Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Army											Date: February 2015	
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 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.514	16.756	10.076	-	10.076	4.874	6.934	12.784	0.965	Continuing	Continuing
586: *Air Traffic Control*	-	0.514	16.756	10.076	-	10.076	4.874	6.934	12.784	0.965	Continuing	Continuing

Note

FY 2016: POMBES16-20 increased the FY 2016 by $4,108K to fund the Mobile Tower System (MOTS) Airfield Lighting System (ALS) and the ATC Tactical Network nonrecurring engineering, test and evaluation.

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) Airfield Lighting System (ALS), and Tactical Terminal Control System (TTCS) modernization.

TAIS, the Airspace Management System of the Army Mission Command System, requires the development and testing of web-based services for Airspace Control, and integration of these new web-based services into the TAIS common Army Mission Command hardware, Air Traffic Services (ATS) 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 management 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 OCONUS and CONUS. ATNAVICS will network its radar picture and interogator 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 (ADS-B). 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 Airfield Lighting System (ALS) is a component of the MOTS and can operate solar powered or by generator power. The ALS improvements include a Precision Approach Path Indicator (PAPI) and an

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

B. Program Change Summary ($ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	0.514	16.764	5.968	-	5.968
Current President's Budget	0.514	16.756	10.076	-	10.076
Total Adjustments	-	-0.008	4.108	-	4.108
• Congressional General Reductions	-	-0.008			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	4.108	-	4.108

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army			Date: February 2015
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604633A / *Air Traffic Control*	Project (Number/Name) 586 / *Air Traffic Control*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
586: *Air Traffic Control*	-	0.514	16.756	10.076	-	10.076	4.874	6.934	12.784	0.965	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project 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) Airfield Lighting System (ALS), and Tactical Terminal Control System (TTCS) modernization.

TAIS, the Airspace Management System of the Army Mission Command System, requires the development and testing of web-based services for Airspace Control, and integration of these new web-based services into the TAIS common Army Mission Command hardware, Air Traffic Services (ATS) 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 management 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 OCONUS and CONUS. ATNAVICS will network its radar picture and interogator 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 (ADS-B). Advanced Surveillance integrates local radar feeds and self-reporting aircraft positional data into a correlated air situational awareness picture. 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 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 operate solar powered or by generator power. The ALS improvements include a Precision Approach Path Indicator (PAPI) 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 2016 Army		Date: February 2015
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 2014	FY 2015	FY 2016
Title: Tactical Airspace Integration System (TAIS)	-	9.463	2.733
Description: TAIS Airspace Information Center (AIC) 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 environment. TAIS also integrates advanced surveillance interfaces to further enhance a dynamic airspace management capability. ***FY 2015 Plans:*** 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. 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 and with Allied Nations. Develop dynamic mission updates and interfaces with Unmanned Aerial Systems and DoD / Joint Air platforms for situational awareness. Develop and refine interfaces to cooperative, and non cooperative sensors 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. Develop personnel recovery data dissemination to facilitate medical evacuation and search-and-rescue operations. Develop 3D view of airspace execution and usage to prevent fratricide and mid-air collisions between military and civil aircraft. Develop capability to display and disseminate Instrument Flight Rules (IFR) and route structures, navigation information, and terminal area information. Implement new interfaces to support the rapid visualization, de-confliction of airspace, increasing situational awareness and facilitating rapid clearance of airspace. ***FY 2016 Plans:*** 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. 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 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 sensors 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. Develop a computer-based, adaptive learning environment (ALE) to advance operator proficiency and adaptive decision-making capabilities. Integrate the Simulation, Networking Commonality (SiNC) and Centralized Aviation Flight Records System (CAFRS) efforts to incorporate automated forms such as electronic flight strips, duty and facility logs and ATC records within the ATC network environment.			
Title: Air Traffic Navigation Integration and Coordination System (ATNAVICS) Modernization	-	3.601	2.153

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
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 Plans:*** Continue the development of the TPX-57 with Mode S as the secondary surveillance interrogator onto the radar. Support 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. Conduct system testing and qualification, as well as certification and Federal Aviation Administration (FAA) Army Spectrum Managment 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 ICAO and FAA mandates.			
Title: Advanced Surveillance ***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 and similar civil aircraft self-reporting technologies. Local radar feeds include any radars in close proximity to ATC systems. ***FY 2015 Plans:*** Complete testing and integration of the selected Advanced Surveillance passive receiver into non-equipped tactical ATC equipment, including the TAIS and TTCS. Testing and evaluation will include 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.	-	0.500	-
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.	-	1.275	3.000

