Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604504N *I Air Control*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	99.055	55.947	47.404	75.186	-	75.186	63.645	62.095	55.421	45.525	Continuing	Continuing
0718: *MATCALS*	7.034	1.405	0.314	11.508	-	11.508	6.578	6.854	3.266	2.783	Continuing	Continuing
0993: *Carrier ATC*	78.753	39.538	30.254	32.799	-	32.799	34.411	32.775	29.442	24.727	Continuing	Continuing
1657: *ATC Improvement*	3.046	0.399	0.383	0.413	-	0.413	0.423	0.432	0.442	0.451	Continuing	Continuing
3372: *ATC Systems*	10.222	14.605	16.453	30.466	-	30.466	22.233	22.034	22.271	17.564	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element provides for the development, integration, and testing of Automated Air Traffic Control (ATC) hardware and software required to provide improved flight safety and more reliable all-weather ATC and landing system capabilities at Naval Air Stations (NASs) and Marine Corps Air Stations (MCASs) and Fleet Area Control and Surveillance Facilities (FACSFAC) worldwide. Funded programs are required to upgrade or replace aging ATC and landing system equipment on aircraft, aircraft carriers, amphibious ships, NASs, MCASs and Navy/Marine Corps tactical/expeditionary airfields and remote landing sites. These upgrades include addressing broadened CyberSecurity requirements to remain compliant with software CyberSecurity directives and Information Assurance mandates. Virtual Warfare Center (VWC) supports the Marine Air Ground Task Force (MAGTF) Integrated Air and Missile Defense (IAMD) development

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under SYSTEM DEVELOPMENT AND DEMONSTRATION because it includes those projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	57.928	47.404	65.223	-	65.223
Current President's Budget	55.947	47.404	75.186	-	75.186
Total Adjustments	-1.981	0.000	9.963	-	9.963
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.716	0.000			
• SBIR/STTR Transfer	-1.265	0.000			
• Program Adjustments	0.000	0.000	10.427	-	10.427
• Rate/Misc Adjustments	0.000	0.000	-0.464	-	-0.464

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604504N *I Air Control*

Change Summary Explanation

FY 2018 programs increased $10.427 million net for BISOG G/ATOR Mode 5/S, HQMC Aviation Virtual Warfare Center, and EASR/TPX-42 interface and other minor program adjustments.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 0718 / *MATCALS*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0718: *MATCALS*	7.034	1.405	0.314	11.508	-	11.508	6.578	6.854	3.266	2.783	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program provides for continued development, integration, and testing of hardware and software to meet requirements for all-weather operations and improved flight safety of Air Traffic Control (ATC) and Landing Systems at Marine Corps expeditionary airfields. An Acquisition Decision Memorandum from Jan 2005 approved the use of the U.S. Army AN/TPN-31 Air Traffic Navigation, Integration, and Coordination System (ATNAVICS) to fulfill the Air Surveillance and Precision Approach Radar and Control System (ASPARCS) requirement for Jul 2006. The ATNAVICS will replace the legacy ATC Precision Approach Radar (PAR), Airport Surveillance Radar (ASR), and Command and Control Subsystem with a High Mobility Multipurpose Wheeled Vehicle based PAR, ASR and Command and Control Subsystem. The MROC Decision Memorandum 11-2005 of Dec 2004 outlines the evolutionary improvements required by Headquarters Marine Corps. This program works with the Marine ATC Working Group identifying the requirements to implement the P3I and evolutionary product improvements as required for G/ATOR, ATNAVICS, Expeditionary ATC Towers, and Navigational Aids that support Marine Air Traffic Control Detachments.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: ASPARCS Improvements	0.610	0.264	1.608	0.000	1.608
Articles:	-	-	-	-	-
Description: Investigate and resolve obsolescence issues. Perform studies and analyses to implement P3I and other evolutionary improvements. Develop criteria for existing ASPARCS software to achieve Defense Information Infrastructure-Common Operating Environment Level 5 compliance, Information Assurance, Radar Range Extension and Mapping functionality, and enhanced simulation and training into the existing ASPARCS software. Perform Mode 5/S integration, operational functionality study and analyses with AN/TPN-31(V)7 ATNAVICS System.					
FY 2016 Accomplishments: Completed the Air Traffic Control Tower capability improvement Part 1 Engineering Change Proposal (ECP) that recommended which areas; mobility, alternate power source, and identify additional communication (radar, visual, weather, links, Non-Classified Internet Protocol Router & Secret Internet Protocol Router) products that can be upgraded via a Part 2 ECP and provide greater situational awareness for air traffic controllers utilizing these systems. Complete the Part 1 Tactical Air Navigation Modernization ECP for AMTAC.					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Develop Part 1 ECP to select and implement the next operating system for AN/TPN-31 (V)7 Air Traffic Navigation, Integration, and Coordination System (ATNAVICS). ***FY 2018 Base Plans:*** *Note - The $1.334 million increase in Air Surveillance and Precision Approach Radar Control System (ASPARCS) Improvements is to initiate a Part I ECP for the AN/TSQ-263 Tactical Terminal Communications System (TTCS). This ECP will resolve known obsolesce issues and reduce deployment setup time. Commence the Part I ECP to develop and test a prototype which modernizes the AN/TSQ-263 TTCS. This ECP will reduce system hardware requirements, improve reliability, address obsolescence issues, and reduce the deployment set-up time. FY18 efforts will include requirements generation, ECP development and initial systems development. ***FY 2018 OCO Plans:*** N/A					
Title: Ground/Air Task Oriented Radar System (G/ATOR) ***Articles:*** ***Description:*** G/ATOR is multi-role, ground-based, expeditionary radar that replaces five legacy radar systems for the Marine Air Ground Task Force. It satisfies the Marine Air Command and Control System and the Ground Counter Fire/ Counter Battery capabilities. The G/ATOR replaces the AN/TPS-63 and complements the AN/TPS-59 long range radar and will provide mobile, multi-functional, three-dimensional surveillance of air breathing targets, detection of cruise missiles and Unmanned Aerial Systems, and the cueing of air defense weapons. The G/ATOR contributes to the extension of Sea Shield/Sea Strike by surveillance and detection of enemy air threats not seen by Navy sensors in the littorals by participating in a cooperative engagement network of sensors and shooters; G/ATOR enables Integrated Fire Control (IFC) and provides engage/fire on remote capability. G/ATOR surveillance coverage with IFC will provide unprecedented reach, volume and precision in the execution of Operational Maneuver From The Sea allowing Naval forces to project and sustain power deep inland. G/ATOR will add Mode 5/S capability, Federal Aviation Administration flight certification requirements, and the ability to integrate with AN/TPN-31(V) ATNAVICS for Precision Approach Radar. This increment of G/ATOR replaces the Marine Corps' AN/TPS-73 radar and the Airport Surveillance Radar portion of the ATNAVICS also known as Air Surveillance and Precision Approach Radar Control System.	0.795 -	0.050 -	8.000 -	0.000 -	8.000 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
FY 2016 Accomplishments: Began efforts to achieve Federal Aviation Administration (FAA) flight certification for G/ATOR. Commence Command & Control (C2) and AN/TPN-31(V)7 integration requirements. Continue Mode 5/S development for G/ATOR ***FY 2017 Plans:*** Complete the hardware/software development to achieve FAA flight certification for G/ATOR. Complete the hardware/software requirements for the integration of AN/TPN-31(V)7 Air Traffic Navigation, Integration, and Coordination System (ATNAVICS) and G/ATOR. Complete the Mode 5/S development for G/ATOR. ***FY 2018 Base Plans:*** *Note - Increase from FY17 to FY18 ($8.0M) addresses integration of Mode 5/S capability into G/ATOR. Develop a Test and Evaluation Master Plan that supports the Mode 5/S integration into G/ATOR, includes a Joint Operational Test Approach (JOTA) event required by the Marine Corps and a plan for obtaining DoD AIMS certification for the G/ATOR platform. Commence system testing of the G/ATOR Mode 5/S integration for FAA and DoD AIMS certification and use by all G/ATOR blocks. ***FY 2018 OCO Plans:*** N/A					
Title: Virtual Warfare Center Support ***Articles:*** ***Description:*** Virtual Warfare Center (VWC) Support - This project supports fully interactive operator in the loop simulations in support of the Virtual Warfare Center (VWC) in order to quantify USMC Integrated Air and Missile Defense (IAMD) family of systems performance and how it impacts effectiveness in the IAMD mission area. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** N/A ***FY 2018 Base Plans:*** *Note-FY18 $1.9 increase is for Virtual Warfare Center (VWC) Support - This project supports fully interactive operator in the loop simulations at the Virtual Warfare Center (VWC) in order to quantify USMC Integrated Air and Missile Defense (IAMD) family of systems performance and how it impacts effectiveness in the IAMD	0.000 -	0.000 -	1.900 -	0.000 -	1.900 -

