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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0303142A / <i>SATCOM Ground Environment (SPACE)</i>							
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	-	18.002	15.222	18.321	-	18.321	15.133	11.965	12.622	12.724	Continuing	Continuing
253: <i>Dscs-Dcs (Phase II)</i>	-	4.212	4.080	7.832	-	7.832	7.242	5.012	5.014	5.063	Continuing	Continuing
456: <i>MILSATCOM System Engineering</i>	-	13.790	11.142	2.920	-	2.920	1.812	1.800	2.455	2.510	0.000	36.429
CO7: <i>Protected Tactical Satellite Communications</i>	-	-	-	7.569	-	7.569	6.079	5.153	5.153	5.151	0.000	29.105

A. Mission Description and Budget Item Justification

A portion of this funding line is directly aligned to support the Network Army Modernization Priority. Project 253, Dscs-Dcs (Phase II), SATCOM Ground Environment (SPACE) supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 - Unified Network.

Project 253, Fiscal Year 2023 (FY23) Base funding in the amount of \$7.832 million develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

Project 456, MILSATCOM System Engineering supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team (N-CFT) capability set approach to achieve the network modernization strategy.

Fiscal Year 2023 (FY23) Base funding in the amount of \$2.920 million - MILSATCOM System Engineering assures the tactical Army satellite communications (SATCOM) and SATCOM On-the-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM System Engineering shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM System Engineering represents the Army's tactical interests within Department of Defense (DoD), Commercial and International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts. MILSATCOM System Engineering also provides the technical and programmatic expertise to facilitate the Unified Network Capabilities and Integration (UNCI) integration mission of transport convergence and integration of N-CFT emerging solutions within the Tactical Network portfolio as part of future Capability Sets. MILSATCOM SE provides the programmatic and technical expertise to coordinate the UNCI mission to align and integrate elements of the Tactical Network portfolio in support of the Expeditionary Signal Battalion (ESB) and Multi Domain Task Force (MDTF).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army	Date: April 2022
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303142A / <i>SATCOM Ground Environment (SPACE)</i>
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Project 456 also includes Protected Anti-jam Tactical SATCOM efforts, which fill a critical communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and protect against catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the tactical Army protection against interference that is either intentional or unintentional. These efforts are synchronized with the Space Force and DoD's plans for Protected Tactical Waveforms (PTW) on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

Funds transferred to project CO7 in FY23 fund continuing Protected Anti-jam Tactical SATCOM and Protected Tactical Waveforms (PTW) efforts under the same program element 0303142A. Protected Tactical Anti-jam SATCOM supported initial development, testing and certification of production representative PTW modems, incorporating Army specific requirements, to support continued spiral development of critical protected communications capabilities to address resiliency in jamming environments. The Protected/Resilient SATCOM Abbreviated - Capabilities Development Document was validated and approved in June 2021.

FY23 Protected Anti-jam Tactical SATCOM funding under project CO7 in the amount of \$7.569M will support Protected SATCOM modem development, test and evaluation, system engineering, program management, and development of training materials and data rights.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	18.002	15.247	0.000	-	0.000
Current President's Budget	18.002	15.222	18.321	-	18.321
Total Adjustments	0.000	-0.025	18.321	-	18.321
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	18.321	-	18.321
• FFRDC Transfer	-	-0.025	-	-	-

Change Summary Explanation

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 253 / Dscs-Dcs (Phase II)
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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
253: Dscs-Dcs (Phase II)	-	4.212	4.080	7.832	-	7.832	7.242	5.012	5.014	5.063	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 253, Dscs-Dcs (Phase II), SATCOM Ground Environment (SPACE) supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 - Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Fiscal Year 2023 (FY23) Base funding in the amount of \$7.832 million develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

