Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Army											Date: February 2016	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604633A *I Air Traffic Control*							
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	-	17.066	10.076	3.421	-	3.421	6.749	10.111	6.301	8.235	Continuing	Continuing
586: *Air Traffic Control*	-	17.066	10.076	3.421	-	3.421	6.749	10.111	6.301	8.235	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element funds continuous efforts in the development of modernized tactical Air Traffic Control (ATC) systems that will enable safety of aircraft operations. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international air traffic control mandates and combat identification requirements. Funding will be utilized to develop, evaluate and integrate technologies required to support ATC requirements. Efforts funded include the Tactical Airspace Integration System (TAIS) Web Based Architecture and Airspace Improvements Initiative, Air Traffic Navigation Integration and Coordination System (ATNAVICS) Modernization, Advanced Surveillance, the development of an ATC Tactical Network, the Mobile Tower System (MOTS) Preplanned Product Improvement (P3I) upgrades, and Tactical Terminal Control System (TTCS) modernization.

TAIS, the Airspace Control System of the Army's Mission Command Information Systems (MCIS), requires the development and testing of web-based services for Airspace Control, and integration of these new web-based services into the TAIS common MCIS hardware, Air Traffic Services Common Operating Environment and Airspace Integration Improvement Initiatives. Additional capabilities will be provided through advanced surveillance interfaces, mission planning interfaces, and TAIS dynamic airspace updates to the cockpit. TAIS efforts also include developing and testing improvements to the air picture including the addition of Blue Force Tracker correlation and radar fusion capability. TAIS develops software and required hardware for airspace control web services, to operate effectively in a dynamic net-centric interconnected environment. TAIS also integrates advanced surveillance capabilities to further enhance airspace integration and dynamic management capabilities. ATNAVICS provides all weather instrument flight capabilities to include terminal, radar precision approach and landing services to all Army, Joint, and Allied aircraft. ATNAVICS will integrate Mode S capabilities required to control aircraft both Outside of the Continental United States (OCONUS) and Continental United States (CONUS). ATNAVICS will network its radar picture and interrogator data (Mode S) to aviation and joint network nodes through TAIS. ATNAVICS will undergo an effort to increase the range of the primary radar to 60 nautical miles. As the Department of Defense transitions military aircraft to positional self-reporting technologies, these various technologies will be incorporated in the Advanced Surveillance program. Advanced Surveillance allows ATC reception of aircraft self-reporting data which includes the Automatic Dependent Surveillance Broadcast. Advanced Surveillance integrates local radar feeds and self-reporting aircraft positional data into a correlated air situational awareness picture. ATC Tactical Networking supports the non-recurring engineering, test and evaluation tasks necessary for the integration of the radios, control stations and transmitter/receivers and software that will provide all ATC tactical systems an airfield network node capability. This will enable each ATC system to send voice and data between ATC platforms including connectivity to an external network for long range flight-following and data exchange. ATC Networking is required to meet the Net Ready Key Performance Parameter for ATC tactical systems. MOTS provides the Joint Force Commander or Combatant Commander a highly mobile, self-contained, integrated, and reliable information system platform for visual and procedural aircraft deconfliction and aircrew force protection in unified action terminal airspace environments. The ALS is a component of the MOTS and can be operated by solar power or by generator power. The ALS improvements include a Precision Approach Path Indicator and an ALS trailer charging system. The TTCS provides initial Air Traffic Services at remote landing sites and drop zones. TTCS includes secure communications equipment for aircraft separation and ground control, meteorological measuring system for basic weather information, and precision location capability.

Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Army					Date: February 2016
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 5: *System Development & Demonstration (SDD)*		R-1 Program Element (Number/Name) PE 0604633A / *Air Traffic Control*			
B. Program Change Summary ($ in Millions)	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**
Previous President's Budget	16.756	10.076	4.874	-	4.874
Current President's Budget	17.066	10.076	3.421	-	3.421
Total Adjustments	0.310	0.000	-1.453	-	-1.453
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.904	-			
• SBIR/STTR Transfer	-0.594	-			
• Adjustments to Budget Years	-	-	-1.453	-	-1.453

Change Summary Explanation

The Fiscal Year (FY) 2017 funding request was reduced by $1,453,000 to account for availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army			Date: February 2016
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604633A / *Air Traffic Control*	Project (Number/Name) 586 / *Air Traffic Control*	

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
586: *Air Traffic Control*	-	17.066	10.076	3.421	-	3.421	6.749	10.111	6.301	8.235	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element funds continuous efforts in the development of modernized tactical Air Traffic Control (ATC) systems that will enable safety of aircraft operations. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international air traffic control mandates and combat identification requirements. Funding will be utilized to develop, evaluate and integrate technologies required to support ATC requirements. Efforts funded include the Tactical Airspace Integration System (TAIS) Web Based Architecture and Airspace Improvements Initiative, Air Traffic Navigation Integration and Coordination System (ATNAVICS) Modernization, Advanced Surveillance, the development of an ATC Tactical Network, the Mobile Tower System (MOTS) Preplanned Product Improvement (P3I) upgrades, and Tactical Terminal Control System (TTCS) modernization.

TAIS, the Airspace Control System of the Army's Mission Command Information Systems (MCIS), requires the development and testing of web-based services for Airspace Control, and integration of these new web-based services into the TAIS common MCIS hardware, Air Traffic Services Common Operating Environment and Airspace Integration Improvement Initiatives. Additional capabilities will be provided through advanced surveillance interfaces, mission planning interfaces, and TAIS dynamic airspace updates to the cockpit. TAIS efforts also include developing and testing improvements to the air picture including the addition of Blue Force Tracker correlation and radar fusion capability. TAIS develops software and required hardware for airspace control web services, to operate effectively in a dynamic net-centric interconnected environment. TAIS also integrates advanced surveillance capabilities to further enhance airspace integration and dynamic management capabilities. ATNAVICS provides all weather instrument flight capabilities to include terminal, radar precision approach and landing services to all Army, Joint, and Allied aircraft. ATNAVICS will integrate Mode S capabilities required to control aircraft both Outside of the Continental United States (OCONUS) and Continental United States (CONUS). ATNAVICS will network its radar picture and interrogator data (Mode S) to aviation and joint network nodes through TAIS. ATNAVICS will undergo an effort to increase the range of the primary radar to 60 nautical miles. As the Department of Defense transitions military aircraft to positional self-reporting technologies, these various technologies will be incorporated in the Advanced Surveillance program. Advanced Surveillance allows ATC reception of aircraft self-reporting data which includes the Automatic Dependent Surveillance Broadcast. Advanced Surveillance integrates local radar feeds and self-reporting aircraft positional data into a correlated air situational awareness picture. ATC Tactical Networking supports the non-recurring engineering, test and evaluation tasks necessary for the integration of the radios, control stations and transmitter/receivers and software that will provide all ATC tactical systems an airfield network node capability. This will enable each ATC system to send voice and data between ATC platforms including connectivity to an external network for long range flight-following and data exchange. ATC Networking is required to meet the Net Ready Key Performance Parameter (KPP) for ATC tactical systems. MOTS provides the Joint Force Commander or Combatant Commander a highly mobile, self-contained, integrated, and reliable information system platform for visual and procedural aircraft deconfliction and aircrew force protection in unified action terminal airspace environments. The Airfield Lighting System (ALS) is a component of the MOTS and can be operated by solar power or by generator power. The ALS improvements include a Precision Approach Path Indicator and an ALS trailer charging system. The TTCS provides initial Air Traffic Services at remote landing sites and drop zones. TTCS includes secure communications equipment for aircraft separation and ground control, meteorological measuring system for basic weather information, and precision location capability.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604633A / *Air Traffic Control*	**Project (Number/Name)** 586 / *Air Traffic Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Tactical Airspace Integration System (TAIS)	8.333	3.565	2.184

Description: TAIS Airspace Information Center (AIC), Common Operating Environment (COE) and Airspace Integration Improvements Initiative enhancements will be addressed through upgrades to the communications suite through new components such as 117G radios, BFT2/KGV-72, and ADS-B. TAIS develops software and required hardware for airspace management web services to operate effectively in a dynamic net-centric interconnected COE environment. TAIS also integrates advanced surveillance interfaces and passive receiver to further enhance a dynamic airspace management capability.

