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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force									Date: February 2019			
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0207455F I Three Dimensional Long-Range Radar (3DELRR)							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	146.754	12.122	24.856	37.290	0.000	37.290	34.196	18.396	0.468	0.475	30.343	304.900
646002: Three Dimensional Expeditionary Long Range Radar	146.754	12.122	24.856	37.290	0.000	37.290	34.196	18.396	0.468	0.475	30.343	304.900
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Program MDAP/MAIS Code: 393												
A. Mission Description and Budget Item Justification												
<p>Mission Description: The Three-Dimensional Expeditionary Long-Range Radar (3DELRR) will be the principal USAF long-range, ground-based sensor for detecting, identifying, tracking and reporting aerial tracks for the Joint Force Air Component Commander (JFACC) through the Theater Air Control System. The 3DELRR system will provide multiple benefits and increased capabilities to the USAF and to the Joint Services: 1) Replace the aging USAF AN/TPS-75 radar system, which is at the end of its service life and costly to maintain; 2) Detect and track highly maneuverable, small radar cross section air-breathing targets; 3) Mitigate reliability, operational availability, maintainability, transportability and sustainability issues, which plague the AN/TPS-75 radar system; 4) Enable greater battlefield and battlespace awareness through its precise, real-time air picture of sufficient quality to control individual aircraft under a wide range of environmental and operational conditions; 5) Serve as a pilot program for Defense Exportability Features (DEF) to maximize export potential early in the design phase while reducing 3DELRR life cycle costs through increased production; and 6) Provide exchange of information to the United States Marine Corps, Navy and Army via appropriate interfaces.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver Three-Dimensional Expeditionary Long-Range Radar 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, and 0605898F.</p> <p>As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.</p> <p>This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&amp;P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.</p>												

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3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		PE 0207455F I Three Dimensional Long-Range Radar (3DELRR)				
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Previous President's Budget	10.645	40.326	41.416	0.000	41.416	
Current President's Budget	12.122	24.856	37.290	0.000	37.290	
Total Adjustments	1.477	-15.470	-4.126	0.000	-4.126	
• Congressional General Reductions	-0.356	-15.470				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	2.020	0.000				
• SBIR/STTR Transfer	-0.187	0.000				
• Other Adjustments	0.000	0.000	-4.126	0.000	-4.126	
Change Summary Explanation						
FY18 and FY19 adjusted to reflect Congressional General Reductions, FFRDC, and Reprogramming.						
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2018	FY 2019	FY 2020
Title: Contractor Engineering and Manufacturing Development (EMD)				0.000	16.006	23.896
Description: Contractor's portion of EMD efforts contribute to the overall development of 3DELRR capabilities.						
FY 2019 Plans:						
Activities will include but are not limited to the following:						
- Mitigate known risks associated with hardware, software and test during the EMD phase of the 3DELRR program						
- Conduct Test Readiness Review (TRRs) prior to Contractor Developmental Test and Evaluation (CDT&E)events						
- Continue to complete build of three (3) Engineering & Manufacturing Development (EMD) units						
- Continue to support the Defense Exportability Features (DEF) effort						
- Continue IFF Box Certification						
- Continue contractor developmental testing of components & subsystems						
- Continue planning of Government Developmental Test & Evaluation (DT&E)						
- Support studies and analyses to assess future capabilities						
- Update the Modeling and Simulation (M&S) plan as needed						
- Update the Test and Evaluation Master Plan (TEMP) as needed						
- Continue development of technical manuals						
- Continue development of interoperability with external agencies as required						
FY 2020 Plans:						