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
mission area. VWC support encompasses a set of integrated fire control (IFC) activities that also includes concept/CONOPS development, family of systems architecture development, and systems engineering/ integration efforts. Conduct Design of Experiment related to Marine Air Ground Task Force (MAGTF) IAMD capabilities. Provide event technical support for four analysis events. Conduct and document analysis results for USMC stakeholders ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	1.405	0.314	11.508	0.000	11.508

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2815: *MATCALS*	10.011	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	294.376
• RDTEN/0204460M: *G/ATOR*	61.348	83.538	54.645	-	54.645	16.406	14.607	6.700	6.832	Continuing	Continuing
• OPN/2820: *Ashore ATC Equipment/MATCALS*	0.000	12.598	9.556	-	9.556	5.482	5.562	5.770	6.057	Continuing	Continuing

Remarks

Ashore ATC Equipment: FY2017-FY2022 reflects MATCALS portion of Ashore ATC Equipment budget.

D. Acquisition Strategy

An Acquisition Decision Memorandum was signed in Jan 2005 approving the procurement of the Army AN/TPN-31 ATNAVICS to fulfill the Air Surveillance and Precision Approach Radar and Control System requirement for July 2006. The MROC Decision Memorandum 11-2005 of December 2004 outlined the evolutionary improvements required by Headquarters Marine Corps. This program has joined with the Army to implement Pre-Planned Product Improvements and evolutionary product improvements.
G/ATOR will add Mode 5/S capability, FAA flight certification requirements, and the ability to integrate with AN/TPN-31 ATNAVICS for Precision Approach Radar.
The Marine Air Traffic Control (ATC) Working Group identified requirements to address obsolescence issues with ATC Expeditionary Towers. These requirements were validated by APX-25 and a Decision Analysis Study was conducted by NAVAIR 4.10. Funding will address development of expeditionary ATC Tower capability improvements via the Engineering Change Proposal process.

E. Performance Metrics

The MATCALS RDTEN funding will be utilized to continue development of evolutionary improvements envisioned by Headquarters Marine Corps for the MATCALS Family of Systems.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 0718 / *MATCALS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop - ASPARCS Mode 5/S	WR	NAWCAD : Patuxent River, MD	1.230	0.047	Dec 2015	0.107	Dec 2016	0.673	Feb 2018	-		0.673	0.000	2.057	-
Primary HDW Develop - ASPARCS	WR	SPAWARSYSCEN : San Diego, CA	0.453	0.057	Dec 2015	0.000		0.000		-		0.000	0.000	0.510	-
Primary HDW Develop - ASPARCS	C/CPFF	TRANDES : San Diego, CA	1.783	0.000		0.000		0.000		-		0.000	0.000	1.783	1.783
		Subtotal	3.466	0.104		0.107		0.673		-		0.673	0.000	4.350	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development - G/ATOR	WR	NSWC : Dahlgren, VA	0.000	0.595	Jul 2016	0.025	Jan 2017	2.837	Feb 2018	-		2.837	Continuing	Continuing	Continuing
Software Development - ASPARCS	WR	NAWCAD : Patuxent River, MD	3.328	0.229	Dec 2015	0.107	Dec 2016	0.825	Mar 2018	-		0.825	Continuing	Continuing	Continuing
Software Development - Mode 5/S Dev - G/ATOR	SS/CPIF	Telephonics : Huntington Station, NY	0.000	0.000		0.025	Jan 2017	4.818	Mar 2018	-		4.818	Continuing	Continuing	Continuing
Engineering Support - VWC	TBD	NSMA : TBD	0.000	0.000		0.000		1.320	Jan 2018	-		1.320	0.000	1.320	-
Software Development - VWC	C/BA	TBD : TBD	0.000	0.000		0.000		0.580	Jan 2018	-		0.580	0.000	0.580	5.800
		Subtotal	3.328	0.824		0.157		10.380		-		10.380	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	0.240	0.277	Dec 2015	0.050	Dec 2016	0.155	Jan 2018	-		0.155	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 0718 / *MATCALS*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Managemnt Support	WR	G/ATOR : PEO Land Systems	0.000	0.200	Mar 2016	0.000		0.300	Jan 2018	-		0.300	0.000	0.500	-
		Subtotal	0.240	0.477		0.050		0.455		-		0.455	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	7.034	1.405		0.314		11.508		-		11.508	-	-	-

