

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)					R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Technology							
COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	-	174.768	105.549	94.424	-	94.424	116.536	144.591	146.835	147.571	0.000	930.274
AM7: Modular RF Communications Advanced Technology	-	10.059	-	1.993	-	1.993	13.319	12.802	12.942	0.236	0.000	51.351
AM9: Protected SATCOM Advanced Technology	-	30.859	14.200	5.511	-	5.511	14.199	15.630	8.023	6.199	0.000	94.621
AN4: Non Traditional Waveforms Advanced Technology	-	5.823	5.215	17.488	-	17.488	16.062	18.075	19.931	18.843	0.000	101.437
AN8: COE - Every Receiver is a Sensor Advanced Tech	-	1.371	6.539	5.480	-	5.480	4.486	5.192	5.237	6.105	0.000	34.410
AO1: UNT - Every Receiver is a Sensor Advanced Tech	-	-	3.170	4.179	-	4.179	4.684	8.199	6.717	13.815	0.000	40.764
AOT: EW for Maneuver Operations (EMO) Adv Tech	-	5.968	3.152	-	-	-	-	3.168	3.742	3.779	0.000	19.809
AQ5: Sensor CE-Integrated Sensor Architecture Adv Tech	-	0.625	1.955	-	-	-	-	1.981	2.003	2.023	0.000	8.587
AQ8: High Tempo Data Driven Decision Tools Adv Tech	-	6.472	3.602	3.791	-	3.791	7.940	7.942	10.823	10.901	0.000	51.471
AR6: Understanding the Environment as a Threat Adv Tech	-	2.709	-	-	-	-	-	-	-	-	0.000	2.709
AT8: Network-Enabled GeoSpatial-GEOINT Services AdvTech	-	4.501	4.760	3.764	-	3.764	7.943	9.128	3.134	4.716	0.000	37.946
AU1: Tactical GeoSpatial Information Capabilities ATech	-	5.869	2.112	2.722	-	2.722	3.433	7.992	6.128	7.464	0.000	35.720
AU4: Geospatially Enabled Operational Design Adv Tech	-	12.186	10.953	10.813	-	10.813	5.133	6.435	8.194	8.276	0.000	61.990

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2025 Army</b>										<b>Date: March 2024</b>			
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology								
AV8: Navigation Warfare (NAVWAR) Advanced Technology	-	1.949	6.029	3.988	-	3.988	6.036	5.352	10.955	15.494	0.000	49.803	
AW6: Modular GPS Independent Sensors Advanced Tech	-	10.131	12.343	11.282	-	11.282	5.010	5.940	10.300	6.829	0.000	61.835	
BP4: ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)	-	52.500	-	-	-	-	-	-	-	-	0.000	52.500	
CI7: Mobile & Survivable Command Post (MASCP) Adv Tech	-	12.813	18.691	9.978	-	9.978	13.248	16.340	19.242	19.951	0.000	110.263	
CJ8: Assured PNT Communications Advanced Tech	-	10.933	11.783	13.435	-	13.435	15.043	17.268	16.182	19.331	0.000	103.975	
DB6: Pathfinder 3D Advanced Technology	-	-	1.045	-	-	-	-	3.147	3.282	3.609	0.000	11.083	

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

This Program Element (PE) matures and demonstrates technologies to provide an Army tactical network and enabling infrastructure that support operations in any environment, to include where the electromagnetic spectrum is denied or degraded. This is accomplished through the exploitation and optimization of components and systems for robust, low signature communications and data networks; assured positioning, navigation, and timing in contested environments; converged and coordinated cyber and electronic warfare activities; resilient mission command on the move; and the collection, processing, and dissemination of information for intelligence, surveillance, and reconnaissance in a common operating picture.

Work in this PE complements PE 0602146A (Network C3I Technology), PE 0602143A (Soldier Lethality Technology), PE 0602145A (Next Generation Combat Vehicle Technology), PE 0602147A (Long Range Precision Fires Technology), PE 0602148A (Future Vertical Lift Technology), PE 0602150A (Air and Missile Defense Technology), PE 0602213A (C3I Applied Cyber), PE 0603118A (Soldier Lethality Advanced Technology), PE 0603462A (Next Generation Combat Vehicle Advanced Technology), PE 0603464A (Long Range Precision Fires Advanced Technology), PE 0603465A (Future Vertical Lift Advanced Technology), and PE 0603466A (Air and Missile Defense Advanced Technology).

This PE is directly aligned with the Network and Assured Positioning, Navigation, and Timing (APNT) Army Modernization priorities.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research is performed by the U.S. Army Engineer Research and Development Center (ERDC).

**UNCLASSIFIED**

**Exhibit R-2, RDT&E Budget Item Justification:** PB 2025 Army **Date:** March 2024

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>
---	--

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>
Previous President's Budget	177.917	105.549	107.608	-	107.608
Current President's Budget	174.768	105.549	94.424	-	94.424
Total Adjustments	-3.149	0.000	-13.184	-	-13.184
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.823	-			
• SBIR/STTR Transfer	-2.326	-			
• Adjustments to Budget Years	-	-	-13.184	-	-13.184

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** BP4: *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*

	FY 2023	FY 2024
Congressional Add: <i>Program Increase - Assured Position, Navigation, and Timing Technology</i>	5.000	-
Congressional Add: <i>Program Increase - Alternative Navigation for GPS-Denied Landing Environments</i>	4.500	-
Congressional Add: <i>Program Increase - Next Generation Command Posts</i>	7.000	-
Congressional Add: <i>Program Increase - ADVANCE MATERIALS FOR COMMAND POST OF THE FUTURE</i>	1.500	-
Congressional Add: <i>Program Increase - ADVANCED PRECISION, NAVIGATION AND TIMING FOR LANDING ENVIRONMENTS</i>	2.500	-
Congressional Add: <i>Program Increase - HUMAN GEOGRAPHY REPOSITORY FOR COMMERCIAL CIVIL AFFAIRS</i>	5.000	-
Congressional Add: <i>Program Increase - MULTI-PLATFORM RECEIVER-SENSOR TECHNOLOGY</i>	20.000	-
Congressional Add: <i>Program Increase - SMALL SATELLITE HIGH ALTITUDE LAUNCH, INTEGRATION, TEST, AND EVALUATION</i>	7.000	-
Congressional Add Subtotals for Project: BP4	52.500	-
Congressional Add Totals for all Projects	52.500	-

**Change Summary Explanation**

Funding realigned to research Electronic Warfare (EW) distributed payloads, initiate Signals Intelligence (SIGINT) modernization, develop algorithms and techniques to distribute Positioning, Navigation, and Timing (PNT) across Army platforms, and to partially fund Precision Strike Missile (PRsM) Inc 4.

**UNCLASSIFIED**

**Exhibit R-2A, RDT&E Project Justification:** PB 2025 Army **Date:** March 2024

<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AM7 / Modular RF Communications Advanced Technology
--	---	---

COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
AM7: <i>Modular RF Communications Advanced Technology</i>	-	10.059	-	1.993	-	1.993	13.319	12.802	12.942	0.236	0.000	51.351
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In Fiscal Year (FY) 2024, funding in this Project has a Skip Year.