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

	FY 2021	FY 2022	FY 2023
Title: SATCOM Terminal Digital Intermediate Frequency Implementation Analysis	2.190	1.299	4.158
<p>Description: SATCOM Terminal Digital Intermediate Frequency (IF) implementation analysis and experimentations aimed at improving bandwidth efficiency of gateway terminals while providing an additional layer of resiliency through terminal redundancy. These analysis and experimentations include various evaluations for digital terminal components to replace current, less efficient, analog components. These analyses also include assessment of terrestrial connectivity among SATCOM terminals to enable Continuity Of Operations (COOP) and failover scenarios required for resiliency.</p> <p>FY 2022 Plans: Integrate Digital IF Solutions for the Interconnect Facility (ICF) Replacement into the Prototyping, Integration, Test, Training (PITT) facility at Tobyhanna Army Depot (TYAD). Perform technical assessments and Wideband Global SATCOM (WGS) delta certification tests.</p> <p>FY 2023 Plans: Integrate Digital IF Solutions for the Interconnect Facility (ICF) Replacement Wideband Signal Processors (WSP), COTS LAN Switches and Routers and High Speed Fiber Optics into the Prototyping, Integration, Test, Training (PITT) facility at Tobyhanna Army Depot (TYAD). Perform technical assessments and Wideband Global SATCOM (WGS) delta certification tests.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 253 / Dscs-Dcs (Phase II)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Increase due to integration of various Digital IF components required to support Gateway Optimization and Resiliency (GOaR) study recommendations for a digital IF Initial Operational Capability (IOC) in FY2025. Digital IF Wideband Signal Processors (WSP), COTS LAN Switches and Routers and High Speed Fiber Optics must be assessed and certified during FY23 and FY24 to be incorporated into GOaR IOC set in FY25.				
<p>Title: Electromagnetic Interference Mitigation Analysis</p> <p>Description: Continue to assess multiple interference mitigation/cancellation technologies for effectiveness in improving reliability/resiliency of strategic and tactical communications. Mature technology to software/firmware that will improve protected SATCOM modem/terminal performance in a electro-magnetic interference contested environment. Technology will also improve terminal performance against adversary and friendly satellite link jamming resources.</p> <p>FY 2022 Plans: Assess multiple interference mitigation/cancellation technologies for effectiveness in improving reliability/resiliency of strategic and tactical communications. Mature technology to software/firmware that will improve protected SATCOM modem/terminal performance in a electro-magnetic interference contested environment. Technology will also improve terminal performance against adversary and friendly satellite link jamming resources.</p> <p>FY 2023 Plans: Integrate Interference Mitigation algorithms into Enterprise Digital IF Multi-carrier (EDIM) Modem.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Decrease is due to the Interference Cancellation Algorithms reaching TRL-6 in FY22. FY23 efforts will be focused on incorporating Interference Mitigation algorithms into EDIM Modem.</p>		2.022	1.346	0.400
<p>Title: Low Earth Orbit (LEO)/Medium Earth Orbit (MEO) Satellite Service Integration</p> <p>Description: Investigate the availability of LEO/MEO Satellite Services in the commercial market place and assess their viability for use at Department of Defense (DoD) SATCOM gateways.</p> <p>FY 2022 Plans: Based on previously conducted studies and analyses, assess technology readiness for supporting DoD Gateway users in conjunction with Geosynchronous Earth Orbit (GEO) satellite services. Conduct analyses of alternatives and provide a recommendation on how to integrate these services into the DoD SATCOM Gateways.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: This effort is being superseded by Enterprise Digital IF Multi-carrier (EDIM) Modem System Engineering Analysis.</p>		-	1.286	-
Title: Enterprise Digital IF Multi-carrier (EDIM) Modem		-	-	3.274