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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
Activities will include but are not limited to the following: <ul style="list-style-type: none"> <li>- Will mitigate known risks associated with hardware, software and test during the EMD phase of the 3DELRR program</li> <li>- Will conduct Test Readiness Reviews (TRRs) prior to specific Contractor Developmental Test and Evaluation (CDT&amp;E) events</li> <li>- Will continue to complete build of three (3) Engineering &amp; Manufacturing Development (EMD) units</li> <li>- Will continue to support the Defense Exportability Features (DEF) effort</li> <li>- Will continue IFF Box Certification</li> <li>- Will continue contractor developmental testing of components &amp; subsystems</li> <li>- Will initiate full system CDT&amp;E</li> <li>- Will continue planning of Government Developmental Test &amp; Evaluation (DT&amp;E)</li> <li>- Will continue physical configuration audit pending completion of EMD units</li> <li>- Will continue to support studies and analyses to assess future capabilities</li> <li>- Will continue to update the Modeling and Simulation (M&amp;S) plan as needed</li> <li>- Will continue to update the Test and Evaluation Master Plan (TEMP) as needed</li> <li>- Will continue the development of technical manuals</li> <li>- Will continue development of interoperability with external agencies as required</li> </ul> <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Risks associated with the development of the 3DELRR system have not yet been realized.				
<b>Title:</b> Government Developmental Test and Evaluation (DT&E) Planning/Preparation  <b>Description:</b> Early planning and preparation for Government DT&E.  <b>FY 2019 Plans:</b> Activities will include but are not limited to the following: <ul style="list-style-type: none"> <li>- Monitor and evaluate contractor DT&amp;E and tailor lessons for Government DT&amp;E</li> <li>- Continue to develop and refine of TEMP and other test planning documentation</li> <li>- Conduct test site surveys</li> <li>- Continue to plan for cybersecurity testing</li> <li>- Continue to integrate Modeling and Simulation (M&amp;S) into test plans</li> <li>- Continue site infrastructure improvements to support Government DT&amp;E</li> <li>- Initiate Environmental Testing (McKinley Climatological Lab)</li> <li>- Training and travel in preparation for Government DT&amp;E</li> </ul> <b>FY 2020 Plans:</b> Activities will include but are not limited to the following:		0.651	3.077	5.318

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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>
<ul style="list-style-type: none"> <li>- Will continue to monitor and evaluate CDT&amp;E: tailor lessons for Government DT&amp;E</li> <li>- Will witness formal CDT&amp;E events</li> <li>- Will continue development and refinement of TEMP and other test planning documentation</li> <li>- Will conduct site surveys and continue cybersecurity planning</li> <li>- Will conduct 3DELRR Mobility Testing</li> <li>- Will continue Environmental Testing (McKinley Climatological Lab)</li> <li>- Will continue to integrate Modeling and Simulation (M&amp;S) into test plans</li> <li>- Will prepare for Test Readiness Review (TRR) to support Government Developmental Test &amp; Evaluation (DT&amp;E)</li> <li>- Will continue site infrastructure improvements to support Government DT&amp;E</li> <li>- Will conduct training and travel in preparation for Government DT&amp;E</li> </ul>				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funds increase from FY19 to FY20 for start and completion of DT&E readiness review and start/ramp-up of Government Development, Training and witness of CDT&E.				
<b>Title:</b> Systems Engineering/Technical Support		11.471	5.773	8.076
<b>Description:</b> Efforts provide management, engineering and technical support to the program office.				
<b>FY 2019 Plans:</b> Activities will include but are not limited to the following: <ul style="list-style-type: none"> <li>- Continue EMD efforts to further mature technology readiness and manufacturing capabilities</li> <li>- Lead and manage program through daily interaction with contractor and key stakeholders</li> <li>- Oversee programmatic design and technical reviews</li> <li>- Monitor reliability growth during contractor component, subsystem and system level testing</li> <li>- Identify, monitor and mitigate program and technical risks; facilitate program office reporting</li> <li>- Continue preparation of Milestone C documentation</li> <li>- Continue follow-on product support BCA, various studies/analyses and planning activities</li> <li>- Continue efforts for interoperability with external agencies as required</li> </ul>				
<b>FY 2020 Plans:</b> Activities will include but are not limited to the following: <ul style="list-style-type: none"> <li>- Will continue EMD efforts to further mature technology readiness and manufacturing capabilities</li> <li>- Will continue to Lead and manage program through daily interaction with contractor and key stakeholders</li> <li>- Will continue to oversee programmatic design and technical reviews</li> <li>- Will continue to monitor reliability growth during contractor component, subsystem and system level testing</li> </ul>				

