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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604823A / Firefinder							
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	6.177	45.605	45.473	-	45.473	48.745	49.874	48.167	49.479	0.000	293.520
L86: <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>	-	3.064	2.136	4.194	-	4.194	4.913	5.379	3.459	4.288	0.000	27.433
L87: <i>Hypervelocity Armament System (HAS)</i>	-	0.000	36.000	35.617	-	35.617	35.587	35.581	35.576	35.567	0.000	213.928
L88: <i>Enhanced AN/TPQ 36</i>	-	3.113	7.469	5.662	-	5.662	8.245	8.914	9.132	9.624	0.000	52.159

A. Mission Description and Budget Item Justification

This program funds design, development and test of primary target acquisition and counterfire radars to automatically detect, locate and classify hostile indirect fire weapons (mortars, artillery, and rockets). The program directly supports the prioritization, tracking and locating of targets, and dissemination of that information for simultaneous attack of multiple threats. It provides the Warfighter with continuous and responsive counterfire target acquisition systems for all types and phases of military operations. Project L86, Lightweight Counter Mortar Radar (LCMR), version AN/TPQ-50 provides 360 degrees of azimuth coverage from ranges of 500 meters to 10 kilometers. The AN/TPQ-50 and AN/TPQ-53 radars are currently fielded to multiple Continental United States (CONUS) and Outside Continental United States (OCONUS) locations to include operational support to Operation Inherent Resolve (OIR) and Operation Freedom's Sentinel (OFS). Project L88, AN/TPQ-53 is a highly mobile radar system that leverages the latest in technology design to accelerate technology infusion and increase range while improving false location rate, reducing obsolescence and increasing reliability. The AN/TPQ-53 provides a system with increased range and accuracy throughout a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) for locating mortar, artillery and rocket firing positions.

The Fiscal Year FY 2019 Base funding in the amount of \$9.856 million will support ongoing AN/TPQ-53 test efforts and Army interoperability certifications (AICs), AN/TPQ-50 and AN/TPQ-53 development and testing of modernization efforts for electronic protection and new and emerging threats as well as the performance of technical assessments, concept studies, risk reduction and required documentation.

Starting in FY 2019, program office core employee labor costs have been moved from RDTE to OMA as part of an OSD auditability directive.

This program line also funds development of an integrated Hypervelocity Armament System (HAS), and associated technologies as they mature to support accelerated demonstration and transition of advanced gun weapon systems, command guided maneuverable projectiles, and tactical sensors. The development of HAS would include advancing artillery powder guns firing Hypervelocity Projectiles (HVPs), resulting in next-generation, common, low drag, guided cannon artillery projectiles capable of completing multiple missions with improved cost effectiveness across different gun systems. Integration with a fire control radar and sensor array will allow closed-loop targeting of moving and relocatable targets beyond the range of conventional artillery. Current estimates for follow on development efforts achieve transitionable technology solutions by FY 2023.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>
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Fiscal Year FY 2019 Base funding in the amount of \$35.617 million will support the continued initiation of accelerated transition planning, contract requirements package development, system evaluation, requirements/specification work, integration development and test plans for the Hypervelocity Armament System. The Army will leverage Strategic Capabilities Office (SCO) prototypes and technologies to continue transition from the FY 2018 program into programs of record.

B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	9.235	45.605	47.023	-	47.023
Current President's Budget	6.177	45.605	45.473	-	45.473
Total Adjustments	-3.058	0.000	-1.550	-	-1.550
• Congressional General Reductions	-0.004	-			
• Congressional Directed Reductions	-2.810	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.244	-			
• Other Adjustments 3	-	-	-1.550	-	-1.550

Change Summary Explanation

FY 2017 Congressional General Reduction of \$0.004 million is for FFRDC for both Lightweight Counter Mortar Radar (LCMR) and Enhanced AN/TPQ-36 (\$0.002 million per program).

FY 2017 Congressional Directed Reduction of \$2.810 million for Enhanced AN/TPQ-36 carryover.