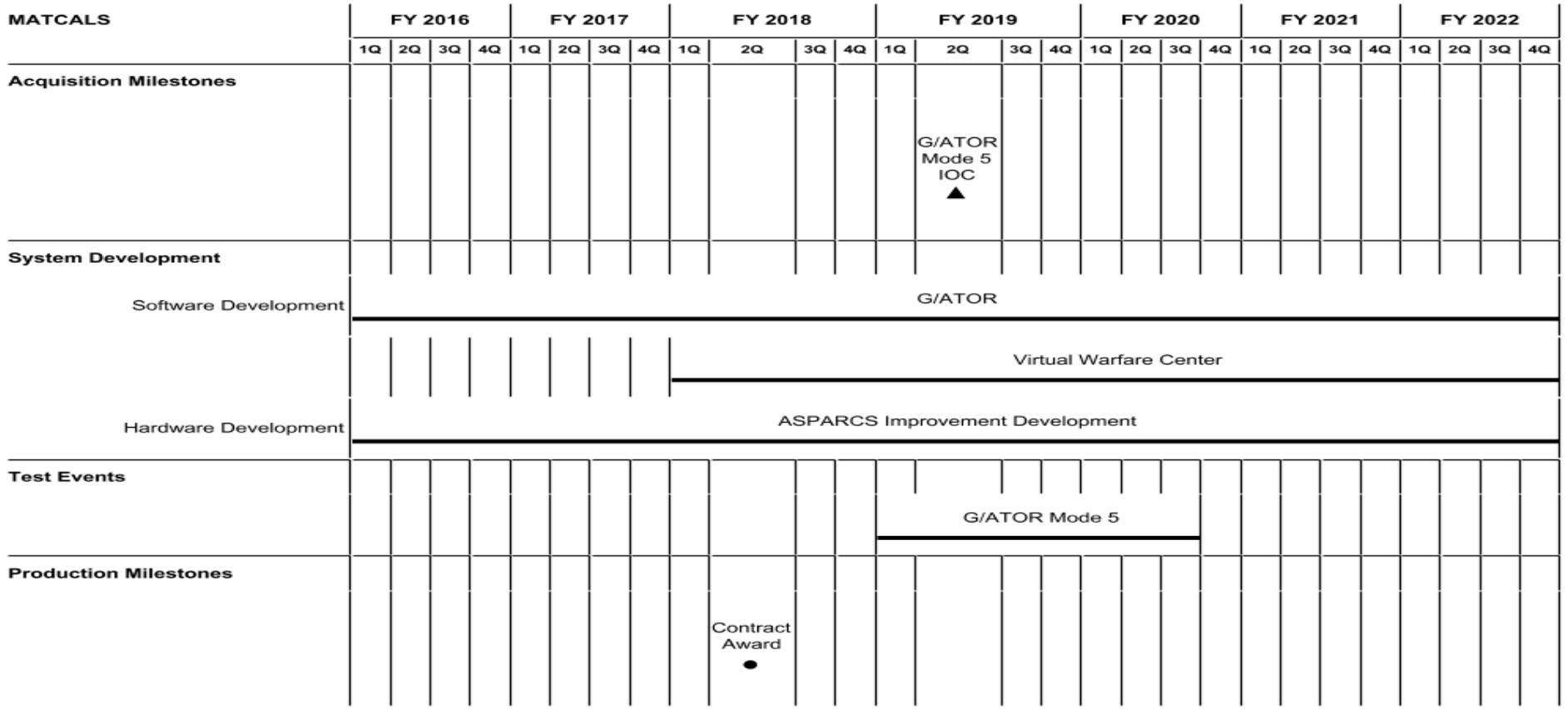
Remarks

MATCALS PU 0718 funding increased from FY17 to FY18 by $9.289 million. Increase addresses integration of Mode 5/S capability into G/ATOR.

The $7.955 million increase in G/ATOR funding from FY17 to FY18 is the initiation of Mode 5/S system development.
The $1.334 million increase in Air Surveillance and Precision Approach Radar Control System (ASPARCS) Improvements is to initiate a Part I ECP for the AN/TSQ-263 Tactical Terminal Communications System (TTCS). This ECP will resolve known obsolesce issues and reduce deployment setup time.

FY18 $1.9 increase is for Virtual Warfare Center (VWC) Support - This project supports fully interactive operator in the loop simulations at the Virtual Warfare Center (VWC) in order to quantify USMC Integrated Air and Missile Defense (IAMD) family of systems performance and how it impacts effectiveness in the IAMD mission area. VWC support encompasses a set of integrated fire control (IFC) activities that also includes concept/CONOPS development, family of systems architecture development, and systems engineering/integration efforts.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*



2018OSD - 0604504N - 0718

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0718 / *MATCALS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MATCALS				
Acquisition Milestones: G/ATOR Mode 5 IOC	2	2019	2	2019
System Development: Software Development: G/ATOR	1	2016	4	2022
System Development: Software Development: Virtual Warfare Center	1	2018	4	2022
System Development: Hardware Development: ASPARCS Improvements	1	2016	4	2022
Test Events: G/ATOR Mode 5	1	2019	3	2020
Production Milestones: G/ATOR Mode 5 Integration	2	2018	2	2018

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 0993 / *Carrier ATC*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0993: *Carrier ATC*	78.753	39.538	30.254	32.799	-	32.799	34.411	32.775	29.442	24.727	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Shipboard Air Traffic Control systems, interfacing with versions of the AN/TPX-42A(V) Direct Altitude and Identity Readout (DAIR), allow shipboard Air Traffic Controllers to identify, marshal, and direct aircraft within a 50 Nautical Mile (NM) radius of the ship. In recent years, the top 25 percent of the AN/SPN-43C frequency band has been reallocated to the Fixed Wireless Access Community prohibiting Air Traffic Control (ATC) Air Search Radar (ASR) operation within 50NM of the coast. Because the Navy requires an air traffic control surveillance radar, this project unit will include engineering efforts to identify requirements and develop the AN/SPN-50(V)1 as an AN/SPN-43C replacement system. In addition, bridging Engineering Change Proposals (ECP) will be required to sustain the AN/SPN-43C capability until the AN/SPN-50(V)1 is completely fielded. Finally, the AN/TPX-42A(V) DAIR continues to undergo several phased upgrades that have resulted in a number of field changes/technology refresh/insertion efforts. System improvements include replacing militarized front-end equipment in the track processor with open architecture Commercial Off the Shelf technology, converting the operational program software to more commonly used and flexible "C" language, providing the "hooks" for potential interface with Mode 5 Identification Friend or Foe, and integrating a flat panel monitor into the controller work station. The development of an ATC common console will reduce operational costs, improve reliability, and provide compatible interfaces and commonality for all ATC workstations. The addition of an embedded trainer within AN/TPX-42A(V) will improve controller training and increase flight safety. Meet CyberSecurity compliance requirements and Information Assurance mandates.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: AN/SPN-50	34.601	25.606	22.759	0.000	22.759
Articles:	2	1	-	-	-
Description: This project funds the development of the AN/SPN-43C replacement program (AN/SPN-50), which was previously funded under AN/SPN-43C and is being broken out for administrative reasons. This system enables Air Traffic Controllers to assure the safe and expeditious movement of air traffic. This capability is an enabler in maintaining launch/recovery cycle times/sortie rates. #3 CVN NARG, #1 ATC NARG priorities.					
FY 2016 Accomplishments: Released RFP and initiated source selection for AN/SPN-50(V)1 contract award. Achieved Material Development Decision. System Requirements Review closed out. Test and Evaluation Master Plan Signed. System Requirement Document signed. Complete Source Selection for AN/SPN-50, award contract. Order two Engineering Development Model (EDM) units and conduct Systems Engineering					
FY 2017 Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Execution of SPN-50 Engineering & Manufacturing Development (EMD) contract with government as lead system integrator to provide and test 3 units in EMD phase leading to a successful Milestone C in FY-20. Conduct and close out action items for System Requirements Review (SRR)-2, System Functional Review (SFR), Software Specification Review (SSR), and Preliminary Design Review (PDR). Conduct Critical Design Review (CDR). Conduct and close out Integrated Baseline Review (IBR). Complete PEO(T) review of PDR assessment with associated documentation. Systems Integration Lab standup. Delivery of EDM#1. Receipt of initial Original Equipment Manufacturer (OEM) system training and technical documentation. ***FY 2018 Base Plans:*** Execute contract Modification for SPN-50 EMD Contract to add incremental funding. Close out action items from CDR. Conduct Test Readiness Review (TRR). EDM #2/3 delivered. Finalize Hardware and Software design of EDM #3 in Post-CDR Configuration. Develop Post-CDR Software Build. Continuation of Systems Integration Lab standup and commence sub-system testing. Development of OEM training for fleet and test operators. ***FY 2018 OCO Plans:*** N/A					
Title: AN/SPN-43C	1.404	1.263	2.188	0.000	2.188
Articles:	-	-	-	-	-
Description: Funds development of sustainment Engineering Change Proposals (ECP) for the AN/SPN-43C. The sustainment effort will ensure the capabilities provided by the AN/SPN-43C remain available to CVN, LHA and LHD type ships until the replacement system is fielded. ***FY 2016 Accomplishments:*** Continued sustainment ECPs for AN/SPN-43C. ***FY 2017 Plans:*** Continue sustainment ECPs for AN/SPN-43C. ***FY 2018 Base Plans:*** Continue sustainment ECPs for AN/SPN-43C ***FY 2018 OCO Plans:*** N/A					
Title: AN/TPX-42	3.533	3.385	7.852	0.000	7.852
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Description: This project funds the ongoing modernization of the AN/TPX-42 system through engineering changes and technology refresh, to include CyberSecurity requirements and compliance. Specific engineering changes are: Development of an Air Traffic Control (ATC) Multi-Function Console (MFC) which will reduce operational costs, improve reliability, and provide common hardware for all ATC workstations. Additionally, MFC will provide interfaces for emerging/planned sensors. ***FY 2016 Accomplishments:*** Continued CATCC/DAIR Recorder Replacement ECP; Completed CATCC/DAIR Embedded Trainer ECP; Initiated CATCC/DAIR Embedded Trainer ECP to incorporate ATC final control functions; continued MFC ECP. ***FY 2017 Plans:*** Complete CATCC/DAIR Recorder Replacement ECP; continue CATCC/DAIR Embedded Trainer ECP to incorporate ATC final control functions; continue MFC ECP. ***FY 2018 Base Plans:*** *Note- TPX-42 increase is due to 1) broadened CyberSecurity requirement to remain compliant with software CyberSecurity directives and Information Assurance; and 2) funding provided for TPX-42 hardware and software development so that TPX-42 will interface with EASR sensor. Complete MFC ECP and CATCC/DAIR Embedded Trainer ECP to incorporate ATC final control functions; initiate sustainment ECPs for AN/TPX-42. EASR/TPX-42 Interface Development, and CyberSecurity requirements and compliance. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	39.538	30.254	32.799	0.000	32.799

