Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army											Date: April 2022	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603463A *I Network C3I Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
Total Program Element	-	215.337	211.068	125.565	-	125.565	107.766	112.285	139.273	151.952	0.000	1,063.246
AM7: *Modular RF Communications Advanced Technology*	-	12.057	9.270	10.440	-	10.440	-	1.978	13.207	12.683	0.000	59.635
AM9: *Protected SATCOM Advanced Technology*	-	16.032	25.494	31.660	-	31.660	14.138	-	14.079	15.485	0.000	116.888
AN2: *Narrowband SATCOM Advanced Technology*	-	4.813	11.590	-	-	-	-	-	-	-	0.000	16.403
AN4: *Non Traditional Waveforms Advanced Technology*	-	7.508	9.300	5.905	-	5.905	5.192	20.173	11.540	9.104	0.000	68.722
AN6: *Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech*	-	1.725	-	-	-	-	-	-	-	-	0.000	1.725
AN8: *COE - Every Receiver is a Sensor Advanced Tech*	-	2.934	2.887	1.371	-	1.371	6.510	6.433	6.435	6.434	0.000	33.004
AO1: *UNT - Every Receiver is a Sensor Advanced Tech*	-	2.888	2.944	-	-	-	3.156	3.153	3.154	3.153	0.000	18.448
AO3: *Stand-In Advanced RF Effects (STARE) Adv Tech*	-	2.888	-	-	-	-	-	-	-	-	0.000	2.888
AO6: *Tag Track and Locate Small Satellites Adv Tech*	-	16.051	-	-	-	-	-	-	-	-	0.000	16.051
AO7: *EW for Maneuver Operations (EMO) Adv Tech*	-	2.810	5.769	6.142	-	6.142	3.138	1.084	3.136	3.135	0.000	25.214
AP6: *C4ISR Integrated Demonstrations Advanced Tech*	-	3.603	-	-	-	-	-	-	-	-	0.000	3.603
AP8: *Comms/Horiz Int for Army Mod Priorities Adv Tech*	-	6.798	-	-	-	-	-	-	-	-	0.000	6.798
AP9: *Next Generation HF Advanced Technology*	-	6.739	7.730	-	-	-	-	-	-	-	0.000	14.469

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603463A *I Network C3I Advanced Technology*							
AQ1: *Spectrum Obfuscation Advanced Technology*	-	3.744	-	-	-	-	-	-	-	-	0.000	3.744
AQ5: *Sensor CE-Integrated Sensor Architecture Adv Tech*	-	1.971	1.645	0.625	-	0.625	1.946	1.966	1.963	1.962	0.000	12.078
AQ8: *High Tempo Data Driven Decision Tools Adv Tech*	-	2.911	3.099	6.636	-	6.636	3.586	3.762	3.899	3.898	0.000	27.791
AR4: *Intelligent Env Battlefield Awareness Adv Tech*	-	3.138	4.075	-	-	-	-	-	-	3.643	0.000	10.856
AR6: *Understanding the Environment as a Threat Adv Tech*	-	2.706	2.524	2.767	-	2.767	2.730	1.682	-	-	0.000	12.409
AR8: *Sensing in Contested Environments Adv Tech*	-	0.948	1.611	-	-	-	-	-	-	-	0.000	2.559
AS9: *Persistent Geophysical Sensing-Infrasound Adv Tech*	-	4.600	2.448	-	-	-	-	-	-	-	0.000	7.048
AT3: *Subterranean Detection and Monitoring Adv Tech*	-	3.360	2.217	-	-	-	-	-	-	-	0.000	5.577
AT8: *Network-Enabled GeoSpatial-GEOINT Services AdvTech*	-	2.888	3.059	4.603	-	4.603	4.739	4.178	5.416	8.013	0.000	32.896
AU1: *Tactical GeoSpatial Information Capabilities ATech*	-	3.603	4.207	5.996	-	5.996	2.103	2.702	2.797	5.717	0.000	27.125
AU2: *Optimization of Geospatial Data for Visualization*	-	2.022	2.171	-	-	-	-	-	-	-	0.000	4.193
AU4: *Geospatially Enabled Operational Design Adv Tech*	-	7.905	7.956	12.197	-	12.197	10.905	10.731	5.090	5.089	0.000	59.873
AV1: *GEOInt/Ops Logistics Integration-Planning Adv Tech*	-	3.771	3.867	-	-	-	-	-	-	-	0.000	7.638
AV2: *LEO Advanced Technology*	-	1.949	-	-	-	-	-	-	-	-	0.000	1.949
AV4: *Foundational S&T for Network C3I Advanced Tech*	-	2.068	7.751	0.896	-	0.896	0.043	2.268	12.409	16.282	0.000	41.717

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army											Date: April 2022		
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603463A *I Network C3I Advanced Technology*								
AV8: *Navigation Warfare (NAVWAR) Advanced Technology*	-	2.535	1.927	1.949	-	1.949	6.002	3.958	5.985	-	0.000	22.356
AW4: *DoD PNT M&S Collaborative Initiative (CI) Adv Tech*	-	2.888	-	-	-	-	-	-	-	-	0.000	2.888
AW6: *Modular GPS Independent Sensors Advanced Tech*	-	10.684	6.791	10.131	-	10.131	12.289	16.702	14.629	20.609	0.000	91.835
BP4: *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*	-	64.800	55.500	-	-	-	-	-	-	-	0.000	120.300
CF9: *Automated IPB Adv Tech*	-	-	0.989	-	-	-	-	-	-	-	0.000	0.989
CI7: *Mobile & Survivable Command Post (MASCP) Adv Tech*	-	-	7.809	13.119	-	13.119	18.609	16.332	19.729	19.724	0.000	95.322
CJ8: *Assured PNT Communications Advanced Tech*	-	-	16.438	11.128	-	11.128	11.640	13.208	13.830	13.903	0.000	80.147
DB6: *Pathfinder 3D Advanced Technology**	-	-	-	-	-	-	1.040	1.975	1.975	3.118	0.000	8.108

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2023

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).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I 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 United States (U.S.) Army Futures Command (AFC), the U.S. Army Space and Missile Defense Command (SMDC) and U.S. Army Engineer Research and Development Center (ERDC).

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	216.520	155.867	0.000	-	0.000
Current President's Budget	215.337	211.068	125.565	-	125.565
Total Adjustments	-1.183	55.201	125.565	-	125.565
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	55.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.183	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	125.565	-	125.565
• FFRDC Transfer	-	-0.299	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Project: BP4: *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*		
Congressional Add: *Assured Position, Navigation, and Timing Technology*	6.300	4.000
Congressional Add: *Army Visual and Tactical Arctic Reconnaissance*	2.000	-
Congressional Add: *Program increase - anticipating threats to natural systems*	6.000	-
Congressional Add: *Program Increase - S?UAS cyber threat management*	7.500	-
Congressional Add: *Program Increase - Sub?Surface Infrastructure in Arctic Environments*	1.000	-
Congressional Add: *Program Increase - Mesh Network-Enabled Small Satellites*	10.000	-
Congressional Add: *Program Increase - Geospatial Artificial Intelligence Analytic Tools*	4.000	-
Congressional Add: *Program Increase - Advanced Materials and Technologies for Command Post Modernization*	10.000	-
Congressional Add: *Program Increase - Advanced Materials for Resilient Sensors*	8.000	5.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603463A *I Network C3I Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Congressional Add: *Program Increase - Tactical Geospatial Information Capabilities*	10.000	5.000
Congressional Add: *Alternative Navigation for GPS-Denied Landing Environments*	-	4.500
Congressional Add: *Edge-High Performance Computing for Multi-Domain Operations*	-	5.000
Congressional Add: *HALITE*	-	7.000
Congressional Add: *Next Generation Command Posts*	-	10.000
Congressional Add: *Receiver-Sensor Technology for Tactical Networks*	-	15.000
Congressional Add Subtotals for Project: BP4	64.800	55.500
Congressional Add Totals for all Projects	64.800	55.500

Change Summary Explanation

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AM7 / *Modular RF Communications Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AM7: *Modular RF Communications Advanced Technology*	-	12.057	9.270	10.440	-	10.440	-	1.978	13.207	12.683	0.000	59.635
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project optimizes autonomous networking protocols to automate the Primary, Alternate, Contingency, and Emergency (PACE) communication plan to initialize, adapt, and continue operations under changing environments and threats.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AM6 (Modular RF Communications Technology) and PE 0602213A (C3I Applied Cyber) / Project CY1 (Information Assurance and Network Resiliency Tech).