FY 2017 SBIR/STTR Transfer is split between LCMR (\$0.121 million) Enhanced AN/TPQ-36 (\$0.123 million).

FY 2019 Other Adjustments 3 reflects the following decreases:

*LCMR - \$0.167 million

*Hypervelocity Armament System (HAS) - \$0.383 million

*Enhanced AN/TPQ-36 - \$1.122 million

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
L86: <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>	-	3.064	2.136	4.194	-	4.194	4.913	5.379	3.459	4.288	0.000	27.433
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AN/TPQ-50 Lightweight Counter Mortar Radar (LCMR) is a highly mobile radar that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing 360 degrees of azimuth coverage from ranges of 500 meters to 10 kilometers and is capable of being deployed in two configurations, standalone or vehicle mounted. The AN/TPQ-50 system interoperates with mission command systems (MCSs) to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-50 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-50 is currently fielded to multiple Continental United States (CONUS) and Outside Continental United States (OCONUS) locations to include support to Operation Inherent Resolve (OIR) and Operation Freedom's Sentinel (OFS).

The Fiscal Year (FY) 2019 Research, Development, Test and Evaluation (RDTE) funds of \$4.194 million will continue the work required to enhance the AN/TPQ-50's capability to address electronic protection against cyber electromagnetic activity (CEMA) and other known, new, emerging and evolving threats identified in the System Threat Assessment Report (STAR). This effort will develop and integrate sensor protect capabilities into the software baseline, develop advanced protection techniques which take advantage of hardware upgrades, and develop documentation for hardware and software capability improvements. Funding supports all associated testing costs and program support.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Electronic Protection	0.797	-	-	-	-
Description: The effort develops spectrum management techniques, mitigates electromagnetic interference (EMI) from commercial and military bands in addition to hostile EMI, and improves signal processor protection algorithms to defeat radar targeting armaments.					
Title: Modernization & New and Emerging Threats	2.267	2.136	4.194	-	4.194
Description: Program modernization effort which completes the development of hardware kits and develops advanced electronic protection techniques via software to combat CEMA. This effort funds the development of capabilities to address vulnerabilities identified in the bi-annual release of the STAR and changes on the battlefield due to new tactics, techniques, procedures (TTPs) and/or areas of operation.					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army				Date: February 2018	
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>		Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>	

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p><i>FY 2018 Plans:</i> This will continue the work required to enhance the AN/TPQ-50's capability to address electronic protection against CEMA and other known, new emerging and evolving threats identified in the STAR. This effort will complete the development of the sensor protect effort and develop hardware modifications for technical refresh. Funding supports all associated testing costs and program support.</p> <p><i>FY 2019 Base Plans:</i> This will continue the work required to enhance the AN/TPQ-50's capability to address electronic protection against CEMA and other known, new, emerging and evolving threats identified in the STAR. In addition, it integrates developed capabilities into the baseline, develops documentation for hardware and software capability improvements, and includes operational testing for capability improvements. Funding supports all associated testing costs and program support.</p> <p><i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Additional funding in FY 2019 supports increased development scope.</p>					
Accomplishments/Planned Programs Subtotals	3.064	2.136	4.194	-	4.194

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• B05201: SSN: B05201 <i>Lightweight Counter Mortar Radar</i>	125.145	20.459	9.165	-	9.165	-	-	8.326	7.380	0.000	170.475
Remarks											
D. Acquisition Strategy											
<p>The AN/TPQ-50 Lightweight Counter Mortar Radar was developed in 2009 to meet Training and Doctrine Command (TRADOC) Capabilities Production Document (CPD) requirements. A favorable full rate production (FRP) decision was achieved on 21 June 2013. The AN/TPQ-50 is currently in full rate production; 400 systems have been procured to complete the program's current AAO requirement.</p> <p>The Fiscal Year (FY) 2019 Research, Development, Test and Evaluation (RDTE) funds of \$4.194 million will continue the work required to enhance the AN/TPQ-50's capability to address electronic protection against CEMA and other known, new, emerging and evolving threats identified in the STAR. This effort will develop and integrate sensor protect capabilities into the software baseline, develop advanced protection techniques which take advantage of hardware upgrades, and develop documentation for hardware and software capability improvements. Funding supports all associated testing costs and program support.</p>											