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2831: *Shipboard Air Traffic Control*	9.346	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	218.271
• OPN/2832: *Automatic Carrier Landing Systems*	21.281	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	136.090
• OPN/2830: *Afloat ATC Equipment*	0.000	33.484	44.611	-	44.611	48.625	49.956	52.644	52.790	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

AN/TPX-42 Voice/Video recorder replacement, Joint Precision Approach and Landing System Interface, Shipboard trainer, and Air Traffic Control (ATC) Console are all anticipated ECPs, with improvements being incorporated into the production of AN/TPX-42 upgrade kits. AN/SPN-50 replacement program will be an ACAT IVT program.

All other projects are non-ACAT upgrades to existing systems. An evolutionary acquisition approach is being used to introduce these technology advancements that either satisfy user requirements, such as all weather operation, or address supportability and cost of ownership problems.

E. Performance Metrics

Award AN/SPN-50(V)1 post-CDR EDM contract 3QFY17. Attain MS C 3QFY20.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 0993 / *Carrier ATC*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HDW Develop-TPX-42	WR	NAWCAD : PAX River, MD	4.259	0.374	Dec 2015	0.360	Dec 2016	0.973	Dec 2017	-		0.973	Continuing	Continuing	Continuing
Primary HDW Develop - SPN-43	WR	NAWCAD : PAX River, MD	3.245	0.474	Dec 2015	0.470	Dec 2016	0.485	Dec 2017	-		0.485	Continuing	Continuing	Continuing
Primary HDW Develop - SPN-50(V)1 Pre-CDR Configuration EDM	C/CPIF	SAAB : Syracuse NY	0.000	25.749	Aug 2016	0.000		0.000		-		0.000	0.000	25.749	25.749
Primary HDW Develop - SPN-50(V)1 Post-CDR Configuration EDM	C/CPIF	SAAB : Syracuse NY	0.000	0.000		15.516	May 2017	8.620	Dec 2017	-		8.620	15.516	39.652	39.652
Prior year Prod Dev no longer funded in the FYDP	Various	Various : TBD	17.902	0.000		0.000		0.000		-		0.000	0.000	17.902	-
Primary HDW EMD	C/CPIF	SAAB : Syracuse NY	0.000	0.000		0.000		5.000	Dec 2017	-		5.000	2.000	7.000	7.000
		Subtotal	25.406	26.597		16.346		15.078		-		15.078	-	-	-

Remarks

2016: Contract award will provide Pre-CDR Configuration EDMs and will provide the contract vehicle for the entire SPN-50 EMD phase. EDMs will be existing production Commercial Off The Shelf (COTS) units that will not meet all SPN-50 requirements. The EDMs will be used for integration and initial DT/environmental testing. PDR & CDR planned in FY16/FY17 will determine modifications required to meet all SPN-50 requirements.
2017: Post-CDR EDM is an exercisable option on the SPN-50 EMD contract. It will include the required modifications to meet SPN-50 requirements, to include hardware redesign, development, and integration & test of above and below deck hardware to increase redundancy to expand operational availability from 94% to 98%.
TPX-42 increase is due to broadened CyberSecurity requirement to remain compliant with software CyberSecurity directives and Information Assurance.
2018 - Primary HDW EMD line added to support all phases of SPN50 Engineering and Development required to meet all system certifications.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development-TPX-42	WR	NAWCAD : PAX River, MD	16.021	1.734	Dec 2015	1.700	Dec 2016	3.050	Dec 2017	-		3.050	Continuing	Continuing	Continuing
Integrated Logistics Support- TPX-42	WR	NAWCAD : PAX River, MD	1.619	0.120	Dec 2015	0.120	Dec 2016	0.220	Dec 2017	-		0.220	Continuing	Continuing	Continuing
Integrated Logistics Support - SPN-43	WR	NAWCAD : PAX River, MD	0.621	0.310	Dec 2015	0.200	Dec 2016	0.224	Dec 2017	-		0.224	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 0993 / *Carrier ATC*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support-SPN-50(V)1	WR	NAWCAD : PAX River, MD	0.805	0.700	Dec 2015	0.663	Dec 2016	0.806	Dec 2017	-		0.806	Continuing	Continuing	Continuing
Studies & Analysis-SPN-50(V)1	WR	NAWCAD : PAX River, MD	3.442	0.800	Dec 2015	0.763	Dec 2016	0.800	Dec 2017	-		0.800	Continuing	Continuing	Continuing
Software Development - SPN-50(V)1	WR	NAWCAD : PAX River, MD	3.171	3.841	Dec 2015	3.797	Dec 2016	3.702	Dec 2017	-		3.702	Continuing	Continuing	Continuing
Studies & Analysis-SPN-43	WR	NAWCAD : PAX River, MD	1.989	0.020	Dec 2015	0.020	Dec 2016	0.020	Dec 2017	-		0.020	Continuing	Continuing	Continuing
Studies & Analysis-TPX-42	WR	NAWCAD : PAX River, MD	0.721	0.100	Dec 2015	0.100	Dec 2016	0.500	Dec 2017	-		0.500	Continuing	Continuing	Continuing
Systems Engineering-SPN-50(V)1	WR	NAWCAD : PAX River, MD	2.300	2.911	Dec 2015	2.964	Dec 2016	3.000	Dec 2017	-		3.000	Continuing	Continuing	Continuing
Prior Year Support no longer funded in the FYDP	Various	Various : Various	13.393	0.000		0.000		0.000		-		0.000	0.000	13.393	-
		Subtotal	44.082	10.536		10.327		12.322		-		12.322	-	-	-

Remarks

TPX-42 increase is due to broadened CyberSecurity requirement to remain compliant with software CyberSecurity directives and Information Assurance.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation- TPX-42	WR	NAWCAD : PAX River, MD	2.245	0.500	Dec 2015	0.400	Dec 2016	0.900	Dec 2017	-		0.900	Continuing	Continuing	Continuing
Development Test & Evaluation - SPN-43	WR	NAWCAD : PAX River, MD	0.900	0.600	Dec 2015	0.573	Dec 2016	1.459	Dec 2017	-		1.459	Continuing	Continuing	Continuing
Operational Test & Evaluation-SPN-50(V)1	WR	OPTEVOR : Norfolk, VA	0.500	0.600	Dec 2015	0.903	Dec 2016	1.840	Dec 2017	-		1.840	Continuing	Continuing	Continuing
Prior year T&E no longer funded in the FYDP	Various	Various : Various	1.707	0.000		0.000		0.000		-		0.000	0.000	1.707	-
Develpment Test & Evaluation SPN-50	WR	NAWCAD : PAX River	0.000	0.000		1.000	Dec 2016	0.000		-		0.000	0.000	1.000	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 0993 / *Carrier ATC*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	5.352	1.700		2.876		4.199		-		4.199	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	American Electronics, Inc. : California, MD	2.495	0.300	Dec 2015	0.300	Dec 2016	0.500	Dec 2017	-		0.500	1.500	5.095	5.095
Program Management Support	WR	NAWCAD : PAX River, MD	1.178	0.350	Dec 2015	0.350	Dec 2016	0.500	Dec 2017	-		0.500	Continuing	Continuing	Continuing
Travel	WR	NAVAIRHQ : PAX River, MD	0.240	0.055	Oct 2015	0.055	Oct 2016	0.200	Dec 2017	-		0.200	Continuing	Continuing	Continuing
		Subtotal	3.913	0.705		0.705		1.200		-		1.200	-	-	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	78.753	39.538		30.254		32.799		-		32.799	-	-	-