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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0207455F I Three Dimensional Long-Range Radar (3DELRR)							
C. Accomplishments/Planned Programs (\$ in Millions)										FY 2018	FY 2019	FY 2020
- Will continue to identify, monitor and mitigate program and technical risks; facilitate program office reporting - Will continue preparation of Milestone C documentation - Will continue follow-on product support BCA, various studies/analyses and planning activities - Will continue efforts for interoperability with external agencies as required  FY 2019 to FY 2020 Increase/Decrease Statement: Portions of FY19 program support requirements were funded with FY18 funds; program support requirements remain consistent.												
Accomplishments/Planned Programs Subtotals										12.122	24.856	37.290
D. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
• OPAF 03 Line Item 833060: 3D Expeditionary Long Range-Radar	-	0.000	0.000	-	0.000	63.075	21.902	156.775	119.792	636.350	997.894	
Remarks												
E. Acquisition Strategy												
The 3DELRR strategy is a single step acquisition approach for full capability to develop, produce and field a highly capable and sustainable, expeditionary long-range radar. A limited competition was conducted for the Engineering and Manufacturing Development (EMD) contract among the multiple contractors that participated in two Technology Maturation and Risk Reduction (TMRR) phases.												
The EMD contract was awarded 11 May 2017 to a single developer to complete the final design, build, integration and test of the 3DELRR system; with options to produce Low Rate Initial Production (LRIP) units, conduct Interim Contractor Support (ICS), and produce Full Rate Production (FRP) units.												
The primary contract type for EMD is a Fixed Price Incentive Firm (FPIF). The contract also includes a FPIF option to execute LRIP, Cost Plus Fixed Fee (CPFF) options for ICS and Firm Fixed Price (FFP) options for FRP. A CPFF option is planned for ICS due to the uncertainty of the quantity and the exact nature of the work. An FFP option is planned for FRP due to stable requirements and low risk of changes in scope. The program office will exercise the LRIP option upon Milestone Decision Authority (MDA) approval at MS C. The program office will also seek MDA approval to exercise ICS options (as necessary) and FRP options.												
The EMD prime contractor will deliver three (3) EMD units, which will be the primary assets used for Contractor Developmental Test and Evaluation (CDT&E)and Government Developmental Test and Evaluation (DT&E). The three (3) EMD units will also be used for Initial Operational Test and Evaluation (IOT&E)once LRIP equivalency is certified. The LRIP option provides scope for the refurbishment of these three (3) EMD units to production quality specifications after the successful completion of IOT&E. The LRIP option also enables the delivery of three (3) additional production quality units for a total of six (6) units at Initial Operational Capability (IOC).												

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Program Office will request MDA approval to use procurement funds prior to MS C to procure early Low Rate Initial Production (LRIP) materials to reduce schedule risk. The FRP options will deliver an additional twenty-nine (29)units for a total of thirty-five (35) units at Full Operational Capability (FOC).		
The MDA for the 3DELRR program is the Assistant Secretary of the Air Force (Acquisition). The Air Force Program Executive Officer (PEO) for Battle Management (AFPEO BM) located at Hanscom AFB, MA is the PEO for 3DELRR. The Air Force Life Cycle Management Center (AFLCMC) located at Wright-Patterson AFB, OH is the contracting authority for the 3DELRR program, as AFLCMC provides contracting, legal, comptroller, programmatic, engineering, test and logistics support.		
F. Performance Metrics		
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0207455F / Three Dimensional Long-Range Radar (3DELRR)				Project (Number/Name) 646002 / Three Dimensional Expeditionary Long Range Radar					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
EMD Phase (Prime Contract)	C/FPIF	Raytheon, Woburn, MA : NV	110.701	-		16.006	Sep 2019	23.896	Sep 2020	-		23.896	36.629	187.232	56.640
Subtotal			110.701	-		16.006		23.896		-		23.896	36.629	187.232	N/A
Remarks															
- FINANCIAL PERFORMANCE: 3DELRR is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the 3DELRR EMD contract is a FPIF contract with progress payments. 20 percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health. The program has an approved funding profile that reflects the Service Cost Position that includes program risk. Target value of contract remains at \$56.640M, total cost for product development (\$204.369M) reflects total spending from program initiation through EMD.															
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
System Engineering - A	SS/CPFF	MIT/Lincoln Laboratory : Lexington, MA	6.887	1.550	Nov 2017	1.206	Sep 2019	1.210	Nov 2019	-		1.210	1.178	12.031	-
System Engineering - B	SS/CPFF	Carnegie Mellon University : Pittsburgh, PA	0.419	0.233	Oct 2017	0.314	Sep 2019	0.320	Oct 2019	-		0.320	0.289	1.575	-
System Engineering - C	SS/CPFF	GTRI : Atlanta, GA	1.450	0.773	Feb 2018	0.725	Feb 2019	0.730	Feb 2020	-		0.730	0.910	4.588	-
System Engineering - D	SS/CPFF	MITRE : Bedford, MA	4.625	4.310	Oct 2017	1.126	Sep 2019	2.243	Oct 2019	-		2.243	2.216	14.520	-
Subtotal			13.381	6.866		3.371		4.503		-		4.503	4.593	32.714	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Government Developmental Test and Evaluation Planning and Preparation	PO	46 TS : Eglin AFB, FL	2.178	0.651	Jan 2018	3.077	Jan 2019	5.318	Jan 2020	-		5.318	3.849	15.073	-