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

This Project matures developed techniques, methods, and standards for automation and intelligence to optimally broadcast data among available radio frequency (RF) and networking technologies. This Project will predict that a change in the network is needed and automatically make that change (transport, waveform mode, routing) prior to the network failing or being degraded. This Project provides a resilient transport agnostic network to the user.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AM6 (Modular RF Communications Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	FY 2023	FY 2024	FY 2025
<b>Title:</b> Modular Radio Frequency (RF) Communications Advanced Technology	10.059	-	-
<b>Description:</b> This effort optimizes autonomous networking protocols to automate the PACE communication plan to initialize, adapt, and continue operations under changing environments and threats.			
<b>Title:</b> Predictive Intelligent Networking Adv Tech	-	-	1.993
<b>Description:</b> This effort matures and demonstrates methods to enable the tactical network with artificial intelligence (AI) to autonomously identify, learn, predict, and react to changes in network operating conditions and threats to ensure end-to-end network resiliency against adversarial AI-driven electronic attacks (EA), electronic warfare (EW), and cyberattacks.			
<b>FY 2025 Plans:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>	<b>Project (Number/Name)</b> AM7 / <i>Modular RF Communications Advanced Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
Will develop internal and external facing Application Programming Interfaces (APIs) for integration into Program of Record (POR) systems; optimize and mature algorithms from Modeling and Simulation (M&S) for Mobility Prediction and Network Optimization work.  <b><i>FY 2024 to FY 2025 Increase/Decrease Statement:</i></b> Funding increase reflects planned initiation of this effort. In Fiscal Year (FY) 2025 this Project is realigned from Program Element (PE) 0602213A (C3I Applied Cyber) / Project CY6 (Autonomous Cyber Technology).				
<b>Accomplishments/Planned Programs Subtotals</b>		10.059	-	1.993
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AM9 / Protected SATCOM Advanced Technology			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AM9: Protected SATCOM Advanced Technology	-	30.859	14.200	5.511	-	5.511	14.199	15.630	8.023	6.199	0.000	94.621
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project matures and demonstrates technologies and components to increase resiliency of Wideband Satellite Communications (SATCOM) in contested and congested electromagnetic environments. This Project improves resiliency through science & technology investigation. This Project complements technologies that provide obfuscation of radio frequency (RF) spectrum signature in order to counter enemy electronic surveillance capabilities.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects AM8 (Protected SATCOM Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Protected SATCOM Advanced Technology and Resilient Tactial Networking and Comms	30.859	14.200	-
<b>Description:</b> This effort matures and demonstrates technologies and components to increase resiliency of Wideband SATCOM in contested and congested electromagnetic environments. This effort improves resiliency through science & technology investigation. Will complement technologies that provide obfuscation of RF spectrum signature in order to counter enemy electronic surveillance capabilities.			
<b>FY 2024 Plans:</b> Will mature, optimize, and demonstrate select SATCOM technologies that contribute to SATCOM resiliency; will mature and demonstrate OTM satellite ground terminal technology that supports operation over multiple satellite constellations with low available SWAP, leading to Army communications resiliency through diversity for tactical vehicles; and mature and demonstrate ATH satellite ground terminal technology that supports operation over multiple satellite constellations simultaneously, leading to Army communications resiliency through diversity for Army TOCs.			
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>	<b>Project (Number/Name)</b> AM9 / <i>Protected SATCOM Advanced Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
Funding change reflects the planned life cycle conclusion of this Science and Technology effort. In Fiscal Year (FY) 2025, this project is restructured to Program Element (PE) 0602146A (Network C3I Technology) / Project AM8 (Protected SATCOM Technology).				
<b>Title:</b> Multi-Orbit Modem (MOM) Advanced Technology		-	-	5.511
<b>Description:</b> This effort matures, optimizes and demonstrates Satellite Communications (SATCOM) ground terminal modem and management technology components to enable operation over multiple satellite constellations to increase performance and resiliency of wideband SATCOM in contested and congested electromagnetic environments. Modem components will include a software based terminal controller for modem management, repository of modem waveforms, and supporting network management. This effort develops resiliency through a flexible modem technology investigation and is complementary with Protected SATCOM efforts focused on antenna development.				
<b>FY 2025 Plans:</b> Will mature, optimize, and demonstrate select SATCOM technologies that contribute to SATCOM resiliency; will mature and demonstrate OTM satellite ground terminal technology that supports operation over multiple satellite constellations at multiple frequency bands.				
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects planned initiation of this effort.				
<b>Accomplishments/Planned Programs Subtotals</b>		30.859	14.200	5.511
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AN4 / Non Traditional Waveforms Advanced Technology			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AN4: Non Traditional Waveforms Advanced Technology	-	5.823	5.215	17.488	-	17.488	16.062	18.075	19.931	18.843	0.000	101.437
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project demonstrates non-traditional waveforms and technologies for resilient communications in contested environments providing anti-jam, low probability of intercept, and low probability of detection for the dismounted and vehicular user. This Project also optimizes technologies not typically applied to the tactical environment, such as millimeter wave communications and directional networking with coherent combining of radio frequency signals, to maintain networked communications in and under contested and congested electromagnetic spectrum environments.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AN3 (Non Traditional Waveforms Technology) and Project AO4 (Energy Efficient Devices Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Non Traditional Waveforms Advanced Technology	5.823	-	-
<b>Description:</b> This effort demonstrates non-traditional waveforms and technologies for resilient communications in contested environments providing anti-jam, low probability of intercept, and low probability of detection for the dismounted and vehicular user. This effort optimizes technologies not typically applied to the tactical environment, such as millimeter wave communications and directional networking with coherent combining of radio frequency signals, to maintain networked communications in and under contested and congested electromagnetic spectrum environments.			
<b>Title:</b> Relay for Aerial to Non-line-of-sight Ground Environments (RANGE)	-	5.215	12.925
<b>Description:</b> This effort matures and demonstrates as next-generation aerial communications relay payloads to maintain communications coverage in Non-Line-of-Sight (NLOS) environments. The technology will provide flexibility to enable the communications relay to support both currently fielded radios and emerging/future radios including those with anti-jam and low probability of detection capabilities.			
<b>FY 2024 Plans:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AN4 / Non Traditional Waveforms Advanced Technology

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Will mature and demonstrate small form factor aerial relay communications payloads capable of enabling both low-band (e.g. L/S/C) and high-band (e.g. millimeter-wave) operations; optimize communications components for directional systems and demonstrate communications relay performance while reducing size, weight, and power of the aerial communications payload by aligning with Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Modular Open Suite of Standards (CMOSS) standards.</p> <p><b>FY 2025 Plans:</b> Will mature scalable and modular small-form-factor aerial relay communications payloads to include system prototyping of multiple system variants; perform lab-based assessments to validate sub-system and integrated system performance; implement and validate communications waveforms/protocols on system; mature and demonstrate CMOSS adapter card; perform initial field testing in an outdoor environment; mature a radio communications system that has the flexibility to support not only high bandwidth, low latency commercial communication systems (e.g. 5G, Wi-Fi) but also tactical waveforms with the ability to seamlessly switch between tactical and commercial communications methods based on mission needs and security considerations without the need for multiple hardware systems.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects planned maturation and validation of multiple tactical communication system prototypes of multiple size variants to be used in different use cases depending on available size, weight, and power of end user platforms, within the CMOSS standards, culminating in iterative demonstrations.</p>			
<p><b>Title:</b> Spectrum Superstorm</p> <p><b>Description:</b> This effort matures commercial technical effects technology with an emphasis on blue force communications deconfliction, high fidelity pattern of life generation, and orchestration software. This effort provides the capability to create a radio frequency (RF) "smoke screen" for the network that will overwhelm adversary electronic support capability resulting in increased difficulty to find and fix targets based on their RF signature.? This capability has applications at Division and below and the CEMA cell efforts to create periods of spectrum dominance during the dominate phase of conflict.</p> <p><b>FY 2025 Plans:</b> Will mature system design characteristics in both preliminary design review and critical design reviews; optimize system size, weight, and power; demonstrate multiple technical effects device in a laboratory environment.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects planned initiation of this effort.</p>	-	-	4.563
<b>Accomplishments/Planned Programs Subtotals</b>	5.823	5.215	17.488

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>	<b>Project (Number/Name)</b> AN4 / <i>Non Traditional Waveforms Advanced Technology</i>

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AN8 / COE - Every Receiver is a Sensor Advanced Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AN8: COE - Every Receiver is a Sensor Advanced Tech	-	1.371	6.539	5.480	-	5.480	4.486	5.192	5.237	6.105	0.000	34.410
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project optimizes automated exploitation and fusion analysis tools, applications, and software services that harvest, correlate and fuse tactical receiver sources with new and emerging data sources to improve understanding of the threat picture and more efficiently support near-real time Situational Understanding of the battlefield.