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Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 253 / Dscs-Dcs (Phase II)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Description: Assess and integrate various commercial technologies on to a single modem platform to replace the existing almost out of life EDEM modem currently fielded at all DoD Gateways. New technologies include Multi-carrier capability to assist future growth of SATCOM, Digital IF to enable resiliency and path diversity and Interference Cancellation to improve reliability of SATCOM communication links.</p> <p>FY 2023 Plans: Integrate Multi-carrier capabilities, Interference Cancellation Algorithms and Digital IF technology into EDIM Modem. Initiate Non-Recurring Engineering (NRE) contract to integrate, test and certify EDIM Modem Platform.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: This effort supersedes Low Earth Orbit (LEO)/Medium Earth Orbit (MEO) Satellite Service Integration requirement.</p> <p>Title: SBIR/STTR Transfer</p> <p>Description: FY22 SBIR/STTR Transfer</p> <p>FY 2022 Plans: Funding transferred in accordance with Title 15 USC 7638</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 7638</p>			
Accomplishments/Planned Programs Subtotals	-	0.149	-
	4.212	4.080	7.832

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• BB8500: Defense Enterprise Wideband Satcom Systems	101.498	90.928	107.228	-	107.228	116.716	90.849	94.346	94.304	Continuing	Continuing
Remarks											

D. Acquisition Strategy
This finances Project Manager, Defense Communications and Army Transmission Systems (PM DCATS) netcentric systems engineering, modem risk mitigation, and risk management framework support. Funding provides for SATCOM terminal upgrades, enhancement of baseband throughput capabilities, technology insertion and upgrades which improves SATCOM gateway resiliency while allowing for full utilization of Wideband Global SATCOM (WGS) capabilities. Both the Wideband SATCOM Operational Management System (WSOMS) and the Enterprise Wideband SATCOM Terminal System (EWSTS) Capability Production Documents (CPDs) contain Netcentric-Ready Key Performance Parameters (NR-KPPs) as required by CJCSI 6212.01C. Netcentric efforts are required to facilitate the migration from the current

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Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 253 / Dscs-Dcs (Phase II)
<p>trunk-based communications systems to Internet Protocol (IP) based systems and to engineer, test and integrate IP based capabilities into WSOMS and EWSTS systems. Studies, risk mitigation, system integration and advanced demonstrations for Netcentric baseband and policy based control will accommodate technology insertion, data sharing, remote operations, architecture efforts and use of commercial technology, thus ensuring the life of the Defense Enterprise Wideband Satellite System (DEWSS) terminal family beyond 2035 and reducing lifecycle costs and enterprise requirements on the WGS and Defense Satellite Communication System (DSCS) satellites in the future. Contracting approach for new technology is through the use of Broad Agency Announcements (BAA) and Other Transaction Authority (OTA) contracts.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0303142A / SATCOM Ground Environm ent (SPACE)				253 / Dscs-Dcs (Phase II)							
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SBIR/STTR Transfer	TBD	To Be Determined : To Be Determined	-	-		0.149		-		-		-	0.000	0.149	-
Subtotal			-	-		0.149		-		-		-	0.000	0.149	N/A
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SATCOM Terminal Digital IF Implementation Analysis	MIPR	Aberdeen Proving Ground : MD	-	1.885	Jan 2021	1.125	Jan 2022	3.206	Jan 2023	-		3.206	Continuing	Continuing	Continuing
Electromagnetic Interference Mitigation Analysis	MIPR	Aberdeen Proving Ground : MD	-	1.666	Jan 2021	1.095	Jan 2022	0.400	Jan 2023	-		0.400	Continuing	Continuing	Continuing
Low Earth Orbit/Medium Earth Orbit (LEO/MEO)	MIPR	Aberdeen Proving Ground : MD	-	-		1.116	Jan 2022	-		-		-	Continuing	Continuing	Continuing
Enterprise Digital IF Multi-carrier (EDIM) Modem System Engineering Analysis	MIPR	ACC - Rock Island : IL	-	-		-		3.274	Jan 2023	-		3.274	Continuing	Continuing	Continuing
Subtotal			-	3.551		3.336		6.880		-		6.880	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
In-house Support	Allot	PdM WESS : Ft. Belvoir, VA	-	0.060		0.045		0.060		-		0.060	Continuing	Continuing	Continuing
Contractor Support	MIPR	ACC : Rock Island, IL	-	0.601	Jan 2021	0.550	Jan 2022	0.892	Jan 2023	-		0.892	Continuing	Continuing	Continuing
Subtotal			-	0.661		0.595		0.952		-		0.952	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army								Date: April 2022			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environm ent (SPACE)				Project (Number/Name) 253 / Dscs-Dcs (Phase II)			
	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals	-	4.212	4.080	7.832	-	7.832	Continuing	Continuing	N/A		