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

Research in this Project is performed by the United States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Modular Radio Frequency (RF) Communications Advanced Technology	12.057	8.931	10.440
Description: This effort optimizes autonomous networking protocols to automate the PACE communication plan to initialize, adapt, and continue operations under changing environments and threats. ***FY 2022 Plans:*** Will optimize the network protocols design for disparate transport networks across multiple security classifications enabling a unified network operations across the Army Brigade network; optimize the algorithms of the decision engine to process data received from external systems; integrate the automated PACE (A-PACE) solution with Program of Record products (e.g. Mounted Mission Command Software and Advanced Field Artillery Tactical Data System (AFAATDS) and other Science and Technology (S&T) products; will use opportunities such as, Network Modernization Experiment (NetMod X), Joint Capabilities Technology Demonstration (JCTD), and Dynamic Front to optimize the design. ***FY 2023 Plans:*** Will demonstrate automated PACE capabilities in simulated laboratory and field test environments. Will demonstrate integrated PACE capabilities with various nodes; dismounted, mounted, command post and interface to Warfighter Information Network-Tactical (WIN-T) (dismounted and command post node variants completed in Fiscal Year 2020 (FY20), mounted node variant to			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AM7 / *Modular RF Communications Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
be completed in FY21/FY22, WIN-T interface to be completed in FY23). Will mature automated PACE decision engine features and demonstrated integration with other protected terrestrial and space-based radios/waveforms and external systems to provide input to the decision engine. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding increase reflects planned lifecycle level of effort for increased maturity and demonstration of PACE communication.			
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.339	-
Accomplishments/Planned Programs Subtotals	12.057	9.270	10.440

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AM9 / *Protected SATCOM Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AM9: *Protected SATCOM Advanced Technology*	-	16.032	25.494	31.660	-	31.660	14.138	-	14.079	15.485	0.000	116.888
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. Will compliment technologies that provide obfuscation of radio frequency (RF) spectrum signature in order to counter enemy electronic surveillance capabilities.

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

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

Research in this Project is performed by the United States (U.S.) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Protected SATCOM Advanced Technology and Resilient Tactial Networking and Comms	12.223	24.368	31.660
Description: 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 compliment technologies that provide obfuscation of RF spectrum signature in order to counter enemy electronic surveillance capabilities.			
FY 2022 Plans: Will mature and demonstrate components that support the control of the Army satellite networks in a contested environment, enabling automated tactical communications resiliency technologies; mature and optimize select SATCOM technologies for basic SATCOM waveforms that will automatically adapt to changing contested environments, leading to protection which improves throughput in tactical and enterprise environments; mature On-the-Move (OTM) satellite ground terminal technology that supports operation over multiple satellite constellations with low available size, weight, and power (SWAP), leading to Army communications resiliency through diversity for tactical vehicles; and mature At-the-Halt (ATH) satellite ground terminal technology that supports operation over multiple satellite constellations simultaneously, leading to Army communications resiliency through diversity for Army Tactical Operations Centers (TOC).			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AM9 / *Protected SATCOM Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Will mature and optimize select SATCOM technologies that contribute to SATCOM resiliency; will mature 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 will mature ATH satellite ground terminal technology that supports operation over multiple satellite constellations simultaneously, leading to Army communications resiliency through diversity for Army TOCs. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding increase reflects increased support to technology maturation and optimization efforts of OTM and ATH satellite ground terminal technology in support of multiple satellite constellations leading to resiliency through diversity for Army TOCs and vehicles.			
Title: High Altitude: Wideband Global Satellite Communications (WGS) Ka Band Surrogate Payload / Aerial Tier Networking ***Description:*** Demonstrate a WGS surrogate payload for usage on a High Altitude Platform (HAP) with seamless transition to existing ground terminals by modifying existing solutions to support Capability Sets (CS), beginning with CS 23: Capacity & Resiliency. ***FY 2022 Plans:*** Will validate the potential use of the WGS Surrogate?s receive signals to identify and geo-locate adversary electronic warfare threats. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Effort completes in Fiscal Year 2022 (FY22).	3.809	0.193	-
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.933	-
Accomplishments/Planned Programs Subtotals	16.032	25.494	31.660

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AM9 / *Protected SATCOM Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AN2 / *Narrowband SATCOM Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AN2: *Narrowband SATCOM Advanced Technology*	-	4.813	11.590	-	-	-	-	-	-	-	0.000	16.403
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is Terminated.

A. Mission Description and Budget Item Justification

This Project validates and demonstrates technologies to enable gateway communications across disparate Narrowband Satellite Communications (SATCOM) networks, enabling resiliency in contested environments. The Narrowband SATCOM network is the largest tactical network operated by the Army to provide situational understanding across all echelons. This Project also optimizes technologies and protocols to enable risk mitigation solution sets and awareness through adaptive learning capabilities.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project BZ6 (Narrowband SATCOM Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Narrowband SATCOM Advanced Technology	4.813	11.166	-
Description: This effort validates and demonstrates technologies to enable gateway communications across disparate Narrowband SATCOM networks, enabling resiliency in contested environments. ***FY 2022 Plans:*** Will optimize the Narrowband SATCOM gateway network transport management system to incorporate capabilities such as artificial intelligence, machine learning and cognitive computing; validate system design performance and resiliency in maintaining an acceptable level of communication services; perform integrated demonstrations using multiple use-case scenarios of the Networks, Long Range Precision Fires, Air & Missile Defense and Next Generation Combat Vehicle; and mature system to Technology Readiness Level of 5. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** This Project is Terminated in FY23.			
Title: FY2022 SBIR/STTR Transfer	-	0.424	-
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AN2 / *Narrowband SATCOM Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Funding transferred in accordance with Title 15 USC ?638			
FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	4.813	11.590	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AN4 / *Non Traditional Waveforms Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AN4: *Non Traditional Waveforms Advanced Technology*	-	7.508	9.300	5.905	-	5.905	5.192	20.173	11.540	9.104	0.000	68.722
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.

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Non Traditional Waveforms Advanced Technology	7.508	8.960	5.905
Description: 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.			
FY 2022 Plans: Will mature anti-jam and low probability of intercept, low probability of detection communications capabilities for protected communications to be better suited for operationally relevant, contested environments; enable directional millimeter wave communications to support additional users in complex scenarios (e.g. on-the-move high speed directional ad-hoc network at operational distances); exploit and mature government owned millimeter wave antenna aperture to reduce the unit cost of mmW communications systems; apply techniques developed in previous years, (cooperative beamforming for voice and data communications) and enable upgrade of a legacy waveform(s) via software/firmware update only; and enhance waveform			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AN4 / *Non Traditional Waveforms Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
protection in contested environments using methods, such as combining cooperative beamforming with additional anti-jam low probability of intercept, low probability of detection techniques. ***FY 2023 Plans:*** Will mature tactical millimeter wave communications to technology readiness level (TRL) 6. Will mature the robustness of the solution for increased reliability in on-the-move scenarios including support for vehicular (ground based) relay nodes. Will develop and integrate improved hybrid beamforming (or active electronically scanned array) antennas to increase line-of-sight range and further reduce low probability of intercept/low probability of detection capability. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding decrease in Fiscal Year 2023 (FY23) reflects planned lifecycle efforts to advance tactical millimeter wave communications technology and maturation to TRL 6.			
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.340	-
Accomplishments/Planned Programs Subtotals	7.508	9.300	5.905

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AN6 / *Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AN6: *Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech*	-	1.725	-	-	-	-	-	-	-	-	0.000	1.725
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures technologies providing increased resiliency for Wideband Satellite Communications (SATCOM) from contested and congested electromagnetics through the use of technologies including adaptive interference mitigation and diversity through multiple paths. Wideband SATCOM is the primary high-bandwidth Beyond Line of Sight (BLOS) communications used by the tactical Army and this Project demonstrates protection of this valuable communication link.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology).

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech	1.725	-	-
Description: This effort matures technologies providing increased resiliency for Wideband SATCOM from contested and congested electromagnetics through the use of technologies including adaptive interference mitigation and diversity through multiple paths. Wideband SATCOM is the primary high-bandwidth BLOS Communications used by the tactical Army and this project demonstrates protection of this valuable communication link.			
Accomplishments/Planned Programs Subtotals	1.725	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AN8 / *COE - Every Receiver is a Sensor Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AN8: *COE - Every Receiver is a Sensor Advanced Tech*	-	2.934	2.887	1.371	-	1.371	6.510	6.433	6.435	6.434	0.000	33.004
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.

Research 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 Tech).

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Advanced Data Analytics for Situational Awareness	2.934	2.782	-
Description: This effort improves software technologies for intelligence/mission command (MC) mission collaboration to provide faster and higher quality decision-making support for the commander and his key staff. Specific efforts focus on integrating intelligence, surveillance and reconnaissance (ISR) planning and execution at the Task Force/Battalion through troop-level, as well as efforts that provide the capability to identify, fuse, and trace/track specific targets in an asymmetric environment. ***FY 2022 Plans:*** Will add and demonstrate enhanced attribute and cell level security capabilities within the converged intelligence and operations platform to show functionality across different classification boundaries; Will integrate machine learning frameworks to demonstrate machine learning capabilities within the converged platform; Will demonstrate tactical distributed Processing, Exploitation, and. Dissemination (PED) workflows and efficient data synchronization at lower echelons by developing and demonstrating Tactical Edge data synchronization to support the Disconnected, Intermittent, and Limited (DIL) environment. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding change reflects planned conclusion of this task.			
Title: Intelligence, Surveillance and Reconnaissance Optimization for Multi-Domain Operations Support Advanced Tech	-	-	1.371

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AN8 / *COE - Every Receiver is a Sensor Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: 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. ***FY 2023 Plans:*** Will evaluate sensor optimization algorithms. Will evaluate external interfaces of Program of Record (PoR) collection management platforms. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding change reflects planned initiation of this task.			
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.105	-
Accomplishments/Planned Programs Subtotals	2.934	2.887	1.371

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AO1 / *UNT - Every Receiver is a Sensor Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO1: *UNT - Every Receiver is a Sensor Advanced Tech*	-	2.888	2.944	-	-	-	3.156	3.153	3.154	3.153	0.000	18.448
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this project has a funding skip year.