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604823A / Firefinder				Project (Number/Name) L86 / LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)					
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management (Government Support)	Various	Various : Activities	1.279	0.303	Apr 2017	0.082	May 2018	0.164	May 2019	-		0.164	Continuing	Continuing	Continuing
Program Management (Contractor Support)	C/CPFF	Various : APG, MD	0.200	0.364	Mar 2017	0.372	Mar 2018	0.379	Mar 2019	-		0.379	Continuing	Continuing	Continuing
Subtotal			1.479	0.667		0.454		0.543		-		0.543	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Electronic Protection	SS/CPFF	Various : Various	1.870	0.460	Mar 2017	-		-		-		-	0.000	2.330	1.410
Modernization & New and Emerging Threats	SS/CPFF	Various : Various	0.656	1.817	Mar 2017	1.382	Nov 2017	2.206	Nov 2018	-		2.206	Continuing	Continuing	Continuing
Subtotal			2.526	2.277		1.382		2.206		-		2.206	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Support (Government)	Various	Various : Activities	4.751	0.120	May 2017	0.300	Nov 2017	1.445	Nov 2018	-		1.445	Continuing	Continuing	Continuing
Subtotal			4.751	0.120		0.300		1.445		-		1.445	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			8.756	3.064		2.136		4.194		-		4.194	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

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2040 / 5

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PE 0604823A / Firefinder

Project (Number/Name)	Start Date	End Date	Duration (Days)	Project Manager	Status	Notes
101	2023-01-01	2023-01-15	14	John Doe	Completed	Project completed successfully.
102	2023-01-15	2023-02-01	16	Jane Smith	In Progress	Project is currently in progress.
103	2023-02-01	2023-02-15	14	John Doe	Completed	Project completed successfully.
104	2023-02-15	2023-03-01	15	Jane Smith	In Progress	Project is currently in progress.
105	2023-03-01	2023-03-15	14	John Doe	Completed	Project completed successfully.
106	2023-03-15	2023-03-31	15	Jane Smith	In Progress	Project is currently in progress.
107	2023-03-31	2023-04-15	15	John Doe	Completed	Project completed successfully.
108	2023-04-15	2023-04-30	15	Jane Smith	In Progress	Project is currently in progress.
109	2023-04-30	2023-05-15	15	John Doe	Completed	Project completed successfully.
110	2023-05-15	2023-05-31	15	Jane Smith	In Progress	Project is currently in progress.

L86 / LIGHTWEIGHT COUNTER MORTAR
RADAR (LCMR)

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Electronic Protection	3	2016	4	2017
Modernization & New and Emerging Threats	3	2016	4	2023
Government Test	3	2017	4	2023

Note
RDT&E funded testing is required at the end of each development period.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / Firefinder				Project (Number/Name) L87 / Hypervelocity Armament System (HAS)			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
L87: Hypervelocity Armament System (HAS)	-	0.000	36.000	35.617	-	35.617	35.587	35.581	35.576	35.567	0.000	213.928
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
Project L87 The Hypervelocity Armament System (HAS) and associated technologies are composed of advanced gun weapon systems, command guided maneuverable projectiles, and tactical sensors. The development of HAS would include advancing artillery powder guns firing Hypervelocity Projectiles (HVPs), resulting in a next generation, common, low drag, guided cannon artillery projectiles capable of completing multiple missions with improved cost effectiveness. Integration with a fire control radar and sensor array will allow closed-loop targeting of moving and relocatable targets beyond the range of conventional artillery. Current estimates for follow on development efforts achieve transitionable technology solutions by FY 2023.												
FY 2019 Base funding in the amount of \$35.617 million supports the continued initiation of contract requirements package development, system evaluation, develop and integrate advanced gun systems, requirements/specification work, integration development, howitzer gun system integration and test plans. The Army will leverage Strategic Capabilities Office (SCO) prototypes and technologies to continue transition from the FY 2018 program into programs of record.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Hypervelocity Armament System (HAS)								-	36.000	-	-	-
Description: The Hypervelocity Armament System (HAS) will integrate advanced artillery gun systems firing HVPs with closed loop fire control sensors to engage high value moving targets beyond common artillery ranges.												
FY 2018 Plans: Supports the initiation of accelerated transition planning, contract requirements package development, system evaluation, and requirements/specification work, integration development and test plans.												
FY 2018 to FY 2019 Increase/Decrease Statement: ARDEC/SCO (Strategic Capability Office) initiated the Hypervelocity Program for FY 2018. Program was shifted in FY 2019 to Self-Propelled Howitzer Systems.												
Title: Development								-	-	30.444	-	30.444
Description: Funding is provided for all development efforts on Hypervelocity Armament System (HAS) technology transitions.												