Remarks

SATCOM Terminal Digital Intermediate Frequency (IF) demonstrations with multi-vendor equipment will be conducted using live satellite links between Tobyhanna Army Depot (TYAD) and Joint SATCOM Engineering Center (JSEC) at Aberdeen Proving Grounds. All components demonstrated will be at Technology Readiness Level (TRL) 6.

Electromagnetic Interference Algorithms at TRL 6 will be hosted on a stand-alone hardware platform and tested at JSEC using live satellite links. All verified algorithms and performance specifications will transition to the Enterprise Digital IF Multi-Carrier (EDIM) modem program during 4Q FY 2023.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army			Date: April 2022		
Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)		Project (Number/Name) 253 / Dscs-Dcs (Phase II)	

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SATCOM Terminal Digital Intermediate Frequency (IF) Implementation	[Redacted]																											
Electromagnetic Interference Mitigation Analysis	[Redacted]																											
Enterprise Digital IF Multi-carrier (EDIM) Modem System Engineering Analysis	[Redacted]								[Redacted]																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 253 / Dscs-Dcs (Phase II)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SATCOM Terminal Digital Intermediate Frequency (IF) Implementation Analysis	1	2021	4	2027
Electromagnetic Interference Mitigation Analysis	1	2021	4	2024
Enterprise Digital IF Multi-carrier (EDIM) Modem System Engineering Analysis	1	2023	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)				Project (Number/Name) 456 / MILSATCOM System Engineering			
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
456: MILSATCOM System Engineering	-	13.790	11.142	2.920	-	2.920	1.812	1.800	2.455	2.510	0.000	36.429
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Network Cross Functional Team.

MILSATCOM System Engineering assures the tactical Army satellite communications (SATCOM) and SATCOM On-the-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM System Engineering shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM System Engineering represents the Army's tactical interests within Department of Defense (DoD), Commercial and International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts. MILSATCOM System Engineering also provides the technical and programmatic expertise to facilitate the Unified Network Capabilities and Integration (UNCI) integration mission of transport convergence and integration of N-CFT emerging solutions within the Tactical Network portfolio as part of future Capability Sets. These emerging solutions include Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) capabilities and are synchronized with Space Force DoD's plans for Protected Tactical Waveforms (PTW) on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems. MILSATCOM SE provides the programmatic and technical expertise to coordinate the UNCI mission to align and integrate elements of the Tactical Network portfolio in support of the Expeditionary Signal Battalion (ESB) and the Multi Domain Task Force (MDTF).

FY 2023 funding supports the systems engineering required to support technology maturation, systems analysis, experimentation and planning associated with Joint SATCOM development efforts. This line continues to fund the systems architecture and analysis for current and future SATCOM efforts in both wideband and protected satellite communications.

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

	FY 2021	FY 2022	FY 2023
Title: Protected communications system engineering and WGS communications	0.896	0.752	0.502
Description: Provides systems engineering support for technology maturation, development and planning associated with joint SATCOM development efforts.			
FY 2022 Plans: Funding supports continued systems engineering and analysis for Protected Communications and WGS Communications, as well as development and technology maturation of NCW-T.			
FY 2023 Plans:			

