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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	-	115.688	96.679	-	96.679	-	-	-	-	-	-
BV4: <i>Area Protection and Alt Nav Technology Development</i>	-	-	18.152	16.516	-	16.516	-	-	-	-	-	-
ED5: <i>Assured Positioning, Navigation and Timing (PNT)</i>	-	-	26.222	21.192	-	21.192	-	-	-	-	-	-
EH8: <i>DISMOUNTED</i>	-	-	12.850	12.294	-	12.294	-	-	-	-	-	-
EJ2: <i>MOUNTED</i>	-	-	58.464	46.677	-	46.677	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The current Global Positioning System (GPS) capability is a fixed frequency system susceptible to electronic warfare and field environments (e.g. urban, dense vegetation). Assured Positioning, Navigation and Timing (APNT) provides Army ground maneuver forces access to assured PNT under conditions that may be limited or denied (jammed and spoofed) and in accordance with National Defense Authorization Act guidance. APNT products are ruggedized tactical systems that enable Army forces the ability to shoot, move, communicate, thereby allowing forces to maneuver from operational and strategic distances to close with, destroy, and exploit the enemy with sufficient combat power, tempo, and momentum. APNT addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fires, and Command and Control systems that are dependent on accurate Position and Timing, and a foundational Multi-Domain Battle capability to support: calibrated force posture (position and maneuver across strategic distances); multi-domain formations (operate in contested spaces against near-peer adversaries); convergence (continuous integration of capabilities in all domains).

Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 April 2010, approved the PNT Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. Army Futures Command approved the Mounted APNT System (MAPS) Directed Requirement (DR) on 31 January 2019. The Dismounted APNT System (DAPS) Directed Requirement was approved 19 March 2019. The Alternative Navigation (ALTNAV) Directed Requirement was approved in 10 August 2019. On 12 September 2020, the Army Requirements Oversight Council (AROC) approved the MAPS Capabilities Development Document (CDD). DAPS CDD is planned to be approved in Fiscal Year (FY) 2021. Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) in support of House Report 116-442, 2020 efforts will prototype modular cards and software according to the Modular Open System Architecture (MOSA) standards, for future modernization and new weapons systems. In addition, the CMOSS Mounted Form Factor Abbreviated Capabilities Development Document (A-CDD) was approved in 2nd Quarter FY 2021.

APNT consists of four Projects; (BV4) Area Protection and ALTNAV Technology Development, (ED5) Assured PNT, (EH8) Dismounted APNT System (DAPS), and (EJ2) MAPS.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>
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(BV4) - The Area Protection and Alt Nav Technology Development project supports the transition of technologies from industry, academia, and government Science & Technology organizations, and consequent development of alternative and complementary PNT technologies for integration into MAPS and Dismounted APNT System (DAPS). Area Protection & ALTNAV Technologies will be developed in order to demonstrate Modular Open System Architecture (MOSA), CMOSS, ALTNAV, Science & Technology emerging complementary PNT, and net-enabled GPS solutions to provide Radio Frequency (RF) and non-RF threat mitigation.

(ED5) - The Assured PNT project funding line is for Resiliency and Software Assurance Measures (RSAM) software upgrades to legacy military GPS receivers. Additionally, the Assured PNT project supports the development of Assured PNT enablers, network integration and certification of ALTNAV enterprise build out (ground). Completes critical timing and equipment upgrades. These connections, upgrades, and certification activities are critical to operationalizing ALTNAV as an effective and suitable contingency source of PNT data in the event GPS is denied/degraded.

(EH8) - The Dismounted APNT System (DAPS) will provide Dismounted Soldiers, Commanders, and Systems the resilient, survivable, Military Code (M-Code) capable timing and position data to effectively engage targets, share data across the network and conduct mission command in degraded or denied GPS environments.

(EJ2) - The MAPS is a platform-mounted, ruggedized tactical PNT system that provides electronic protection capabilities to provide Army forces the ability to move, shoot, communicate, and provide situational awareness in degraded or denied GPS environments.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	128.125	66.661	-	66.661
Current President's Budget	0.000	115.688	96.679	-	96.679
Total Adjustments	0.000	-12.437	30.018	-	30.018
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.761			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-4.676			
• Adjustments to Budget Years	-	-	30.018	-	30.018

Change Summary Explanation

FY 2022 funding increased for MAPS platform integrations.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army										Date: May 2021		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>				Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
<i>BV4: Area Protection and Alt Nav Technology Development</i>	-	-	18.152	16.516	-	16.516	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The primary focus of Area Protection and Alt Nav Technology Development is to enable the effective transition of incremental and disruptive technologies to fieldable Positioning, Navigation and Timing (PNT) solutions to pace or overmatch current and evolving threats and in accordance with National Defense Authorization Act (NDAA) Guidance (2021 NDAA: Section 1611). Program activities including advanced component development, prototyping, and demonstration to bridge the gap between advanced technology development (S&T) and system development (products). These activities demonstrate the military utility to enable effective transitions and synergize development across products.