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018			
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>		Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<i>FY 2019 Base Plans:</i> Finalize initial incremental technology transition requirements and specifications, contract requirements package development and begin execution of contracts and development. Continue support for system evaluation, requirement/specification work, integration development and test plans, prototyping, and developmental testing for the Hypervelocity Armament System to include projectile, sensor arrays and radars, launch platforms, fire control software and tracking to verify and validate performance against high value threats at greatly increased ranges.						
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> ARDEC/SCO (Strategic Capability Office) operated the Hypervelocity Program in FY 2018. It was transferred to Self-Propelled Howitzer Systems in FY 2019 and funding is broken out between Development and Program Management.						
<i>Title:</i> Program Management <i>Description:</i> Funding is provided for all program management efforts on Hypervelocity Armament System (HAS). <i>FY 2019 Base Plans:</i> Begin the development for all required documents, office staff and engineering Integrated Product Team (IPT) development. <i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> ARDEC/SCO (Strategic Capability Office) operated the Hypervelocity Program in FY 2018. It was transferred to Self-Propelled Howitzer Systems in FY 2019 and funding is broken out between Development and Program Management.		-	-	5.173	-	5.173
Accomplishments/Planned Programs Subtotals		-	36.000	35.617	-	35.617
C. Other Program Funding Summary (\$ in Millions)						
N/A						
Remarks						
D. Acquisition Strategy						
The Army will leverage Strategic Capabilities Office (SCO) prototypes and technologies to continue transition from the FY 2018 program into programs of record.						

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>
<p>The Army is transitioning prototype articles from the SCO demonstration to develop advanced gun systems, command guided maneuverable projectiles, and fire control sensors capable of engaging tactical range targets. Emerging requirements include communication suite changes, munitions updates, and introduction of new munitions require software and/or hardware updates to ensure full compatibility and maintain operational viability.</p> <p><u>E. Performance Metrics</u> N/A</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>					

Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
HAS Product Development	C/Various	TBD : TBD	-	-		36.000		30.456		-		30.456	0.000	66.456	-
Subtotal			-	-		36.000		30.456		-		30.456	0.000	66.456	N/A

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management	MIPR	PM/PEO : VARIOUS	-	-		-		5.161		-		5.161	0.000	5.161	-
Subtotal			-	-		-		5.161		-		5.161	0.000	5.161	N/A

			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		36.000		35.617		-		35.617	0.000	71.617	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army												Date: February 2018																							
Appropriation/Budget Activity 2040 / 5												R-1 Program Element (Number/Name) PE 0604823A / Firefinder												Project (Number/Name) L87 / Hypervelocity Armament System (HAS)											
Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023										
	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							
Hypervelocity Armament System Development																																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / Firefinder	Project (Number/Name) L87 / Hypervelocity Armament System (HAS)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Hypervelocity Armament System Development	1	2018	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / Firefinder				Project (Number/Name) L88 / Enhanced AN/TPQ 36			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
L88: Enhanced AN/TPQ 36	-	3.113	7.469	5.662	-	5.662	8.245	8.914	9.132	9.624	0.000	52.159
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AN/TPQ-53 Counterfire Target Acquisition Radar System is a highly mobile radar set that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) and will replace the current AN/TPQ-36 and AN/TPQ-37 Firefinder Radars. The AN/TPQ-53 system interoperates with mission command systems (MCSs) to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-53 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-53 is fielded to multiple Continental United States (CONUS) and Outside Continental United States (OCONUS) locations to include support to Operation Inherent Resolve (OIR).

