinel to IAMD to allow for optimum engagement management and mission planning. Supports Sentinel Digital Simulation Software (SDS/SENTSIM) development efforts for testing of future capabilities. Includes software development for Low Slow Small in a test fix test environment as well as integration and testing of the IAMD B kit on board the Sentinel FMTV platform.

Adjunct sensor technology effort will integrate and test a supplemental technology for the Sentinel A3 radar to detect and identify current and emerging threats. Adjunct sensor technology compliments current radar capabilities to improve system performance and reduces adversaries countermeasure abilities by improving system electronic protect capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army					Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 5: *System Development & Demonstration (SDD)*		R-1 Program Element (Number/Name) PE 0604820A / *Radar Development*			
B. Program Change Summary ($ in Millions)	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**
Previous President's Budget	15.983	32.968	31.761	-	31.761
Current President's Budget	15.368	32.968	39.338	-	39.338
Total Adjustments	-0.615	0.000	7.577	-	7.577
• Congressional General Reductions	-0.008	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.607	-			
• Adjustments to Budget Years	-	-	7.577	-	7.577

Change Summary Explanation

FY 2019 increase of $7.577 Million to address Sentinel Mode S development and testing and to support the Active Electronically Scanned Array (AESA) (Sentinel A4) contract award efforts.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / *Radar Development*	Project (Number/Name) E10 / *Sentinel*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
E10: *Sentinel*	-	15.368	32.968	39.338	-	39.338	91.534	96.427	80.394	43.874	0.000	399.903
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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The Sentinel currently consists of two primary variants: the enhanced radar variant AN/MPQ-64A3 system mounted on a High Mobility Multi-purpose Wheeled Vehicle (HMMWV) and the AN/MPQ-64A3 mounted on a 2.5 ton trailer and towed by an armored Family of Medium Tactical Vehicle (FMTV) platform to meet force protection and Integrated Air and Missile Defense Battle Command System (IBCS) system requirements. The fielding of the FMTV configuration AN/MPQ-64A3 assets will be complete in FY 2019. 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.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604820A / *Radar Development*	**Project (Number/Name)** E10 / *Sentinel*

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.

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Sentinel System of Systems: Software Development in support of a system of systems architecture (IAMD and IFPC Inc 2-I) for a required simulation capability. The simulation capability will add a high fidelity representation of Sentinel to IAMD to allow for optimum engagement management and mission planning. Supports Sentinel Digital Simulation Software (SDS/SENTSIM) development efforts for testing of future capabilities. Includes software development for Low Slow Small in a test fix test environment as well as integration and testing of the IAMD B kit on board the Sentinel FMTV platform.

Adjunct sensor technology effort will integrate and test a supplemental technology for the Sentinel A3 radar to detect and identify current and emerging threats. Adjunct sensor technology compliments current radar capabilities to improve system performance and reduces adversaries countermeasure abilities by improving system electronic protect capabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Product Development	12.530	28.182	34.603	-	34.603
Description: Funding is provided for the following efforts:					
FY 2018 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604820A / *Radar Development*	**Project (Number/Name)** E10 / *Sentinel*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Integrate firmware, software and hardware. Design and 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. Continue analysis of technology, program milestone documentation, development of contract requirement packages and proposal evaluation activities in support of Active Electronically Scanned Array (AESA) technology. Support University Affiliated Research Centers (UARC) modeling and analysis as well as lab development efforts in preparation for evaluating AESA. Support Sentinel Digital Simulation Software (SDS/ SENTSIM) development efforts for testing of future capabilities. Software development for Low Slow Small in a test fix test environment as well as integration and testing of the IAMD B kit on board the Sentinel FMTV platform. ***FY 2019 Base Plans:*** Integrate firmware, software and hardware. Design and 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. Continue analysis of technology, program milestone documentation, development of contract requirement packages and proposal evaluation activities in support of Active Electronically Scanned Array (AESA) technology. Support acquisition and contract activities for Sentinel AESA in preparation for Milestone B and contract award. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increase from FY 2018 to FY2 019 supports contract award and milestone B activities for the Sentinel A4 as well as Mode S development efforts.					
Title: Test & Evaluation ***Description:*** Funding is provided for the following efforts: ***FY 2018 Plans:*** Conduct software qualification test and hardware verification testing, field testing against representative targets. Prepare logistics products and required documentation for materiel release of software and hardware upgrades. Final integration and testing of IAMD B kits on Sentinel Platform. ***FY 2019 Base Plans:***	1.312	4.786	4.735	-	4.735