FY 2015 Accomplishments:
Initiated development of sensor and data interfaces to Civil Aviation agencies in support of military and homeland defense Air Traffic Services and Airspace Management Command and Control. Initiated development of web services and service oriented architecture with Joint systems to facilitate Air Traffic services and Airspace Command and Control across Department of Defense (DoD) agencies, Federal Agencies and with Allied Nations. Developed dynamic mission updates and interfaces with Unmanned Aerial Systems and DoD / Joint Air platforms for situational awareness. Developed and refined interfaces to cooperative, and non-cooperative sensors and self-reporting aircraft in support of Situational Awareness and airspace management and de-confliction. Developed rapidly deployable web based capabilities to enable disconnected off grid operations via non-line-of-sight communications and disjoined edge user nodes in support of ATC and Air Traffic Services (ATS). Developed personnel recovery data dissemination to facilitate medical evacuation and search-and-rescue operations. Developed 3D view of airspace execution and usage to prevent fratricide and mid-air collisions between military and civil aircraft. Developed capability to display and disseminate Instrument Flight Rules (IFR) and route structures, navigation information, and terminal area information. Implemented new interfaces to support the rapid visualization, de-confliction of airspace, increasing situational awareness and facilitating rapid clearance of airspace.

FY 2016 Plans:
Continue development of sensor and data interfaces to Civil Aviation agencies in support of military and homeland defense Air Traffic Services and Airspace Management Command and Control. Continue development of web services and service oriented architecture with Joint systems to facilitate Air Traffic services and Airspace Command and Control across DoD agencies, Federal agencies, COE and with Allied Nations. Continue to address Airspace Integration Improvements Initiative enhancements through upgrades to the communications suite through new components such as 117G radios, BFT2/KGV-72, and ADS-B. Continue to develop dynamic mission updates and interfaces with Unmanned Aerial Systems and DoD/Joint Air platforms for situational awareness. Continue to develop and refine interfaces to cooperative and non-cooperative sensor and self-reporting aircraft in support of Situational Awareness and airspace management and de-confliction. Develop deployable web based capabilities to enable disconnected off grid operations via non-line-of-sight communications and disjoined edge user nodes in support of ATC and ATS. Develop a computer-based, adaptive learning environment (ALE) to advance operator proficiency and adaptive