Work in this Project complements Program Element (PE) 0603463A (Network C3I Advanced Technology) / Project AO1 (UNT - Every Receiver is a Sensor Advanced Tech) and PE 0602146A (Network C3I Technology) / Project AN7 (COE - Every Receiver is a Sensor Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Intelligence, Surveillance and Reconnaissance Optimization for Multi-Domain Operations Support Advanced Tech	1.371	6.539	3.038
<b>Description:</b> This effort will use automated threat process to focus sensor collection requirements. Collection plans are to be synchronized across echelons optimizing scheduling and placement of sensor assets from both national and joint capabilities. Effort enables cooperative multi-sensor, multi-intelligence (INT) collection orchestrations by leveraging All Domain Overhead Collection Operations (AOCO) family of standards. Effort develops prototype software to demonstrate autonomous cross cue of multi-INT sensors and analytics.			
<b>FY 2024 Plans:</b> Will mature and integrate sensor optimization algorithms with collection orchestration tools to reduce timeline for sensor selection and tasking; mature and demonstrate standardized messaging and interfaces for tasking Army, national, and joint sensor assets; mature Intelligence Surveillance and Recognizance (ISR) collection orchestration software tools to enable near-real-time cross-cueing of sensors to improve target detection, tracking, and identification.			
<b>FY 2025 Plans:</b> Will demonstrate ISR collection orchestration software tools to execute cooperative sensing and near-real-time cross cueing of Army, national, and joint sensors to improve target detection, tracking, and identification during Multi-Domain Operations (MDO).			
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AN8 / COE - Every Receiver is a Sensor Advanced Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
Funding decrease reflects conclusion of primary development phase, which included development and integration of multiple subsystems necessary to demonstrate collection optimization across Army, national, and joint assets. Funding decrease reflects administrative realignment to task Virtual Orchestration of Kinetic Non-Kinetic Targeting Advanced Technology within this project.				
<p><b>Title:</b> Virtual Orchestration of Kinetic Non-Kinetic Targeting Advanced Technology</p> <p><b>Description:</b> This effort will provide Army Commanders the full range of multi-domain options by integrating kinetic and non-kinetic targeting and effects into the mission execution and mission planning cycles. Effort will develop software tools to augment the kinetic targeting process, to include non-kinetic engagement.</p> <p><b>FY 2025 Plans:</b> Will mature target development workflow tools to incorporate non-kinetic effects planning into the target development process with alignment to the Attack Guidance Matrix (AGM) and the Target Selection Standards (TSS); mature target weapons pairing analytics to improve recommendations for kinetic and non-kinetic engagements.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects planned initiation of the effort. Funding increase reflects administrative realignment from task Intelligence, Surveillance and Reconnaissance Optimization for Multi Domain Operations Support Advanced Tech within this project.</p>		-	-	2.442
<b>Accomplishments/Planned Programs Subtotals</b>		1.371	6.539	5.480
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AO1 / UNT - Every Receiver is a Sensor Advanced Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AO1: <i>UNT - Every Receiver is a Sensor Advanced Tech</i>	-	-	3.170	4.179	-	4.179	4.684	8.199	6.717	13.815	0.000	40.764
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project demonstrates high fidelity Cyber-Electromagnetic Activity (CEMA) situational understanding by exploiting tactical receivers with sufficient capabilities as sensors. This Project also optimizes real-time radio frequency mapping of the tactical environment in support of network operation and decision making.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AN9 (UNT - Every Receiver is a Sensor Technology) and Project AN7 (COE - Every Receiver is a Sensor Technology); and PE 0603463A (Network C3I Advanced Technology) / Project AN8 (COE Every Receiver is a Sensor Advanced Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Multi Int Modernization Combined Architecture (MIMCA) Advanced Technology	-	3.170	3.177
<p><b>Description:</b> This effort develops technologies and methodologies to overcome the interference experienced in current co-located, multifunction systems that hinders the efficient, effective execution of simultaneous Electronic Warfare (EW), signals intelligence and cyber missions. This effort will improve resourcing, scheduling and collaboration so that sensor systems can self-optimize, identify spectrum conflicts and fully utilize all available assets scheduling to enable simultaneous use of the spectrum on a threat dense battlefield.</p> <p><b>FY 2024 Plans:</b> Will leverage advanced machine language-based resource schedulers to dynamically optimizes resource allocation on EW platforms to increase simultaneity; leverage advanced Radio Frequency (RF) payload that can accommodate an advanced scheduler, implement novel interference mitigation components, and can self-optimize based on real-time feedback from shared resources to compensate for Battle Damage Assessment (BDA) or adaptive Electronic Attack (EA).</p> <p><b>FY 2025 Plans:</b></p>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AO1 / UNT - Every Receiver is a Sensor Advanced Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Will mature and demonstrate advanced scheduling technology to dynamically optimize resource allocation to complete multifunction missions; exploit commercial interference mitigation technology to increase efficient use of RF spectrum resources and simultaneity on multifunction platforms.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase is an economic adjustment.</p>				
<p><b>Title:</b> Army SIGINT Modernization Advanced Technology</p> <p><b>Description:</b> This effort will mature and demonstrate radio frequency (RF) signal analysis and processing techniques that automate detection, identification, and exploitation of high priority peer/near-peer adversary military signals, significantly increasing autonomous detection and parameterization of unknown signal operating instructions. The effort will improve robustness against realistic congested RF environments and will be suitable for size, weight, and power constrained tactical edge environments.</p> <p><b>FY 2025 Plans:</b> Will mature RF signal detection and classification techniques against peer/near-peer adversary threats, improving robustness against realistic congested RF environments and suitability for size, weight, and power (SWAP) constrained tactical edge environments; use modeling and simulation to demonstrate and optimize signal detection performance and ranges for fixed-site/on-the-move platforms.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects planned initiation of this effort.</p>		-	-	1.002
<b>Accomplishments/Planned Programs Subtotals</b>		-	3.170	4.179
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AO7 / EW for Maneuver Operations (EMO) Adv Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AO7: EW for Maneuver Operations (EMO) Adv Tech	-	5.968	3.152	-	-	-	-	3.168	3.742	3.779	0.000	19.809
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

There is no Fiscal Year (FY) 2025 budget request. Work in this project is planned to be completed in FY24.

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

This Project matures and demonstrates distributed, coordinated Electronic Warfare (EW) capabilities designed to extend effective range, reduce susceptibility to localization, and introduce errors into adversary ISR systems to facilitate multi-domain operations (MDO). This Project will mature Electronic Warfare (EW) resources to mitigate Electronic Protection (EP), against a finite set of threat capabilities, present in Anti-Access Area Denial (A2/AD) threats to achieve improved freedom of maneuver.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AP5 (Electronic Warfare Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Stand-in Advanced RF Effects Advanced Technology	2.991	-	-
<b>Description:</b> This effort matures and demonstrates highly advanced hardware and software to improve power-on-target for EW systems against certain threat systems.			
<b>Title:</b> Tactical Force Signature Effects (TFORSE) Advanced Technology - Counter ISR Techniques	2.977	3.152	-
<b>Description:</b> This effort matures and demonstrates Electronic Warfare capabilities against adversary counter-fire sensors and Intelligence, Surveillance, and Reconnaissance (ISR) systems leveraging high fidelity hardware-in-the-loop, modeling and simulation (M&S), and representative systems.			
<b>FY 2024 Plans:</b> Will use representative adversary sensor systems in a field demonstration environment, validate combined performance of decoy hardware and countermeasure techniques to reduce the effectiveness of adversary ISR and counterfire capabilities, impacting			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AO7 / EW for Maneuver Operations (EMO) Adv Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
their ability to localize blue emissions and therefore target blue platforms for kinetic weapons engagements; demonstrate and document tactical placement of EW platforms to optimize countermeasure effects and to create larger regions of uncertainty.  <b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding decrease reflects planned life cycle conclusion of this Science and Technology Effort. In Fiscal Year (FY) 2025, funding is realigned to Program Element (PE) 0602146A (Network C3I Technology) / Project AQ2 (EW Techniques Technology).				
<b>Accomplishments/Planned Programs Subtotals</b>		5.968	3.152	-
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AQ5 / Sensor CE-Integrated Sensor Architecture Adv Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AQ5: Sensor CE-Integrated Sensor Architecture Adv Tech	-	0.625	1.955	-	-	-	-	1.981	2.003	2.023	0.000	8.587
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In Fiscal Year (FY) 2025, this Project is terminated.