The Fiscal Year (FY) 2019 funds of \$5.662 million will support ongoing test efforts, a tropical regions test, Army interoperability certifications (AICs), testing of modernization efforts for electronic protection and new and emerging threats as well as the performance of technical assessments, concept studies, risk reduction and required documentation.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Test support	1.742	4.325	5.662	-	5.662
Description: Funding is provided to support testing efforts.					
FY 2018 Plans: Test activities to include a Tropical Regions test, Army Interoperability Certification (AIC) testing, engineering and customer tests, an adversarial assessment, and associated Program Management Office (PMO) and test support costs.					
FY 2019 Base Plans: Test activities to include a Tropical Regions test, AIC testing, engineering and customer tests, an adversarial assessment, associated PMO and test support costs.					
FY 2018 to FY 2019 Increase/Decrease Statement: Increase in FY 2019 due to increased test scope to test multiple software versions.					
Title: Electronic Protection / Worldwide Interoperability for Microwave Access (WiMAX)	0.891	2.353	-	-	-

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Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604823A / Firefinder				Project (Number/Name) L88 / Enhanced AN/TPQ 36			
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: This effort funds the development of radio frequency (RF) management tactical decision aids that improve operational frequency band selection, radar emplacement, and signal processor protection algorithms to defeat radar targeting armaments. The effort also improves spectrum management and mitigates electromagnetic interference (EMI) from commercial and military bands in addition to hostile EMI.</p> <p>FY 2018 Plans: Continue to mitigate EMI from military bands, hostile EMI, and the WiMAX commercial spectrum. Funding supports all associated testing costs and program support.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 development efforts will be redirected to address increased test scope. EP/WiMAX development efforts will continue in FY 2020.</p>											
<p>Title: New and Emerging Threats</p> <p>Description: This effort funds the development of capabilities not included in the current requirement resulting from the bi-annual release of the STAR and changes on the battlefield due to new TTPs and/or areas of operation.</p> <p>FY 2018 Plans: Continue developmental efforts to accurately detect, track, and locate new and emerging threats to the warfighter as a result of changes in the battlefield and areas of operation. Funding supports all associated testing costs and program support.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 development efforts will be redirected to address increased test scope. New and emerging threats development efforts will continue in FY 2020.</p>							0.480	0.791	-	-	-
Accomplishments/Planned Programs Subtotals							3.113	7.469	5.662	-	5.662
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• B05310: SSN B05310 AN/TPQ-53	297.509	329.057	162.121	165.200	327.321	11.120	5.972	6.279	30.244	0.000	1,007.502
Remarks											