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604633A / *Air Traffic Control*	**Project (Number/Name)** 586 / *Air Traffic Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
decision-making capabilities. Incorporate automated forms such as electronic flight strips, duty and facility logs within the ATC network environment. ***FY 2017 Plans:*** Continue to develop sensor and data interfaces to Civil Aviation agencies in support of military and homeland defense Air Traffic Services and Airspace Management Command and Control. Continue to develop web services and service oriented architecture with Joint systems to facilitate Air Traffic services and Airspace Command and Control across DoD agencies, Federal agencies, COE and with Allied Nations. Continue to develop dynamic mission updates and interfaces with Unmanned Aerial Systems and DoD/Joint Air platforms for situational awareness. Continue to develop and refine interfaces to cooperative and non-cooperative sensor and self-reporting aircraft in support of Situational Awareness and airspace management and de-confliction. Develop rapidly deployable web based capabilities to enable disconnected off grid operations via non-line-of-sight communications and disjoined edge user nodes in support of ATC and ATS. Continue to develop a computer-based, adaptive learning environment (ALE) to advance operator proficiency and adaptive decision-making capabilities. Continue incorporation of automated forms such as electronic flight strips, duty and facility logs within the ATC network environment strips, duty and facility logs and ATC records within the ATC network environment. Continue to reduce TAIS operator workload by simplifying software operations.			
Title: Air Traffic Navigation Integration and Coordination System (ATNAVICS) Modernization ***Description:*** ATNAVICS is a highly mobile tactical area surveillance and precision approach air traffic control radar system. It provides the Joint Force Commander, or Combatant Commander, with a mobile, self-contained, and reliable Airport Surveillance Radar, Precision Approach Radar, and a Secondary Surveillance Radar capability. System modernization includes radar interrogation enhancements. ***FY 2015 Accomplishments:*** Continued the development of the TPX-59 with Mode S as the secondary surveillance interrogator onto the radar. Supported development of the hardware and software which processes both Mode S and ADS-B messages as transmitted via the extended squitter function or upon interrogation, as well as the physical integration of the component into the ATNAVICS. Conducted system testing and qualification, as well as certification and Federal Aviation Administration (FAA) Army Spectrum Management Office (ASMO) approvals, and Air Traffic Control Radar Beacon System Identification Friend or Foe, Mark XII/Mark XIIa Systems (AIMS) certification. ***FY 2016 Plans:*** Complete system level development, testing, certification and integration of Mode S and ADS-B secondary surveillance radar capability (AN/TPX-59) into the ATNAVICS Platform. This will enable ATNAVICS to be compliant with International Civil Aviation Organization (ICAO) and FAA mandates.	5.291	3.774	-
Title: Advanced Surveillance	0.500	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Description: Advanced Surveillance technologies integration supports the nonrecurring engineering, integration and test tasks required to incorporate the passive reception of self-reporting technologies and the correlation of local radar feeds into Air Traffic Control systems. Self-reporting technologies include ADS-B, Mode 5 Level 2, Mode S, Universal Access Transmitter (UAT) and similar civil aircraft self-reporting technologies. Local radar feeds include any radars in close proximity to ATC systems. ***FY 2015 Accomplishments:*** Completed testing and integration of the selected Advanced Surveillance passive receiver into non-equipped tactical ATC equipment, including the TAIS and TTCS. Testing and evaluation included participation in NIE and Bold Quest exercises and operational/developmental testing to include potentially destructive testing. Advanced Surveillance will enable tactical Army ATC equipment to comply with FAA mandated capabilities.			
Title: ATC Tactical Network ***Description:*** ATC Tactical Networking supports the nonrecurring engineering, test and evaluation tasks necessary for the integration of the radios, control stations and transmitter/receivers and software that will provide all ATC tactical systems an airfield network node capability. This will enable each ATC system to send voice and data between ATC platforms including connectivity to an external network for long range flight-following and data exchange. ATC Networking is required to meet the Net Ready KPP for ATC tactical systems. ***FY 2015 Accomplishments:*** Conducted non-recurring engineering, test and evaluation tasks necessary for the integration of the radios, control stations and transmitter/receivers and software that will provide all ATC tactical systems an airfield network node capability. This enables each ATC system to send voice and data between ATC platforms including connectivity to an external network for long range flight-following and data exchange.	1.028	-	-
Title: Mobile Tower System (MOTS) P3I ***Description:*** MOTS is a rapidly deployable Air Traffic Control System supporting operations at military/civilian airfields and tactical landing zones. It provides ATC tower, secure, anti-jam communications, basic weather information, and precision location. The system includes an Airfield Lighting System that provides a visual indication of landing zone and runway locations in degraded conditions. ***FY 2016 Plans:*** Conduct nonrecurring engineering, test, and evaluations tasks necessary for the development and integration of amplifier for 117G radios, ARC-220 replacement, and universal power supply (UPS). The 117G amplifier will increase the range of the 117G radios to allow the system to meet the 30 nautical mile range to meet the threshold requirement. The ARC-220 will be replaced	-	2.737	1.237