Remarks

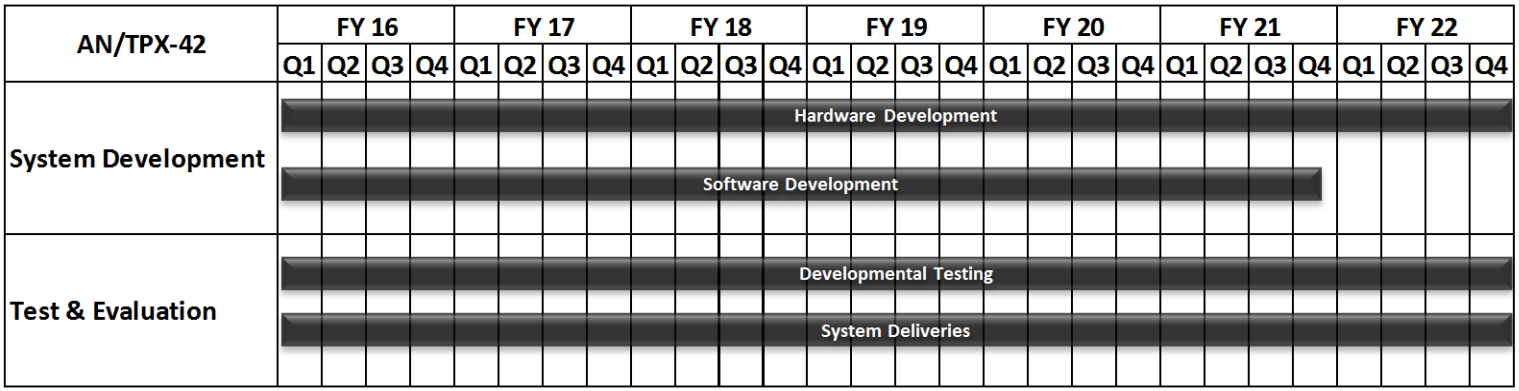
Increase in TPX-42 Primary HDW Development, Software Development, and Developmental T&E FY18-FY22 due to funding Enterprise Air Surveillance Radar (EASR) TPX-42 to interface the EASR sensor to the TPX-42.

Increase in TPX-42 Primary hardware development, software development, and studies and analysis due to funding of CyberSecurity directives and Information Assurance mandates.

Increase in SPN-43C Developmental T&E in FY18 is to test receiver/transmitter ECP which is required to sustain shipboard ATC surveillance capability until SPN-50 is fielded.

Increase in program management support and travel is directly related to the increased efforts in support of SPN-50.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*