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

This Project matures and demonstrates capabilities that enable and enhance sensor interoperability across disadvantaged and disparate networks. It leverages and furthers the existing architectures consisting of standards, interfaces, and services. Enabling operationally relevant data to efficiently move across the network and ensures data is available for the Command & Control (C2) systems, integration into Tactical Operations Centers (TOC), ingestion into decision support aides and is actionable at the tactical edge.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Sensor CE - Integrated Sensor Architecture	0.625	1.955	-
<b>Description:</b> This effort matures and demonstrates an agile and adaptive interoperability sensor architecture that allows a system to dynamically discover and leverage other systems on a network without any specific or prior knowledge across limited, heterogeneous resources and against a peer adversary. The goal of this effort is to develop standards, models, and protocols that provide a common language for sensor systems to connect, publish their capabilities and needs, and interact with other systems, even on disadvantaged networks. The benefits of this effort are increased sensor collaboration, reduced decision timelines, reduced soldier load, and reduced integration costs.			
<b>FY 2024 Plans:</b> Will mature the subscription services and demonstrate scalability to multiple sensors across a disadvantaged network; improve upon performance metrics; mature and optimize approaches to de-conflict multiple target indicators; validate de-confliction approach of sensors and shooter across a network representing Multi Domain Operations (MDO).			
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>	<b>Project (Number/Name)</b> AQ5 / <i>Sensor CE-Integrated Sensor Architecture Adv Tech</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
In Fiscal Year (FY) 2025, this Project is terminated.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.625	1.955	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AQ8 / High Tempo Data Driven Decision Tools Adv Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AQ8: High Tempo Data Driven Decision Tools Adv Tech	-	6.472	3.602	3.791	-	3.791	7.940	7.942	10.823	10.901	0.000	51.471
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project matures and demonstrates data driven decision tools that help develop Situational Understanding (SU) for Commanders. It enhances decision-making and accurately assesses and integrates cross-warfighting functional area impacts with all the domains in Multi-Domain Operations (MDO), and thereby enhances mission effectiveness by improving decision cycles. This Project matures and integrates methods to optimize the Army's Command and Control (C2) services and data architecture to strengthen data-driven decisions.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AQ7 (High Tempo Data Driven Decision Tools Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> High Tempo Data Driven Decision Tools Advanced Technology	3.237	-	-
<b>Description:</b> This effort matures and demonstrates data driven decision tools tailored to reflect specific mission / information needs of the commander and individual staff members comprised of the following: software that facilitates the exchange of cyber data and mission information between the cyber electromagnetic activities (CEMA) cell, the S-6 and other staff officers (e.g., S-3, S-2, Fire Support Officer (FSO)), helping to assess higher-level impacts of lower-level events, and capturing the information as part of models for possible re-use; and software that dynamically populates the Common Operating Picture (COP) with visualizations designed for exploration and understanding of the impact of the cyber domain on the current mission.			
<b>Title:</b> RoadRunner Advanced Technology	3.235	3.602	3.791
<b>Description:</b> This effort matures and demonstrates stakeholder prioritized capabilities that fuse intel and ops perspectives that drive decisions to enable dominance in complex Multi-Domain Operations. Effort will deliver applications which improve command post warfighter functions through information and decision dominance. Proposals are selected in budget year and year of execution to meet stakeholder prioritized capabilities.			
<b>FY 2024 Plans:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AQ8 / High Tempo Data Driven Decision Tools Adv Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Will validate and provide improved strategies for friendly versus enemy engagements while reducing cognitive burden with minimal impact to time constrained force on force interactions; exploit non-obvious insights, self and adversary vulnerabilities, and tactical opportunities using real time decision support tools during planning and execution phases.</p> <p><b>FY 2025 Plans:</b> Will integrate Development, Security, and Operations (DevSecOps) technologies onto existing mission command and intel platforms coexisting with Innovation requirements efforts; mature red-teaming capabilities to identify application vulnerabilities and deploy software patches; develop adaptive threat order of battle, optimize strategies using digitized plans, and prioritization with real time battle damage assessment.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects an economic adjustment.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		6.472	3.602	3.791
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AR6 / Understanding the Environment as a Threat Adv Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AR6: <i>Understanding the Environment as a Threat Adv Tech</i>	-	2.709	-	-	-	-	-	-	-	-	0.000	2.709
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project matures and demonstrates tools that provide capability to inform the Soldier of different routes through a complex urban landscape. Optimizes tools that balance exposure to environmental threats with mission constraints to provide a risk versus reward capability of operating in different areas of the urban theater. This Project matures and demonstrates predictive software accurately integrating the risks of physical, chemical, and biological threats in an urban environment into route planning tools.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR5 (Understanding the Environment as a Threat Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Environmental Threat Technology Demonstrations for route planning <b>Description:</b> This effort matures and demonstrates a software tool that informs and balances the risk of exposure to environmental threats with maneuver constraints along potential routes. The software integrates the risks associated with different environmental matrices in complex urban environments and includes the capability for routing in off-road scenarios.	1.008	-	-
<b>Title:</b> Hazard Prediction Demonstration <b>Description:</b> This effort matures and demonstrates a mission planning platform that provides Soldiers with a predictive visualization technology to identify, track and plan for industrial or commercial chemical/environmental threats in operational environments.	1.001	-	-
<b>Title:</b> Subsurface Forensics Demonstration <b>Description:</b> This effort matures and demonstrates sensing technologies for TIC/MS to detect illicit activities with authentic wastewater treatment influent.	0.700	-	-

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AR6 / Understanding the Environment as a Threat Adv Tech

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Accomplishments/Planned Programs Subtotals</b>	2.709	-	-

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

N/A

**Remarks**

N/A

**D. Acquisition Strategy**

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AT8 / Network-Enabled GeoSpatial-GEOINT Services AdvTech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AT8: Network-Enabled GeoSpatial-GEOINT Services AdvTech	-	4.501	4.760	3.764	-	3.764	7.943	9.128	3.134	4.716	0.000	37.946
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project accelerates and exploits the tactical value of emerging field generated, mission relevant 3-dimensional (3D) geospatial data supporting mission planning, mission rehearsal and tactical situational awareness. Integrates and demonstrates the geo-registration, feature extraction, change detection, data visualization and transmission capabilities developed in the applied research portion of this Project. Tools developed for the exploitation of 3D datasets will be integrated into a streamlined workflow requiring low levels of expertise, putting advanced processing capabilities in the hands of the Soldier. This Project also includes demonstrations of tactical enhancements and the integrated ability to rapidly share mission critical 3D information in support of planning and execution.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AT7 (Network-Enabled GeoSpatial and GEOINT Services Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center Geospatial Research Laboratory, Cold Regions Research and Engineering Laboratory, and Information Technology Laboratory.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> 3D Terrain Automated Geospatial Co-Registration and Change Detection	2.703	-	-
<b>Description:</b> This effort matures, integrates and demonstrates the design and formulation of new urban terrain data models, frameworks and processes to automate the transformation of tactical unit generated source data (e.g. Light Detection and Ranging (LiDAR), imagery, and full motion video derived data) to new model constructs for rapid and accurate geo-registration of features (manmade infrastructure).			
<b>Title:</b> Optimization of Geospatial Data for Tactical Visualization-Demonstration	1.798	1.838	-
<b>Description:</b> This effort matures and demonstrates new open source software, data models and processes to generate a vision based geospatial foundation layer to enable end-users systems to visualize real-time mission critical geospatial content at the			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AT8 / Network-Enabled GeoSpatial-GEOINT Services AdvTech