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604820A / *Radar Development*	**Project (Number/Name)** E10 / *Sentinel*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Conduct software qualification test and hardware verification testing, field testing against representative targets. Prepare logistics products and required documentation for materiel release of software and hardware upgrades. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Minimal funding decrease from FY 2018 to FY 2019 supports software verification and software qualification testing to be released into the field. Funding also supports Limited User Testing events.					
Title: Management Support ***Description:*** This funds Government and technical support.	1.526	-	-	-	-
Accomplishments/Planned Programs Subtotals	15.368	32.968	39.338	-	39.338

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• C53101: *MSE Missile*	809.201	1,106.040	871.276	260.000	1,131.276	512.775	734.152	727.032	813.280	793.430	6,627.186
• EF9: *Proj EF9, System Integration and Test*	61.449	78.926	79.283	-	79.283	107.785	111.124	121.376	117.336	Continuing	Continuing
• EX2: *Proj EX2; Lower Tier Air Missile Defense (LTAMD) Capability*	33.780	76.728	120.374	-	120.374	125.772	376.738	332.322	241.461	Continuing	Continuing
• C50016: *Lower Tier Air and Missile Defense (AMD)*	126.470	140.826	111.395	-	111.395	130.051	105.044	107.288	106.178	Continuing	Continuing
• DU3: *Proj DU3, IFPC2 (FY12 PE0603305A IFPC II - Intercept)*	-	11.303	51.030	-	51.030	146.731	132.361	156.732	21.528	Continuing	Continuing
• EY7: *Proj EY7; IFPC Increment 2 - Block 1*	80.781	175.069	157.710	-	157.710	77.599	32.517	-	-	0.000	523.676
• C62001: *INDIRECT FIRE PROTECTION CAPABILITY, INC 2-1 Block 1 Missile 1*	-	57.742	145.636	-	145.636	143.466	99.516	14.472	-	0.000	460.832
• C62002: *IFPC INC 2-I BLOCK 1 SYSTEM*	-	-	0.000	-	0.000	175.576	303.422	273.802	388.377	0.000	1,141.177
• S40: *Proj S40, Army Integrated Air and Missile Defense (AIAMD)*	273.240	336.420	277.607	-	277.607	200.275	130.860	63.741	33.196	Continuing	Continuing
• BZ5075: *IAMD Battle Command System*	-	-	0.000	-	0.000	72.307	323.680	428.572	497.974	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604820A / *Radar Development*	**Project (Number/Name)** E10 / *Sentinel*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• 146: *Proj 146 Air Defense C2I Eng Dev*	14.987	24.306	24.326	-	24.326	14.300	8.401	2.915	1.228	0.000	90.463
• AD5070: *Air & MSL Defense Planning & Control Sys*	126.539	35.735	33.837	-	33.837	24.983	49.385	68.021	63.273	0.000	401.773
• 149: *Proj 149; Air Defense C2I Eng Dev*	24.899	4.420	1.846	-	1.846	1.277	0.909	-	-	0.000	33.351
• C62005: *IFPC Inc 2-I Block 2 Missile*	-	-	0.000	-	0.000	-	-	12.192	36.278	0.000	48.470

Remarks

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

D. Acquisition Strategy

Sentinel was procured from Raytheon as a non-developmental item. Raytheon owns the Technical Data Package (TDP) for the Sentinel A3 and its predecessors and therefore no other contractor has the technical ability to modify the Sentinel radar or Sentinel software. The modifications planned for the Sentinel that fall into this category are: Electronic Attack/Electronic Protect, Signal Data Processor/North Finding Module, Medium Bandwidth, and Mode S. For the Active Electronically Scanned Array, the product office will issue a new contract to develop a modified Sentinel with a new Active Electronically Scanned Array (AESA) antenna.

Electronic Attack/Electronic Protect (EA/EP) (Sentinel A3): The Sentinel Product Office will contract with Raytheon 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 (Sentinel A3): The Sentinel Product Office will contract with Raytheon 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 (Sentinel A3): The Sentinel Product Office will contract with Raytheon 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 (Sentinel A3): The Sentinel Product Office will contract with Raytheon 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 Electronically Scanned Array (AESA) (Sentinel A4): The Sentinel Product Office will award a new contract to develop the new AESA antenna for integration with the existing Sentinel A3 hardware and software. The CMDS Product Office will support requirement documentation and conduct design analysis to include analysis of

technology, decision review preparation, and contract package development for acquisition of the AESA antenna to upgrade the current Sentinel A3. The software and hardware will be tested, documented and released for installation in the field.

