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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</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	-	42.390	19.429	10.820	0.000	10.820	-	-	-	-	-	-
640200: <i>DE Prototyping</i>	-	42.390	19.429	10.820	0.000	10.820	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center, Architecture and Integration Directorate Directed Energy Prototyping Program acquires and evaluates prototype high energy laser, high power microwave and/or other electromagnetic radiation or particle beam technologies as a future integral component of the Airbase defense mission. The Directed Energy Prototyping Program bridges the gap between lab based technology demonstration under a controlled environment, and demonstration of a system in realistic environments with the intent of establishing successful acquisition, and operation or operational capability implementation.

This prototyping effort enables the ability to integrate the directed energy prototype systems with other operational systems required for the mission (e.g. radar, command and control, etc.), conduct test and evaluation activities, and mature emerging directed energy technology systems based on prototyping activities to enable rapid fielding to the warfighter. The Directed Energy Prototyping Program allows acquisition program managers (capability developers) and warfighters (capability recipients and end users) to prototype, integrate, evaluate, and demonstrate candidate weapon technologies and assess them in an operational environment with the intent of iteratively maturing directed energy technologies to a production representative design.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. It may also include necessary civilian pay expenses required to perform analysis and developmental activities required in support of the transition of weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	44.000	20.964	10.983	0.000	10.983
Current President's Budget	42.390	19.429	10.820	0.000	10.820
Total Adjustments	-1.610	-1.535	-0.163	0.000	-0.163
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-1.535			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.610	0.000			
• Other Adjustments	0.000	0.000	-0.163	0.000	-0.163

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

Project: 640200: DE Prototyping

Congressional Add: Program increase - Counter-UAS targeting solution

Congressional Add: Unfunded Requirement

Congressional Add Subtotals for Project: 640200

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	14.000	-
	20.000	-
	34.000	-
	34.000	-

Change Summary Explanation

Undistributed Mark: FY 2021 \$35 million

Decrease from FY 2021 to FY 2022 of \$8.609 million is due to planned completion of non-recurring engineering and manufacturing tasks no longer required.

Congressional Mark: Decrease FY 2021 \$1.5 million

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

	FY 2020	FY 2021	FY 2022
Title: Directed Energy Capabilities	8.390	19.429	10.820
Description: Prototypes and evaluates Directed energy weapon technologies for Airbase Defense against unmanned aerial vehicles and cruise missiles, Precision Strike against electronic and conventional targets and Aircraft Defense against incoming threats.			
FY 2021 Plans:			

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Continue to test and evaluate acquired systems to determine operational effectiveness. Results from operational testing will be used to consider program initiation. Opening operating location at Kirtland Air Force Base to support transition, test, and evaluation of directed energy technologies.			
FY 2022 Plans: Continue to test and evaluate acquired DE C-UAS prototype systems to determine system capability and operational effectiveness. Results from operational assessment will be used to support future fielding/Program of Record decision.			
FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by \$8.609 million. Funding decreased due to the planned upfront non-recurring costs for these prototypes complete in FY 2021 and are no longer required in FY 2022. Funding in FY 2022 and beyond includes continuation of Air Force' emphasis on the acceleration of developing high power microwave counter-unmanned aerial system enhancements.			
Accomplishments/Planned Programs Subtotals	8.390	19.429	10.820

	FY 2020	FY 2021
Congressional Add: Program increase - Counter-UAS targeting solution	14.000	-
FY 2020 Accomplishments: Conduct Congressional directed efforts.		
Congressional Add: Unfunded Requirement	20.000	-
FY 2020 Accomplishments: Conduct Congressional directed efforts.		
Congressional Adds Subtotals	34.000	-

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

N/A

Remarks

N/A

E. Acquisition Strategy

During FY 2020, the Air Force Life Cycle Management Center, Architecture and Integration Directorate, Wright-Patterson Air Force Base, Ohio conducted a source selection evaluating eight (8) ground-based Counter Unmanned Aerial Systems for prototype development. In 4QFY20, three (3) vendors were selected for award using Other Transaction Authority based on a best value determination with Technical being the most important factor. During FY21, these three (3) prototypes will be evaluated and potentially down-selected at specific testing gates based on operational capability/suitability assessment supporting the Airbase defense mission.

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After operational assessment is complete in FY 2022, the selected prototype(s) will be iterated to production representative with incremental improvements, while documenting design, sustainment, and initial operational concepts of operation information to support a future program of record.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 4				PE 0604032F / Directed Energy Prototyping				640200 / DE Prototyping								
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				
Directed Energy Prototypes	C/FFP	Various : Various	-	6.390	Mar 2021	7.429	Mar 2021	-		-		-	-	-	-	-
Congressional Add: Program Increase Counter-UAS targeting solution	C/FFP	Not specified. : TBD	-	14.000	Mar 2021	-		-		-		-	-	-	-	-
Congressional Add: Unfunded Requirement	C/FFP	Not specified. : TBD	-	20.000	Dec 2020	-		-		-		-	-	-	-	-
Subtotal			-	40.390		7.429		-		-		-	-	-	-	N/A
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				
Directed Energy C-UAS Prototype Technical Maturation and Improvements	Various	Various : Various	-	0.000		10.000	May 2021	8.820	Apr 2022	-		8.820	-	-	-	-
Subtotal			-	0.000		10.000		8.820		-		8.820	-	-	-	N/A
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				
Directed Energy Prototyping Program Administration	Various	AFLCMC : Various	-	2.000	Oct 2019	2.000	Oct 2020	2.000	Oct 2021	-		2.000	-	-	-	-
Subtotal			-	2.000		2.000		2.000		-		2.000	-	-	-	N/A
Project Cost Totals			-	42.390		19.429		10.820		-		10.820	-	-	-	N/A

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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
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Remarks
 FY 2022 - FY 2026 will concentrate on prototyping and maturing high energy laser and high power microwave systems for base area defense in preparation for transition to program of record. The program makes use of Other Transactional Authorities (OTA). Continued support will be provided by the Directed Energy Transition Management Office, Kirtland Air Force Base, New Mexico.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</i>	Project (Number/Name) 640200 / <i>DE Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Prototype Manufacturing</i>				
Prototype build and contractor test	4	2020	4	2021
<i>Operational Test</i>				
Government assessment of suitability and effectiveness for field operations	4	2021	3	2022
<i>Directed Energy Counter-Unmanned Aerial System (C-UAS) technical maturation</i>				
Incremental improvements to of Directed Energy C-UAS Prototype systems to provide increased Airbase defense C-UAS capability to warfighter	2	2021	4	2024
<i>Directed Energy Base Defense technical maturation</i>				
Mature Directed Energy technologies to enhance the Airbase defense layered architecture. Increasing defensive capabilities to include cruise missiles and other airborne threats.	4	2023	4	2026

Note

FY 2022 - FY 2026 will concentrate on maturing high energy laser and high power microwave systems for base area defense in preparation for transition of prototype weapon systems to program(s) of record. The program makes use of Other Transactional Authorities (OTA). Continued support will be provided by the Directed Energy Transition Management Office, Kirtland Air Force Base, New Mexico.