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>required level-of-detail (LOD) and enable position-navigation self-localization capability applicable to end-user devices at required accuracies optimized for the device, application, and mission.</p> <p><b>FY 2024 Plans:</b> Will demonstrate advanced delivery of vision-based Position Navigation (PN) self localization from optimized geospatial data on end user devices at required accuracies. Will demonstrate reduced network bandwidth requirements through implementation of 3D Level-of-Detail (LOD) architectures and provide rigorous Figure of Merit assessment for integration to vision-based position/navigation methods.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding change reflects planned life cycle conclusion of this Science and Technology effort.</p>			
<p><b>Title:</b> Geospatial - Intelligence Community Merge Demonstration</p> <p><b>Description:</b> This effort matures an approach to automatically search Intelligence Community (IC) databases to discover and extract relevant attributes to be added as new metadata to adaptively scaled 3D terrain features and/or geographic areas. Geospatial and relevant intelligence data will be merged together, discoverable, and capable of user-selected query from a single computing environment. An enhanced 3D common operating picture will be demonstrated providing a more comprehensive understanding of the Operational Environment for greater situational awareness and decision making.</p> <p><b>FY 2024 Plans:</b> Will advance Application Programming Interface (API) connectivity to relevant selected Intelligence Community (IC) databases to complement and enrich 3D terrain by extracting relevant attributed added as new metadata to adaptively scaled 3D terrain features and/or geographic areas.</p> <p><b>FY 2025 Plans:</b> Will demonstrate machine to machine API for database scraping to search, discover and extract relevant geospatial attributes. Will demonstrate software for retrieval of large geospatial datasets to end user devices in low bandwidth situations to enable Soldiers on the tactical edge to provide soldier-derived contextualization to the data.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects the planned milestones to mature and demonstrate a prototype geospatial solution for automated workflows.</p>	-	2.138	2.717
<p><b>Title:</b> Geospatially Relevant Intuitive Propagation Services for Complex Environments Demonstration</p> <p><b>Description:</b> This effort matures and demonstrates a novel expert propagation framework for assessing sensor performance in complex terrain, with integrated battlefield sensor data and environmental predictive modeling (weather and terrain influences)</p>	-	0.784	1.047

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>	<b>Project (Number/Name)</b> AT8 / <i>Network-Enabled GeoSpatial-GEOINT Services AdvTech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>into intuitive displays for analysts, planners, and collection managers. The resulting technology will optimize collection asset employment against adversaries as well as providing situational awareness of friendly units', multi-modal signature footprint (e.g. radio frequency, thermal, acoustic). This effort will significantly reduce the analyst cognitive load, and fill an important need for fused, validated, environment and terrain-aware analyses for multi-modal sensors in support of C2, Intelligence and Protection Warfighting Functions.</p> <p><b>FY 2024 Plans:</b> Will advance use cases within the Common Operating Environment to enable an automated and integrated system to predict and visualize sensor performance caused by environmental conditions effects.</p> <p><b>FY 2025 Plans:</b> Will demonstrate multi-modality software to take real-time cues from the sensor network and publish sensor performance results back to the Sensor Compute Environment producing geospatial data discoverable within Army devices. Will integrate fractional line of sight algorithms into the sensor performance modeling environment.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects the planned milestones to mature and demonstrate capabilities integrated with sensor networks.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		4.501	4.760	3.764
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
N/A				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AU1 / Tactical GeoSpatial Information Capabilities ATech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AU1: <i>Tactical GeoSpatial Information Capabilities ATech</i>	-	5.869	2.112	2.722	-	2.722	3.433	7.992	6.128	7.464	0.000	35.720
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project matures and demonstrates next generation geospatial analytical tools for three-dimensional (3D) complex environments applicable to low echelon and tactical edge exploitation. These new capabilities will allow deployed units to enhance/update provisioned (baseline) standard, sharable, geospatial foundation (SSGF) data through automated analytics on multi-sourced spatial data resulting in streamlined, high fidelity terrain analysis products. Reducing data gaps and processing timelines will greatly increase Soldier situational awareness and support faster decision making in complex terrain.

Work in this Project complements Program Element (PE) 0602146A Network C3I Technology / Project AT9 (Tactical GeoSpatial Information Capabilities Techn).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center Geospatial Research Laboratory.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> 3D Terrain Analysis	3.819	-	-
<b>Description:</b> This effort integrates and demonstrates software models and workflows provisioned on the geospatial and GEOINT workstations for improved capabilities to generate, process and exploit terrain products enabling situational awareness and rapid decision making at the tactical edge.			
<b>Title:</b> Previously Advanced Airborne Light Detection and Ranging (LIDAR)	2.050	-	-
<b>Description:</b> This effort integrates and demonstrates enhanced Geiger-mode LiDAR hardware/software, for advanced testing of protocols, equipment, and products for enhanced high-altitude/wide area terrain data collection, to support tactical operations.			
<b>Title:</b> Geospatial Analytics and Prediction Demonstration	-	2.112	2.722
<b>Description:</b> This effort integrates and demonstrates automated/semi-automated geospatial tools implementing spatial/temporal data analysis, creation of predictive scenarios, anomaly detection and cross-scale and local-scale analysis of terrain.			
<b>FY 2024 Plans:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>	<b>Project (Number/Name)</b> AU1 / <i>Tactical GeoSpatial Information Capabilities ATech</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Will advance high-resolution 3D building-scale mapping workflow including interiors, exteriors and surrounding urban terrain. Will initiate designs for preliminary software tools for spatial, temporal and cross-scale analysis of terrain.</p> <p><b>FY 2025 Plans:</b> Will demonstrate and mature mapping workflows for high-resolution building-scale 3D imagery collection (interiors, exteriors and surrounding urban terrain), with optimized processing. Will expand designs for software tools for spatial, temporal and cross-scale analysis of terrain, using overhead imagery sources.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects the planned milestones for development of automated/semi-automated geospatial tools.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	5.869	2.112	2.722

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

N/A

**Remarks**

N/A

**D. Acquisition Strategy**

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AU4 / Geospatially Enabled Operational Design Adv Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AU4: <i>Geospatially Enabled Operational Design Adv Tech</i>	-	12.186	10.953	10.813	-	10.813	5.133	6.435	8.194	8.276	0.000	61.990
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project demonstrates, integrates and transitions to Mission Command Systems, a geospatially enabled collaborative planning environment, accessible across echelons, with capabilities that support Army Design Methodology (ADM) by providing the ability to perform conceptual planning and problem framing, supporting a greater understanding and visualization of the dynamic operational environment, a shared understanding of the operations purpose across echelons, and enhanced products to drive detailed budget planning and operational assessment processes, enhancing the collaborative interaction between commanders, staffs, and unified action partners.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AU3 (Geospatially Enabled Operational Design Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center Geospatial Research Laboratory and Information Technology Laboratory.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Geospatially Operational Design (GEOD) - Demonstration	5.076	-	-
<b>Description:</b> This effort integrates and demonstrates automation technologies to digitally visualize, create and assess critical elements of the Operational Environment required to inform the Operational Design functions, including collaborative conceptual framing of the problem.			
<b>Title:</b> Integration of intel and logistics Multi Echelon Planning	4.035	3.109	-
<b>Description:</b> This effort demonstrates a suite of analytical and visualization tools designed to facilitate analysis of multiple courses of action through modeling and simulation (M&S) and wargames to support development of alternate Courses of Action (COAs) and approval of the operational plan.			
<b>FY 2024 Plans:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AU4 / Geospatially Enabled Operational Design Adv Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Will demonstrate advanced suite of analytical and visualization tools to facilitate Courses of Action (COA) analysis through modeling and simulation (M&amp;S) and wargames to improve coordination and increase efficiencies in the Military Decision Making Process (MDMP).</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding change reflects planned life cycle conclusion of this Science and Technology effort.</p>				
<p><b>Title:</b> Automated intelligence Preparation of the Battlefield (IPB) Demonstrations</p> <p><b>Description:</b> This effort develops and demonstrates a collaborative, adaptive planning capability that allows planners to employ resources leveraging geospatial, terrain, environmental effects, and authoritative data from distributed information databases in order to collaborate in the development and assessment of courses of action, visualize potential outcomes, make decisions and develop and disseminate plans and orders.</p> <p><b>FY 2024 Plans:</b> Will demonstrate analytical tools within Joint Planning Services (JPS) platform for the generation of digestible Intelligence Preparation of the Battlefield (IPB) information to increase understanding of operational environment and threats in support of the military planning process.</p> <p><b>FY 2025 Plans:</b> Will mature and demonstrate automated analytical tools that allow IPB products which support the Military Decision Making Process (MDMP) to be processed and integrated into the digital plans inside Joint Planning Services (JPS) and the common command and control software/Command Post Computing Environment. Will optimize advanced algorithms to extract authoritative data supporting seamless integration with Intel analysis tools that generate IPB products.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects the planned milestones for development of automated tools.</p>		3.075	3.160	5.363
<p><b>Title:</b> GEOInt Ops Integration of tactical operational and strategic orders</p> <p><b>Description:</b> This effort will demonstrate a suite of automated tools designed to facilitate rapid and efficient dissemination of orders and real-time visibility of subordinate planning as it relates to key tasks from higher echelons and desired end state down to Battalion.</p> <p><b>FY 2024 Plans:</b></p>		-	4.684	5.450