Sentinel System of Systems (Sentinel A3): The Sentinel Product Office will contract with Raytheon for risk reduction efforts in the development of the software package to support the identification and engagement of Low Slow Small target sets. The Sentinel Product Office will work with Other Government Agencies to finalize integration and test of the IAMD B Kit on board the Sentinel platform and to add simulation capability to allow a high fidelity representation of Sentinel to IAMD.

Adjunct Sensor (Sentinel A3): The Sentinel Product Office will integrate and test a government off the shelf adjunct sensor. The sensor will be tested, documented and released for installation in the field.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / *Radar Development*	Project (Number/Name) E10 / *Sentinel*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Electronic Attack/ Electronic Protect	Various	Various : Multiple	-	0.425	Nov 2016	-		-		-		-	0.000	0.425	-
Signal Data Processor North Finding Module	Various	Various : Multiple	-	0.125	Nov 2016	-		-		-		-	0.000	0.125	-
Medium Bandwidth Waveform	Various	Various : Multiple	-	0.213	Nov 2016	-		-		-		-	0.000	0.213	-
Active Electronically Scanned Array (A4)	Various	Various : Multiple	-	0.549	Nov 2016	-		-		-		-	0.000	0.549	-
Management Support	Various	Various : Multiple	1.498	-		2.841	Nov 2017	2.843	Nov 2018	-		2.843	0.000	7.182	Continuing
		Subtotal	1.498	1.312		2.841		2.843		-		2.843	0.000	8.494	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Electronic Attack/ Electronic Protect	Various	Raytheon & Various : Fullerton, CA / Various	4.879	3.977	Jan 2017	7.777	Jan 2018	6.188	Jan 2019	-		6.188	Continuing	Continuing	-
Signal Data Processor/ North Finding Module	Various	Raytheon & Various : Fullerton, CA / Various	3.598	1.071	Jan 2017	-		-		-		-	0.000	4.669	-
Medium Bandwidth Waveform	Various	Raytheon & Various : Fullerton, CA / Various	0.943	0.702	Jan 2017	0.222	Jan 2018	-		-		-	0.000	1.867	-
Active Electronically Scanned Array (A4)	Various	TBD & Cruise Missile Defense Systems : TBD and Huntsville, AL	-	6.780	Jan 2017	12.024	Jan 2018	21.113	May 2019	-		21.113	Continuing	Continuing	-
System of Systems	Various	Raytheon & Various : Fullerton, CA / Various	-	-		4.900	Jan 2018	-		-		-	0.000	4.900	-
Mode S	Various	Raytheon & Various : Fullerton, CA / Various	-	-		1.838	Jan 2018	5.723	Jan 2019	-		5.723	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / *Radar Development*	Project (Number/Name) E10 / *Sentinel*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	9.420	12.530		26.761		33.024		-		33.024	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Electronic Attack/ Electronic Protect	Various	Raytheon & Various : Fullerton, CA / Various	0.463	0.857	Jan 2017	1.138	Jan 2018	1.501	Jan 2019	-		1.501	Continuing	Continuing	-
Signal Data Processor North Finding Module	Various	Raytheon & Various : Fullerton, CA / Various	0.781	0.324	Jan 2017	-		-		-		-	0.000	1.105	-
Medium Bandwidth Waveform	Various	Raytheon & Various : Fullerton, CA / Various	0.278	0.345	Jan 2017	0.151	Jan 2018	-		-		-	0.000	0.774	-
System of Systems	Various	Raytheon & Various : Fullerton, CA / Various	-	-		1.561	Jan 2018	-		-		-	0.000	1.561	-
Mode S	Various	Raytheon & Various : Fullerton, CA / Various	-	-		0.516	Jan 2018	1.970	Jan 2019	-		1.970	Continuing	Continuing	-
		Subtotal	1.522	1.526		3.366		3.471		-		3.471	Continuing	Continuing	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	12.440	15.368		32.968		39.338		-		39.338	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604820A / *Radar Development*	**Project (Number/Name)** E10 / *Sentinel*