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.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects 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 research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Multi Intelligence Modernization supporting Multifunction Operations	2.888	2.837	-
Description: This effort will optimize Intelligence Community investments in software frameworks and exploits against threat signals of interest (SOI) to mature a library of open, modular, and scalable software solutions that address identified capability gaps and to provide the commander with electronic situational awareness while at the same time protecting his assets from enemy deception and jamming.			
FY 2022 Plans: Demonstrate Electronic Warfare payloads designed to operate from high altitude, long endurance platforms; mature and demonstrate small, form factor hardware standards to facilitate the use of modular hardware on small Size, Weight and Power (SWAP) platforms such as high altitude, long endurance platforms and small, unmanned aerial vehicles.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AO1 / *UNT - Every Receiver is a Sensor Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
In Fiscal Year 2023 (FY23) this Project has a funding Skip Year.			
Title: FY2022 SBIR/STTR Transfer	-	0.107	-
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	2.888	2.944	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AO3 / *Stand-In Advanced RF Effects (STARE) Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO3: *Stand-In Advanced RF Effects (STARE) Adv Tech*	-	2.888	-	-	-	-	-	-	-	-	0.000	2.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies and capabilities to provide robust and reliable communications capabilities by leveraging commercial technologies and enhancing their operation to maintain network connectivity in contested and congested environments.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AO2 (Stand-In Advanced RF Effects (STARE)).

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

Research in this Project is performed by the United States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Stand-In Advanced Radio Frequency (RF) Effects Advanced Technology	2.888	-	-
Description: This effort harvests investments from Applied Research component level maturation and hardware synchronization research, to mature hardware for demonstration of capabilities for distributed Electronic Warfare.			
Accomplishments/Planned Programs Subtotals	2.888	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AO6 / *Tag Track and Locate Small Satellites Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO6: *Tag Track and Locate Small Satellites Adv Tech*	-	16.051	-	-	-	-	-	-	-	-	0.000	16.051
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates payloads, sensors, and data down link systems for tactically responsive Space and High Altitude platforms supporting Army ground forces. This Project matures, demonstrates, and integrates lightweight materials, hardware components with reduced power consumption, and advanced data collection, processing, and dissemination capabilities. This Project also improves algorithms that process space and near space sensor data in real and near real time for integration into battlefield operating systems including a technical demonstration of a sensor designed to provide space-based situational awareness to the tactical Warfighter; Development and demonstration of small satellite capabilities, which include classified payloads, to provide Assured Positioning, Navigation, and Timing services to the tactical ground component Warfighters; Constellation of space-based sensors that provide Reconnaissance, Surveillance, and Target Acquisition (RSTA) and Situational Awareness (SA) to the ground force commander to support Multi-Domain Operations (MDO); Applied research in quantum sciences based communications, sensing, and data teleportation to mature current technologies for small spacecraft applications.

These efforts support the Army's ability to control and exploit space assets that contribute to current and future military operations as defined in the national, Department of Defense (DOD), and Army future space strategies.

The Research completed under this Project supports the Army Modernization Priorities.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AO5 (Tag Track and Locate Small Satellites Technology).

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

Research in this Project is performed by the United States Army Space and Missile Defense Command (USASMDC) Technical Center (TC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Tag, Track, and Locate Small Satellites	16.051	-	-
Description: This effort matures and demonstrates technologies required for smaller, warfighter-responsive sensor and communication Low Earth Orbit (LEO) small satellite constellations. Work will augment, improve, exploit and optimize existing commercial and DoD technologies and networks. This effort also validates software, hardware, and algorithms used to enable space-based capabilities in support of the Army's Modernization Priorities. This effort will exploit commercial advances and opportunities in small satellite constellation and payload management toward future Army concepts.			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AO6 / *Tag Track and Locate Small Satellites Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Accomplishments/Planned Programs Subtotals	16.051	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AO7 / *EW for Maneuver Operations (EMO) Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AO7: *EW for Maneuver Operations (EMO) Adv Tech*	-	2.810	5.769	6.142	-	6.142	3.138	1.084	3.136	3.135	0.000	25.214
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies that understand contested spectrum features, sense, locate, and cue fires missions to create windows of opportunity in Anti-Access/ Area Denial (A2/AD) environments, restore network capabilities, and enable maneuver and fires.

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

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Electronic Warfare (EW) for Maneuver Ops ***Description:*** This effort matures and demonstrates hardware and software to conduct EW for intelligence, surveillance, and reconnaissance (ISR) in support of Army tactical operations. ***FY 2022 Plans:*** Will mature (i.e., technology readiness level 6) and demonstrate EW capabilities for use against sensor systems in representative environments, threats, and hardware; and flight-demonstrate distributed and coordinated capabilities for novel geolocation. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding change reflects planned conclusion of this effort.	1.601	1.672	-
Title: Simultaneous Countermeasure for Active Reconnaissance and Surveillance (SCARS) ***Description:*** This effort matures and demonstrates EW capabilities leveraging hardware-in-the-loop and modeling and simulation (M&S) of threat ISR systems to validate coordinated and collaborative non-kinetic effects.	1.209	-	-
Title: Stand-in Advanced RF Effects Advanced Technology ***Description:*** This effort matures and demonstrates highly advanced hardware and software to improve power-on-target for EW systems against certain threat systems.	-	2.698	3.078

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AO7 / *EW for Maneuver Operations (EMO) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
FY 2022 Plans: Will mature and optimized synchronization hardware, advanced signal processing, and EW system designs for distributed EW. Field demonstrate hardware system improvements to validate the effectiveness of distributed EW against certain classes of threat systems. ***FY 2023 Plans:*** Will demonstrate Array Control Payload synchronization capabilities for distributed EW techniques. Will demonstrate complex waveforms capability at a technology readiness level (TRL) 6. Will deliver an engineering design unit for cooperative networked electronic warfare. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Tactical Force Signature Effects (TForSE) Advanced Technology ? Counter ISR Techniques ***Description:*** 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. ***FY 2022 Plans:*** Will mature initial EW capabilities against adversary systems that provide battlefield situational understanding and localization; and validate EW effectiveness in laboratory or representative environments to mask and deceive blue locations. ***FY 2023 Plans:*** Will integrate advanced apertures and decoy techniques into complex modeling and simulation scenarios to prove efficacy in a contested operating environment. Will demonstrate advanced aperture and decoy techniques via a field validation exercise to be determined ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding increase supports maturation of advanced aperture and decoy techniques.	-	1.187	3.064
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:***	-	0.212	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AO7 / *EW for Maneuver Operations (EMO) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	2.810	5.769	6.142

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AP6 / *C4ISR Integrated Demonstrations Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AP6: *C4ISR Integrated Demonstrations Advanced Tech*	-	3.603	-	-	-	-	-	-	-	-	0.000	3.603
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provides System of Systems (SoS) engineering rigor on Science & Technology (S&T) projects by providing field-based risk reduction processes, quantifiable technology performance in a SoS context, data-driven programmatic decision support, and field-based performance data to supplement Technology Readiness Level (TRL) assessments.

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

Research in this Project is performed by the United States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Integrated Demonstrations Advanced Tech	3.603	-	-
Description: This effort provides appropriate SoS engineering rigor for multiple S&T projects by providing field-based risk reduction processes, quantifiable technology performance in a SoS context, data- driven programmatic decision support, and field-based performance data to supplement Technology Readiness Level Assessments. This effort provides network automation, resiliency, and situational understanding through S&T advancements.			
Accomplishments/Planned Programs Subtotals	3.603	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AP8 / *Comms/Horiz Int for Army Mod Priorities Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AP8: *Comms/Horiz Int for Army Mod Priorities Adv Tech*	-	6.798	-	-	-	-	-	-	-	-	0.000	6.798
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project provides unified communications for the Army's modernization priorities through operationally-relevant, end-to-end network demonstrations which leverage Science & Technology (S&T) and commercial technology adapted to mitigate performance gaps in the presence of electronic warfare (EW) systems and reduce network complexity.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AP7 (Comms/Horiz Int for Army Mod Priorities Tech).

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Communications Support to Army Modernization Priorities/Horizontal Integration Fields Advance Technology	6.798	-	-
Description: This effort provides unified communications for the Army's modernization priorities through operationally-relevant, end-to-end network demonstrations which leverage S&T and commercial technology adapted to mitigate performance gaps in the presence of EW systems and reduce network complexity.			
Accomplishments/Planned Programs Subtotals	6.798	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AP9 / *Next Generation HF Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AP9: *Next Generation HF Advanced Technology*	-	6.739	7.730	-	-	-	-	-	-	-	0.000	14.469
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project has completed.