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Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 456 / MILSATCOM System Engineering		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Funding supports continued systems engineering and analysis for Protected Communications and WGS Communications, as well as development and technology maturation of NCW-T.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Decrease due to realignment of efforts.</p>				
<p>Title: Systems architecture and analysis support</p> <p>Description: Provides systems engineering support relating to the architecture and analysis of Network Centric Waveform Tool (NCW-T) and collaborative SATCOM efforts. These efforts, such as research, analysis, technical engineering and integration services for bandwidth studies and future technology insertions, impact Army use of military and commercial satellite constellations and integration of enabling technologies.</p> <p>Provides additional programmatic support across the tactical network.</p> <p>FY 2022 Plans: Funding supports continued in house engineering support, contractor support, and system architecture and analysis.</p> <p>FY 2023 Plans: Funding supports continued in house engineering support, contractor support, and system architecture and analysis.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Increase in system engineering support relating to architecture and analysis of NCWT and joint DoD SATCOM efforts</p>		1.997	1.191	1.568
<p>Title: Testing and certification of critical SATCOM and SATCOM On-the-Move communication and network technologies</p> <p>Description: Provides testing and certification of the critical SATCOM and SATCOM On-the-Move (SOTM) communication and network technologies.</p> <p>FY 2022 Plans: Funding supports continued testing and certification of critical SATCOM and SATCOM On-the-Move communication and network technologies.</p> <p>FY 2023 Plans: Funding supports continued testing and certification of critical SATCOM and SATCOM On-the-Move communication and network technologies.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>		0.425	0.435	0.600

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Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 456 / MILSATCOM System Engineering		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Increase due to new modems in development				
Title: Protected Tactical Waveform (PTW) Modem Development and Testing		10.472	8.357	-
FY 2022 Plans: Funding supports development and engineering of Army specific requirements for the PTW modem that will be utilized for protected tactical communications.				
FY 2022 to FY 2023 Increase/Decrease Statement: Effort transitioned to Project CO7.				
Title: Unified Network Capabilities and Integration Program Management and Support		-	-	0.250
Description: Provides programmatic and technical expertise in systems engineering to align and integrate elements of the Tactical Network Portfolio.				
FY 2023 Plans: Funding supports systems engineering and integration efforts in support of cross domain elements such as the Expeditionary Signal Battalion ? Enhanced (ESB-E) and the Multi-Domain Task Force (MDTF)				
FY 2022 to FY 2023 Increase/Decrease Statement: New Accomplishment				
Title: SBIR/STTR Transfer		-	0.407	-
FY 2022 Plans: SBIR/STTR Transfer for MSE/Protected SATCOM				
FY 2022 to FY 2023 Increase/Decrease Statement: SBIR/STTR Transfer for MSE/Protected SATCOM				
Accomplishments/Planned Programs Subtotals		13.790	11.142	2.920
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
In FY 2023 funding was realigned from PE 123142A / 456 to 1203142A / CO7 (Protected Tactical Satellite Communications)				