Currently, military GPS is limited to specific frequency bands which could be defeated by our enemies. This project supports the Alternative Navigation (ALTNV) capability and complementary PNT technologies. ALTNV provides frequency and source diversity to enable Army users with accurate and assured position and time information in GPS degraded environments. Additional Radio Frequency (RF) signals such as Global Navigation Satellite Systems (GNSS) and other satellite communications (SATCOM) sources integrated into PNT products and user equipment will provide alternatives while operating in a GPS degraded environment. Complementary PNT technology will include network integration, installation and testing of the infrastructure capability and user equipment. Other efforts include the continuation of situational awareness development, spectrum modification for PNT solutions, and modeling and simulation support.

Prototyping efforts for modular cards and software are developed according to Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) (Reference House Report 116-442, 2020). Hardware and software technologies transitioned to Mounted Assured PNT System (MAPS) and Dismounted Assured PNT System (DAPS) programs of record will comply with the PNT Reference Architecture and Modular Open System Architecture (MOSA) compliant hardware; CMOSS and software frameworks (PNT Operating System (pntOS)), to ensure a plug and play capability. Utilization of these standards will be verified in the Open Innovation Lab (OIL).

Fiscal Year (FY) 2022 Base funds in the amount of \$16.516 Million support prototyping and technical validation of complementary PNT technologies; CMOSS design and platform integration; pntOS software development and OIL operations and testing.

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

	FY 2020	FY 2021	FY 2022
Title: Area Protection & Alt Nav Technology Development	-	18.152	16.516
Description: The effort supports complementary and Alternative Navigation (ALTNV) PNT capabilities.			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Base funds in the amount of \$18.152 Million support ALTNAV User Equipment characterization and optimization and prototyping and technical validation of complementary PNT technologies; Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) design and platform integration; pntOS software development and Open Innovation Lab (OIL) operations and testing.			
FY 2022 Plans: FY 2022 Base funds in the amount of \$16.516 Million will support prototyping and technical validation of complementary PNT technologies; C5ISR CMOSS design and platform integration; pntOS software development and OIL operations and testing.			
FY 2021 to FY 2022 Increase/Decrease Statement: Area Protection and Alt Nav Technology Development RDT&E funding decreased from \$18.152 Million in FY 2021 to \$16.516 Million in FY 2022 due to reduced funding for Modular Open System Architecture (pntOS & CMOSS).			
Accomplishments/Planned Programs Subtotals	-	18.152	16.516

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EH8: <i>DISMOUNTED</i>	-	12.850	12.294	-	12.294	-	-	-	-	-	-
• EJ2: <i>MOUNTED</i>	-	58.464	46.677	-	46.677	-	-	-	-	-	-
• AW6: <i>Modular GPS Independent Sensors Advanced Tech</i>	-	10.684	6.813	-	6.813	-	-	-	-	-	-
• AV8: <i>Navigation Warfare (NAVWAR) Advanced Technology</i>	5.707	2.535	1.927	-	1.927	-	-	-	-	-	-
• 0603639A: <i>Tank and Medium Caliber Ammunition</i>	72.456	100.367	79.873	-	79.873	-	-	-	-	-	-

Remarks
The project matures prototyping or other demonstrations to prove out technology before it is integrated into a Program of Record (PoR). This is solidified by the following linkage:

- Modular GPS Independent Sensors (AW6)
- Navigation Warfare (AV8)
- Tank and Medium Caliber Ammunition (0603639A)

Linked to:

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army	Date: May 2021
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
Area Protection and Alt Nav technology development (BV4)											
Linked to:											
Dismounted Assured PNT Systems (EH8)											
Mounted Assured PNT Systems (EJ2)											

D. Acquisition Strategy

Mounted Assured Positioning, Navigation, and Timing System (MAPS) Capabilities Development Document (CDD), Army Requirements Oversight Council (AROC) Approved, 12 September 2020.

MAPS Directed Requirement (DR), 31 January 2019.

Dismounted Assured Positioning, Navigation, and Timing System (DAPS) DR, 19 March 2019.

Alternative Navigation (ALTNAV) DR, 10 August 2019.

Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Modular Open Suite of Standards (CMOSS) Mounted Form Factor Abbreviated Capabilities Development Document (A-CDD), validated by GEN Murray on 4 January 2021.

Area Protection & Alt Nav Technology Development program will utilize prototyping and modeling & simulation to assess the military utility of advanced component capabilities through critical Soldier touchpoints, laboratory, and field assessments to determine technology maturation for integration into Mounted Assured Positioning, Navigation, and Timing System (MAPS) and Dismounted Assured Positioning, Navigation, and Timing System (DAPS). ALTNAV Enterprise Capability enhancements will be implemented by utilizing a mix of competitive Other Transaction Authority (OTA)'s and Federal Acquisition Regulation contracts. This will inform future MAPS and DAPS requirements.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				BV4 / Area Protection and Alt Nav Technology Development							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
Project Management Support	Various	Various : Various	-	-		0.911	Nov 2020	1.011	Nov 2021	-		1.011	0.000	1.922	-
Subtotal			-	-		0.911		1.011		-		1.011	0.000	1.922	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
ALTNAV Development	Various	Various : Various	-	-		1.927	Dec 2020	1.500	Dec 2021	-		1.500	0.000	3.427	-
Complementary PNT Modeling & Simulation, and Experimentation	Various	Various : Various	-	-		0.908	Apr 2021	0.600	Apr 2022	-		0.600	0.000	1.508	-
Modular Open System Architecture (pntOS & CMOSS)	Various	Various : Various	-	-		8.479	Nov 2020	6.691	Nov 2021	-		6.691	0.000	15.170	-
Subtotal			-	-		11.314		8.791		-		8.791	0.000	20.105	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 and Technical Services - Government	Various	C5ISR : Various	-	-		0.249	Nov 2020	0.256	Nov 2021	-		0.256	0.000	0.505	-
Engineering and Technical Services - Contractor	Various	DCS Corporation / MITRE / DOTC : APG, MD	-	-		4.790	Nov 2020	4.804	Nov 2021	-		4.804	0.000	9.594	-
Subtotal			-	-		5.039		5.060		-		5.060	0.000	10.099	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) BV4 / Area Protection and Alt Nav Technology Development
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Open Innovation Lab (OIL)	MIPR	C5ISR : APG, MD	-	-		0.480	Nov 2020	1.234	Nov 2021	-		1.234	0.000	1.714	-
System Integration Lab (SIL)	MIPR	C5ISR : APG, MD	-	-		0.408	Feb 2021	0.420	Feb 2022	-		0.420	0.000	0.828	-
Subtotal			-	-		0.888		1.654		-		1.654	0.000	2.542	N/A

Remarks
The Modular Integration Lab (MIL) was renamed to the Open Innovation Lab (OIL). The OIL conducts a recurring series of data driven demonstrations and evaluations of high Technical Readiness Level (TRL) operationally effective PNT solutions that transition to production easily in order to pace/overmatch enemy PNT threat systems.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-	18.152	16.516	-	16.516	0.000	34.668	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) BV4 / Area Protection and Alt Nav Technology Development	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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
ALTNAV Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Alt Nav Development																												
Complementary PNT Modeling & Simulation, and Experimentation	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Complementary PNT Modeling & Simulation, and Experimentation																												
PNT Technical Demonstrations & Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Tech Demonstrations & Testing																												
Modular Opens Systems Architecture, PNT Operating System & CMOSS	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
MoGIS, PntOS, CMOSS																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) BV4 / <i>Area Protection and Alt Nav Technology Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ALTNAV Development	2	2019	4	2022
Complementary PNT Modeling & Simulation, and Experimentation	2	2019	4	2022
PNT Technical Demonstrations & Testing	1	2020	4	2022
Modular Opens Systems Architecture, PNT Operating System & CMOSS	1	2021	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army										Date: May 2021		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
ED5: Assured Positioning, Navigation and Timing (PNT)	-	-	26.222	21.192	-	21.192	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Assured Positioning, Navigation and Timing (PNT) project funds the Resiliency and Software Assurance Measures (RSAM) which provides increased capability and situational awareness for fielded legacy military Global Positioning System (GPS) receivers supporting systems and soldiers through at least 2035. Legacy GPS receivers targeted for RSAM enhancements, include but are not limited to, 226,000 Defense Advanced GPS Receiver (DAGR) and 200,000+ embedded Ground Based-GPS Receiver Applications Module (GB-GRAM). RSAM software upgrades mitigate threats to legacy DAGR and GB-GRAM Selective Availability and Anti-Spoof Module (SAASM) based military GPS receivers. RSAM provides an interim solution in a GPS-challenged operational environment until future Positioning, Navigation and Timing (PNT) solutions are fully deployed. RSAM will coordinate integrated software testing with military system managers and the test community to validate software and synchronize RSAM deployment to the user. Additionally, the Assured PNT project supports the Alternative Navigation (ALTNAV) capability that will provide positioning and timing information for navigation for the Army, which completes critical timing and equipment upgrades, and key certification activities. These connections, upgrades, and certification activities are critical to operationalizing ALTNAV as an effective and suitable contingency source of PNT data in the event GPS is denied/degraded.