A. Mission Description and Budget Item Justification

This Project improves performance of technologies to provide assured and resilient reach-back communications in satellite denied or degraded environments. This Project optimizes performance of new high frequency (HF) technology to provide low probability of detection and anti-jam capabilities to overcome emerging electronic warfare threats.

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

Research in this Project is performed by the United States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Next Generation HF Advanced Technology	6.739	7.444	-
Description: This effort improves performance of technologies to provide assured and resilient reach-back communications in satellite denied or degraded environments. This effort optimizes performance of HF technology to provide low probability of detection and anti-jam capabilities to overcome emerging electronic warfare threats.			
FY 2022 Plans: Will enhance the HF Communications Hub and mature the edge terminal HF radio hardware and software to provide an assured, resilient, alternate beyond line-of-sight communications link for tactical and strategic Army assets; conduct technology readiness level 6 demonstration in a beyond line-of-sight operationally relevant environment of the HF Communications Hub proof-of-concept operating with legacy HF radios, other edge radio terminals, and the Regional Hub Node integrated into the larger tactical network executing mission threads; provide final assessment of performance from technology demonstration and provide recommendations to transition organizations; assess the performance against pacing threats in satellite denied and area denied environments to determine the increased resiliency to enemy detection and interception.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AP9 / *Next Generation HF Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
In FY23 this effort has completed.			
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.286	-
Accomplishments/Planned Programs Subtotals	6.739	7.730	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AQ1 / *Spectrum Obfuscation Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AQ1: *Spectrum Obfuscation Advanced Technology*	-	3.744	-	-	-	-	-	-	-	-	0.000	3.744
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project validates and demonstrates technologies that provide obfuscation of radio frequency (RF) spectrum signature in order to counter enemy electronic surveillance capabilities. This Project optimizes, matures and demonstrates novel materials, technologies, techniques and applications that increase camouflage and concealment capabilities against known and emerging sensor threats, provide effective deception capabilities, increase survivability, mature analytical processes for modeling performance of signature management technologies during multi-domain operations as well as developing combinations of physical and electronic signature decoy components. These technologies will produce proof of concept system demonstrators that decrease the probability of detection and targeting by peer and near-peer adversaries, enabling freedom of movement of semi-independent and dispersed formations

Research in this Project complements Program Element (PE) 0603463A (Network C3I Advanced Technology) / Project CI7 (Mobile & Survivable Command Post (MASCP) Adv Tech) and 0603118A (Soldier Lethality Advanced Technology) / Project AZ6 (Soldier Signature Management Advanced Technology).

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Camouflage, Concealment and Deception	3.744	-	-
Description: This effort demonstrates innovative camouflage, concealment and deception technologies for expeditionary assets (i.e. mission command platforms, battle management centers and supporting equipment) to defeat advanced current 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, assisting in closing the capability gap between current camouflage, concealment and deception technologies and defeating enemy sensorial capabilities in future operating environments.			
Accomplishments/Planned Programs Subtotals	3.744	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AQ1 / *Spectrum Obfuscation Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AQ5 / *Sensor CE-Integrated Sensor Architecture Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AQ5: *Sensor CE-Integrated Sensor Architecture Adv Tech*	-	1.971	1.645	0.625	-	0.625	1.946	1.966	1.963	1.962	0.000	12.078
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a sensor interoperability architecture consisting of standards, interfaces, and services.

Research in this Project supports the Army Science and Technology Network, Next Generation Combat Vehicle, Soldier Lethality, Air and Missile Defense, Long Range Precision Fires and Future Vertical Lift 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 in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Sensor CE - Integrated Sensor Architecture	1.971	1.585	0.625
Description: 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.			
FY 2022 Plans: Will optimize network awareness technologies to improve bandwidth utilization for sensor interoperability; will demonstrate dynamic allocation of resources to show the correct sensor data assisting in providing targeting information to effectors.			
FY 2023 Plans: Will demonstrate intelligent subscription services and effect on data distribution to show reduced time for a sensor to be discovered on a network. Will optimize approaches for sensor to shooter data confidence to enable validation and de-confliction of multiple target indicators.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AQ5 / *Sensor CE-Integrated Sensor Architecture Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Funding decrease reflects reduction in automatic redundancy efforts.			
Title: FY2022 SBIR/STTR Transfer	-	0.060	-
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	1.971	1.645	0.625

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AQ8 / *High Tempo Data Driven Decision Tools Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AQ8: *High Tempo Data Driven Decision Tools Adv Tech*	-	2.911	3.099	6.636	-	6.636	3.586	3.762	3.899	3.898	0.000	27.791
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates data driven decision tools that help develop cyber situational understanding (SU) for Commanders. It enhances decision-making and accurately assesses and integrates cyber impacts with all of the domains in Multi-Domain Operations (MDO) and thereby enhances mission effectiveness by improving decision cycles.

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

The cited research 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)	FY 2021	FY 2022	FY 2023
Title: High Tempo Data Driven Decision Tools Advanced Technology	2.911	2.985	3.319
Description: 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. ***FY 2022 Plans:*** Update COP Visualizations based on soldier/stakeholder feedback; develop cyber visualization guides to inform COP Visualization development; incorporate additional commander's cyber needs into COP Visualizations; demonstrate improved cyber SU in S-6 / S-3 / Commander perspectives and collaboration in field environment and dynamically connect to canned data; demonstrate that the Collaborative Cyber Understanding software dynamically updates the COP Visualizations and cyber decision models; conduct a soldier evaluation of cyber decision model (cyber workflow/decision making process). ***FY 2023 Plans:*** Will develop software that connects to available and live data sources in a field environment for a soldier Collaborative Cyber Understanding demonstration. Will further mature existing and new cyber data sources, cyber avenues of approach and the cyber data visualization tool based on experimentation feedback. Wil demonstrate that the Collaborative Cyber Understanding software			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AQ8 / *High Tempo Data Driven Decision Tools Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
dynamically updates the COP Visualizations and cyber decision models; Will conduct a soldier demonstration of cyber decision model (cyber workflow/decision making process). ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: RoadRunner Advanced Technology ***Description:*** 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. ***FY 2023 Plans:*** Engagements with peer/near-peer and highly technical adversaries will reveal new vulnerabilities and opportunities. Using a concurrent Development, Security and Operations (DEVSECOPS) environment, will develop and demonstrate optimal strategies in friendly versus enemy engagements using digitized plans and real-time decision support providing exposure to non-obvious insights, vulnerabilities, and opportunities during planning and execution phases. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In FY23 this effort will build upon the High Tempo Data Driven Decision Tools effort to include the fusion of intelligence and operations information that enable faster decision making process	-	-	3.317
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.114	-
Accomplishments/Planned Programs Subtotals	2.911	3.099	6.636

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AR4 / *Intelligent Env Battlefield Awareness Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AR4: *Intelligent Env Battlefield Awareness Adv Tech*	-	3.138	4.075	-	-	-	-	-	-	3.643	0.000	10.856
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) / Project CX7 (Intelligent Env Battlefield Awareness Adv Tech).

A. Mission Description and Budget Item Justification

This Project demonstrates and optimizes technologies to allow Soldiers to maneuver faster around or through existing environmental (urban/industrial) conditions and physical landscape constraints. This Project also matures and demonstrates web modules/software tools delivering crucial geo-chemical resources and advanced knowledge of geo-environmental infrastructure to mission planners.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR3 (Intelligent Environmental Battlefield Awareness).

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

Research in this Project is performed by the Unites states (U.S.) Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Geo-Forensics for Reconnaissance Exploitation	1.503	1.142	-
Description: This effort provides unique terrestrial patterns to describe and predict the geological, biological, and overall ecological information associated with anti-access/area denial (A2/AD) sites from the continental U.S. (CONUS) analogs. ***FY 2022 Plans:*** Mature search algorithms to match global analogs, ?smart? interpolation function, and expand search criteria by desired geochemical characteristics. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In FY23 this Project is realigned to PE 0603042A (C3I Advanced Technology) / Project CX7 (Intelligent Env Battlefield Awareness Adv Tech).			
Title: Arctic Threat Demonstrations	1.635	1.237	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AR4 / *Intelligent Env Battlefield Awareness Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: This effort matures and demonstrates visualization tools which enable geospatial decisions based on anticipated physical threats, hazards and dependencies posed by terrain and weather extremes in cold regions. ***FY 2022 Plans:*** Demonstrate environmental prediction algorithms to accurately assess ice structure, permafrost and freeze thaw events for operational movement. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In FY23 this Project is realigned to PE 0603042A (C3I Advanced Technology) / Project CX7 (Intelligent Env Battlefield Awareness Adv Tech).			
Title: Predictive Geographic Information System (GIS) Mapping (physical) Demonstration ***Description:*** This effort reduces the impact of unknown and changing terrain conditions by automating the integration of disparate datasets and overlays of terrain obstacles producing a high-fidelity map that integrates soil composition, vegetation, hydrology, and permafrost/ice data. ***FY 2022 Plans:*** Demonstrate a comprehensive database of input and output variables used across terrain (soil, hydrologic, and arctic) models and identify compatible integration points. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In FY23 this Project is realigned to PE 0603042A (C3I Advanced Technology) / Project CX7 (Intelligent Env Battlefield Awareness Adv Tech).	-	1.548	-
Title: FY 2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.148	-
Accomplishments/Planned Programs Subtotals	3.138	4.075	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AR4 / *Intelligent Env Battlefield Awareness Adv Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AR6 / *Understanding the Environment as a Threat Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AR6: *Understanding the Environment as a Threat Adv Tech*	-	2.706	2.524	2.767	-	2.767	2.730	1.682	-	-	0.000	12.409
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates tools that provide capability to inform the Solider 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.