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AU4 / Geospatially Enabled Operational Design Adv Tech

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Will demonstrate through agile design reviews with Program of Record automated tools within Joint Planning Services (JPS) platform to allow rapid creation and dissemination of digital orders and reduce cognitive burden and gain efficiencies in the military planning process.</p> <p><b>FY 2025 Plans:</b> Will mature and demonstrate automated analytical tools that allow IPB products which support the Military Decision Making Process (MDMP) to be processed and integrated into the digital plans inside Joint Planning Services (JPS) and the common command and control software/Command Post Computing Environment for Plans and Operations orders down to Battalion through tools that automatically populate planning tasks and ensure alignment with Commander's intent. Will demonstrate a flexible data model that will result in a real-time dashboard for integration of plans and orders to generate automated Operational Orders (OPORDs) and Fragmentary Orders resulting in time savings and reduction of cognitive burden.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects the planned milestones for development of automated tools.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	12.186	10.953	10.813

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

N/A

**Remarks**

N/A

**D. Acquisition Strategy**

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AV8 / Navigation Warfare (NAVWAR) Advanced Technology			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AV8: Navigation Warfare (NAVWAR) Advanced Technology	-	1.949	6.029	3.988	-	3.988	6.036	5.352	10.955	15.494	0.000	49.803
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project matures and demonstrates capabilities allowing the Army to monitor, understand, and control the Navigation Warfare (NAVWAR) environment. This requires an integrated approach to Electronic Protection (EP), Electronic Support (ES), and Electronic Attack (EA) to rapidly characterize the NAVWAR environment, deny Positioning, Navigation, and Timing (PNT) based capabilities to our adversaries, and maintain Army capabilities.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AW1 (Autonomous Navigation Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> PNT Situational Awareness (SA) Advanced Technology	1.949	-	-
<b>Description:</b> This effort demonstrates real time PNT Situational Awareness for a Common Operating Picture (COP) on selected Computing Environment (CE); improves fusion algorithms for at least two types of PNT SA sensors (terrestrial, air, space); generates an Interface Control Document (ICD) for PNT SA messages; allow open integration and reference implementation for PNT SA stored data for distribution on various platforms.			
<b>Title:</b> Intelligent Electronic Protect (IEP) Advanced Technology	-	6.029	3.988
<b>Description:</b> This effort matures and demonstrates hardware and software capabilities that will enable an Assured Position Navigation and Timing (APNT) system to function as a Navigation Warfare (NAVWAR) sensor. The IEP enabled APNT system will be able to detect and identify information about jamming and spoofing threats in the Global Positioning System (GPS) environment, protecting units from spoofing and increasing the number and availability of NAVWAR sensors in the field. The proliferation of NAVWAR sensors allows the Electronic Warfare Planning and Management Tool (EWPMT) to create a NAVWAR Common Operating Picture with greater accuracy and coverage, allowing Commanders to make more informed decisions about maneuver and allowing for more accurate and successful fires missions.			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> AV8 / Navigation Warfare (NAVWAR) Advanced Technology		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p><b><i>FY 2024 Plans:</i></b> Will mature machine learning (ML) techniques to enable detection and classification capabilities in an IEP enabled APNT system for use on ground vehicle platforms; exploit the machine learning techniques to allow use of existing GPS receiver hardware as a NAVWAR sensor; optimize artificial intelligence (AI)/ML techniques to understand the changes in the environment and utilize appropriate modes to counter interference events; mature the APNT system (hardware and software) to exploit this new NAVWAR data to improve overall anti-spoof protection; demonstrate initial machine learning techniques and hardware improvements at end of FY24 field test event.</p> <p><b><i>FY 2025 Plans:</i></b> Will optimize machine learning (ML) techniques to enhance electronic sensing in an IEP enabled APNT system; provide capabilities that will allow software defined GPS receiver hardware to function as NAVWAR sensors; exploit NAVWAR data to provide protection through algorithm development, enabling communication between NAVWAR and APNT subsystems.</p> <p><b><i>FY 2024 to FY 2025 Increase/Decrease Statement:</i></b> Funding decrease reflects planned focus on specific needs and technologies within the effort as it continues to progress. In Fiscal Year (FY) 2025, funding is realigned to Program Element (PE) 0602146A (Network C3I Technology) / Project AW5 (Modular GPS Independent Sensors Technology).</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		1.949	6.029	3.988
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> AW6 / Modular GPS Independent Sensors Advanced Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
AW6: Modular GPS Independent Sensors Advanced Tech	-	10.131	12.343	11.282	-	11.282	5.010	5.940	10.300	6.829	0.000	61.835
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project matures and demonstrates a resilient, soldier-integrated precision navigation and timing solution, providing precision geolocation, geospatial survey information, global positioning system (GPS) spoofing awareness and countermeasures to dismounted warfighters in GPS-denied/degraded environments. It develops capabilities to enable open and flexible Position Navigation and Timing (PNT) systems architecture with unlimited data rights for the Army's dismounted systems.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AW1 (Autonomous Navigation Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center and the Army Applications Laboratory.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Soldier-Integrated Positioning, Navigation, and Timing (PNT)	2.476	3.003	3.606
<b>Description:</b> This effort implements a standards-based, open PNT architecture solution for rapid commercial of the shelf (COTS) and emerging technology integration; incorporates artificial intelligence approaches to aggregate multiple organic and networked sensor inputs for improved PNT accuracy and reliability; demonstrates Simultaneous Localization and Mapping (SLAM) based-algorithms incorporating alternative PNT inputs; and demonstrates alternative PNT sensors and approaches, including radio frequency time differencing, signals of opportunity, inertial, gravimetric, and imagery.			
<b>FY 2024 Plans:</b> Will continue to exploit and provide technology discovery for network ranging, flexible and modular Radio Frequency (RF) antenna designs. Will incorporate artificial intelligence approaches and will mature alternate PNT sensors to improve PNT accuracy and reliability.			
<b>FY 2025 Plans:</b> Will optimize and fully integrate previously developed COTs technologies into final hardware, software, and modular open systems architecture.			
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / <i>Network C3I Advanced Technology</i>	<b>Project (Number/Name)</b> AW6 / <i>Modular GPS Independent Sensors Advanced Tech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
The integration of multiple technologies prior to the start of the deliverables due in FY26 accounts for the increase of funding.				
<b>Title:</b> Soldier Integrated Positioning Navigation and Timing - Modular Architecture & Integrated Demonstrators		7.655	9.340	7.676
<b>Description:</b> This effort optimizes, improves, and demonstrates the modular architecture for PNT capabilities; matures and integrates alternative PNT sensors modules, including signals of opportunity, inertial, barometric, vision-based navigation modules; matures, integrates, demonstrates and validates a final Modular Handheld; integrates and demonstrates PNT technologies with interfacing Soldier systems. Results from this effort will be a fused PNT solution that will operate in a GPS denied environment.				
<b>FY 2024 Plans:</b> Will integrate PNT sensors, algorithms, anti-jam capabilities, vision aided navigation, network ranging and other alternative navigation technologies with existing Soldier-borne device and demonstrate capability at a Soldier touch-point in a relevant environment; assess performance and mature interfaces and messaging necessary to distribute accurate position and timing across wirelessly connected Soldier-borne devices; integrate low-cost timing technologies into a modular open systems architecture Soldier Integrated technology demonstrator.				
<b>FY 2025 Plans:</b> Will optimize and fully integrate PNT sensors for Soldier-borne device; mature final software, hardware, and specification components; demonstrate final hardware, software, and Modular Open Systems Architecture at FY25 Demonstrator Soldier Touch Point; provide integrity scoring and power management strategies for PNT sensors implemented into final demonstrator.				
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding decrease reflects planned milestones for refining target areas of interest and finalizing technological advancements. In Fiscal Year (FY) 2025, funding is realigned to PE 0602146A (Network C3I Technology) / Project AW5 (Modular GPS Independent Sensors Technology).				
<b>Accomplishments/Planned Programs Subtotals</b>		10.131	12.343	11.282
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> BP4 / ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
BP4: ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)	-	52.500	-	-	-	-	-	-	-	-	0.000	52.500
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Congressional Interest Item funding provided for Electronic Warfare Advanced Technologies.