Fiscal Year (FY) 2022 base funds in the amount of \$21.192 Million support RSAM software enhancements to Army PNT receivers and capabilities, and development of Assured PNT enablers to include network integration and certification of ALTNAV enterprise build out (ground).

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

	FY 2020	FY 2021	FY 2022
Title: Resiliency and Software Assurance Measures (RSAM)	-	15.969	14.232
Description: Funding supports the following efforts:			
FY 2021 Plans:			
FY 2021 base funds in the amount of \$15.969 million support the release of RSAM GB-GRAM Update 1, support continued software development of RSAM DAGR Update 2 and RSAM GB-GRAM Update 2, to include prototype testing, formal qualification testing, and risk mitigation efforts. RSAM DAGR and GB-GRAM receiver integration testing efforts for Update 2 are performed in association with relevant military vehicles and systems.			
FY 2022 Plans:			

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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>FY2022 base funds in the amount of \$14.232 Million will complete development of RSAM DAGR Update 2 and RSAM GB-GRAM Update 2, to include prototype testing, formal qualification testing, and risk mitigation efforts. RSAM DAGR and RSAM GB-GRAM receiver integration testing efforts for this update will be performed in association with military vehicles and systems.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Resiliency Software and Assurance Measures, Program Element (PE) 0604120A project ED5 funding decreased from \$15.969 Million in FY 2021 to \$14.232 Million in FY 2022 due to completion of software update to MicroGRAM receivers.</p>			
<p>Title: Assured PNT Enablers</p> <p>Description: Assured PNT Enablers.</p> <p>FY 2021 Plans: FY 2021 base funds in the amount of \$10.253 million continue network integration, installation and testing of Alternative Navigation signal enterprise build-out.</p> <p>FY 2022 Plans: FY 2022 base funds in the amount of \$6.960 million will support development of Assured PNT enablers to include network integration and certification of ALTNAV enterprise build out (ground).</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Assured PNT Enablers, PE 0604120A project ED5 funding decreased from \$10.253 Million in FY 2021 to \$6.960 Million in FY 2022 due to reduced scope of Alternative Navigation enterprise build out (ground).</p>	-	10.253	6.960
Accomplishments/Planned Programs Subtotals	-	26.222	21.192

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• K49010: <i>Mounted/Dismounted Receivers</i>	1.724	5.894	1.990	-	1.990	-	-	-	-	-	-

Remarks
K49010 / Mounted/Dismounted Receivers is an OPA subset of Line Item Number K49000 / Assured Positioning, Navigation and Timing.

D. Acquisition Strategy
PNT RSAM will provide software improvements to legacy military GPS receivers by awarding contracts to the original equipment manufacturer and leverage the test community to develop and characterize prototypes and final software solutions.

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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Assured PNT enablers will provide network integration and certification of ALTNAV enterprise build out (ground) by utilizing a mix of competitive Other Transaction Authority (OTA)'s and Federal Acquisition Regulation contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				ED5 / Assured Positioning, Navigation and Timing (PNT)							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
Project Management Support	Various	Various : Various	2.693	-		0.921	Nov 2020	1.227	Nov 2021	-		1.227	0.000	4.841	-
Subtotal			2.693	-		0.921		1.227		-		1.227	0.000	4.841	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	1.168	-		5.750	Nov 2020	1.687	Oct 2021	-		1.687	0.000	8.605	-
RSAM - GB-GRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	2.902	-		5.499	Nov 2020	4.986	Nov 2021	-		4.986	0.000	13.387	-
Assured PNT Enablers	Various	Various : Various	5.177	-		10.253	Nov 2020	6.960	Nov 2021	-		6.960	0.000	22.390	-
RSAM - MicroGRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	2.158	-		-		-		-		-	0.000	2.158	-
Subtotal			11.405	-		21.502		13.633		-		13.633	0.000	46.540	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 and Technical Contracting Services	C/FFP	DCS Corp : APG, MD	9.445	-		1.558	Jan 2021	1.672	Oct 2021	-		1.672	0.000	12.675	-
Engineering and Technical Government Services	MIPR	Various : Various	3.049	-		1.141	Dec 2020	1.542	Nov 2021	-		1.542	0.000	5.732	-
Subtotal			12.494	-		2.699		3.214		-		3.214	0.000	18.407	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
RSAM - Government Engineering Support	MIPR	Various : Various	3.819	-		0.384	Mar 2021	0.558	Nov 2021	-		0.558	0.000	4.761	-
RSAM - Contractor Engineering Support	Various	Various : APG, MD	2.270	-		0.396	Mar 2021	2.380	Nov 2021	-		2.380	0.000	5.046	-
Platform Integration Testing	Various	Various : Various	0.535	-		-		-		-		-	0.000	0.535	-
RSAM Test Equipment	Various	Various : Various	0.414	-		0.320	Mar 2021	0.180	Mar 2022	-		0.180	0.000	0.914	-
Subtotal			7.038	-		1.100		3.118		-		3.118	0.000	11.256	N/A

