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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>
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COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	2,378.898	334.631	349.181	393.268	0.000	393.268	252.530	232.783	124.860	127.073	1,387.576	5,580.800
67A021: OCX	2,276.545	278.552	288.125	331.362	0.000	331.362	189.417	168.477	74.453	75.772	1,131.744	4,814.447
67A025: <i>GPS Enterprise Integrator</i>	102.353	56.079	61.056	61.906	0.000	61.906	63.113	64.306	50.407	51.301	255.832	766.353

**Program MDAP/MAIS Code:** 456

**A. Mission Description and Budget Item Justification**

The Global Positioning System (GPS) is a space based positioning, navigation and timing distribution system which operates through all weather. GPS supports both civil and military users in air, space, sea and land operations. GPS is a satellite-based radio navigation system that serves military and civil users worldwide. GPS users process satellite signals to determine accurate position, velocity and time. GPS must comply with 10 United States Code (USC) sec 2281 which requires that the Secretary of Defense ensures the continued sustainment and operation of GPS for military and civilian purposes and 51 USC sec 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

This Program Element (PE) funds the Research & Development (R&D) for the GPS next generation operational control system (OCX) and the GPS Enterprise Integrator (EI). This includes advanced concept development, systems analysis, modernized control segment development, mission planning development, training simulators, integrated logistics support products, test resources, systems engineering required to meet the government's obligations to the international, military and civil communities, and system requirements verification. OCX acquisition was established to 1) provide command and control of legacy and GPS III satellites, 2) incorporate situational awareness to support Navigation Warfare (NAVWAR) and signal monitoring, 3) enable mission capability upgrades to support a warfighter effects- based approach to operations and 4) integrate DoD information assurance and cyber security controls and capabilities. GPS Enterprise Integrator is responsible for architecture and system definition (the analysis and definition, management, maintenance, and evolution of the GPS Enterprise requirements and interface technical documents) as well as for the planning, execution, and fielding of the GPS Enterprise.

OCX funds will support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, modernization initiatives, systems engineering, system development, test and evaluation efforts and mission operations. These activities support upgrades and product improvements for military and civil applications necessary to enable efforts to protect U.S. military and Allies' use of GPS. Additionally, funds will ensure OCX efforts meet current and future Joint Requirements Oversight Council-approved required capabilities.

The GPS Enterprise consists of Space, Ground Control, Nuclear Detonation (NUDET) Detection System (NDS) and User Equipment Segments. The government is responsible for the integration of the GPS Segments such that they provide worldwide GPS capability to support the warfighter and over a billion national security, civil, Allied, and commercial GPS users.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Air Force	<b>Date:</b> February 2016
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The GPS Enterprise Integrator project includes the efforts associated with the Government's prime contract tasks necessary to accomplish this critical integrating function with the entire GPS user community. The Enterprise Integrator maintains the GPS current architecture and system definition, controls and validates interfaces, ensures compatibility of Generation II and III systems, and develops/manages plans for execution and fielding of the GPS Enterprise. Further, the Enterprise Integrator provides modeling, simulation and technical analyses of impacts for Government-directed enterprise-level trades among the GPS segments leading to definition, management, maintenance, and evolution of the GPS Enterprise requirements and interface technical documents to build and ensure the integrity of the enterprise technical baseline, and perform system requirements verification.

In addition, the GPS Enterprise Integrator project funds the technical evolution, risk reduction, enterprise-level testing and delivery of all GPS Enterprise capabilities. Examples for Generation II include electronic protection and additional civil signals; for Generation III, additional anti-jamming protection. To accomplish this, the GPS Enterprise Integrator delivers Test and Verification capabilities, Requirements and Interface Management, and Systems Integration support across the Space, Control, and User Segments. In this capacity, the Enterprise Integrator is responsible for managing this cross-program work to provide these and other capabilities.