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

Congressional Interest Item funding provided for Electronic Warfare Advanced Technologies.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

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

	<b>FY 2023</b>	<b>FY 2024</b>
<b>Congressional Add:</b> Program Increase - Assured Position, Navigation, and Timing Technology	5.000	-
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for APNT Technology		
<b>Congressional Add:</b> Program Increase - Alternative Navigation for GPS-Denied Landing Environments	4.500	-
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for Alternative Navigation for GPS-Denied Landing Environments		
<b>Congressional Add:</b> Program Increase - Next Generation Command Posts	7.000	-
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for Next Generation Command Posts		
<b>Congressional Add:</b> Program Increase - ADVANCE MATERIALS FOR COMMAND POST OF THE FUTURE	1.500	-
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for ADVANCE MATERIALS FOR COMMAND POST OF THE FUTURE		
<b>Congressional Add:</b> Program Increase - ADVANCED PRECISION, NAVIGATION AND TIMING FOR LANDING ENVIRONMENTS	2.500	-

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> BP4 / ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for ADVANCED PRECISION, NAVIGATION AND TIMING FOR LANDING ENVIRONMENTS		
<b>Congressional Add:</b> Program Increase - HUMAN GEOGRAPHY REPOSITORY FOR COMMERCIAL CIVIL AFFAIRS	5.000	-
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for HUMAN GEOGRAPHY REPOSITORY FOR COMMERCIAL CIVIL AFFAIRS		
<b>Congressional Add:</b> Program Increase - MULTI-PLATFORM RECEIVER-SENSOR TECHNOLOGY	20.000	-
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for MULTI-PLATFORM RECEIVER-SENSOR TECHNOLOGY		
<b>Congressional Add:</b> Program Increase - SMALL SATELLITE HIGH ALTITUDE LAUNCH, INTEGRATION, TEST, AND EVALUATION	7.000	-
<b>FY 2023 Accomplishments:</b> Congressional Interest Item funding provided for SMALL SATELLITE HIGH ALTITUDE LAUNCH, INTEGRATION, TEST, AND EVALUATION		
<b>Congressional Adds Subtotals</b>	52.500	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> C17 / Mobile & Survivable Command Post (MASCP) Adv Tech			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
C17: Mobile & Survivable Command Post (MASCP) Adv Tech	-	12.813	18.691	9.978	-	9.978	13.248	16.340	19.242	19.951	0.000	110.263
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Project matures and demonstrates technologies to support scalable, survivable, mobile Command Posts (CP). Technologies addressed will use the Brigade CP as a baseline while providing the opportunity for solutions to scale up or down to Army tactical echelons. Research in this Project includes integrating anti-jam (AJ) and low probability of intercept (LPI)/low probability of detection (LPD) communications focused on enabling the CP to disperse, form & reform, and employ technologies for signal remoting; optimizing power generation and storage for distributed CP operations; reducing computing infrastructure footprint, size, weight, and power (SWAP), manpower, and complexity; maturing technologies to reduce CP emissions and have situational awareness of those signatures to improve CP node employment; maturing electro-magnetic spectrum (EMS) emulation technologies to improve survivability options; and optimizing emerging electronic-textiles and composite materials for CP structures.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project C13 (Mobile and Survivable Command Post (MASCP) Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center and Soldier Center (SC).

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> CP Modularity and Dispersion Advanced Technology	2.331	9.741	7.324
<b>Description:</b> Increases the ability for Commanders to move and disperse the Command Post (CP) through improved intra-CP communications, modular CP hardware to include distributed power systems, and network solutions leveraging open systems architectures to support information flow in distributed, intermittent, and latent (DIL) environments. This effort will eliminate centralized points of failure and critical nodes that constrain CP mobility and survivability. Areas of technology development include be distributed tactical cloud architecture, mesh network security architecture, high performance computing, integrated power, and distributed collaborative technologies.			
<b>FY 2024 Plans:</b>			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> C17 / Mobile & Survivable Command Post (MASCP) Adv Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Will continue demonstration of wireless antenna remoting capability, specifically for Internet Protocol (IP) and legacy radio systems; optimize modulation and de-modulation performance of antenna remoting for both legacy and IP systems; mature and demonstrate advanced directional communications transport for congested and contested environments, improving anti-jam and low probability of detection of the dispersed command post; improve performance of dispersed collaboration for multi-node command post operations; improve the performance of vehicle mounted power systems and control mechanisms to provide efficient electrical power for dispersed command post operations; exploit Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Electronic Warfare (EW) Open Suite of Standards (CMOSS) capable systems for compatibility and to reduce size, weight, and power.</p> <p><b>FY 2025 Plans:</b> Will mature and demonstrate energy storage solutions with auxiliary power units as vehicle- mounted power systems to provide resilience and versatility for dispersed CP operations; mature and demonstrate solutions for secure mesh local area networks for dispersed CPs; improves performance of dispersed staff collaboration technologies; validate efficacy of disaggregated CP computing infrastructure; validates antenna remoting capability through low probability of detection communications.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding decrease corresponds to a decrease in scope related to demonstration of solutions under development.</p>				
<p><b>Title:</b> Signature Management and Reduction Advanced Technology</p> <p><b>Description:</b> Provides advanced technologies to reduce and manage electromagnetic spectrum signatures of CP platforms and command post components.</p> <p><b>FY 2024 Plans:</b> Will improve real-time spectrum situation awareness of radio frequency emissions at each command post node; optimize coordination of collected spectrum emissions from each command post node during dispersed operations to validate spectrum operating picture; improve software application performance across multiple command post nodes providing situational awareness of CP emission status.</p> <p><b>FY 2025 Plans:</b> Will mature and demonstrate algorithms to specifically identify communications systems and rogue signals emanating from dispersed CPs to enhance the situational awareness of our effective signature as seen by our adversaries.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding decrease reflects completion of command post node dispersal emission collection. In Fiscal Year (FY) 2025 funding is realigned to PE 0603463A (Network C3I Advanced Technology) / Project AO1 (UNT - Every Receiver is a Sensor).</p>		6.693	5.068	2.654
<p><b>Title:</b> Advanced Technology Supporting Camouflage, Concealment, and Deception</p>		3.789	3.882	-

