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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604633A / <i>Air Traffic Control</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	3.433	12.332	6.989	-	6.989	7.523	6.832	2.565	2.129	0.000	41.803
586: <i>Air Traffic Control</i>	-	3.433	12.332	6.989	-	6.989	7.523	6.832	2.565	2.129	0.000	41.803

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 are mission enablers and enable safety of aircraft operations. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international ATC mandates and combat identification requirements.

Tactical Airspace Integration System (TAIS) is the Army's program of record for Airspace Control (AC) and enroute Air Traffic Services (ATS). Continued compatibility and interoperability with the Army Mission Command Information System (MCIS) requires development, testing and integration of new web-based services for AC into common MCIS hardware, while meeting the evolving Common Operating Environment (COE) standards. Includes development and testing of improvements in fusing Blue Force Tracker radar, Identify Friend or Foe, and additional sensor feeds. TAIS develops software and hardware for ATS and AC missions to operate effectively in a dynamic net-centric interconnected environment to further enhance airspace integration and dynamic management capabilities for aviation gateway to mission command.

Air Traffic Navigation Integration and Coordination System (ATNAVICS) is an Airport Surveillance Radar and Precision Approach Radar system that provides ATS at Army terminal airfields and landing sites at Division, Corps, and Echelons Above Corps to include services for Joint and Allied aircraft. ATNAVICS will integrate the Transportable Radar Identification and Recognition capabilities to control aircraft both Outside of the Continental United States and Continental United States. ATNAVICS will network its radar picture and interrogator data to aviation and joint network nodes through TAIS. As the Department of Defense transitions military aircraft to positional self-reporting technologies, flight information will be captured by the upgraded Interrogation Friend-or-Foe (IFF) system. The upgraded IFF allows ATC reception of aircraft self-reporting data to include the Automatic Dependent Surveillance Broadcast and integrates local radar feeds and self-reporting aircraft positional data into a correlated situational awareness air picture.

Tactical Terminal Control System (TTCS) is a mobile ATC communications system that provides initial ATS at remote landing sites and drop zones. It enables secure ground-to-air and ground-to-ground communications between Army aircraft, other services, Allied aircraft, and ground stations. TTCS provides aircraft separation and ground control capabilities, a meteorological measuring system for basic weather information, Blue Force Tracker which provides near real time situational awareness and precision location capability.

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B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	3.536	12.347	6.992	-	6.992
Current President's Budget	3.433	12.332	6.989	-	6.989
Total Adjustments	-0.103	-0.015	-0.003	-	-0.003
• Congressional General Reductions	-0.002	-0.015			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.101	-			
• Adjustments to Budget Years	-	-	-0.003	-	-0.003

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
586: Air Traffic Control	-	3.433	12.332	6.989	-	6.989	7.523	6.832	2.565	2.129	0.000	41.803
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds continuous efforts in the development of modernized tactical Air Traffic Control (ATC) systems that are mission enablers and enable safety of aircraft operations. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international ATC mandates and combat identification requirements.

Tactical Airspace Integration System (TAIS) is the Army's program of record for Airspace Control (AC) and enroute Air Traffic Services (ATS). Continued compatibility and interoperability with the Army Mission Command Information System (MCIS) requires development, testing and integration of new web-based services for AC into common MCIS hardware, while meeting the evolving Common Operating Environment (COE) standards. Includes development and testing of improvements in fusing Blue Force Tracker radar, Identify Friend or Foe, and additional sensor feeds. TAIS develops software and hardware for ATS and AC missions to operate effectively in a dynamic net-centric interconnected environment to further enhance airspace integration and dynamic management capabilities for aviation gateway to mission command.

Air Traffic Navigation Integration and Coordination System (ATNAVICS) is an Airport Surveillance Radar and Precision Approach Radar system that provides ATS at Army terminal airfields and landing sites at Division, Corps, and Echelons Above Corps to include services for Joint and Allied aircraft. ATNAVICS will integrate the Transportable Radar Identification and Recognition capabilities to control aircraft both Outside of the Continental United States and Continental United States. ATNAVICS will network its radar picture and interrogator data to aviation and joint network nodes through TAIS. As the Department of Defense transitions military aircraft to positional self-reporting technologies, flight information will be captured by the upgraded Interrogation Friend-or-Foe (IFF) system. The upgraded IFF allows ATC reception of aircraft self-reporting data to include the Automatic Dependent Surveillance Broadcast and integrates local radar feeds and self-reporting aircraft positional data into a correlated situational awareness air picture.