GPS Enterprise Integrator's analyses guide government decisions to ensure efficient and effective synchronization and execution across all Generation II and III GPS programs. For Enterprise-wide integration to be successful, the Integrator: works with the GPS and NDS prime contractor teams to develop plans for early risk reduction System Integration Demonstrations to ensure system interfaces and functionality meet user and system requirements; ensures all equipment and documentation is ready when needed; integrates and analyzes enterprise schedules; and conducts formal test and verification, including Requirement Verification Plans and System Test Plans and Procedures. GPS Enterprise Integrator performs all these efforts across all GPS programs in all acquisition phases. The government owns the Enterprise system requirements and integration, and highly leverages the Enterprise Integrator team to eliminate the need to fund a development prime contractor to perform these functions. This enhances government control, oversight and program accountability.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that were fielded or received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

<b>B. Program Change Summary (\$ in Millions)</b>	<b><u>FY 2015</u></b>	<b><u>FY 2016</u></b>	<b><u>FY 2017 Base</u></b>	<b><u>FY 2017 OCO</u></b>	<b><u>FY 2017 Total</u></b>
Previous President's Budget	299.060	350.232	222.288	0.000	222.288
Current President's Budget	334.631	349.181	393.268	0.000	393.268
Total Adjustments	35.571	-1.051	170.980	0.000	170.980
• Congressional General Reductions	0.000	-1.051			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	35.571	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	170.980	0.000	170.980

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	
<b>Change Summary Explanation</b> FY15: +\$35.571 Above Threshold Reprogramming (ATR) for OCX overrun FY17: +\$170.980M to fund OCX to the Service Cost Position (SCP)		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force										<b>Date:</b> February 2016		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>				<b>Project (Number/Name)</b> 67A021 / OCX			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
67A021: OCX	2,276.545	278.552	288.125	331.362	0.000	331.362	189.417	168.477	74.453	75.772	1,131.744	4,814.447
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Global Positioning System (GPS) is a space based positioning, navigation and timing distribution system which operates through all weather. This project funds the research and development for the GPS next generation operational control system (OCX). This includes, but is not limited to, advanced concept development, systems engineering and analysis, modernized control segment and mission planning, development, training simulators, integrated logistics support products, and test resources.

OCX acquisition was established to 1) provide command and control of legacy and GPS III satellites, 2) incorporate situational awareness to support Navigation Warfare (NAVWAR) and signal monitoring, 3) enable mission capability upgrades to support a warfighter effects-based approach to operations, and 4) integrate DoD information assurance and cyber security controls and capabilities. OCX funds will support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, technology development, systems engineering, system development, test and evaluation efforts and mission operations in support of upgrades and product improvements for military and civil applications necessary to support efforts to protect U.S. military and Allies' use of GPS. Additionally, funds will ensure efforts to meet current and future Joint Requirements Oversight Council (JROC) approved required capabilities.

OCX Block 0 (through Iteration 1.5) is the Launch and Control System (LCS) intended to conduct Launch and Early Orbit (LEO) operations and the on-orbit checkout of all GPS III satellites. OCX Block 0 is a subset of OCX Block 1.

OCX Block 1 (adds Iterations 1.6, 1.7 and 2.1 to Block 0) fields the operational capability to control all legacy satellites and civil signals (L1C/A), military signals (L1P(Y), L2P(Y)) as well as the GPS III satellites and the modernized civil signal (L2C) and the aviation safety-of-flight signal (L5). In addition, Block 1 will field the basic operational capability to control the modernized military signals (L1M and L2M (M-Code)), and the globally compatible signal (L1C). It also fully meets information assurance/cyber defense requirements.