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

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

Research in this Project is performed by the Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Environmental Threat Technology Demonstrations for route planning	1.357	1.288	1.030
Description: 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.			
FY 2022 Plans: Mature and validate a risk-course forecasting algorithms that account for dynamics and persistence of toxic industrial chemicals and materials (TIC/Ms) in air, water, and soil in denied urban terrain.			
FY 2023 Plans: Will demonstrate the next-phase capability of minimally-viable weighted risk course forecasting algorithms based on sorption/ degradation products in air, water and soil.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AR6 / *Understanding the Environment as a Threat Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Funding decrease reflects the planned lifecycle of this effort as resources are focused on subsurface forensics demonstrations within this Project.			
Title: Hazard Prediction Demonstration ***Description:*** 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. ***FY 2022 Plans:*** Mature and demonstrate developed algorithms that integrate contaminant mobility based on hydrology and soils and the sorption/ degradation products. ***FY 2023 Plans:*** Will demonstrate next-phase capability based on review and critiques of minimally-viable hazard prediction models of TIC/Ms in air, water, and soil in denied urban terrain. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding decrease reflects the planned lifecycle of this effort as resources are focused on subsurface forensics demonstrations within this Project.	1.349	1.044	1.022
Title: Subsurface Forensics Demonstration ***Description:*** This effort matures and demonstrates sensing technologies for TIC/Ms to detect illicit activities with authentic wastewater treatment influent. ***FY 2022 Plans:*** Mature data transmission capabilities from sensor through sewer systems and determine interoperability with commercial off the shelf robotic platforms. ***FY 2023 Plans:*** Will demonstrate sensor communication systems through sewer structures to determine minimal autonomous viable robotic platform for sensor suite. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Planned funding increase reflects adjustments to develop and mature sensor communication systems that meet operational requirements found in complex urban landscapes.	-	0.100	0.715
Title: FY 2022 SBIR/STTR Transfer	-	0.092	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AR6 / *Understanding the Environment as a Threat Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	2.706	2.524	2.767

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AR8 / *Sensing in Contested Environments Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AR8: *Sensing in Contested Environments Adv Tech*	-	0.948	1.611	-	-	-	-	-	-	-	0.000	2.559
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CX9 (Sensing in Contested Environments Adv Technologies).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced sensor technologies that characterize hazards posed to warfighters by non-weaponized biological hazards in subterranean environments. The Project will demonstrate adaptive commercial off the shelf sensor technologies on existing unmanned ground vehicles (UGV) platforms to gather end-user feedback.

Research in this Project complements (PE) 0602146A (Network C3I Technology) / Project AR7 (Sensing in Contested Environments Technology).

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

Research in this Project is performed by the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Non-Traditional Threat Detection Advance Technology	0.948	1.552	-
Description: This effort matures and demonstrates combined commercial off the shelf capabilities from multiple sources as an integrated robotic-operable expeditionary kit for accurate detection of biological hazards for early warning in subterranean environments from point of ingress/egress prior to exposure. ***FY 2022 Plans:*** Demonstrate an integrated optical sensor platform capable of identification of relevant environmental threats. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CX9 (Sensing in Contested Environments Adv Technologies).			
Title: FY 2022 SBIR/STTR Transfer	-	0.059	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AR8 / *Sensing in Contested Environments Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	0.948	1.611	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AS9 / *Persistent Geophysical Sensing-Infrasound Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AS9: *Persistent Geophysical Sensing-Infrasound Adv Tech*	-	4.600	2.448	-	-	-	-	-	-	-	0.000	7.048
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CX8 (Persistent Geophysical Sensing-Infrasound Adv Tech).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates kitted hardware and software solutions that persistently monitor (through non-line-of-sight sensing including infrasound) critical infrastructure conditions and threat activities in dynamic battlefields. These technologies provide near real time data collection, processing, and alerts of infrastructure go/no-go condition required for maneuver planning. This Project also matures and demonstrates methodologies to assign maneuver relevant engineering attributes to geospatial feature data such as bridge load classification, road condition, and bathymetry.

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

Research in this Project conducted at Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AR9 (Persistent Geophysical Sensing-Infrasound Tech).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Remote Assessment of Infrastructure for Ensured Maneuver (RAFTER) Demonstrations ***Description:*** This effort matures and demonstrates a light-weight, low-power, persistent monitoring system that is capable of integration with mission command platforms with associated software for processing geophysical data in near-real-time to provide actionable intelligence concerning critical transportation assets.	4.600	-	-
Title: Battlefield Intelligence by Geophysical Sensing (BIGS) Demonstration ***Description:*** This effort matures and demonstrates geophysical and geo-sensing technologies to persistently assess battlefield elements to include infrastructure (algorithm refinements) and additional sources of interest, such as explosive and fires events and various threats. Optimization of the array sensors and geometry to improve array performance for new sources of interest while reducing logistics will also be matured and demonstrated. New detection and classification signal processing algorithms will be validated throughout the life of the task in a phased demonstration schedule.	-	2.359	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AS9 / *Persistent Geophysical Sensing-Infrasound Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
FY 2022 Plans: Mature and validate non-high performance computing meteorological and terrain/topography overlays for detection thresholds through internal demonstrations before integrating with existing software and will provide configuration updates to Integrated Sensor Architecture (ISA) messaging within the existing software to be compatible with Command Post Computing Environment (CPCE). ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In FY23 this effort is realigned to PE 0603042A (C3I Advanced Technology) Project CX8 (Persistent Geophysical Sensing-Infrasound Adv Tech).			
Title: FY 2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.089	-
Accomplishments/Planned Programs Subtotals	4.600	2.448	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AT3 / *Subterranean Detection and Monitoring Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AT3: *Subterranean Detection and Monitoring Adv Tech*	-	3.360	2.217	-	-	-	-	-	-	-	0.000	5.577
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603042A (C3I Advanced Technology) Project CZ5 (Subterranean Detection and Monitoring Advanced Tech).

A. Mission Description and Budget Item Justification

This Project validates and demonstrates advanced subterranean monitoring and vulnerability assessment technologies providing mobile and man-portable solutions to enhance survivability and threat awareness during urban operations and negate enemy subterranean operation advantage. This Project also optimizes and demonstrates enhanced technologies to detect tunnels and tunneling activity in complex and varied environments.

This Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AT2 (Subterranean Detection and Monitoring Technology).

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

Research in this Project conducted at the United States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Subterranean Threat Assessment by Real-time Sensing Demonstrations	3.360	2.136	-
Description: This effort validates and demonstrates integrated suite of tunnel detection and persistent surveillance technologies, mobile and man-portable solutions to detect underground municipal infrastructure, voids, and other subterranean vulnerabilities in urban and complex domains. ***FY 2022 Plans:*** Demonstrate an integrated suite of tunnel detection and persistent surveillance technologies to detect subterranean avenues of approach in an operationally relevant urban environment. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The effort ends in Fiscal Year 2022 with scheduled demonstration at Maneuver Support, Sustainment and Protection Integration Experiments (MSSPIX).			
Title: FY 2022 SBIR/STTR Transfer	-	0.081	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AT3 / *Subterranean Detection and Monitoring Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	3.360	2.217	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AT8 / *Network-Enabled GeoSpatial-GEOINT Services AdvTech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AT8: *Network-Enabled GeoSpatial-GEOINT Services AdvTech*	-	2.888	3.059	4.603	-	4.603	4.739	4.178	5.416	8.013	0.000	32.896
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.

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

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: 3D Terrain Automated Geospatical Co-Registration and Change Detection	2.888	2.947	2.764
Description: 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).			
FY 2022 Plans: Mature, integrate and test digital elevation model co-registration and change detection algorithms providing tactical units rapid access to newly collected 3D terrain data. Demonstrate the optimization of algorithms for near real time processing, advanced analytics, and 3D data dissemination in a laboratory environment utilizing the Army Geospatial Enterprise Node.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AT8 / *Network-Enabled GeoSpatial-GEOINT Services AdvTech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Will demonstrate advanced change detection algorithms achieving on average less than 10% of errors in matching varied data sources to achieve standard and shareable geospatial foundation data. Will demonstrate 2.5D and 3D data co-registration software in a relevant implementation environment for real-time processing, analytics, dissemination of tactical field collections to archived 3D geospatial data. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding change reflects the final year of Technical Readiness Level (TRL) 6 demonstration supporting insertion to Program Manager Intelligence Systems and Analytics.			
Title: Optimization of Geospatial Data for Tactical Visualization-Demonstration ***Description:*** 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 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. ***FY 2023 Plans:*** Will mature and demonstrate delivery of optimized 3D geospatial data for visualization on end-user-devices. Will demonstrate Position Navigation (PN) solutions extracted from field generated sources and delivered on to handheld devices through auto-generation of Level-of-Detail (LOD) 3D data. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding for this effort is realigned from PE 0603463A (Network C3I Advanced Technology) / Project AU2 (Optimization of Geospatial Data for Visualization).	-	-	1.839
Title: FY 2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.112	-
Accomplishments/Planned Programs Subtotals	2.888	3.059	4.603

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AT8 / *Network-Enabled GeoSpatial-GEOINT Services AdvTech*

C. Other Program Funding Summary ($ in Millions)

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AU1 / *Tactical GeoSpatial Information Capabilities ATech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AU1: *Tactical GeoSpatial Information Capabilities ATech*	-	3.603	4.207	5.996	-	5.996	2.103	2.702	2.797	5.717	0.000	27.125
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 PE 0602146A Network C3I Technology Project AT9 (Tactical GeoSpatial Information Capabilities Techn).