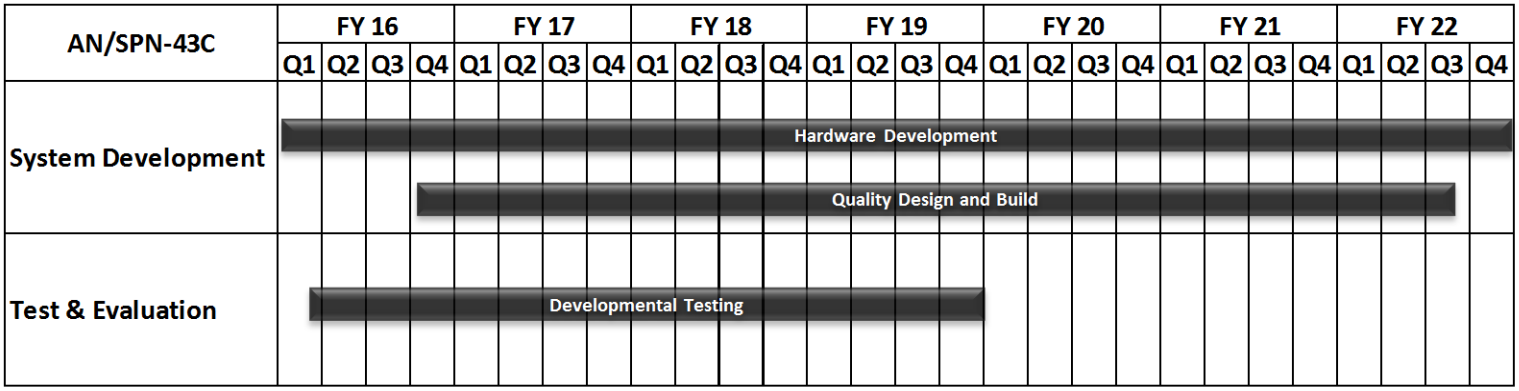


Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

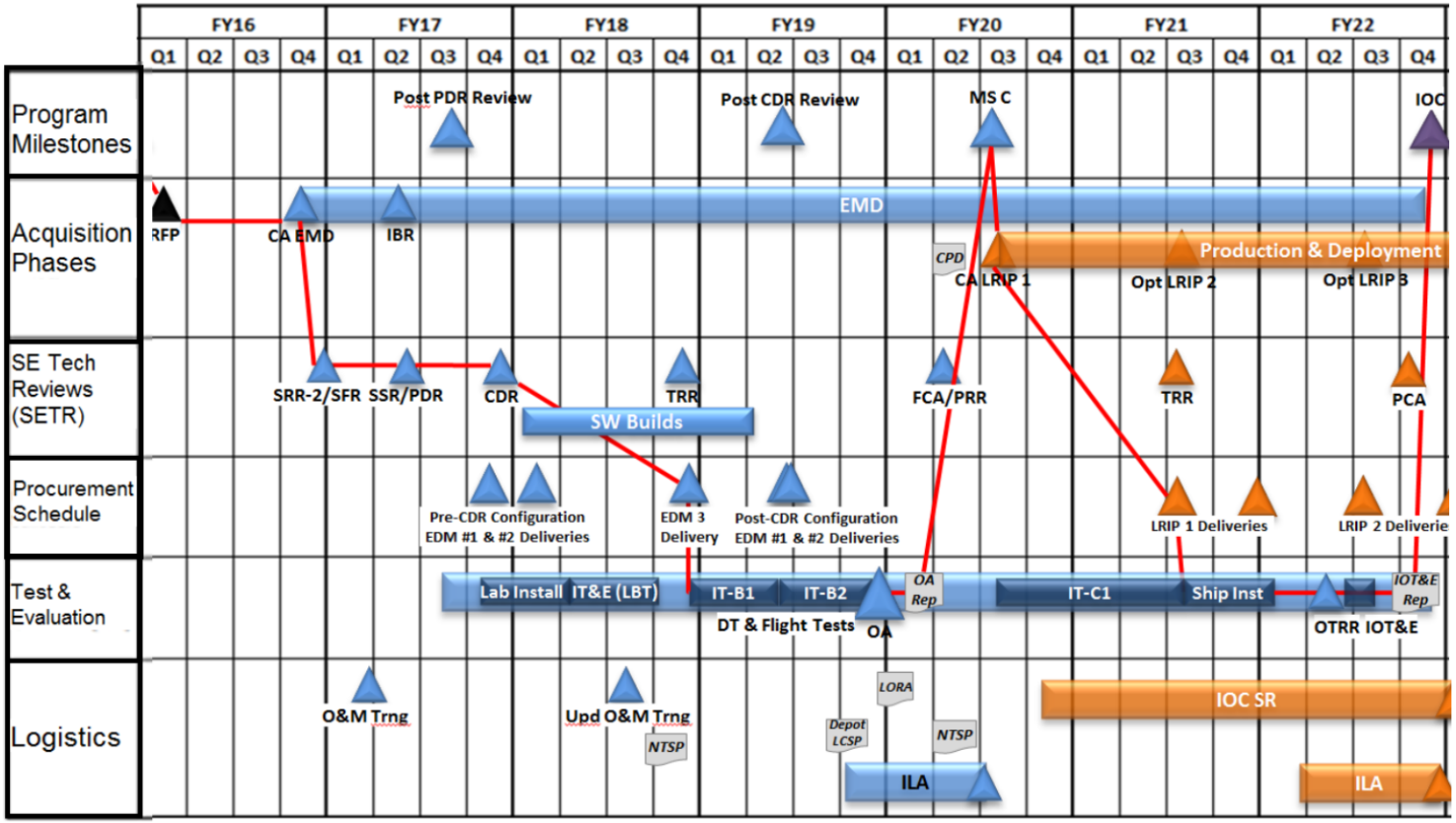


Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 0993 / *Carrier ATC*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Carrier ATC				
Acquisition Milestones: Milestones: AN/SPN-50(V)1 Post CDR Review	2	2019	2	2019
Acquisition Milestones: Milestones: AN/SPN-50(V)1 Milestone C	3	2020	3	2020
System Development: Hardware Development: AN/SPN-43C	1	2016	4	2022
System Development: Hardware Development: Quality Design and Build (AN/SPN43C)	4	2016	3	2022
System Development: Hardware Development: AN/TPX-42A(V)	1	2016	4	2022
System Development: Software Development: AN/TPX-42A(V)	1	2016	4	2021
System Development: Reviews: Critical Design Review (CDR) (AN/SPN-50(V)1)	4	2017	4	2017
System Development: Reviews: System Requirement Review (SRR) (AN/SPN-50)	4	2016	4	2016
Page/Group/Row				
Test and Evaluation: Developmental Testing/Operational Testing (AN/SPN-50(V)1)	4	2018	4	2019
Test and Evaluation: Developmental Testing (AN/TPX-42A(V))	1	2016	4	2022
Production Milestones: Developmental Testing (AN/SPN-43C)	1	2016	4	2019
Production Milestones: Contract Awards: (AN/SPN-50(V)1) Pre-CDR EDM Contract Award	4	2016	4	2016
Production Milestones: Contract Awards: (AN/SPN-50(V)1) Post-CDR EDM Contract Award	4	2017	4	2017
Deliveries: Pre-CDR Configuration Prototype Delivery (AN/SPN-50(V)1)	4	2017	4	2017
Deliveries: Post-CDR Configuration Prototype Delivery (AN/SPN-50(V)1)	4	2018	4	2018
Deliveries: System Deliveries (TPX-42A(V))	1	2016	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 1657 / *ATC Improvement*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
1657: *ATC Improvement*	3.046	0.399	0.383	0.413	-	0.413	0.423	0.432	0.442	0.451	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program provides for engineering development, integration, adaptation, and testing of new and/or modernized Air Traffic Control (ATC) systems, air navigational aids, landing systems, and ATC communication systems for Naval and Marine Corps Air Stations (NAS/MCAS) and Fleet ATC Systems. These systems are critical to Naval Aviation and provide for safe, efficient air operations. Additionally, the Federal Aviation Administration (FAA) is affecting major modernization of the National Airspace System (NAS). The Navy must maintain compatibility with FAA-developed ATC systems in order to ensure seamless interoperability within the NAS. NAS modernization initiatives in Project 1657 include the Visual Information Display System (VIDS) and follow-on Pre-Planned Product Improvements, with additional RDT&E efforts required for modified commercial-off-the-shelf ATC systems and equipment for modernization and recapitalization of these systems at our NAS, MCAS & Fleet Area Control & Surveillance Facilities (FACSFACs) worldwide.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: NAS MOD VIDS	0.199	0.191	0.210	0.000	0.210
Articles:	-	-	-	-	-
Description: Continue engineering development of pre-planned product improvements for the VIDS and initiate efforts to incorporate VIDS into the FACSFACs. Research display alternatives for Navy ATC systems, and evaluate alternatives for future communication and radar systems.					
FY 2016 Accomplishments: Continued engineering development of Pre-Planned Product Improvements for VIDS to incorporate multiple weather source inputs. Continue Standard Terminal Automation Replacement System and VIDS engineering development for technology insertion. Continued engineering efforts to maintain interoperability with the Federal Aviation Administration's (FAA) next generation air traffic control system.					
FY 2017 Plans: Continue engineering development of Pre-Planned Product Improvements for VIDS to incorporate multiple weather source inputs. Continue Standard Terminal Automation Replacement System and VIDS engineering development for technology insertion. Continue engineering efforts to maintain interoperability with the FAA next generation air traffic control system.					
FY 2018 Base Plans: Continue engineering development of Pre-Planned Product Improvement for VIDS to incorporate multiple weather source inputs. Continue Standard Terminal Automation Replacement System and VIDS engineering					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
development for technology insertion. Continue engineering efforts to maintain interoperability with the FAAs next generation air traffic control system. ***FY 2018 OCO Plans:*** N/A					
Title: Fleet ATC Systems ***Articles:*** ***Description:*** Research efforts to determine the best technical approach to integrate various data link and communication system upgrades into Navy/Marine Corps ATC Systems including but not limited to the Digital Airport Surveillance Radar (DASR) and the DoD Advanced Automation Systems (DAAS) into the Fleet Area Control and Surveillance Facilities. Evaluate alternative for future processor/display, sensor and communication systems. ***FY 2016 Accomplishments:*** Continued engineering efforts to maintain interoperability with the FAA. ***FY 2017 Plans:*** Continue engineering efforts to maintain interoperability with the FAAs next generation air traffic control system. Continue evaluation of for future processor/display, sensor and communication systems. ***FY 2018 Base Plans:*** Continue engineering efforts to maintain interoperability with the FAAs next generation air traffic control system. for future processor/display, sensor and communication systems. ***FY 2018 OCO Plans:*** N/A	0.200 -	0.192 -	0.203 -	0.000 -	0.203 -
Accomplishments/Planned Programs Subtotals	0.399	0.383	0.413	0.000	0.413

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2840: *National Air Space System*	25.621	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	382.785
• OPN/2845: *Fleet Air Traffic Control Systems*	8.249	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	211.679

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 1657 / *ATC Improvement*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2820: *Ashore ATC Equipment: NASMOD/Fleet ATC*	0.000	35.498	35.907	-	35.907	36.092	36.716	38.072	39.965	Continuing	Continuing

Remarks

Ashore ATC Equipment: FY2017-FY2022 reflects NASMOD and Fleet ATC portions of Ashore ATC budget.

D. Acquisition Strategy

All projects are non-ACAT upgrades to existing systems. An evolutionary acquisition approach is being used to introduce technology advancements that either satisfy emergent requirements or address supportability and cost of ownership problems.