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604633A / *Air Traffic Control*	**Project (Number/Name)** 586 / *Air Traffic Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
by the PRC-150 to address obsolescence. The placement of UPS in the MOTS will be re-engineered to address human factors issues on the current design. ***FY 2017 Plans:*** Conduct nonrecurring engineering, test and evaluation tasks necessary for the development and integration of remote operation (300 ft) and advanced batteries. The remote operation (300 ft) will improve safety and functionality by providing the MOTS the capability to be remotely operated up to 300 ft away from the shelter. The advanced batteries replacement will allow the MOTS to meet its threshold requirement for extreme cold weather operation and storage.			
Title: Tactical Terminal Control System (TTCS) ***Description:*** TTCS provides initial Air Traffic Services at remote landing sites and drop zones. TTCS includes secure communications equipment for aircraft separation and ground control, meteorological measuring system for basic weather information, and precision location capability. ***FY 2015 Accomplishments:*** Designed, developed and tested the platform specific architecture for the integration of the ATC Tactical Operations Center Intercommunications System (TOCNET) common voice switching system and incorporation of the advanced surveillance system. The integration will permit future networking capabilities.	1.229	-	-
Title: Program Management (PM) Support ***Description:*** PM Support of PM ATC. ***FY 2015 Accomplishments:*** Continued Program Management in support of PM ATC.	0.201	-	-
Title: Tech and Log Support ***Description:*** Technical and logistics services in support of PM ATC. ***FY 2015 Accomplishments:*** Continued technical and logistics services in support of PM ATC.	0.484	-	-
Accomplishments/Planned Programs Subtotals	17.066	10.076	3.421

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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C. Other Program Funding Summary ($ in Millions)

Line Item	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
• Air Traffic Control (AA0050): *Air Traffic Control*	127.232	94.545	50.405	-	50.405	111.890	91.119	53.269	54.922	Continuing	Continuing

Remarks

D. Acquisition Strategy

This project is comprised of multiple systems supporting ATC development and test efforts. While the detailed acquisition strategy varies by program, the general strategy for each program is to complete development and testing efforts through contract modifications, engineering service tasks, and new/follow-on contracts. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international air traffic control and upcoming Next Gen requirements and mandates, as well as current aircraft self-reporting transponders.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Army			Date: February 2016
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604633A / *Air Traffic Control*	Project (Number/Name) 586 / *Air Traffic Control*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	Various	PM ATC : Redstone Arsenal, AL	0.453	0.201	Oct 2014	-		-		-		-	0	0.654	0
		Subtotal	0.453	0.201		-		-		-		-	0.000	0.654	0.000

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TAIS (Web Based Services Dev)	SS/T&M	General Dynamics C4S : Huntsville, AL	14.856	8.333	Aug 2015	3.565	Mar 2016	2.184	Jan 2017	-		2.184	Continuing	Continuing	Continuing
ATNAVICS Modernization	SS/CPFF	Raytheon : Marlboro, Mass	12.187	5.291	Aug 15	3.774	Mar 2016	-		-		-	0	21.252	0
Advanced Surveillance	Various	Various : Various	3.326	0.500	Jan 2015	-		-		-		-	0	3.826	0
Mobile Tower System (MOTS) P3I	SS/FFP	Various : Various	0.000	-		2.737	Jul 2016	1.237	Nov 2016	-		1.237	Continuing	Continuing	Continuing
Tactical Terminal Control System (TTCS)	Various	Various : Various	0.791	1.229	Sep 2015	-		-		-		-	0	2.020	0
Tech and Log Development Support	Various	PM ATC : Huntsville, AL	3.259	0.484	Sep 2015	-		-		-		-	0	3.743	0
ATC Tactical Network	Various	PM ATC : Huntsville, AL	0.000	1.028	Jul 2015	-		-		-		-	0	1.028	0
		Subtotal	34.419	16.865		10.076		3.421		-		3.421	-	-	-

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	34.872	17.066		10.076		3.421		-		3.421	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604633A / *Air Traffic Control*	**Project (Number/Name)** 586 / *Air Traffic Control*