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: 3D Terrain Analysis	3.064	2.148	3.902
Description: 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.			
FY 2022 Plans: Demonstrate advanced terrain data processing capabilities, followed by toolkit testing and delivery, targeted for the Distributed Common Ground System (DCGS-A). Test automated feature extraction and faster processing times for higher-resolution data sources. Demonstrate enhanced terrain processing tools providing highly accurate, tactical scale decision aids supporting situational awareness, actionable maneuver and force protection in complex terrain through an enhanced geospatial feature layer of combined dense terrain and external image sources.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AU1 / *Tactical GeoSpatial Information Capabilities ATech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Will demonstrate mature enhanced terrain processing and feature layer generation tools for Program Manager (PM) Intelligence Systems and Analytics (IS&A) (formerly DCGS-A), providing high resolution, highly accurate feature information to support situational awareness, actionable maneuver and force protection in highly dynamic operational environments. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding increase supports final year of Technical Readiness Level (TRL) 6 demonstration supporting insertion to PM IS&A.			
Title: Previously Advanced Airborne Light Detection and Ranging (LIDAR) ***Description:*** 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. ***FY 2022 Plans:*** Mature new airborne LIDAR sensors signal processing algorithms to increase collection speed and enhance terrain feature collection accuracy providing evolutionary improvements to airborne collection of enhanced 3D urban data with expanded area coverage and decreased workflow timelines. ***FY 2023 Plans:*** Will demonstrate integrated system of hardware components with system-specific calibration and optimized signal processing to inform system requirements enabling long-standoff airborne 3D remote sensing. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding increase supports final year of TRL6 demonstration.	0.539	1.905	2.094
Title: FY 2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.154	-
Accomplishments/Planned Programs Subtotals	3.603	4.207	5.996

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AU1 / *Tactical GeoSpatial Information Capabilities ATech*

C. Other Program Funding Summary ($ in Millions)

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AU2 / *Optimization of Geospatial Data for Visualization*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AU2: *Optimization of Geospatial Data for Visualization*	-	2.022	2.171	-	-	-	-	-	-	-	0.000	4.193
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AT8 (Network-Enabled GeoSpatial-GEOINT Services AdvTech).

A. Mission Description and Budget Item Justification

This Project develops and demonstrates new open source software defined data models, and establishes an architecture to provide correct (mission context) geospatial content to the end-user consistent with device, tactical assessment/need, available bandwidth, and user movement. Advanced software and processes will reduce file size and network requirements, enabling near real-time updates to Soldiers. Resulting three-dimension 3D foundation data and associated accuracy information will enable position and navigation determination, through analysis with a variety of Soldier and vehicle borne sensors.

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Optimization of Geospatial Data for Tactical Visualization-Demonstration	2.022	2.092	-
Description: 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 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. ***FY 2022 Plans:*** Demonstrate push of tactically relevant geospatial intelligence (GEOINT) to mobile devices, with consideration paid to factors determining level of detail and new 3D data representation selected to minimize bandwidth. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In Fiscal Year 2023 this Project is realigned to PE 0603463A (Network C3I Advanced Technology) Project AT8 (Network-Enabled GeoSpatial-GEOINT Services Adv Tech).			
Title: FY 2022 SBIR/STTR Transfer	-	0.079	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AU2 / *Optimization of Geospatial Data for Visualization*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	2.022	2.171	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AU4 / *Geospatially Enabled Operational Design Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AU4: *Geospatially Enabled Operational Design Adv Tech*	-	7.905	7.956	12.197	-	12.197	10.905	10.731	5.090	5.089	0.000	59.873
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates, integrates and transitions to the Army Command Post Computing Environment, 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.

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

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Geospatially Operational Design (GEOD) - Demonstration	7.905	7.665	5.081
Description: 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.			
FY 2022 Plans: Demonstrate tools to support Army Design Methodology (ADM) to frame the problem and visualize the desired end state in a geospatial context. Evaluate a suite of data visualization capabilities that allow commanders and staffs to bridge conceptual planning to deliberate planning at echelons down to battalion.			
FY 2023 Plans: Will demonstrate and transition a set of advanced strategic and operational planning tools to support ADM, and digitally create, visualize, assess, and brief the design framework, critical elements, and their interrelationships inside the Operational			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AU4 / *Geospatially Enabled Operational Design Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Environment in geospatial and geopolitical context. Will be transitioned to the Command Post Computing Environment (CPCE) Program of Record. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding decrease as a result of the final year of Technical Readiness Level (TRL) 6 demonstration and transition to Program Manager Mission Command.			
Title: Integration of intel and logistics Multi Echelon Planning ***Description:*** 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. ***FY 2023 Plans:*** Will integrate and demonstrate an advanced suite of automated tools to facilitate development of COAs, to include initial assessments of their viability and set up of wargames and M&S that support further analysis. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding for this effort is realigned from PE 0603463A (Network C3I Advanced Technology) / Project AV1 (GEOInt/Ops Logistics Integration-Planning Adv Tech).	-	-	4.038
Title: Automated intelligence Preparation of the Battlefield (IPB) Demonstrations ***Description:*** 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. ***FY 2023 Plans:*** Will develop and demonstrate advanced capabilities for multi-domain visualization of IPB products, and automates integration of those products into the military planning process. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding for this effort is realigned from PE 0603463A (Network C3I Advanced Technology) / Project CF9 (Automated IPB Demonstrations).	-	-	3.078
Title: FY 2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638	-	0.291	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AU4 / *Geospatially Enabled Operational Design Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	7.905	7.956	12.197

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AV1 / *GEOInt/Ops Logistics Integration-Planning Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV1: *GEOInt/Ops Logistics Integration-Planning Adv Tech*	-	3.771	3.867	-	-	-	-	-	-	-	0.000	7.638
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a suite of analytical and visualization tools designed to facilitate analysis of courses of action (COAs) through modeling and simulation (M&S) and wargames to support development of alternate COAs and approval of the operational plan (OPLAN). This Project will integrate existing M&S and wargaming applications (One Semi-Automated Forces; Infantry Warrior Simulation ; Logistics Composite Model), to assess multiple courses of action to be analyzed in a multi-domain environment.

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Integration of intel and logistics Multi Echelon Planning	3.771	3.726	-
Description: This effort demonstrates a suite of analytical and visualization tools designed to facilitate analysis of multiple courses of action through M&S and wargames to support development of alternate COAs and approval of the operational plan. ***FY 2022 Plans:*** Demonstrate automated analysis and synchronization of multiple courses of action with M&S and war-games, streamlining the COA comparison and approval processes, and ultimately the operational plan approval. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In FY23 funding for this effort is realigned to PE 0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).			
Title: FY 2022 SBIR/STTR Transfer	-	0.141	-
Description: Funding transferred in accordance with Title 15 USC ?638			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AV1 / *GEOInt/Ops Logistics Integration-Planning Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
FY 2022 Plans: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	3.771	3.867	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AV2 / *LEO Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV2: *LEO Advanced Technology*	-	1.949	-	-	-	-	-	-	-	-	0.000	1.949
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures Low Earth Orbit (LEO) constellation management for space order-of-battle architectures and protocols. The advanced technology development will involve using two spacecraft and will leverage commercial LEO mega-constellation investments to develop capabilities, which support direct sensor-to-shooter data links while under control by a maneuver battalion commander. Technology will be optimized to enable communications and deep strikes in contested environments. This Project supports the Army's efforts to proliferate and control space assets to support the tactical ground commander. It includes exploration efforts to augment missile warning, Global Positioning System (GPS), and global communications.

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

Research in this Project is performed by the Unites States (US) Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) Technical Center in Huntsville, AL and the Defense Advanced Research Projects Agency (DARPA), Arlington, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Payload Technology Development	1.949	-	-
Description: Mature the technology for Low Earth Orbit satellites. Payload integration will be validated as well as the architecture and design of two LEO satellites for support to an Army tactical commander.			
Accomplishments/Planned Programs Subtotals	1.949	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AV4 / *Foundational S&T for Network C3I Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV4: *Foundational S&T for Network C3I Advanced Tech*	-	2.068	7.751	0.896	-	0.896	0.043	2.268	12.409	16.282	0.000	41.717
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates underlying technologies applicable to artificial intelligent agents and holistic network integration as applied to, but not limited to autonomous manned-unmanned teaming for ground and air platforms. This Project also matures and demonstrates emerging research leading to potential technology development in areas of strategic importance to the Army in network technologies, by bringing competitively selected Universities with research teams into Technical Alliances.