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
FY 2015 Plans: Conduct 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 which 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. ***FY 2016 Plans:*** Continue to conduct nonrecurring engineering, test and evaluation tasks necessary for the integration of the network services and software that will provide all ATC tactical systems an airfield network node capability which enables each ATC system to send voice and data between ATC platforms. This will include connectivity to external networks and exchange of system and operations status data.			
Title: Mobile Tower System (MOTS) Airfield Lighting System (ALS) ***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 evaluation tasks necessary for the development and integration of an airfield runway light charging system, and Precision Approach Path Indicator (PAPI) for the ALS. The charging system will enable the runway lights to be charged in unfavorable or non-existent solar conditions. The PAPI will provide the pilot a visual indication of an aircraft's position relative to the designated glide slope for the runway. Provides enhancements to the MOTS Block 0 tactical airfield lighting system. This will meet contingency airfield lighting system requirements designed for night, instrument, and unaided/aided landing zone and runway operations in a theater of operations.	-	-	1.202
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 Plans:***	-	0.987	-

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Design, develop and test the platform specific architecture for the integration of the ATC Tactical Operations Center Intercommunications System (TOCNET) common voice switching system. The integration will permit future networking capabilities.			
Title: Program Management Support ***Description:*** Program Management Support of PM ATC. ***FY 2014 Accomplishments:*** Continued program management in support of PM ATC. ***FY 2015 Plans:*** Continue program management in support of PM ATC. ***FY 2016 Plans:*** Continue program management in support of PM ATC.	0.120	0.321	0.325
Title: Tech and Log Support ***Description:*** Technical and logistics services in support of PM ATC. ***FY 2014 Accomplishments:*** Continued technical and logistics services in support of PM ATC. ***FY 2015 Plans:*** Continue technical and logistics services in support of PM ATC. ***FY 2016 Plans:*** Continue technical and logistics services in support of PM ATC.	0.394	0.609	0.663
Accomplishments/Planned Programs Subtotals	0.514	16.756	10.076

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• Air Traffic Control (AA0050): *Air Traffic Control*	94.192	127.232	94.545	-	94.545	96.825	114.541	99.819	64.178	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2016 Army		Date: February 2015
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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 2016 Army			Date: February 2015
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	Various	PM ATC : Redstone Arsenal, AL	0.333	0.120	Dec 2013	0.321	Oct 2014	0.325	Oct 2015	-		0.325	Continuing	Continuing	Continuing
		Subtotal	0.333	0.120		0.321		0.325		-		0.325	-	-	-

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 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	-		9.463	Apr 2015	2.733	Mar 2016	-		2.733	Continuing	Continuing	Continuing
ATNAVICS Modernization	SS/CPFF	Raytheon : Marlboro, Mass	12.187	-		3.601	Apr 2015	2.153	Mar 2016	-		2.153	-	17.941	-
Advanced Surveillance	Various	Various : Various	3.326	-		0.500	Jan 2015	-		-		-	-	3.826	-
Mobile Tower System (MOTS) Airfield Lighting System (ALS)	SS/FFP	Sierra Nevada Corporation (SNC) : Sparks, NV	0.000	-		-		1.202	Dec 2015	-		1.202	Continuing	Continuing	Continuing
Tactical Terminal Control System (TTCS)	Various	Various : Various	0.791	-		0.987	Mar 2015	-		-		-	-	1.778	-
Tech and Log Development Support	Various	PM ATC : Huntsville, AL	2.865	0.394	Dec 2013	0.609	Oct 2014	0.663	Oct 2015	-		0.663	Continuing	Continuing	Continuing
ATC Tactical Network	Various	PM ATC : Huntsville, AL	0.000	-		1.275	Jan 2015	3.000	Jan 2016	-		3.000	Continuing	Continuing	Continuing
		Subtotal	34.025	0.394		16.435		9.751		-		9.751	-	-	-

	Prior Years	FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	34.358	0.514		16.756		10.076		-		10.076	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Army		Date: February 2015
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604633A / *Air Traffic Control*	**Project (Number/Name)** 586 / *Air Traffic Control*