OCX Block 2 (adds Iteration 2.2 to Block 1) fields the advanced operational capability to control the advanced features of the modernized military signals (L1M and L2M (M-Code)).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<b>Title:</b> OCX Development	262.298	250.991	287.962
<b>Description:</b> Development of the GPS next generation operational control system to launch GPS III and operate a mixed GPS II and GPS III constellation and provide for a robust Information Assurance system.			
<b>FY 2015 Accomplishments:</b>			

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>Continued preparation and dry runs for qualification testing on OCX Block 0. Completed Iteration 1.6 Block 1 segment-level systems engineering for the command and control of GPS II satellites, legacy signals, and modernized signals. Conducted Iteration 1.6 Critical Design Review (CDR). Continued systems engineering for Iterations 1.7, 2.1 (Block 1), and 2.2 (Block 2).</p> <p><b>FY 2016 Plans:</b> Conduct factory and site acceptance testing, receive approval to operate and connect, and certify &amp; accept OCX Block 0 for launch and checkout operations of GPS III satellites. Continue Iteration 1.5 (Block 1) risk reduction testing, Iteration 1.6 (Block 1) software development and integration activities. Conduct Iteration 1.6 Delta CDRs, and conduct qualification testing and production for OCX Monitor Station Receiver Element (OMSRE). Continue development of the remaining modernized civil and military signals.</p> <p><b>FY 2017 Plans:</b> FY17 Funding to the Service Cost Position (SCP) will allow the program to complete Iteration 1.6 software development, integration and testing, and begin Iteration 1.7 and 2.1 software development and integration activities. Complete qualification testing for system simulator and begin accreditation process. Ship, install, receive interim authority to test, and integrate the monitoring stations equipment and OMSRE. Begin final testing and integration activities for all of Block 1. Begin Iteration 2.2 (Block 2) systems engineering. Continue security certification activities leading to Authority to Operate (ATO).</p>				
<p><b>Title:</b> Technical Support</p> <p><b>Description:</b> Development of the Standardized Space Trainer (SST) to provide GPS III operator training. Development of Enterprise Mission Planning Systems. Facilities upgrades for Control Stations and associated equipment and servers.</p> <p><b>FY 2015 Accomplishments:</b> Continued work on the SST and developed demonstration capabilities; continued development of Enterprise Mission Planning Systems. Continued work on the facility upgrades to include the Master Control Station (MCS), Alternate Master Control Station (AMCS), and remote monitor station sites.</p> <p><b>FY 2016 Plans:</b> Continue work on the SST and develop demonstration capabilities; continue development of Enterprise Mission Planning Systems. Continue work and begin fielding to facilities to include the MCS, AMCS, sustainment assets and remote monitor station sites.</p> <p><b>FY 2017 Plans:</b> Continue work on the SST and develop demonstration capabilities; continue development of Enterprise Mission Planning Systems. Continue work on the facility upgrades to include the MCS, AMCS, and remote monitor station sites.</p>		16.254	37.134	43.400
<b>Accomplishments/Planned Programs Subtotals</b>		278.552	288.125	331.362

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A021 / OCX

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017</u>			<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• RDTE: BA07: PE 0305265F: <i>GPS III Space Segment</i>	204.864	180.359	141.888	0.000	141.888	110.860	43.561	78.866	80.265	464.191	1,304.854
• MPAF: BA05: Line Item # GPS <i>III: GPS III Space Segment</i>	312.326	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	312.326
• SPAF: BA01: Line Item # <i>GPSIII: GPS III Space Segment</i>	0.000	199.218	34.059	0.000	34.059	761.515	899.241	761.565	554.763	3,737.790	6,948.151
• DOT: <i>DOT (FAA) Civil Funding</i>	8.000	8.000	17.100	0.000	17.100	0.000	0.000	0.000	0.000	0.000	33.100

**Remarks**

DOT (FAA) funding in FY 2016 - 2018 is TBD. \$25.1M is required.

**D. Acquisition Strategy**

The Air Force is pursuing a "Block" approach to the next generation GPS control segment (OCX) to respond to warfighter capability requirements. The strategy calls for capability (e.g., better signal maintainability, Unified S-Band (USB), Search and Rescue (SAR) GPS, and near-real time C2) on-ramps for the follow-on contract for GPS III SVs (starting no earlier than SV11) which will require updates to the OCX ground segment. Enterprise studies will ensure GPS Enterprise synchronization across space and ground segments.