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
<p><u>D. Acquisition Strategy</u></p> <p>The AN/TPQ-53 leverages technology developed in the multi-mission radar advanced technology objective (ATO) program. In 2006, the Government awarded a contract following full and open competition for the design of the AN/TPQ-53 radar and the purchase of four non-recurring engineering (NRE) radars. Twelve additional quick reaction capability (QRC) radars were purchased under the same contract in response to an urgent directed procurement in July 2008. The Milestone Decision Authority (MDA) approved the acquisition of up to 20 more QRC radars. Twenty systems were procured through two separate contract actions in 2010 and 2011. A competitive production contract for Low Rate Initial Production (LRIP) systems was awarded in 2012 and options for additional systems were awarded in 2013, 2014, and 2015. Production and delivery of all QRC/Initial Production (IP) systems are complete, and production of LRIP systems is ongoing. A Full Rate Production (FRP) decision was obtained in December 2015. The FRP contract to fill the remainder of the Army Acquisition Objective (AAO) was awarded in March 2017. Additionally, all initial production systems will be retrofitted to the FRP configuration. The AAO was increased to 189 systems in May 2017; 142 systems have been procured to date. The FRP system deliveries will continue through fiscal year (FY) 2021. The system will replace all of the AN/TPQ-36 and AN/TPQ-37 systems in the fleet.</p> <p>The Fiscal Year (FY) 2019 funds of \$5.662 million will support ongoing test efforts, a tropical regions test, Army interoperability certifications (AICs), testing of modernization efforts for electronic protection and new and emerging threats as well as the performance of technical assessments, concept studies, risk reduction and required documentation.</p> <p><u>E. Performance Metrics</u></p> <p>N/A</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>					
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Management (Government)	Various	Various : Various	1.567	0.020	Jun 2017	0.356	Nov 2017	0.276	Dec 2018	-		0.276	Continuing	Continuing	Continuing
Program Management (Contractor)	Various	Various : APG, MD	3.969	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			5.536	0.020		0.356		0.276		-		0.276	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Electronic Protection/ Worldwide Interoperability for Microwave Access (WiMAX)	SS/FPIF	Lockheed Martin : Syracuse, NY	2.155	0.891	Jan 2018	2.353	Nov 2017	-		-		-	Continuing	Continuing	Continuing
High Clutter Environment	SS/CPFF	Lockheed Martin : Syracuse, NY	10.340	-		-		-		-		-	0.000	10.340	-
Low Quadrant Elevation (QE) Shots	SS/CPFF	Lockheed Martin : Syracuse, NY	4.865	-		-		-		-		-	0.000	4.865	-
New and Emerging Threats	SS/FPIF	Lockheed Martin : Syracuse, NY	2.154	0.480	Jan 2018	0.791	Nov 2017	-		-		-	Continuing	Continuing	Continuing
Signal Data Processor (SDP)	SS/CPFF	Lockheed Martin : Syracuse, NY	1.992	-		-		-		-		-	0.000	1.992	-
Global Positioning System (GPS) Military Code (M-Code)	SS/CPFF	Lockheed Martin : Syracuse, NY	1.411	-		-		-		-		-	Continuing	Continuing	Continuing
Wireless Communication Upgrade	SS/CPFF	Lockheed Martin : Syracuse, NY	1.942	-		-		-		-		-	0.000	1.942	-
Subtotal			24.859	1.371		3.144		-		-		-	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604823A / Firefinder				Project (Number/Name) L88 / Enhanced AN/TPQ 36					
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Program Support	SS/CPFF	Georgia Tech Research Institute (GTRI) : Atlanta, GA	0.926	0.070	Jun 2017	-		0.300	Jan 2019	-		0.300	Continuing	Continuing	Continuing
Subtotal			0.926	0.070		-		0.300		-		0.300	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Support	Various	Various : Activities	51.154	1.652	Jun 2017	3.969	Nov 2017	5.086	Dec 2018	-		5.086	Continuing	Continuing	Continuing
Subtotal			51.154	1.652		3.969		5.086		-		5.086	Continuing	Continuing	N/A
			Prior Years	FY 2017	FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals			82.475	3.113		7.469		5.662		-		5.662	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity	2040 / 5

R-1 Program Element (Number/Name)
PE 0604823A / *Firefinder*

Project (Number/Name)	L88 / <i>Enhanced AN/TPQ 36</i>
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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Initial Operational Test and Evaluation (IOT&E) 2	3	2015	3	2015
Full Rate Production Contract Award	2	2017	2	2017
Test Support	1	2016	4	2023
Electronic Protection/Worldwide Interoperability for Microwave Access (EP/WiMAX)	1	2016	2	2019
EP/WiMAX	1	2020	4	2023
New and Emerging Threats	1	2016	2	2019
New & Emerging Threats	1	2020	4	2023

Note

FY 2019 development efforts will be redirected to address increased test scope. Development efforts will continue in FY 2020.