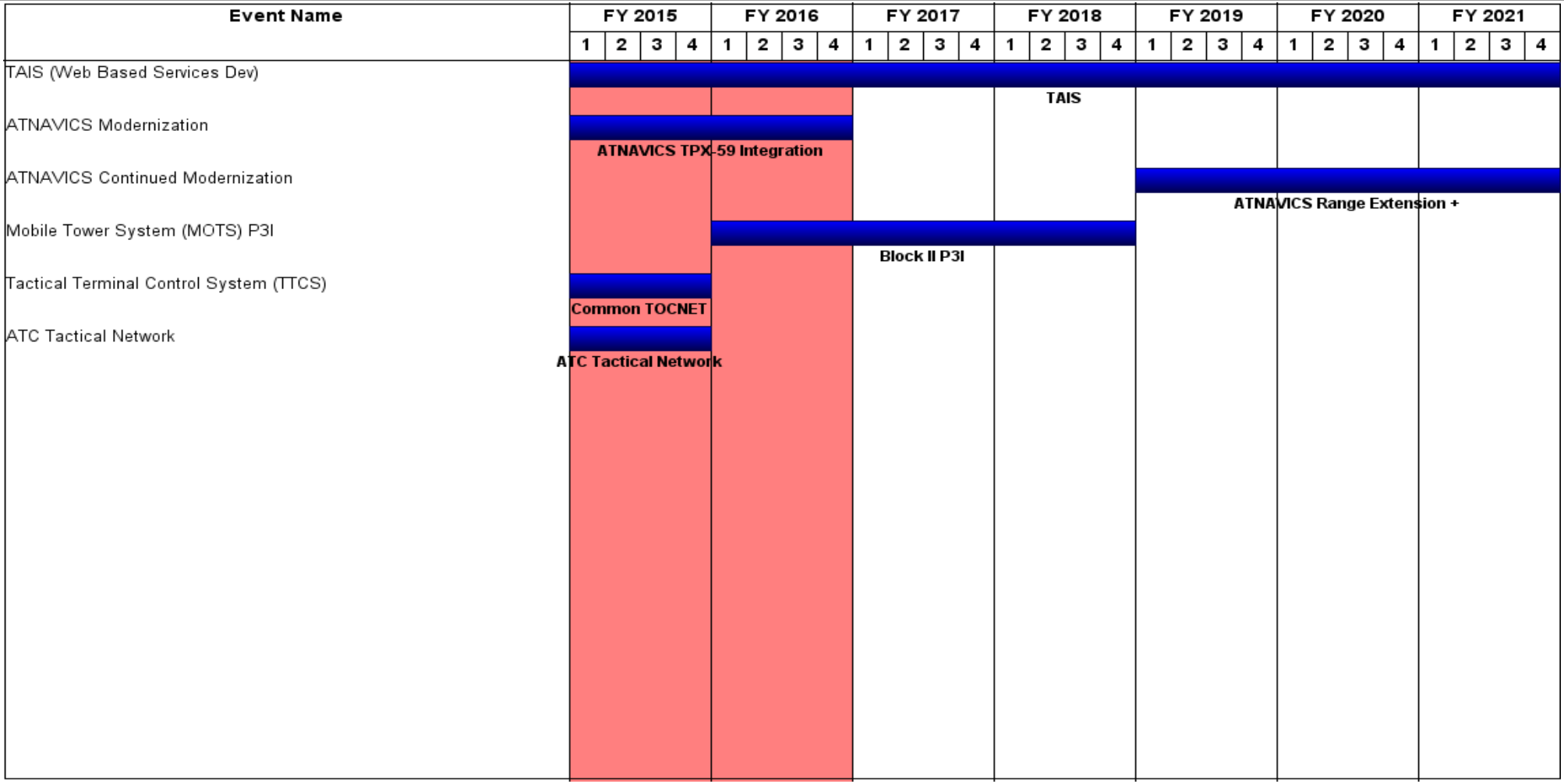

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604633A / *Air Traffic Control*	**Project (Number/Name)** 586 / *Air Traffic Control*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
TAIS (Web Based Services Dev)	1	2015	4	2021
ATNAVICS Modernization	1	2015	4	2016
ATNAVICS Continued Modernization	1	2019	4	2021
Mobile Tower System (MOTS) P3I	1	2016	4	2018
Tactical Terminal Control System (TTCS)	1	2015	4	2015
ATC Tactical Network	1	2015	4	2015

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