E. Performance Metrics

The Air Traffic Control (ATC) Improvement continues to research, evaluate and develop displays and other alternatives for Navy ATC, communication and radar systems. Maintain compatibility with the FAAs next generation Air Traffic Control System.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 3372 / *ATC Systems*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
3372: *ATC Systems*	10.222	14.605	16.453	30.466	-	30.466	22.233	22.034	22.271	17.564	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Landing System Upgrade Program (LSUP) is essential to maintain the United States Navy's capability to perform safe and expeditious aircraft landings aboard CVN and LHA/D vessels. The Navy's Precision Approach and Landing Capability requirements have necessitated Life Cycle Extension upgrades to legacy landing systems, AN/SPN-35, AN/SPN-41 and AN/SPN-46. The LSUP program will modernize technology that was developed and fielded over 30 years ago. It is estimated that without these upgrades, the Navy will lose its Automatic Carrier Landing System capability within 5 years. Meet CyberSecurity requirements and compliance. CyberSecurity requirements have driven increased efforts to remain compliant with software CyberSecurity directives and Information Assurance mandates. Maintaining compliance is critical to retaining an Authority to operate within the Fleet.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: AN/SPN-46 Blk IV Upgrade	14.605	13.397	17.217	0.000	17.217
Articles:	-	-	-	-	-
Description: The AN/SPN-46 Blk IV program targets aging and obsolete components within the carrier landing systems and replaces them with modernized and sustainable components. Blk IV consists of antenna pedestal upgrades, addresses transmitter obsolescence issues, and replacement of obsolete circuit cards, and CyberSecurity					
FY 2016 Accomplishments: Continue hardware and software development of the AN/SPN-46 Blk IV upgrade; continue addressing circuit card and other (part) obsolescence issues.					
FY 2017 Plans: Perform engineering reviews. Begin integration testing of the AN/SPN-46 Blk IV upgrade.					
FY 2018 Base Plans: *Note-Increase from FY17 to FY18 is because the pedestal component of the block upgrade will be fabricated and integrated with the new transmitter and circuit cards, support is required for hardware/software integration and development, and test cost increases required for flight testing of the AN/SPN-46 Blk IV with the F/A-18. Complete development of the Blk IV upgrade. Perform flight testing of the antenna and pedestal.					
FY 2018 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: AN/SPN-35 Blk I Upgrade	0.000	3.056	13.249	0.000	13.249
Articles:	-	-	-	-	-
Description: This accomplishment provides for the development, upgrade, redesign, integration, and testing of the AN/SPN-35C Block I upgrade. AN/SPN-35C is the Precision Approach Radar aboard LHA/LHD class ships and is used for Mode III aircraft recovery which ensures the safe approach and landing of AV-8B and various helicopters during adverse weather & night conditions. The AN/SPN-35C Block I upgrade will include engineering efforts to upgrade, redesign, replace, and support, common failure items, obsolete components, analog systems ensuring the their availability to the fleet and extending the service life of the AN/SPN-35C to 2040. ***FY 2016 Accomplishments:*** N/A ***FY 2017 Plans:*** The AN/SPN-35C Blk I upgrade FY2017 efforts will include the system engineering investigation & analysis, development, upgrade, and redesign of the AN/SPN-35C Pedestal, stabilization, ferrite switch, receiver, and antenna drives. ***FY 2018 Base Plans:*** *Note - AN/SPN-35 Blk I increase between FY17 and FY18 because FY18 is the first full year of the AN/SPN-35 Blk I development and significant engineering events such as CDR. Additionally, there are significant amounts of long lead items that the NAWC, as lead integrator for the AN/SPN-35, will place on order. The AN/SPN-35 is anticipated to be an extensive software change which is expected to also drive cost. Award contracts for Blk I primary and auxiliary equipment development. Continue development of the Blk I upgrade to include ordering of long lead items for the Radar Processing Controller (RPC), the receiver, main I/O processor, and control indicator. Assess and address broadened CyberSecurity requirements to remain compliant with Information Assurance Mandates. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	14.605	16.453	30.466	0.000	30.466

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• OPN/2832: *Automatic Carrier Landing System*	21.281	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	155.476
• OPN/2830: *Afloat ATC Equipment/ACLS*	0.000	24.999	35.942	-	35.942	39.882	40.463	41.317	42.132	Continuing	Continuing

Remarks

Afloat ATC Equipment: FY2017-FY2022 reflects ACLS portion of Afloat ATC Equipment budget.

D. Acquisition Strategy

Landing System Upgrade Program consists of lifecycle extension upgrades to the AN/SPN-35C Precision Approach Radar, AN/SPN-41B Instrument Control Landing Systems and AN/SPN-46 Automatic Carrier Landing Systems which support Air Traffic Control (ATC) operations on board CVN, LHA, and/or LHD-class ships. This effort includes numerous commercial off-the-shelf (COTS) component refresh updates which are urgently needed to sustain the operational viability of these Naval ATC systems supporting fleet air operations for at least the next 15 years until the next generation ATC system is fully implemented. This COTS refresh will include analysis and upgrade of key system components that are critical to overall system operation but have become increasingly difficult to maintain over the past few years. Recent adjustments in the direction and scope of Naval ATC systems have necessitated a re-evaluation of the long-term viability and sustainability of the current Fleet ATC equipment.

The Resources and Requirements Review Board approved the DON Precision Approach and Landing Capability (PALC) Roadmap per Decision Memorandum (DM) Ser: N8B/13U141053 dtd 03 July 2013. This PALC Roadmap re-scoped Joint Precision Approach and Landing System (JPALS) into a single increment and delayed deployment of the JPALS capability to the Fleet. As a result, a requirement to upgrade current SPNs has emerged. Per Enclosure 1 of the above DM, the Landing Systems Upgrade Program will be comprised of the AN/SPN-46, AN/SPN-35C, and AN/SPN-41B and is anticipated that each SPN upgrade will go through separate Material Development Decisions and Milestones.

E. Performance Metrics

Test Readiness Review (TRR) of the AN/SPN-46 Blk IV upgrade.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development - AN/SPN-46 Blk IV Upgrade	WR	NAWCAD : Patuxent River, MD	3.461	6.161	Nov 2015	6.914	Nov 2016	7.263	Nov 2017	-		7.263	Continuing	Continuing	Continuing
Ancillary Hardware Development - AN/SPN-46 Blk IV Upgrade	C/CPFF	Sierra Nevada Corp (SNC) : Reno, NV	6.016	6.721	Dec 2015	5.101	Dec 2016	7.120	Dec 2017	-		7.120	Continuing	Continuing	Continuing
Primary Hardware Development - AN/SPN-35 Blk I Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.000		2.026	Nov 2016	5.236	Nov 2017	-		5.236	Continuing	Continuing	Continuing
Ancilliary Hardware Development - AN/SPN-35 Blk I Upgrade	TBD	TBD : TBD	0.000	0.000		0.272	Apr 2017	4.083	Nov 2017	-		4.083	Continuing	Continuing	Continuing
		Subtotal	9.477	12.882		14.313		23.702		-		23.702	-	-	-

Remarks

AN/SPN-46 Blk IV increase from FY17 to FY18 is because the pedestal component of the block upgrade will be fabricated and integrated with the new transmitter and circuit cards. AN/SPN-35 Blk I increase between FY17 and FY18 because FY18 is the first full year of the AN/SPN-35 Blk I development. Additionally, there are significant amounts of long lead items that the NAWC, as lead integrator for the AN/SPN-35, will place on order. The AN/SPN-35 is anticipated to be an extensive software change which is expected to also drive cost.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support (ILS)	WR	NAWCAD : Patuxent River, MD	0.200	0.242	Nov 2015	0.495	Nov 2016	1.275	Nov 2017	-		1.275	Continuing	Continuing	Continuing
Systems Engineering Support	WR	NAWCAD : Patuxent River, MD	0.145	0.689	Nov 2015	0.720	Nov 2016	2.050	Nov 2017	-		2.050	Continuing	Continuing	Continuing
		Subtotal	0.345	0.931		1.215		3.325		-		3.325	-	-	-

Remarks

FY18 is the first full year of the AN/SPN-35 Blk I development and contains some significant engineering events for the AN/SPN-35 such as CDR. Additionally for both the AN/SPN-35 Blk I and AN/SPN-46 Blk IV, support is required for hardware/software integration and development.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604504N / *Air Control*	Project (Number/Name) 3372 / *ATC Systems*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/SPN-46 Blk IV Upgrade	WR	NAWCAD : Patuxent River, MD	0.000	0.187	Nov 2015	0.305	Nov 2016	2.312	Nov 2017	-		2.312	Continuing	Continuing	Continuing
		Subtotal	0.000	0.187		0.305		2.312		-		2.312	-	-	-

Remarks

Test costs increase FY17 to FY18 because of the required flight testing of the AN/SPN-46 Blk IV with the F/A-18.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management (PM) Support	WR	NAWCAD : Patuxent River, MD	0.300	0.502	Nov 2015	0.510	Nov 2016	0.777	Nov 2017	-		0.777	Continuing	Continuing	Continuing
PM Suppt - MSS	C/CPAF	TBD : Patuxent River, MD	0.100	0.103	Nov 2015	0.110	Nov 2016	0.350	Nov 2017	-		0.350	Continuing	Continuing	Continuing
		Subtotal	0.400	0.605		0.620		1.127		-		1.127	-	-	-

Remarks

Increase in FY18 for Management Services is due to the AN/SPN-35 Blk I entering the first full year of development.