**E. Performance Metrics**

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Air Force** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A021 / OCX
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<b>Product Development (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
GPS OCX Phase B OCX Block 1 & 2 Development	C/CPAF	Raytheon : Aurora, CO	1,672.117	236.428	Dec 2014	226.834	Dec 2015	259.830	Dec 2016	0.000		259.830	1,267.897	3,663.106	2,911.600
GPS OCX Technical Mission Analysis	MIPR	Various : Various	0.000	3.063	Oct 2014	13.734	Oct 2015	14.100	Dec 2016	0.000		14.100	73.320	104.217	-
GPS OCX Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	39.349	5.700	Dec 2014	4.391	Dec 2015	3.000	Dec 2016	0.000		3.000	15.600	68.040	-
GPS OCX Modernization/ SE & Technical Support	Various	Various : Various	53.028	5.119	Jan 2015	17.550	Jan 2016	17.200	Dec 2016	0.000		17.200	89.440	182.337	-
GPS OCX AMCS Facility Dev	Various	Various : Various	0.300	0.072	Mar 2015	0.850	Mar 2016	0.600	Mar 2017	0.000		0.600	3.120	4.942	-
GPS OCX Standard Space Trainer (SST)	C/CPAF	Sonalyt, Inc : Waterford, CT	6.500	5.000	Jan 2015	5.000	Jan 2016	5.000	Dec 2016	0.000		5.000	26.000	47.500	-
GPS OCX Enterprise Mission Planning	C/CPIF	Booz Allen Hamilton Eng Services : El Segundo, CA	7.000	3.000	Jan 2015	0.000	Jan 2016	6.500	Jan 2017	0.000		6.500	33.800	50.300	-
GPS OCX Phase A Development	Various	Various : Various	289.000	0.000		0.000		0.000		0.000		0.000	0.000	289.000	-
<b>Subtotal</b>			2,067.294	258.382		268.359		306.230		0.000		306.230	1,509.177	4,409.442	-

<b>Support (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-

<b>Test and Evaluation (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
GPS OCX T&E	C/CPAF	Various : Various	1.600	0.000	Mar 2015	1.103	Mar 2016	0.730	Mar 2016	0.000		0.730	3.796	7.229	-
<b>Subtotal</b>			1.600	0.000		1.103		0.730		0.000		0.730	3.796	7.229	-



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A021 / OCX

	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	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
Program Replan: Schedule to change					■																							
SV01 Launch (LCS support)									■																			
Monitor Station /Legacy Ground Antenna Installs									■	■	■	■																
GPS System Simulator (GSYS) CIQT													■															
Software Iteration 1.7 Incremental CDR (Include Iteration 1.6 CDR and update dates)															■													
Software Iteration 2.1 Incremental CDR															■													
GSYS Factory Qualification Test (FQT)													■															
GSYS Accreditation																	■											
Iteration 1.7/2.1 FQT TRR																					■							
OCX Blocks 1 & 2 MS C																											■	
OCX Block 1 RTO																											■	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A021 / OCX