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

Research in this Project is performed by the Army Futures Command (AFC).

This Research in this Project is done in coordination with (Program Element (PE) 0602146A (Network C3I Technology) / Project AV3 (Foundational S&T for Network C3I Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Demonstration of emerging technologies for holistic network integration ***Description:*** This effort matures and demonstrates underlying technologies applicable to next generation networks and integration of the same.	2.068	-	-
Title: Demonstration of Disruptive, Innovative Research for Emerging (DIRE) Advanced Network Capabilities ***Description:*** This effort demonstrates innovative network capabilities using a rapid and agile methodology to evaluate the feasibility of incorporation into Army network problem sets. ***FY 2022 Plans:*** Will demonstrate and evaluate innovative emerging technologies focusing on network resiliency, artificial intelligence, and autonomy enabled machine learning technologies that will be integrated into a holistic network in support a multi-domain operations (MDO) enabled environment. ***FY 2023 Plans:***	-	7.468	0.896

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AV4 / *Foundational S&T for Network C3I Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Completing innovative technology pilot for experimenting and demonstrating innovative and disruptive network capabilities in the space of network resiliency, artificial intelligence, and autonomy. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Decrease in funding due to fewer requirements needed to complete identified efforts during the Fiscal Year 2022 (FY22) search process.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.283	-
Accomplishments/Planned Programs Subtotals	2.068	7.751	0.896

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AV8 / *Navigation Warfare (NAVWAR) Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AV8: *Navigation Warfare (NAVWAR) Advanced Technology*	-	2.535	1.927	1.949	-	1.949	6.002	3.958	5.985	-	0.000	22.356
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.

Research accomplished under Program Element (PE) 0602146A (Network C3I Technology) / Project AW1 (Autonomous Navigation Technology) complements this Project.

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: PNT Situational Awareness (SA) Advanced Technology	2.535	1.856	1.949
Description: 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.			
FY 2022 Plans: Will incorporate high altitude sensor data to take advantage of the unique performance characteristics of existing sensors in different domains. Improve existing PNT SA ICD to make use of multidimensional data fields.			
FY 2023 Plans: Will mature and validate integration of aerial sensor data into data fusion software and will demonstrate an integrated system of systems approach at a field demonstration.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AV8 / *Navigation Warfare (NAVWAR) Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Funding change reflects planned lifecycle for this effort.			
Title: FY2022 SBIR/STTR Transfer	-	0.071	-
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	2.535	1.927	1.949

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army												Date: April 2022
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*				Project (Number/Name) AW4 / *DoD PNT M&S Collaborative Initiative (CI) Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
AW4: *DoD PNT M&S Collaborative Initiative (CI) Adv Tech*	-	2.888	-	-	-	-	-	-	-	-	0.000	2.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, demonstrates and performs modeling and simulation (M&S) of Positioning, Navigation, and Timing (PNT) technologies to provide access to trusted PNT information in global positioning system (GPS) denied or degraded environments.

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Project AW3 (DoD PNT M&S Collaborative Initiative (CI) Technolo).

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

Research in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: DoD PNT M&S Collaborative Initiative (CI) ***Description:*** This effort matures, demonstrates and performs M&S of PNT technologies to provide access to trusted PNT information in GPS denied or degraded environments.	2.888	-	-
Accomplishments/Planned Programs Subtotals	2.888	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) AW6 / *Modular GPS Independent Sensors Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
AW6: *Modular GPS Independent Sensors Advanced Tech*	-	10.684	6.791	10.131	-	10.131	12.289	16.702	14.629	20.609	0.000	91.835
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.

Research accomplished under Program Element (PE) 0602146A (Network C3I Technology) complements this Project.

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

Research in this Project is performed by the United States Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Soldier-Integrated Positioning, Navigation, and Timing (PNT)	10.684	6.542	2.476
Description: 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.			
FY 2022 Plans: Will continue to validate, and integrate, initial Soldier-Integrated PNT technologies through technology discovery with Army Applications Lab and maturation of commercial systems. Will mature PNT interfaces and messaging necessary to distribute accurate position and timing across wirelessly-connected soldier-borne component. Will improve the performance of vision aided navigation utilizing artificial intelligence techniques and assess existing spoof-detection algorithms for integration. Will optimize size, weight, and power (SWAP) of anti-jam antennas for dismounted users. Will integrate and demonstrate interoperability of modular, alternative PNT sensors with existing Army dismounted PNT systems.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AW6 / *Modular GPS Independent Sensors Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Will exploit and provide technology discovery for network ranging, flexible and modular Radio Frequency (RF) antenna designs. Will execute demonstrations and soldier touch points with anti-jam technologies. Will finalize fabrication and packaging. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** A portion of funding is realigned to support task Soldier Integrated Positioning Navigation and Timing - Modular Architecture & Integrated Demonstrators			
Title: Soldier Integrated Positioning Navigation and Timing - Modular Architecture & Integrated Demonstrators ***Description:*** This effort optimizes, improves, and demonstrates the modular architecture for PNT capabilities; matures and integrates alternative PNT sensors and approaches, including radio frequency time differencing, signals of opportunity, inertial, gravimetric, and imagery; matures, integrates, demonstrates and validates a final Modular Handheld; integrates and demonstrates PNT technologies with Soldier interface systems. ***FY 2023 Plans:*** Will optimize and validate the Initial Modular Handheld and PNT technologies, including the PNT open architecture; optimize and validate sensor integration for new PNT algorithms, anti-jam capability, vision aided navigation, network ranging and other alternate navigation technologies. Fabricate and demonstrate PNT open architecture, PNT technologies and validated sensors in SWAP optimized integrated demonstrator. Execute soldier touch points with the integrated demonstrator. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding realigned from task Soldier-Integrated PNT to provide greater visibility of this ongoing effort	-	-	7.655
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.249	-
Accomplishments/Planned Programs Subtotals	10.684	6.791	10.131

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** AW6 / *Modular GPS Independent Sensors Advanced Tech*

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) BP4 / *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BP4: *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*	-	64.800	55.500	-	-	-	-	-	-	-	0.000	120.300
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)	FY 2021	FY 2022
Congressional Add: Assured Position, Navigation, and Timing Technology ***FY 2021 Accomplishments:*** Conducted advanced research in Assured Position, Navigation, and Timing Technology. Work executed by Army Futures Command. ***FY 2022 Plans:*** Congressional Interest Item funding provided for APNT Technology	6.300	4.000
Congressional Add: Army Visual and Tactical Arctic Reconnaissance ***FY 2021 Accomplishments:*** Conduct advanced research in Army Visual and Tactical Arctic Reconnaissance. Work executed by Army Futures Command.	2.000	-
Congressional Add: Program increase - anticipating threats to natural systems ***FY 2021 Accomplishments:*** Conduct advanced research in Anticipating Threats to Natural Systems. Work executed by Army Futures Command.	6.000	-
Congressional Add: Program Increase - S?UAS cyber threat management	7.500	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** BP4 / *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022
FY 2021 Accomplishments: Conduct advanced research in S-UAS Cyber Threat Management. Work executed by Army Futures Command.		
Congressional Add: Program Increase - Sub?Surface Infrastructure in Arctic Environments ***FY 2021 Accomplishments:*** Conduct advanced research in Sub-Surface Infrastructure in Arctic Environments. Work executed by Army Futures Command.	1.000	-
Congressional Add: Program Increase - Mesh Network-Enabled Small Satellites ***FY 2021 Accomplishments:*** Conduct advanced research in Mesh Network-Enabled Small Satellites. Work executed by Army Futures Command.	10.000	-
Congressional Add: Program Increase - Geospatial Artificial Intelligence Analytic Tools ***FY 2021 Accomplishments:*** Conduct advanced research in Geospatial Artificial Intelligence Analytical Tools. Work executed by Army Futures Command.	4.000	-
Congressional Add: Program Increase - Advanced Materials and Technologies for Command Post Modernization ***FY 2021 Accomplishments:*** Conducted advanced research in Advanced Materials and Technologies for Command Post Modernization. Work executed by Army Futures Command.	10.000	-
Congressional Add: Program Increase - Advanced Materials for Resilient Sensors ***FY 2021 Accomplishments:*** Conduct advanced research in Advanced Materials for Resilient Sensors. Work executed by Army Futures Command. ***FY 2022 Plans:*** Congressional Interest Item funding provided for Advanced Materials for Resilient Sensors	8.000	5.000
Congressional Add: Program Increase - Tactical Geospatial Information Capabilities ***FY 2021 Accomplishments:*** Conduct advanced research in Tactical Geospatial Information Capabilities.	10.000	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** BP4 / *ELECTRONIC WARFARE ADVANCED TECHNOLOGIES (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022
Work executed by Army Futures Command. ***FY 2022 Plans:*** Congressional Interest Item funding provided for Tactical Geospatial Information Capabilities		
Congressional Add: Alternative Navigation for GPS-Denied Landing Environments ***FY 2022 Plans:*** Congressional Interest Item funding provided for Alternative Navigation for GPS-Denied Landing Environments	-	4.500
Congressional Add: Edge-High Performance Computing for Multi-Domain Operations ***FY 2022 Plans:*** Congressional Interest Item funding provided for Edge-High Performance Computing for Multi-Domain Operations	-	5.000
Congressional Add: HALITE ***FY 2022 Plans:*** Congressional Interest Item funding provided for HALITE	-	7.000
Congressional Add: Next Generation Command Posts ***FY 2022 Plans:*** Congressional Interest Item funding provided for Next Generation Command Posts	-	10.000
Congressional Add: Receiver-Sensor Technology for Tactical Networks ***FY 2022 Plans:*** Congressional Interest Item funding provided for Receiver-Sensor Technology for Tactical Networks	-	15.000
Congressional Adds Subtotals	64.800	55.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) CF9 / *Automated IPB Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CF9: *Automated IPB Adv Tech*	-	-	0.989	-	-	-	-	-	-	-	0.000	0.989
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2023 (FY23) this Project is realigned to Program Element (PE) 0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate advanced algorithms for multi-domain visualization of explicit and implicit relationships between the populace and the theater environment. Capabilities resulting from this effort will directly and substantially support Army and Joint Global Integration Planning requirements, provide a globally accessible web based digital intelligence preparation of the battlefield (IPB) platform supporting collaborative product development, and help facilitate a shared understanding of the operational environment. Automated IPB provides an integrated Intelligence Community planning data platform for Joint Global Integration Planning requirements.