Remarks
The increased FY22 test cost is to complete the software and platform integration testing for the RSAM Update 2 to DAGR and GB-GRAM.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	33.630	-	26.222	21.192	-	21.192	0.000	81.044	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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
RSAM Update 1	[Blue Bar]				[Blue Bar]																							
RSAM DAGR Software Development and Testing Update 1	[Blue Bar]				[Blue Bar]																							
RSAM GB-GRAM Software Development & Testing Update 1	[Blue Bar]				[Blue Bar]																							
Platform Integration Testing Update 1	[Blue Bar]				[Blue Bar]																							
RSAM DAGR Software Release Update 1					▲ 1 DAGR Update 1 Release																							
RSAM GB-GRAM Update 1 Software Release					▲ 2 GB-GRAM Update 1 Release																							
RSAM Update 2	[Blue Bar]				[Blue Bar]				[Blue Bar]																			
RSAM DAGR Software Development and Testing Update 2	[Blue Bar]				[Blue Bar]				[Blue Bar]																			
RSAM GB-GRAM Software Development and Testing Update 2	[Blue Bar]				[Blue Bar]				[Blue Bar]																			
Platform Integration Testing Update 2	[Blue Bar]				[Blue Bar]				[Blue Bar]																			
RSAM DAGR Update 2 Software Release													▲ 3 DAGR Update 2 Release															
RSAM GB-GRAM Update 2 Software Release													▲ 4 GB-GRAM Update 2 Release															
RSAM DAGR and GB-GRAM Post Software Release Support					[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]							

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) ED5 / Assured Positioning, Navigation and Timing (PNT)	

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026							
	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				
Assured PNT Enablers	Assured PNT Enablers																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) ED5 / <i>Assured Positioning, Navigation and Timing (PNT)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RSAM Update 1	1	2019	2	2021
RSAM DAGR Software Development and Testing Update 1	1	2018	4	2020
RSAM GB-GRAM Software Development & Testing Update 1	1	2019	2	2021
Platform Integration Testing Update 1	1	2019	2	2021
RSAM DAGR Software Release Update 1	4	2020	4	2020
RSAM GB-GRAM Update 1 Software Release	2	2021	2	2021
RSAM Update 2	4	2019	4	2022
RSAM DAGR Software Development and Testing Update 2	2	2020	4	2022
RSAM GB-GRAM Software Development and Testing Update 2	4	2020	1	2023
Platform Integration Testing Update 2	3	2021	1	2023
RSAM DAGR Update 2 Software Release	2	2023	2	2023
RSAM GB-GRAM Update 2 Software Release	4	2023	4	2023
RSAM DAGR and GB-GRAM Post Software Release Support	4	2020	4	2026
Assured PNT Enablers	1	2019	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EH8: <i>DISMOUNTED</i>	-	-	12.850	12.294	-	12.294	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Dismounted Assured PNT (APNT) System (DAPS) implements congressional and OSD guidance to develop and field Military Code (M-Code) Ground user Equipment (MGUE) to dismounted Soldiers, Commanders, and systems (e.g. Nett Warrior (NW), other Soldier architecture compliant systems, etc.), in order to provide the timing and position data necessary to effectively engage targets, share data across the network, and conduct mission command functions. DAPS is planned to deliver APNT in an optimized form factor that supports dismounted mission profiles in contested and denied environments and use cases where mounted APNT solutions are not available. DAPS includes the development of hardware and software to integrate M-Code, Global Positioning System (GPS), Alternative Navigation (ALTNV) signals, non-radio frequency (RF) sensors, and other PNT sources to generate and distribute a fused APNT solution to applicable End User Devices (EUD).