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Program Replan: Schedule to change	2	2016	2	2016
SV01 Launch (LCS support)	2	2017	2	2017
Monitor Station /Legacy Ground Antenna Installs	2	2017	4	2017
GPS System Simulator (GSYS) CIQT	2	2018	2	2018
Software Iteration 1.7 Incremental CDR (Include Iteration 1.6 CDR and update dates)	4	2018	4	2018
Software Iteration 2.1 Incremental CDR	4	2018	4	2018
GSYS Factory Qualification Test (FQT)	2	2018	2	2018
GSYS Accreditation	2	2019	2	2019
Iteration 1.7/2.1 FQT TRR	1	2020	1	2020
OCX Blocks 1 & 2 MS C	4	2020	4	2020
OCX Block 1 RTO	4	2020	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force										<b>Date:</b> February 2016		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>				<b>Project (Number/Name)</b> 67A025 / <i>GPS Enterprise Integrator</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
67A025: <i>GPS Enterprise Integrator</i>	102.353	56.079	61.056	61.906	0.000	61.906	63.113	64.306	50.407	51.301	255.832	766.353
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Global Positioning System (GPS) Enterprise Integrator (EI) integrates, synchronizes, tests and verifies the four ACAT I Defense Acquisition Programs that constitute the GPS Enterprise to deliver reliable Positioning, Navigation, and Timing signal capability to military operators, the civil user community, and international partners. The Government Program Office owns and approves the technical baseline and is responsible for the successful fielding of all the GPS Segments. To successfully execute its responsibilities, the Government relies upon the specific expertise of the GPS Enterprise Integrator to integrate segment products and verify that system requirements are met.

The GPS Enterprise Integrator project is responsible for the development and management of the Enterprise technical baseline. The technical baseline consists of more than 6400 specifications and 330 interface documents. The technical baseline reflects the requirements of multiple stakeholder groups such as the Department of Defense (DoD), foreign governments and allies, industry, the general public (through four Interface specifications), and ensures GPS capabilities meet the needs of warfighters, civil agencies, commercial entities, international treaties, and over four billion global GPS users. The Enterprise Integrator manages the process through which the JROC requirements are matured and flowed down to the segments of the system and that interfaces are clearly defined. This enables the GPS system to meet Title 10 of the U.S. Code, Section 2281, mandated GPS capabilities as well as obligations to the international community and allied nations to provide interoperable PNT signals. The Enterprise Integrator is also responsible for all aspects of schedule and technical alignment across the segments. The Enterprise Integrator creates and manages plans that provide for early exercise of the products under development, compatibility analysis, and intersegment testing thereby reducing risk. The intersegment tests are required to prove the interoperability of OCX, GPS III, and modernized user equipment. The Enterprise Integrator's test efforts also extend to validating that GPS can be used for civil aircraft navigation.