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> C17 / Mobile & Survivable Command Post (MASCP) Adv Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p><b>Description:</b> This effort demonstrates innovative camouflage, concealment and deception technologies, for expeditionary assets (i.e. mission command platforms, battle management centers and supporting equipment), in order to defeat advanced and emerging adversary Intelligence, Surveillance and Reconnaissance (ISR) threats, and to reduce the probability of detection in multi-domain operations. Matures physics-based models for material and system performance that support probability of detection metrics in the multi-domain operational environment.</p> <p><b>FY 2024 Plans:</b> Will demonstrate large format advanced camouflage solutions to include material and deployment solutions to conceal high value assets from detection against peer threats and a LiDAR detection capability; validate and verify ability to address signature management performance in a relevant environment.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding change reflects planned life cycle conclusion of this Science and Technology effort. Funding restructured to Program Element (PE) 0602146A (Network C3I Technology) / Project C13 (Mobile and Survivable Command Post (MASCP) Tech).</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		12.813	18.691	9.978
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology					<b>Project (Number/Name)</b> CJ8 / Assured PNT Communications Advanced Tech		
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
CJ8: Assured PNT Communications Advanced Tech	-	10.933	11.783	13.435	-	13.435	15.043	17.268	16.182	19.331	0.000	103.975
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project provides prototyping and development of Space-enabled, High Altitude (HA), Counter-Surveillance and Reconnaissance, and quantum technologies to support wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and enable freedom of maneuver, significantly reducing Sensor to Shooter (S2S) timelines and increasing lethality and force protection. This Project provides Army forces access to commercial and National space assets and develops algorithms that process space and near space sensor data in real and near real time for integration into battlefield operating systems. The payoff of this work will be demonstrated advanced technologies for space-enabled capabilities for more secure, rapid communications, deep target sensing for deep strike lethality, and freedom of maneuver.

Work in this project complements Program Element (PE) 0602146A (Network C3I Technology) / Project CG3 (Assured PNT Communications Applied Research)/and Program Element (PE) 0602182A (C3I Applied Research) / Project CZ6 (Assured PNT Enabling Technologies).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Space and Missile Defense Technical Center.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> Assured Positioning Navigation and Timing (APNT) Communications Advanced Technology	10.933	11.783	-
<b>Description:</b> This effort matures and demonstrates technologies required for smaller, more responsive and direct access to space and HA deep-sensing sensors and tactical communication capabilities for soldiers at the tactical edge. Research will augment, improve, exploit, and optimize existing commercial and Department of Defense (DoD) technologies and networks.			
This effort will validate software, hardware, and algorithms used to enable Space-Based and HA platform based capabilities in support of the Army's Modernization Priorities. This effort will exploit commercial advances and opportunities in integrating Space/HA sensors or Deep Sensing capabilities and payload management toward future Army concepts. Develop/demonstrate critical technical elements for a LEO-based global high-speed network backbone enabling highly networked, resilient, and persistent DoD payloads to provide over the horizon sensing, signals, and communication, with continuous surveillance of ground, surface, and air domains.			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> CJ8 / Assured PNT Communications Advanced Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p><b>FY 2024 Plans:</b> Will develop High Altitude (HA) data communications payload with ability to communicate with Proliferated Low Earth Orbit (P-LEO) satellite constellation. Will continue toward demonstration of classified capability with preparation for military utility assessment. For Alternate Navigation capability development, will delivery payload and integrate with satellite bus.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding decrease reflects administrative realignment to add tasks HAYFINS, Deep Sensing Technologies, and Quantum Sensing within this project.</p>				
<p><b>Title:</b> HAYFINS</p> <p><b>Description:</b> This effort matures and demonstrates a ground-based system supporting Space and Autonomy Modernization priorities by fusing protection technologies with legacy systems that provide multi-modal capabilities to the Army to enhance freedom of maneuver supporting Multi-Domain Operations (MDO). This provides a tailored selection and application of multi-layered active and passive measures.</p> <p><b>FY 2025 Plans:</b> Will evaluate a prototype system in a relevant environment and conduct threat analysis, Modeling and Simulation, and system design for follow-on capabilities.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects administrative realignment from the Assured Positioning Navigation and Timing (APNT) Communications Advanced Technology task within this project.</p>		-	-	5.653
<p><b>Title:</b> Deep Sensing Technologies</p> <p><b>Description:</b> This effort enables timely and operationally relevant connectivity between aerial and space based assets, as well as mesh networks, to collect space-based intelligence information in support of deep sensing operations. The impact to the Army is improved situational awareness, tipping and queuing of sensors, and support for long-range precision fires across multiple domains.</p> <p><b>FY 2025 Plans:</b> Will provide an electronically steerable antenna for integration onto the fuselage of the HADES prototype aircraft that will facilitate aerial and space connectivity to enable intelligence and targeting data from commercial and national assets. Will mature hardware and software in accordance with Sensor Computing Environment Standards to automate tipping and queuing of sensors.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b></p>		-	-	5.326

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology	<b>Project (Number/Name)</b> CJ8 / Assured PNT Communications Advanced Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
Funding increase reflects administrative realignment from the Assured Positioning Navigation and Timing (APNT) Communications Advanced Technology task within this project.				
<p><b>Title:</b> Quantum Sensing</p> <p><b>Description:</b> This effort matures quantum sensing technologies for application to Army missions and demonstrates capabilities to validate applications to the Army sensing missions.</p> <p><b>FY 2025 Plans:</b> Will mature and optimize quantum sensing technologies applicable to Army sensing missions. Will validate Quantum based RF/EO architectures for enhancing Army sensor performance standards. Particular interests include radar, deep sensing missions, LPI/LPD signals acquisition and transmission, environmental characterization and traditional component sensitivity enhancements.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding increase reflects administrative realignment from the Assured Positioning Navigation and Timing (APNT) Communications Advanced Technology task within this project.</p>		-	-	2.456
<b>Accomplishments/Planned Programs Subtotals</b>		10.933	11.783	13.435
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Army										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 2040 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603463A / Network C3I Advanced Technology				<b>Project (Number/Name)</b> DB6 / Pathfinder 3D Advanced Technology			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
DB6: Pathfinder 3D Advanced Technology	-	-	1.045	-	-	-	-	3.147	3.282	3.609	0.000	11.083
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project matures and demonstrates a geospatial rapid position and navigation solution in Global Positioning System (GPS) degraded and denied environments. Research focuses on using onboard sensors and high-resolution digital terrain geospatial alternative solution based upon Visual Three-Dimensional (3-D) Terrain Referencing and Navigation (VTRAN). This Project will result in the linkage of air and ground assets integrating sensory and (One World Terrain and Reference) geospatial data within the modular GPS Independent Sensors architecture. This Project provides critical alternatives to maneuver forces for position and navigation in a multi-domain operational environment.

Work in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project CV4 (Pathfinder 3D Applied Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center Geospatial Research Laboratory.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> PATHFINDER 3D Demonstration	-	1.045	-
<b>Description:</b> This effort will demonstrate and integrate novel Visual Terrain Reference & Navigation (VTRAN) algorithms, onboard sensors, and 3-Dimensional digital terrain to derive position and orientation estimates and apply those to modular Position Navigation and Timing (PNT) integrators.			
<b>FY 2024 Plans:</b> Will demonstrate local routing capabilities, sensors and a basic inertial accuracy for Visual Terrain Reference and Navigation (VTRAN) to test integrated foundation geospatial data including One World Terrain and analogs, sensory sources (from both air and ground) to derive state estimation for a robotic semi-autonomous system.			
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Funding decrease reflects the adjusted scope and planned delay to demonstrate geo-localization from Soldier-equipped passive sensor systems.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	1.045	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / Network C3I Advanced Technology	Project (Number/Name) DB6 / Pathfinder 3D Advanced Technology

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A