Fiscal Year (FY) 2022 Base funds in the amount of \$12.294 Million will support continued engineering development, production and manufacturing readiness, and Limited User Test (LUT) in preparation for Milestone C scheduled for 2nd Quarter (Q) FY 2023.

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

	FY 2020	FY 2021	FY 2022
Title: Dismounted APNT System (DAPS)	-	12.850	12.294
Description: This effort supports the DAPS hardware and software development, system engineering and client integration, development and operational testing, and program management efforts.			
FY 2021 Plans: FY 2021 Base funds in the amount of \$12.850 Million supports continued development of DAPS prototype variants, client system integration, development and operational assessment, and program management efforts.			
FY 2022 Plans: FY 2022 Base funds in the amount of \$12.294 Million will support continued engineering development, production and manufacturing readiness, and LUT in preparation for Milestone C scheduled for 2Q FY 2023.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased from \$12.850 Million in FY 2021 to \$12.294 Million in FY 2022. This reduction is due to reduced prototyping and engineering development efforts.			
Accomplishments/Planned Programs Subtotals	-	12.850	12.294

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>

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

Line Item	FY 2020	FY 2021	FY 2022	FY 2022	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Cost To	
			Base	OCO	Total					Complete	Total Cost
• K49020: <i>Dismounted Hub</i>	-	48.449	32.643	-	32.643	-	-	-	-	-	-
• BV4: <i>Area Protection and Alt Nav Technology Development</i>	-	18.152	16.516	-	16.516	-	-	-	-	-	-

Remarks

K49020 / Dismounted Hub is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

Risk reduction prototyping efforts from 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the DAPS.

D. Acquisition Strategy

The DAPS acquisition strategy consists of an iterative development operations (DevOps) methodology for the development, testing, production and fielding of a material solution that implements Congressional guidance for M-Code capability (10 USC 2281), modular open systems architecture (10 USC 2446a), and the DAPS Capability Development Document (approval planned for 4Q FY 2021) performance requirements. The DAPS strategy leverages competitive Other Transaction Authority (OTA) agreements and Small Business Innovative Research (SBIR) contracts to assess industry capabilities, develop prototypes, and mature technology upgrades. Developmental test and operational assessment results will inform a best value decision in September 2021 of the selected material solution for final engineering development, production and manufacturing readiness, and LUT. LUT results will inform a major capabilities acquisition program Milestone C decision in 2Q FY 2023.

DAPS requirement documents include:

Quick Reaction Capability (QRC): DAPS Directed Requirement (19 Mar 2019), Alternative Navigation Directed Requirement (10 August 2019), APNT Requirements Trace and Concurrence for DAPS with ALTNAV Handheld Devices memorandum (16 April 2020).

Program of Record (POR): DAPS Capabilities Development Document (CDD) (Planned 4Q FY 2021).

DAPS Milestone C shifts from 3Q FY 2021 to 2Q FY 2023 to accommodate additional Quick Reaction Capability (QRC) equipping, additional material solution development, and incorporation of lessons learned from the QRC into the DAPS Program of Record. DAPS will complete development, testing and evaluation in FY 2022 ahead of Low Rate Initial Production (LRIP).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604120A / Assured Positioning, Navigation and Timing (PNT)				EH8 / DISMOUNTED							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
Project Management Support - Contractor	Various	Various : Various	-	-		0.699	Dec 2020	0.567	Dec 2021	-		0.567	0.000	1.266	-
Subtotal			-	-		0.699		0.567		-		0.567	0.000	1.266	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
DAPS Prototyping & Engineering Development, Production & Manufacturing Readiness	MIPR	Various : Various	-	-		7.537	Dec 2020	5.071	Dec 2021	-		5.071	0.000	12.608	-
Engineering and Technical Product Development	MIPR	C5ISR : APG, MD	-	-		1.825	Dec 2020	1.244	Dec 2021	-		1.244	0.000	3.069	-
Subtotal			-	-		9.362		6.315		-		6.315	0.000	15.677	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 and Technical Services - Government	Various	C5ISR : Various	-	-		0.284	Nov 2020	0.388	Nov 2021	-		0.388	0.000	0.672	-
Engineering and Technical Services - Contractor	C/CPFF	DCS Corporation : APG, MD	-	-		0.344	Dec 2020	0.356	Dec 2021	-		0.356	0.000	0.700	-
Subtotal			-	-		0.628		0.744		-		0.744	0.000	1.372	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH8 / DISMOUNTED
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 Evaluations	MIPR	Various : Various	-	-		2.161	Dec 2020	4.668	Dec 2021	-		4.668	0.000	6.829	-
Subtotal			-	-		2.161		4.668		-		4.668	0.000	6.829	N/A