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D. Acquisition Strategy

MILSATCOM System Engineering provides advanced systems engineering, research, development, test, evaluation (RDTE) and integration of new and emerging technologies to optimize terminal performance and communications control. Once the technologies are mature and deemed feasible, funding and management responsibility for implementation and integration of the technology will transition to PM Tactical Network and related Programs of Record.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army												Date: April 2022				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 7				PE 0303142A / SATCOM Ground Environment (SPACE)				456 / MILSATCOM System Engineering								
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
SBIR/STTR Transfer	TBD	Various : Various	-	-		0.407		-		-		-	0.000	0.407	-	
Subtotal			-	-		0.407		-		-		-	0.000	0.407	N/A	
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Protected Communications and WGS Communications	TBD	Various : APG, MD	-	0.580	Apr 2021	0.752	Apr 2022	0.752	Apr 2023	-		0.752	0.000	2.084	-	
Protected Tactical Waveform (PTW) Modem Development	C/IDDQ	To Be Determined : To Be Determined	-	10.912	Apr 2021	7.710	Mar 2022	-		-		-	0.000	18.622	-	
Subtotal			-	11.492		8.462		0.752		-		0.752	0.000	20.706	N/A	
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Engineering (In House)	MIPR	PM WIN-T : APG, MD	-	0.330	Dec 2020	0.647	Dec 2021	-		-		-	0.000	0.977	-	
Engineering Contractor Support	C/CPFF	PM WIN-T : APG, MD	-	1.546	Jan 2021	1.191	Dec 2021	-		-		-	0.000	2.737	-	
System Architecture and Analysis Support	MIPR	CERDEC : APG, MD	-	0.208	Sep 2021	-		1.568	Dec 2022	-		1.568	0.000	1.776	-	
Subtotal			-	2.084		1.838		1.568		-		1.568	0.000	5.490	N/A	
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test and Certification	MIPR	CERDEC : APG, MD	-	0.214	Aug 2021	0.435	Dec 2021	0.600	Dec 2022	-		0.600	0.000	1.249	-	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 456 / MILSATCOM System Engineering
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Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	0.214		0.435		0.600		-		0.600	0.000	1.249	N/A
Project Cost Totals			-	13.790		11.142		2.920		-		2.920	0.000	27.852	N/A

Remarks
 In FY 2023 funding was realigned from PE 123142A / 456 to 1203142A / CO7 (Protected Tactical Satellite Communications)

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Army			Date: April 2022
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 456 / MILSATCOM System Engineering	

Event Name	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Network Centric Waveform Tool (NCWT) Development and Test	[Redacted]																											
	NCWT Development and				Testing																							
SATCOM Systems Architecture, Analysis, Testing and Certification	[Redacted]																											
	SATCOM Systems Architecture and Analysis																											
Protected Tactical Enterprise Service (PTES) Development	[Redacted]																											
	Protected Tactical Enterprise Service (PTES) Development																											
Protected Tactical Enterprise Service (PTES) Initial Operational Capability	[Redacted]																											
	Protected Tactical Enterprise Service (PTES) Initial Operational Capability																											
Protected Tactical SATCOM (PTS) Development	[Redacted]																											
	Protected Tactical SATCOM (PTS) Development																											
Protected Tactical Waveform (PTW) Modem Block I Development	[Redacted]																											
	Protected Tactical Waveform (PTW) Modem (Large Form Factor) Development																											
Protected Tactical Waveform (PTW) Modem Block I Testing	[Redacted]																											
	Protected Tactical Waveform (PTW) Modem (Large Form Factor) Testing																											
Protected Tactical Waveform (PTW) Modem Block I first Unit Equipped	[Redacted]																											
	Protected Tactical Waveform (PTW) Modem (Large Form Factor) first Unit Equipped																											
Testing and Certification of Modems	[Redacted]																											
	Testing and Certification of Modems																											
Testing and Certification of Terminals	[Redacted]																											
	Testing and Certification of Terminals																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) 456 / MILSATCOM System Engineering

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Network Centric Waveform Tool (NCWT) Development and Testing	1	2021	4	2026
SATCOM Systems Architecture, Analysis, Testing and Certification	1	2021	4	2027
Protected Tactical Enterprise Service (PTES) Development	1	2021	4	2022
Protected Tactical Enterprise Service (PTES) Initial Operational Capability	1	2021	4	2022
Protected Tactical SATCOM (PTS) Development	1	2021	4	2022
Protected Tactical Waveform (PTW) Modem Block I Development	1	2021	4	2022
Protected Tactical Waveform (PTW) Modem Block I Testing	1	2021	4	2022
Protected Tactical Waveform (PTW) Modem Block I first Unit Equipped	1	2021	4	2022
Testing and Certification of Modems	1	2022	1	2027
Testing and Certification of Terminals	1	2022	1	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)				Project (Number/Name) CO7 / Protected Tactical Satellite Communications			
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
CO7: Protected Tactical Satellite Communications	-	-	-	7.569	-	7.569	6.079	5.153	5.153	5.151	0.000	29.105
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Network Cross Functional Team.