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

Research in this Project is performed by the Unites States (U.S.) Army Engineer Research and Development Center and coordinated with U.S. Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Automated IPB Demonstrations	-	0.953	-
Description: 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. ***FY 2022 Plans:*** Design and demonstrate algorithms for advanced, multi-domain visualization of explicit and implicit relationships between the populace and the theater environment. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** In Fiscal Year 2023 (FY23), this effort is realigned to PE0603463A (Network C3I Advanced Technology) Project AU4 (Geospatially Enabled Operational Design Adv Tech).			
Title: FY 2022 SBIR/STTR Transfer	-	0.036	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** CF9 / *Automated IPB Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	-	0.989	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) CI7 / *Mobile & Survivable Command Post (MASCP) Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CI7: *Mobile & Survivable Command Post (MASCP) Adv Tech*	-	-	7.809	13.119	-	13.119	18.609	16.332	19.729	19.724	0.000	95.322
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 CI3 (Mobile and Survivable Command Post (MASCP) Tech).

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

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: CP Modularity and Dispersion Advanced Technology	-	3.350	2.387
Description: Increases the ability for Commanders to move and disperse the 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.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** CI7 / *Mobile & Survivable Command Post (MASCP) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Will optimize subsystems of a wireless antenna remoting capability based on the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Electronic Warfare (EW) Open Suite of Standards (CMOSS); improve the performance of highly directional transport using wireless antenna remoting with AJ and LPD to send and receive information between a command node and the remote site; optimize component design of small power generation, storage technology, and onboard vehicle power technologies to enable distributed command post operations; validate and optimize hardware and software components to support distributed CP computing. ***FY 2023 Plans:*** Will begin demonstrations of a wireless antenna remoting capability and Command Post specific communications systems that are effective with Dispersed Command Post configurations; will demonstrate initial capabilities for dispersed collaboration; will mature the vehicle mounted power systems using open standard interfaces to accurately measure and respond to changing power demands of dispersed command post operations. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding decrease in Fiscal Year 2023 (FY23) funding due to significant reduction in scope of wireless antenna remoting capabilities.			
Title: Signature Management and Reduction Advanced Technology ***Description:*** Provides advanced technologies to reduce and manage electromagnetic spectrum signatures of CP platforms and command post components. ***FY 2022 Plans:*** Will mature a sensor-based radio frequency (RF) awareness tool that will allow friendly Commanders to see and understand their emission posture; validate the performance of sensors to detect RF emissions; optimize and demonstrate a software application providing situational awareness of CP emission status. ***FY 2023 Plans:*** Will demonstrate initial proof-of-concept hardware and software to provide real time situational awareness of Command Post radio frequency emissions; will demonstrate solutions to decrease CP signature in ultraviolet, visible, thermal, infrared, radar, and radio frequency spectra. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding increase in FY23 due to increased scope for the development of CP centric sensors; demonstrating RF signal detection algorithms and building additional user interface s/w for CP signature solutions.	-	0.392	6.853
Title: Advanced Technology Supporting Camouflage, Concealment, and Deception	-	3.782	3.879

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** CI7 / *Mobile & Survivable Command Post (MASCP) Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Description: 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. ***FY 2022 Plans:*** Will demonstrate the ability to provide electromagnetic shielding for complexed shelters, while maintaining radio frequency shielding performance, large format advanced camouflage solutions, and demonstrator physical asset with signatures; mature inflatable technologies and protection material solutions and demonstrate these capabilities in support of rapidly deployable CPs; mature and integrate mobile camouflage capabilities to mitigate CP vulnerability; mature and demonstrate use of EMS emulations on autonomous systems. ***FY 2023 Plans:*** Will validate and verify ability to address signature management performance in a relevant environment; will demonstrate deployable command post solutions on targeted mobile platforms; will perform analysis of sensor demonstration data to inform command post situational awareness; will demonstrate increased survivability for multi-domain operations. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: FY2022 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.285	-
Accomplishments/Planned Programs Subtotals	-	7.809	13.119

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** CI7 / *Mobile & Survivable Command Post (MASCP) Adv Tech*

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603463A / *Network C3I Advanced Technology*	Project (Number/Name) CJ8 / *Assured PNT Communications Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
CJ8: *Assured PNT Communications Advanced Tech*	-	-	16.438	11.128	-	11.128	11.640	13.208	13.830	13.903	0.000	80.147
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will provide prototyping, development, and experimentation of High Altitude (HA) sensors and Tactical Space Layer (TSL) sensors (electro-optical, synthetic aperture radar (SAR), and radio frequency) which are designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. This Project matures, demonstrates, and integrates lightweight materials, hardware components with reduced power consumption, and advanced data collection, processing, and dissemination capabilities. This Project also improves algorithms that process space and near space sensor data in real and near real time for integration into battlefield operating systems.

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

Research in this Project is performed by the United States Army Space and Missile Defense Command (USASMDC) Technical Center (TC).

Research in this Project complements Program Element (PE) 0602146A (Network C3I Technology) / Projects CK1 (Assured PNT Enabling Technologies) and Project CG3 (Assured PNT Communications Applied Research).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Assured Positioning Navigation and Timing (APNT) Communications Advanced Technology	-	16.036	11.128
Description: 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.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** CJ8 / *Assured PNT Communications Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Will demonstrate systems during joint exercises; demonstrate a sensor designed to provide space-based situational awareness to the tactical Warfighter; develop and demonstrate small satellite capabilities, which include classified payloads, to provide APNT services to the tactical ground component Warfighters; exploit a constellation of space-based sensors that provide Tactical ISR (Intelligence, Surveillance, and Reconnaissance) and SA to the ground force commander to support multi-domain operations (MDO); develop and demonstrate optical communications for Quantum Entanglement (QE);develop and demonstrate QE including site-to-site communications from a small satellite in Space or High Altitude platform; and mature the QE technology and demonstrate optical and quantum signals passed between small spacecraft, HA platforms, and/or Space (or HA) to ground. Will complete assembly, integration, testing, and conduct a technology demonstration event; and participate in joint exercises, culminating with Technical Readiness Level (TRL) 5 payload technology demonstration in an operational environment. ***FY 2023 Plans:*** Will develop and demonstrate small satellite capabilities, which include classified payloads, to provide APNT services to the tactical ground component Warfighters; exploit a constellation of space-based sensors that provide Tactical ISR (Intelligence, Surveillance, and Reconnaissance) and Situational Awareness (SA) to the ground force commander to support MDO; develop and demonstrate optical communications using classical and Quantum Entanglement (QE) technologies; develop and demonstrate QE including site-to-site communications from a small satellite in Space, High Altitude platform, or ground based/launched platform; and mature the QE technology and demonstrate optical and quantum signals passed between small spacecraft, HA platforms, Space (or HA), and/or ground launched assets. Will complete assembly, integration, testing, and conduct a QE technology demonstration event tied to Army warfighter communications requirements. Will begin design and development of including long lead component orders of classified capabilities and high altitude platforms and associated payloads to support tactical ground component Warfighters with advanced APNT capabilities. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funds decrease reflect completion and transition of two products to Program Executive Officer (PEO) for Intelligence, Electronic Warfare and Sensor (PEO IEW&S) after demonstrations in Fiscal Year 2022 (FY22).			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC 638. ***FY 2022 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC 638.	-	0.402	-
Accomplishments/Planned Programs Subtotals	-	16.438	11.128

Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603463A / *Network C3I Advanced Technology*	**Project (Number/Name)** CJ8 / *Assured PNT Communications Advanced Tech*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A