Remarks
Test and Evaluation costs in FY22 increased for development test and Limited User Test in support of Milestone C decision.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals	-	-	12.850	12.294	-	12.294	0.000	25.144

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EH8 / DISMOUNTED

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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
DAPS Quick Reaction Capability (QRC) Prototyping	QRC Prototyping																											
DAPS Quick Reaction Capability (QRC) Testing and Analyses					QRC Testing and Analyses																							
DAPS Quick Reaction Capability (QRC) Production & Equipping					QRC Production & Equipping																							
DAPS Capability Development Document (CDD)					1 CDD																							
DAPS Program of Record (POR) Engineering Development for Production									DAPS POR Engineering Development for Production																			
DAPS Milestone C Production Decision													2 Milestone C Production Decision															
DAPS Low Rate Initial Production (LRIP)													DAPS LRIP															
DAPS Production																	DAPS Production											
DAPS Fielding																	DAPS Fielding											

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / <i>DISMOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
DAPS Quick Reaction Capability (QRC) Prototyping	2	2019	4	2021
DAPS Quick Reaction Capability (QRC) Testing and Analyses	2	2021	1	2022
DAPS Quick Reaction Capability (QRC) Production & Equipping	3	2021	2	2023
DAPS Capability Development Document (CDD)	4	2021	4	2021
DAPS Program of Record (POR) Engineering Development for Production	1	2022	2	2023
DAPS Milestone C Production Decision	2	2023	2	2023
DAPS Low Rate Initial Production (LRIP)	2	2023	2	2024
DAPS Production	3	2024	2	2028
DAPS Fielding	3	2024	4	2028

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EJ2: <i>MOUNTED</i>	-	-	58.464	46.677	-	46.677	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Mounted Assured Positioning, Navigation and Timing System (MAPS GEN II) will meet congressional (10 USC 2281) and Department of Defense guidance to provide resilient, survivable, M-Code capable Ground User Equipment (MGUE) receivers. The MAPS will provide Army ground maneuver and strategic forces access to assured PNT information utilizing various sources of PNT data to address multiple threats and ensure mission success where Global Positioning System (GPS) may be limited or denied. The MAPS GEN II is comprised of two subsystems: a internally mounted navigation hub where data from sensors and receivers (to include M-code) are fused together to distribute an assured PNT solution to the platform and onboard client systems and an Anti-Jam antenna (AJAS) mounted externally on the platform to protect access to GPS and receive Alternative Navigation signals. The MAPS will enable critical Army Maneuver, Fires, Communications, Command (to include Blue Force Tracking), and Air Defense capabilities that are dependent on accurate position and timing data. The MAPS GEN II will be integrated into prioritized platforms in Armored, Stryker and Infantry Brigade Combat Teams and Key Strategic Units in order to conduct Multi-Domain Operations (MDO).

Fiscal Year (FY) 2022 Base dollars in the amount of \$46.677 Million support system engineering and management support, platform and client integration, and testing of the MAPS capability for 18 host platforms. Milestone Decision C / Low Rate Initial Production (LRIP) Decision and award of the production contract are critical events planned for 2nd Quarter (Q) FY 2022.

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

	FY 2020	FY 2021	FY 2022
<p>Title: Mounted APNT System (MAPS)</p> <p>Description: Funding supports MAPS GEN II hardware and software development, systems engineering, platform and client system integration, development and operational testing, and program management efforts.</p> <p>FY 2021 Plans: FY 2021 Base dollars in the amount of \$58.464 Million supports MAPS GEN II hardware and software engineering development, manufacturing readiness (production maturation), host platform and client integration (Double-Vee Hull Stryker variants, Joint Light Tactical Vehicles, Abrams M1A2 SEP V3, Bradley M2A4, Paladin M109A7), development, and program management activities. The year will culminate with a Limited User Test conducted with Soldiers conducting operational maneuver on Strykers.</p> <p>FY 2022 Plans: FY 2022 Base dollars in the amount of \$46.677 Million supports software integration, manufacturing readiness (production maturation), client system and platform integration and testing for 18 platforms, and program management activities. Milestone C is scheduled for 2Q FY 2022.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	-	58.464	46.677

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army	Date: May 2021
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding decreased from \$58.464 Million in FY 2021 to \$46.677 Million in FY 2022 due to reduced MAPS system engineering management efforts leading to Milestone C and testing.			
Accomplishments/Planned Programs Subtotals	-	58.464	46.677

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

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• K49030: <i>Mounted Hub A-PNT</i>	41.728	86.610	80.658	-	80.658	-	-	-	-	-	-
• BV4: <i>Area Protection and Alt Nav Technology Development</i>	-	18.152	16.516	-	16.516	-	-	-	-	-	-

Remarks
 K49030 / Mounted Hub APNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the MAPS.