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2020 Air Force</b>												<b>Date:</b> February 2019			
<b>Appropriation/Budget Activity</b> 3600 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>						<b>Project (Number/Name)</b> 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>			
<b>Test and Evaluation (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Subtotal</b>			2.178	0.651		3.077		5.318		-		5.318	3.849	15.073	N/A
<b>Management Services (\$ in Millions)</b>				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Program Management Administration	Various	AFLCMC/HBDD : Hanscom AFB, MA	20.494	4.605	Oct 2017	2.402	Oct 2018	3.573	Oct 2019	-		3.573	3.646	34.720	-
<b>Subtotal</b>			20.494	4.605		2.402		3.573		-		3.573	3.646	34.720	N/A
			<b>Prior Years</b>	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			146.754	12.122		24.856		37.290		-		37.290	48.717	269.739	N/A
<b>Remarks</b>															



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2020 Air Force			<b>Date:</b> February 2019		
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>			<b>Project (Number/Name)</b> 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
<b><i>Three Dimensional Expeditionary Long Range Radar</i></b>																												
EMD																												
Government DT&E Planning/Preparation																												
Critical Design Review (CDR)																												
Contractor Development Test & Evaluation (CDT&E)																												
Developmental Test and Evaluation Test Readiness Review																												
Government Development Test																												
EMD Unit Delivery																												
Operational Test Readiness Review (OTRR)																												
Milestone C																												
Government Operational Test																												
LRIP Materials Buy Prior to MS C																												
Low Rate Initial Production (LRIP)																												
Full Rate Production (FRP) Decision																												
Full Rate Production																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Air Force			<b>Date:</b> February 2019
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	<b>Project (Number/Name)</b> 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>	

**Schedule Details**

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Three Dimensional Expeditionary Long Range Radar</i></b>				
EMD	1	2018	2	2022
Government DT&E Planning/Preparation	1	2018	1	2021
Critical Design Review (CDR)	2	2018	2	2018
Contractor Development Test & Evaluation (CDT&E)	2	2019	4	2020
Developmental Test and Evaluation Test Readiness Review	4	2020	4	2020
Government Development Test	1	2021	2	2022
EMD Unit Delivery	1	2021	1	2021
Operational Test Readiness Review (OTRR)	2	2022	2	2022
Milestone C	2	2022	2	2022
Government Operational Test	3	2022	2	2023
LRIP Materials Buy Prior to MS C	4	2021	1	2022
Low Rate Initial Production (LRIP)	2	2022	4	2024
Full Rate Production (FRP) Decision	3	2023	3	2023
Full Rate Production	3	2023	4	2024

**Note**

Program Office will request MDA approval to use procurement funds prior to MS C to procure early Low Rate Initial Production (LRIP) materials to reduce schedule risk. The FRP options will deliver an additional twenty-nine (29) units for a total of thirty-five (35) units at Full Operational Capability (FOC).

LRIP phase ends 1QFY25  
FRP phase ends 2QFY30