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.222	14.605		16.453		30.466		-		30.466	-	-	-

Remarks

Overall project costs increase because FY18 is the first full year of AN/SPN-35 Blk I development, which is occurring simultaneously with the continued development and testing of the AN/SPN-46 Blk IV.

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

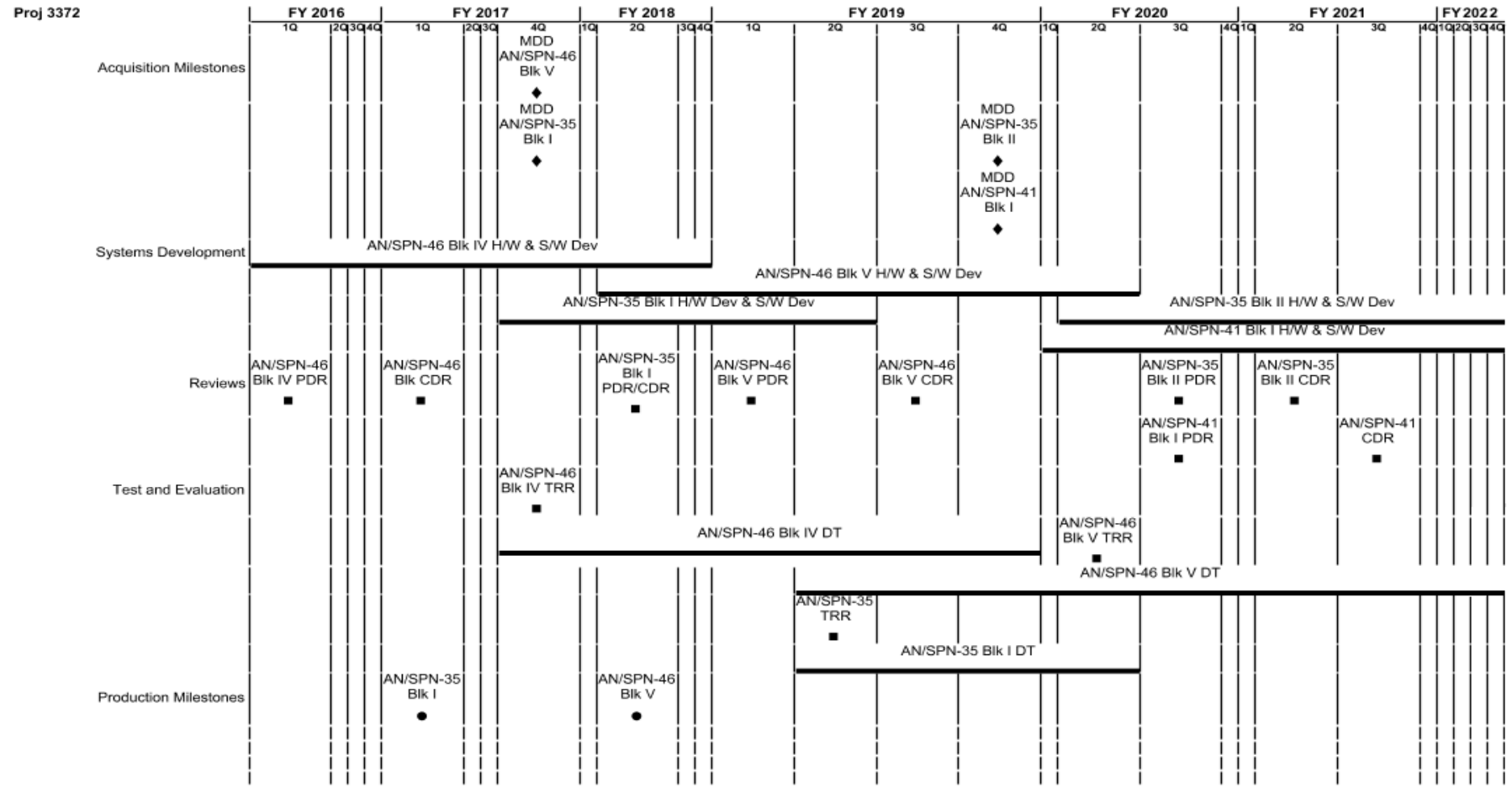


Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3372				
Acquisition Milestones: MDD AN/SPN-46 Blk V	4	2017	4	2017
Acquisition Milestones: MDD AN/SPN-35 Blk I	4	2017	4	2017
Acquisition Milestones: MDD AN/SPN-35 Blk II	4	2019	4	2019
Acquisition Milestones: MDD AN/SPN-41 Blk I	4	2019	4	2019
Systems Development: AN/SPN-46 Blk IV H/W and S/W Dev	1	2016	4	2018
Systems Development: AN/SPN-46 Blk V H/W and S/W Dev	2	2018	2	2020
Systems Development: AN/SPN-35 Blk I H/W and S/W Dev	4	2017	2	2019
Systems Development: AN/SPN-35 Blk II H/W and S/W Dev	2	2020	4	2022
Systems Development: AN/SPN-41 Blk I H/W and S/W Dev	1	2020	4	2022
Reviews: AN/SPN-46 Blk IV Preliminary Design Review (PDR)	1	2016	1	2016
Reviews: AN/SPN-46 Blk IV Critical Design Review (CDR)	1	2017	1	2017
Reviews: AN/SPN-46 Blk V Preliminary Design Review (PDR)	1	2019	1	2019
Reviews: AN/SPN-46 Blk V Critical Design Review (CDR)	3	2019	3	2019
Reviews: AN/SPN-35 Blk I Critical Design Review (CDR)	2	2018	2	2018
Reviews: AN/SPN-35 Blk II Preliminary Design Review (PDR)	3	2020	3	2020
Reviews: An/SPN-35 Blk II Critical Design Review (CDR)	2	2021	2	2021
Reviews: AN/SPN-41 Blk I Preliminary Design Review (PDR)	3	2020	3	2020
Reviews: AN/SPN-41 Blk I Critical Design Review (CDR)	3	2021	3	2021
Test and Evaluation: An/SPN-46 Blk IV Test Readiness Review (TRR)	4	2017	4	2017
Test and Evaluation: AN/SPN-46 Blk IV Development Testing (DT)	4	2017	4	2019
Test and Evaluation: AN/SPN-46 Blk V Test Readiness Review (TRR)	2	2020	2	2020
Test and Evaluation: AN/SPN-46 Blk V Development Testing (DT)	2	2019	4	2022

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604504N / *Air Control*	**Project (Number/Name)** 3372 / *ATC Systems*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Test and Evaluation: AN/SPN-35 Blk I Test Readiness Review (TRR)	2	2019	2	2019
Test and Evaluation: AN/SPN-35 Blk I Development Testing (DT)	2	2019	2	2020
Production Milestones: Contract Award AN/SPN-46 BLK V	2	2018	2	2018
Production Milestones: Contract Award AN/SPN-35 Blk I	1	2017	1	2017