The Enterprise Integrator activity supports the Government Program Office's GPS spectrum protection at international forums such as the International Telecommunications Union, assisting the United States when negotiating with foreign partners. In addition, the Enterprise Integrator provides technical expertise and continuity for maintaining relationships with other U.S. government agencies to include the FAA, NGA, NASA, as well as the Departments of State, Transportation, Homeland Security, and Commerce. Spectrum expertise from the Enterprise Integrator ensures GPS priority over eight essential spectrum signals such as the safety of life signal, L5, which is required for civil air navigation. Spectrum Protection prevents encroachment from commercial or foreign entities, which preserves reliable signals to warfighters and civil users, ensuring military operations and the integrity of the global economic infrastructure. The Enterprise Integrator is the GPS enterprise expert for Information Assurance (IA), Cyber Security, System Safety, and System Security, ultimately ensuring a protected GPS Signal for both the military and civil users from emerging cyber threats. The Enterprise Integrator is accountable for the development, execution, and analysis of OCX cyber security and IA test cases, which are necessary to deliver a secure, operational system, protected against adversarial cyber-attacks intended to deny, disrupt, or degrade GPS operations.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force	<b>Date:</b> February 2016
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A025 / <i>GPS Enterprise Integrator</i>
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The Enterprise Integrator supports the Government development and implementation of various Systems engineering documents, defines the methods of verification, conducts the analyses or tests, and assists the government in leading Integrated System Tests. The Enterprise Integrator validates the system performance in various mission threat scenarios during its development. The Enterprise Integrator provides deep, technical, highly specific expertise. The GPS EI functions enhance government control, oversight and program accountability.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p><b>Title:</b> GPS Enterprise Integrator</p> <p><b>Description:</b> The integration and technical baseline control of all elements of the GPS system (space/ground/user equipment) with one another in support of both military and civil users. Execute four major integration exercises, multiple mini-exercises, and five rehearsals between space and ground leading up to the launch of GPS III SV-01.</p> <p><b>FY 2015 Accomplishments:</b> Conducted a series of mini integration exercise events, which concluded the 'exercise' portion of readiness for launch. Performed SV01 verification tests and began Launch and Checkout Capability/System (LCC/LCS) Enterprise Assessments. Conducted multiple systems integration risk reduction demos. Initiated Integrated System Test (IST) 3-3 testing (Phases 0-2) for MGUE verification. Completed GPS Enterprise End-to-End Validation (GENEVA) model. Started developing Selective Availability Anti-Spoofing Module (SAASM) Mission Planning System (SMPS) V5 and Architecture Evolution Plan (AEP)/Modernized Navigation(MODNAV) in support of M-Code Available for Use milestone.</p> <p><b>FY 2016 Plans:</b> Continue IST 3-3 Phase 1 MGUE verification tests. Initiate IST 3-3 Phase 2 MGUE Field Test and IST 3-3 Phase 3. Conduct launch and early orbit operation rehearsals on the delivered system between ground and space segment in support of SV01 launch. Continue LCC/LCS Enterprise Assessments. Conduct multiple system integration demos. Support SV01 FCA/PCA. Continue developing Selective Availability Anti-Spoofing Module (SAASM) Mission Planning System (SMPS) V5 and AEP/ MODNAV in support of M-Code Available for Use milestone.</p> <p><b>FY 2017 Plans:</b> Complete IST 3-3 Phase 3 MGUE verification tests. Initiate GPS III end to end testing with GPS III, LCS, and MGUE lead platform. Conduct launch and early orbit operation rehearsals on the delivered system between ground and space segment in support of SV01 launch. Initiate M-Code Available Operational Test through AEP MODNAV. Complete SMPS V5c PDR and SMPS V5b install.</p>	56.079	61.056	61.906
<b>Accomplishments/Planned Programs Subtotals</b>	56.079	61.056	61.906

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force										<b>Date:</b> February 2016	
<b>Appropriation/Budget Activity</b> 3600 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>				<b>Project (Number/Name)</b> 67A025 / <i>GPS Enterprise Integrator</i>			

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2015	FY 2016	FY 2017	FY 2017	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Cost To	
			Base	OCO	Total					Complete	Total Cost
• RDTE: BA04: PE 0305164F: <i>NAVSTAR Global Positioning System (User Equipment) (Space)</i>	152.144	141.861	278.147	0.000	278.147	235.790	188.750	170.937	173.989	247.888	1,589.506
• RDTE: BA07: PE 0305265F: <i>GPS III Space Segment</i>	204.864	180.359	141.888	0.000	141.888	110.860	43.561	78.866	80.265	464.191	1,304.854
• RDTE: BA07: PE 0305913F: <i>NUDET Detection System</i>	20.405	14.403	21.093	0.000	21.093	31.418	19.919	17.093	14.268	Continuing	Continuing
• MPAF: BA05: Line Item # MGPS00: <i>Global Positioning System (Space)</i>	52.959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	52.959
• SPAF: BA01: Line Item # MGPS00: <i>Global Positioning System (Space)</i>	0.000	64.135	13.171	0.000	13.171	0.000	0.000	0.000	0.000	0.000	77.306
• MPAF: BA05: Line Item # GPS III: <i>GPS III Space Segment</i>	312.326	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	312.326
• SPAF: BA01: Line Item # GPSIII: <i>GPS III Space Segment</i>	0.000	199.118	34.059	0.000	34.059	761.515	899.241	761.565	554.763	3,738.790	6,949.051

**Remarks**

**D. Acquisition Strategy**

In accordance with a "back to basics" acquisition approach and exercise of strong oversight of development contractors, the Air Force is required to exercise complete ownership of the architecture, system definition, and integration of the GPS space, ground, and user segments. This complex inter-segment integration is traditionally performed by a prime contractor under a systems development contract. To eliminate the need to fund a development prime contractor to perform these functions, the government leverages systems engineering and integration expertise from both Federally Funded Research and Development Center (FFRDC) contractors and a Systems Engineering & Integration (SE&I) contractor. GPS Enterprise Integrator function of the SE&I contractor is currently funded within this Program Element (PE). The SE&I effort was originally procured in 2007 through a full and open competition, as was the new follow-on SE&I contract awarded in 2015. The SE&I follow-on strategy builds in year over year cost reductions as requirements stabilize.