Tactical Terminal Control System (TTCS) is a mobile ATC communications system that provides initial ATS at remote landing sites and drop zones. It enables secure ground-to-air and ground-to-ground communications between Army aircraft, other services, Allied aircraft, and ground stations. TTCS provides aircraft separation and ground control capabilities, a meteorological measuring system for basic weather information, Blue Force Tracker which provides near real time situational awareness and precision location capability.

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

	FY 2018	FY 2019	FY 2020
Title: Tactical Airspace Integration System (TAIS)	1.178	7.221	4.149
Description: TAIS Airspace Information Center (AIC), Common Operating Environment (COE) and Airspace Integration Improvements Initiative enhancements will be addressed through Expanded Airtrack Sensor Interface optimization and the expansion of electronic flight strips. The radio frequency Link 16 Battlefield Awareness System solution will be certified by Joint			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Interoperability Test Certification. Cyber Security and communications range testing will complete qualifications. TAIS continues to develop software and required hardware for airspace management web services to operate effectively in a dynamic net centric interconnected COE environment.</p> <p>FY 2019 Plans: Continue COE and Airspace Integration Improvements, Joint Interoperability Testing and Network Integration Event test and certification in support of the interoperability within the Army's Mission Command Information System (MCIS). Incorporate emerging Federal Aviation Administration (FAA) requirements. Develop software solutions to provide FAA Notice to Airman, Pilot Reports and Temporary Flight Restrictions. Develop system and user defined quality of service and performance tools to monitor and adjust critical performance and loading of software. Continue System Modification 2 testing which includes reliability and maintainability, communications range testing, transportability, and mobility tests.</p> <p>FY 2020 Plans: Will continue COE and Airspace Integration Improvements and certification in support of the interoperability within the Army's Mission Command Information Systems (MCIS). Incorporate emerging FAA requirements. Develop software solutions to provide FAA Notice to Airman, Pilot Reports and adjust critical performance and loading software.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease in FY 2020 is due to decrease in TAIS systems test and evaluation requirements.</p>				
<p>Title: Air Traffic Navigation Integration and Coordination System (ATNAVICS) Modernization</p> <p>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.</p> <p>FY 2019 Plans: Complete NRE to ensure ATNAVICS compliance with Risk Management Framework (RMF) to comply with Cyber Security requirements. Complete system Army Test Evaluation Command (ATEC) testing required for Full Material Release. Continue modernization for TPX-59 and Range Extension.</p> <p>FY 2020 Plans: Continue TPX-59 integration, RMF compliance, and product support analysis efforts for ATNAVICS.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in FY 2020 is due to decrease in systems test and evaluation requirements.</p>		0.938	3.760	2.611
<p>Title: Tactical Terminal Control System (TTCS)</p>		0.847	0.899	0.229

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: The TTCS is a mobile ATC communications system that provides initial ATS at remote landing sites and drop zones. It enables secure ground-to-air and ground-to-ground communications between Army aircraft, other services, Allied aircraft and ground stations. TTCS also provides aircraft separation and ground control capabilities, a meteorological measuring system for basic weather information, and Blue Force Tracker which provides near real time situational awareness and precision location capability.</p> <p>FY 2019 Plans: Continue testing of the Tactical Terminal Control System (TTCS) 198C Upgrade to include Cooperative Vulnerability and Penetration Assessment Testing, and Vehicle Durability Simulator Testing.</p> <p>FY 2020 Plans: Will continue testing of the TTCS 198C Upgrade to include High Altitude Electromagnetic Pulse testing. This is a destructive test event and will be performed at completion of the testing in FY 2020.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to and completion of testing in FY2020.</p>			
<p>Title: Program Management (PM) Support</p> <p>Description: PM support of PM ATC</p>	0.470	-	-
<p>Title: FY 2019 SBIR/STTR Transfer</p> <p>Description: FY 2019 SBIR/STTR Transfer</p> <p>FY 2019 Plans: FY 2019 SBIR/STTR transfer.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer</p>	-	0.452	-
Accomplishments/Planned Programs Subtotals	3.433	12.332	6.989

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• AA0050: Air Traffic Control	78.790	63.872	32.738	-	32.738	37.332	34.044	34.219	33.988	0.000	314.983
Remarks											

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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

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army **Date:** March 2019

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Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
TAIS (Web Based Services Dev)																												
TAIS																												
ATNAVICS Modernization TPX-59																												
TPX-59																												
Tactical Terminal Control System (TTCS) - 198C Upgrade																												
198C Upgrade																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
TAIS (Web Based Services Dev)	1	2015	4	2024
ATNAVICS Modernization TPX-59	3	2017	4	2021
Tactical Terminal Control System (TTCS) - 198C Upgrade	2	2018	4	2020