D. Acquisition Strategy
 The MAPS acquisition strategy consists of an iterative development operations methodology for the development, testing, production and fielding of a material solution that implements Congressional guidance for M-Code capability (10 USC 2281), modular open systems architecture (10 USC 2446a), and the MAPS Capability Development Document (approved 12 September 2020) performance requirements. The MAPS strategy leverages competitive Other Transaction Authority (OTA) agreements to assess industry capabilities, develop prototypes, and mature technology upgrades. Development test and operational assessment results informed a best value decision in September 2020 of the selected material solution for final engineering development, production and manufacturing readiness, and Limited User Test (LUT). LUT results will inform a major capabilities acquisition program Milestone C decision in 2Q FY 2022 and enable expedited fielding. A follow-on fixed priced type production contract to the OTA will be awarded following MS C and provide production representative test articles for Initial Operational Test and Evaluation in FY 2023 and demonstrate ramp-up capability to full rate productions quantities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army **Date:** May 2021

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)	Project (Number/Name) EJ2 / MOUNTED
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Project Management Support	C/CPFF	Various : Various	-	-		1.430	Nov 2020	0.747	Jan 2022	-		0.747	0.000	2.177	Continuing
Subtotal			-	-		1.430		0.747		-		0.747	0.000	2.177	N/A

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Manufacturing Readiness (Product Maturation) Contract	C/FFP	Collins Aerospace : APG, MD	-	-		21.195	Nov 2020	6.715	Nov 2021	-		6.715	0.000	27.910	-
Mounted PNT Integration - Combat Platforms	C/CPFF	Various : Various	-	-		21.402	Mar 2021	8.949	Dec 2021	-		8.949	0.000	30.351	-
Mounted PNT Integration - Combat Support Platforms	C/CPFF	Various : Various	-	-		0.493	Nov 2020	8.371	Feb 2022	-		8.371	0.000	8.864	-
Mounted PNT Integration - Combat Systems Platforms	Various	Various : Various	-	-		0.469	Dec 2020	15.531	Feb 2022	-		15.531	0.000	16.000	-
Client Software Integration (MMC)	MIPR	AvMC / S3I : Huntsville, AL	-	-		0.805	Feb 2021	0.810	Jan 2022	-		0.810	0.000	1.615	-
Technical Manuals and Support Equipment	C/FFP	TBD : TBD	-	-		-		0.289	Dec 2021	-		0.289	0.000	0.289	Continuing
Subtotal			-	-		44.364		40.665		-		40.665	0.000	85.029	N/A

Remarks
 Manufacturing Readiness (Product Maturation) will baseline the design, transition production processes for a ramp up and delivers hardware for the developmental and Limited User Tests that inform Milestone C in 2QFY2022.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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
Client and Platform Integration	[Blue bar spanning all quarters from FY 2020 to FY 2025]																											
Mounted APNT Prototyping and Testing - Phase 2	[Blue bar]				[Blue bar]																							
Operational Tech Demonstration				[Blue square]																								
Direct Requirement Decision Preferred Material Solution				[Blue triangle 1]																								
Production Maturation and Testing - Phase 3					[Blue bar]																							
Limited User / Development Test									[Blue bar]																			
Milestone C Low Rate Initial Production (LRIP) Decision																												
Production Contract Award																												
Initial Operational Test & Evaluation																												
Full Rate Production Decision																												
Follow on Test and Evaluation																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604120A / <i>Assured Positioning, Navigation and Timing (PNT)</i>	Project (Number/Name) EJ2 / <i>MOUNTED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Client and Platform Integration	3	2019	4	2025
Mounted APNT Prototyping and Testing - Phase 1	1	2019	4	2019
Mounted APNT Prototyping and Testing - Phase 2	4	2019	4	2020
Operational Tech Demonstration	4	2020	4	2020
Direct Requirement Decision Preferred Material Solution	4	2020	4	2020
Production Maturation and Testing - Phase 3	4	2020	2	2022
Limited User / Development Test	3	2021	4	2021
Milestone C Low Rate Initial Production (LRIP) Decision	2	2022	2	2022
Production Contract Award	2	2022	2	2022
Initial Operational Test & Evaluation	4	2023	4	2023
Full Rate Production Decision	2	2024	2	2024
Follow on Test and Evaluation	4	2024	4	2024