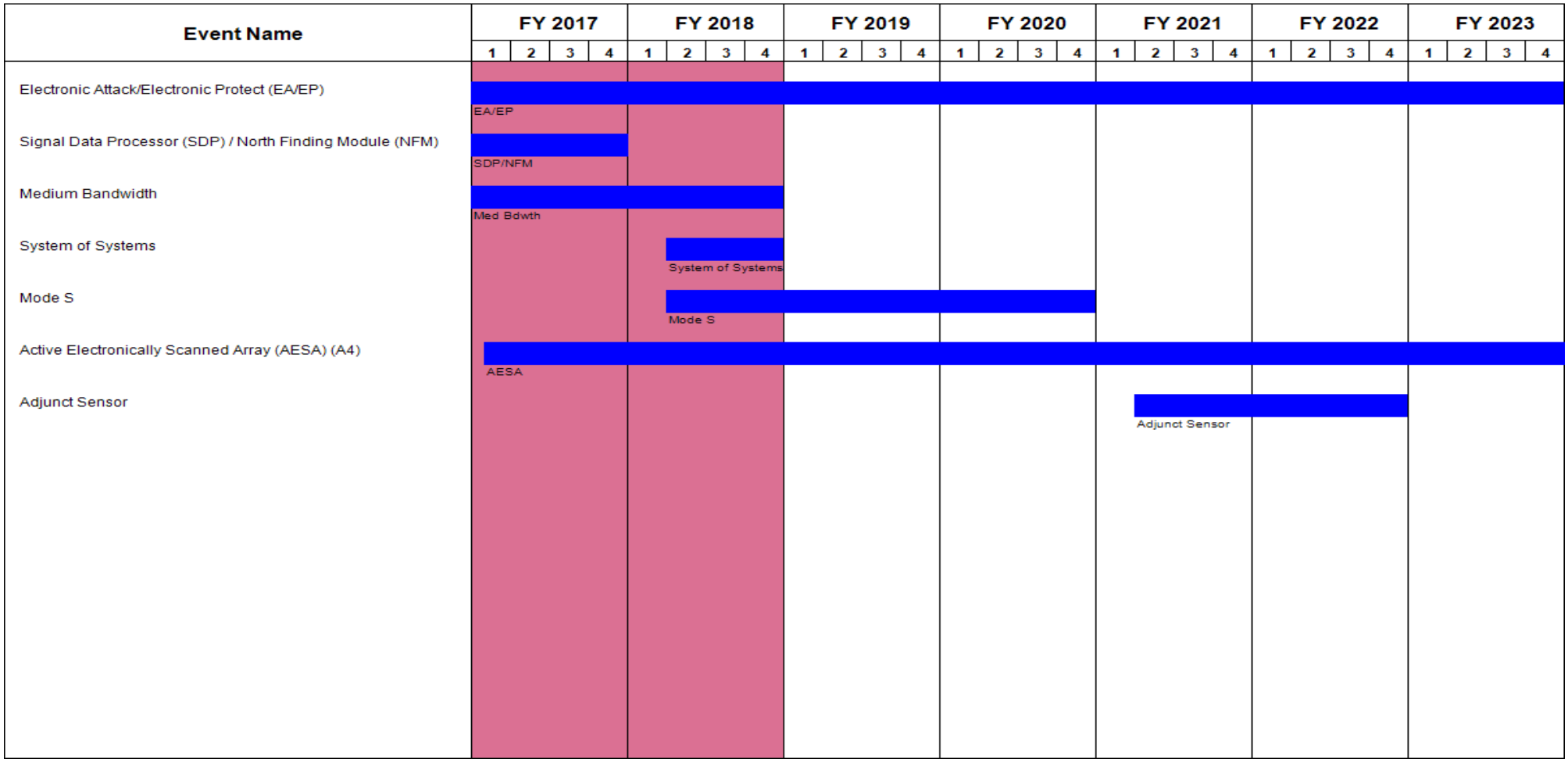

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604820A / *Radar Development*	**Project (Number/Name)** E10 / *Sentinel*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Electronic Attack/Electronic Protect (EA/EP)	2	2015	4	2023
Signal Data Processor (SDP) / North Finding Module (NFM)	2	2015	4	2017
Medium Bandwidth	2	2016	4	2018
System of Systems	2	2018	4	2018
Mode S	2	2018	4	2020
Active Electronically Scanned Array (AESA) (A4)	1	2017	4	2033
Adjunct Sensor	2	2021	4	2022