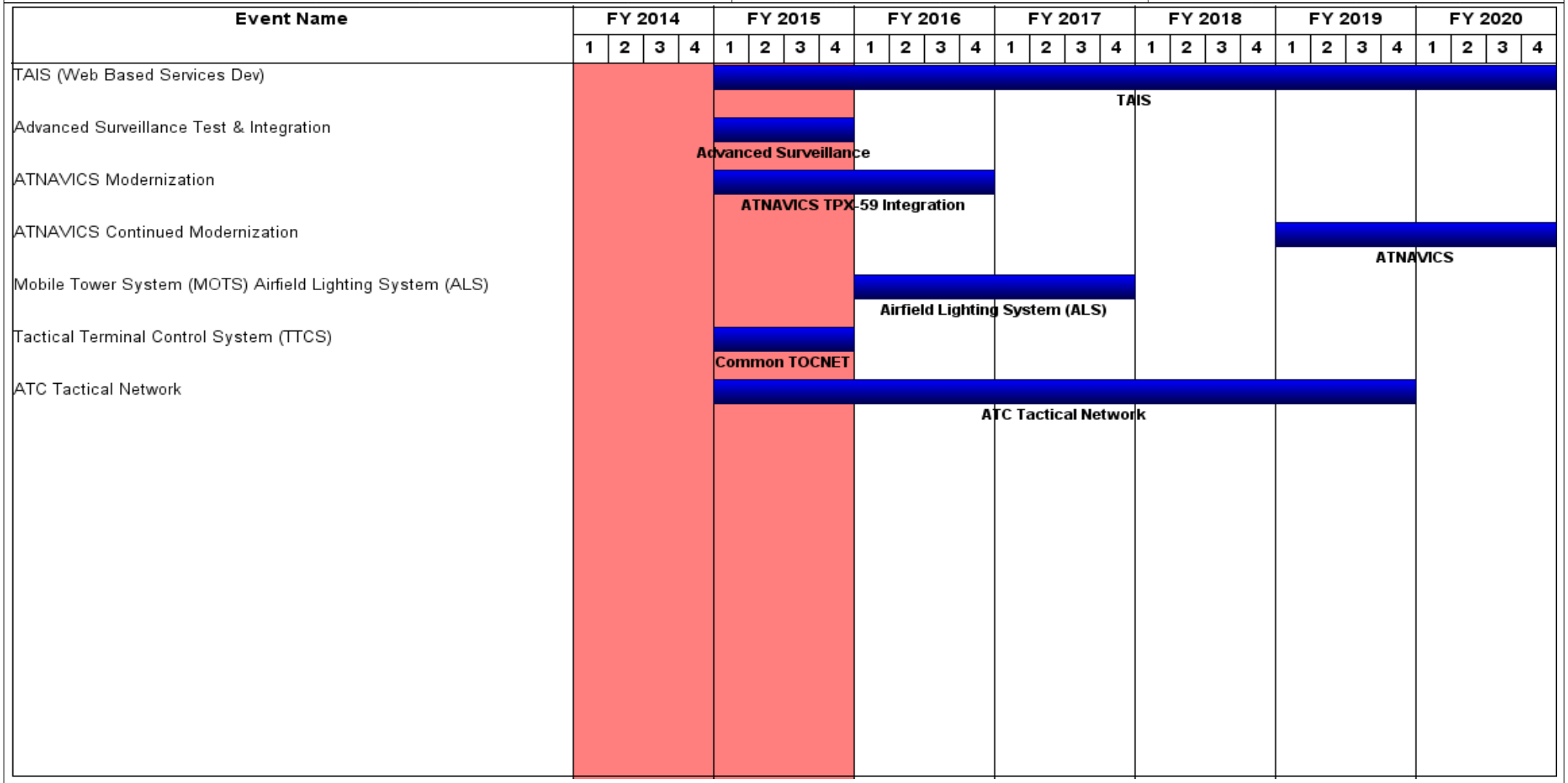

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Army		Date: February 2015
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Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
TAIS (Web Based Services Dev)	1	2015	4	2020
Advanced Surveillance Test & Integration	1	2015	4	2015
ATNAVICS Modernization	1	2015	4	2016
ATNAVICS Continued Modernization	1	2019	4	2020
Mobile Tower System (MOTS) Airfield Lighting System (ALS)	1	2016	4	2017
Tactical Terminal Control System (TTCS)	1	2015	4	2015
ATC Tactical Network	1	2015	4	2019