**E. Performance Metrics**

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Air Force** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A025 / <i>GPS Enterprise Integrator</i>
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<b>Product Development (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
GPS EI Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	65.375	31.772	Jan 2015	19.450	Oct 2015	17.838	Jan 2017	0.000		17.838	152.132	286.567	-
GPS EI Technical Mission Analysis 1	MIPR	Aerospace : El Segundo, CA	16.135	10.020	Oct 2014	11.200	Oct 2015	11.536	Oct 2016	0.000		11.536	94.595	143.486	-
GPS EI Technical Mission Analysis 2	WR	MITRE : Bedford, MA	17.341	8.968	Oct 2014	8.975	Jan 2016	9.412	Oct 2016	0.000		9.412	77.178	121.874	-
GPS EI MRTA/MSTA	C/CPIF	Draper Labs : Cambridge, MA	0.000	0.000		4.025	Dec 2015	5.345	Dec 2016	0.000		5.345	14.214	23.584	-
GPS EI Enterprise Mission Planning	C/CPIF	TBD : El Segundo, CA	0.000	0.000		1.320	Oct 2015	1.320	Oct 2016	0.000		1.320	10.824	13.464	-
GPS EI Cybersecurity	TBD	TBD : El Segundo, CA	0.000	0.000		9.150	Oct 2015	9.550	Oct 2016	0.000		9.550	78.310	97.010	-
GPS EI Additional Product Development	Various	Various : Various, CA	0.000	1.556	Nov 2014	2.857	Oct 2015	2.570	Oct 2016	0.000		2.570	21.074	28.057	-
<b>Subtotal</b>			98.851	52.316		56.977		57.571		0.000		57.571	448.327	714.042	-

<b>Support (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-

<b>Test and Evaluation (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A025 / <i>GPS Enterprise Integrator</i>

	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	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
Specifications and ICDs for GPS III Space Modernization Initiative Technical Baseline	■																											
IST 3-3/MGUE Verification Testing (Phase I)	■	■	■	■																								
IST 3-3/MGUE Verification Testing (Phase II)					■	■	■	■																				
IST 3-3/MGUE Verification Testing (Phase III)							■	■																				
IST 3-3/MGUE Verification Testing (Phase IV)									■	■	■	■	■	■	■	■												
GPS III SV01 Available for Launch								■																				
GPS III SV02 Available for Launch											■	■																
Support OCX Block 1 Ready to Transition to Operations (RTO)																			■	■								
Support OCX Blocks 1 & 2 Milestone C																											■	■

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603423F / <i>Global Positioning System III - Operational Control Segment</i>	<b>Project (Number/Name)</b> 67A025 / <i>GPS Enterprise Integrator</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Specifications and ICDs for GPS III Space Modernization Initiative Technical Baseline	1	2015	1	2015
IST 3-3/MGUE Verification Testing (Phase I)	2	2015	2	2016
IST 3-3/MGUE Verification Testing (Phase II)	2	2016	2	2017
IST 3-3/MGUE Verification Testing (Phase III)	3	2016	1	2017
IST 3-3/MGUE Verification Testing (Phase IV)	4	2016	1	2019
GPS III SV01 Available for Launch	4	2016	4	2016
GPS III SV02 Available for Launch	4	2017	4	2017
Support OCX Block 1 Ready to Transition to Operations (RTO)	4	2019	4	2019
Support OCX Blocks 1 & 2 Milestone C	4	2020	4	2020

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