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

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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	19.023	15.820	4.269	0.000	4.269	4.080	4.082	4.168	4.260	0.000	55.702
640200: <i>DE Prototyping</i>	-	19.023	15.820	4.269	0.000	4.269	4.080	4.082	4.168	4.260	0.000	55.702
Quantity of RDT&E Articles	-	4	1	-	-	-	-	-	-	-	-	-

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 weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In Prior Years \$0.852M was expended for civilian pay expenses in this program element, and in CY22 \$0.973M is forecasted for civilian pay expenses in this program element.

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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	19.429	10.820	0.000	0.000	0.000
Current President's Budget	19.023	15.820	4.269	0.000	4.269
Total Adjustments	-0.406	5.000	4.269	0.000	4.269
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.406	0.000			
• Other Adjustments	0.000	0.000	4.269	0.000	4.269

Change Summary Explanation

The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY2023 cannot be made in a relevant manner.

Decrease in FY 2021 reflects reprogramming to support Prototyping & Technology Development Projects, 10 U.S.C. Section 2363, an amendment to PL 110-417, 10 U.S.C. Section 2358 and 10 U.S.C. 2805(d)(1)(B)

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Directed Energy Capabilities	19.023	15.820	4.269
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 2022 Plans: Continue to test and evaluate acquired Directed Energy Counter-small Unmanned Ariel System prototype-systems to determine system capability and field effectiveness of this next generation of prototypes. Results from government field assessment will be used to support future fielding/Program of Record decisions. The effort will initiate another round of Counter-small Unmanned Ariel System technology maturation based on information gleaned from previous efforts.			
FY 2023 Plans: Iterate the FY22 plans for integrating the recent maturation efforts into prototypes and then follow up with government capability/ field effectiveness testing. The prototyping office will continue to work with Air Force futures, the Joint counter small Unmanned Ariel System Office, and others to refine requirements and architecture for defense of critical infrastructure and base defense. The			

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
prototyping office will work with major/combatant commands to identify paths to incorporate new directed energy prototypes into integration/testing during their exercises.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 decreased compared to FY 2022 by \$11.551 million because this investment meets the requirement to provide Directed Energy prototypes to counter small UAS.			
Accomplishments/Planned Programs Subtotals	19.023	15.820	4.269

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

N/A

Remarks

Not Applicable

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. After acceptance testing and characterization testing is complete in FY 2022, the prototypes will be iterated toward a production representative article. An acquisition readiness assessment will be made while documenting design, sustainment, and initial operational concepts of operation information to support a future milestone decision regarding program of record status.

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

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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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
High Energy Laser Prototypes	C/FFP	Various : Various	-	6.872	Mar 2021	6.800	Mar 2022	-		-		-	Continuing	Continuing	-
High Power Microwave Development	C/CPAF	Not specified. : Various	-	6.000	Jun 2021	4.395	Jul 2022	1.000	Jun 2023	-		1.000	Continuing	Continuing	-
Subtotal			-	12.872		11.195		1.000		-		1.000	Continuing	Continuing	N/A

Remarks
Other Transactions Authorities used for High Energy Laser Prototype contracts.

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy C-UAS Prototype Technical Maturation and Improvements	Various	Various : Various	-	4.940	May 2021	2.697	Apr 2022	2.000	Apr 2023	-		2.000	Continuing	Continuing	-
Subtotal			-	4.940		2.697		2.000		-		2.000	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Prototyping Program Administration	Various	AFLCMC : Various	-	0.359	Oct 2020	1.000	Oct 2021	0.419	Oct 2022	-		0.419	Continuing	Continuing	-
Direct Cite Authority	TBD	AFLCMC : Various	-	0.852	Oct 2020	0.928	Oct 2021	0.850	Oct 2022	-		0.850	Continuing	Continuing	-
Subtotal			-	1.211		1.928		1.269		-		1.269	Continuing	Continuing	N/A

			Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	19.023	15.820	4.269	-	4.269	Continuing	Continuing	N/A

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	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 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 2023 Air Force **Date:** April 2022

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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	1	2021	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.