Protected Anti-jam Tactical SATCOM (Protected SATCOM) fills a critical communications gap for Anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the Army tactical terminals to be resilient in a contested environment and protect against catastrophic loss of situational awareness and command and control during critical battle movement with Anti-jam capabilities.

Air Force/Army Anti-Jam Modem (A3M) will offer tactical Army protection against interference that is either intentional or unintentional. These DoD Joint efforts are synchronized with United States Space Force (USSF) and Army for execution of Protected Tactical Waveforms (PTW) on Wideband Global SATCOM (WGS), Protected Tactical Satellites (PTS), and commercial SATCOM systems.

Protected Anti-jam Tactical SATCOM is a continuation of efforts previously funded under the MILSATCOM System Engineering 0303142A/456 line. Funds transferred in FY23 from project 456 to project C07 under the same program element 0303142A to fund continuing Protected Anti-jam Tactical SATCOM and Protected Tactical Waveforms (PTW) efforts. Protected Tactical Anti-jam SATCOM supported initial development, testing and certification of production representative PTW modems, incorporating Army specific requirements, to support continued spiral development of critical protected communications capabilities to address resiliency in jamming environments. The Protected/Resilient SATCOM Abbreviated - Capabilities Development Document was validated and approved in June 2021.

FY23 funding in the amount of \$7.569M will support Protected SATCOM modem development, test and evaluation, system engineering, program management, and development of training materials and data rights.

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

	FY 2021	FY 2022	FY 2023
Title: PTW Block I Modem Development	-	-	5.524
Description: PTW Development of Block I Modems (formerly referred to as Large Form Factor) supports development and engineering of Army specific requirements for the PTW modems that will be utilized for protected tactical communications.			
FY 2023 Plans: Funding supports system test and evaluation and development of Block I Modems.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) C07 / Protected Tactical Satellite Communications		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Previously funded effort under project 456.				
Funds transferred in FY23 from project 456 to project C07 under the same program element 0303142A to fund continuing Protected Anti-jam Tactical SATCOM and Protected Tactical Waveforms (PTW) efforts.				
<p>Title: Logistics Support and Data Development</p> <p>Description: Funding supports the total documentation (training, tech manuals) and logistics support package. The efforts associated with the design, development, and production of prototype training equipment, and the execution of training services. Transforming data into Government format, Technical data providing instructions for installation, operation, maintenance, training, and support, formatted into a technical manual. The data items necessary for configuration management, required by the Government. The data items designed to document support planning in accordance with functional categories.</p> <p>Cost decreased aligning existing terminal TSP and TM approved products resulting in less government requirements.</p> <p>FY 2023 Plans: Funding supports development of training materials for Block I/II modems</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Previously funded effort under project 456.</p> <p>Funds transferred in FY23 from project 456 to project C07 under the same program element 0303142A to fund continuing Protected Anti-jam Tactical SATCOM and Protected Tactical Waveforms (PTW) efforts.</p>		-	-	0.208
<p>Title: Government System Engineering and Program Management Support (SEPM)</p> <p>Description: Funding supports Government System Engineering and Program Management (SEPM) which includes programmatic personnel, travel, and other related administrative costs. Government Program Management consists of matrix personnel labor and travel requirements. This includes all required program oversight, system engineering and technical control, risk management, and fielding support. CORE Government program management is paid with OMA.</p> <p>Cost decreased and forecasted with current with matrix staffing levels.</p> <p>FY 2023 Plans: Funding support SEPM efforts related to Block I/II modem development</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Previously funded effort under project 456.</p>		-	-	0.359

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) C07 / Protected Tactical Satellite Communications		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Funds transferred in FY23 from project 456 to project C07 under the same program element 0303142A to fund continuing Protected Anti-jam Tactical SATCOM and Protected Tactical Waveforms (PTW) efforts.				
<p>Title: Contractor System Engineering and Program Management Support (SEPM)</p> <p>Description: Funding supports Contractor System Engineering and Program Management (SEPM) which includes programmatic personnel (program analyst, budget analyst, engineer, etc.), travel, and other related administrative costs.</p> <p>No change</p> <p>FY 2023 Plans: Funding supports Contractor System Engineering and Program Management (SEPM) which includes programmatic personnel (program analyst, budget analyst, engineer, etc.), travel, and other related administrative costs.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Previously funded effort under project 456.</p> <p>Funding supports Contractor System Engineering and Program Management (SEPM) which includes programmatic personnel (program analyst, budget analyst, engineer, etc.), travel, and other related administrative costs.</p>		-	-	0.454
<p>Title: Test and Certification</p> <p>Description: Funding for Gov't led labor for testing and certification. New Planned Accomplishment.</p> <p>FY 2023 Plans: FY 2023 Gov't led labor for testing and certification</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Previously funded effort under project 456.</p> <p>Funds transferred in FY23 from project 456 to project C07 under the same program element 0303142A to fund continuing Protected Anti-jam Tactical SATCOM and Protected Tactical Waveforms (PTW) efforts.</p>		-	-	1.024
Accomplishments/Planned Programs Subtotals		-	-	7.569
C. Other Program Funding Summary (\$ in Millions)				
N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) C07 / Protected Tactical Satellite Communications

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

Remarks
This is not a new start. Effort was previously funded under project 456.

Funds transferred in FY23 from project 456 to project C07 under the same program element 0303142A to fund continuing Protected Anti-jam Tactical SATCOM and Protected Tactical Waveforms (PTW) efforts. Procurement funding line Parent BC4000/B34002 (baby) begins in FY23 (\$5.853M).

D. Acquisition Strategy

Protected Anti-jam Tactical SATCOM (Protected SATCOM) is a Joint effort with United States Space Force (USSF) for development. There is a current USSF Acquisition Strategy (AS), and Memorandum of Agreement (MOA) signed 14 June 2019 with Space Force for collaborative modem development and cost sharing for A3M Block I modem. The program will leverage contracts established by USSF for the development of Protected Tactical Waveform (PTW) modems, including development of a small form factor modem capable of running the PTW and Network Centric Waveform - Resilient (NCW-R). Two multi-vendor USSF IDIQ contracts are being utilized for modem development efforts concluding in FY23. In FY24, Army will lead A3M Block II modem development efforts, which will be awarded to a single vendor IDIQ contract.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environm ent (SPACE)	Project (Number/Name) CO7 / Protected Tactical Satellite Communications
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government System Engineering and Program Management	MIPR	Various : APG	-	-		-		0.359	Dec 2022	-		0.359	0.000	0.359	-
Contractor Systems Engineering and Program Support	MIPR	Various : APG	-	-		-		0.454	Dec 2022	-		0.454	0.000	0.454	-
Subtotal			-	-		-		0.813		-		0.813	0.000	0.813	N/A

Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Logistics Support and Data Development	MIPR	APG : APG	-	-		-		0.208	Dec 2022	-		0.208	0.000	0.208	-
PTW Development of Block I Modems	C/FPIF	L3 Harris, Raytheon : Massachusetts	-	-		-		5.524	Oct 2022	-		5.524	0.000	5.524	-
Subtotal			-	-		-		5.732		-		5.732	0.000	5.732	N/A

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Certification	TBD	TBD : TBD	-	-		-		1.024	Nov 2022	-		1.024	0.000	1.024	-
Subtotal			-	-		-		1.024		-		1.024	0.000	1.024	N/A

			Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-	-	7.569	-	7.569	0.000	7.569	N/A

Remarks
This is not a new start. Effort was previously funded under project 456.

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) CO7 / Protected Tactical Satellite Communications
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PTW Block I Modem Development	2	2020	4	2023
Test and Certification	1	2023	4	2023

Note
This is not a new start. Effort was previously funded under project 456.