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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0207410F / <i>Air & Space Operations Center (AOC)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	98.854	114.864	51.187	0.000	51.187	112.232	112.888	103.946	90.182	Continuing	Continuing
674596: <i>AOC WS Modifications</i>	0.000	98.854	114.864	51.187	0.000	51.187	112.232	112.888	103.946	90.182	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Operations Center Weapon System (AOC WS), AN/USQ-163 Falconer, the senior element of the Theater Air Control System (TACS), is the weapon system that the Commander, Air Force Forces (COMAFFOR) provides the Combined/Joint Force Air Component Commander (C/JFACC) for planning, executing, and assessing theater-wide air and space operations. The C/JFACC provides air, space and cyber support to the Combined/Joint Forces Commander (C/JFC) by coordinating, deconflicting and assessing the progress of various weapon systems to advance the C/JFC's campaign. The AOC WS develops operations strategy and planning documents. The weapon system also disseminates tasking orders; executes day-to-day peacetime and combat air, space and cyber operations; and provides rapid reaction to immediate situations by exercising positive control of friendly forces.

In FY 2021, funding supports continued software engineering capacity required for AOC WS Modifications to enable the retirement of Theater Battle Management Core System - Force Level (TBMCS FL) and AOC 10.1 while enabling an extensible cloud-based Infrastructure and Platform as a Service (IaaS/PaaS) hosting platform. Additionally, the continued software engineering capacity delivers air operations capabilities improving speed and automation of the full air tasking cycle, including unit-level sortie generation capabilities that feed friendly order of battle information to the Master Air Attack Plan process. AOC WS Modifications are required for the AOC to keep pace with evolving COTS/GOTS components, DoD directives, changes in the underlying IT environment, and to remain interoperable, certified, supportable, and compliant through software engineering solutions, integration, testing, fielding, training, and sustainment of new capabilities and upgrades to the AOC WS. This includes utilization of managed cloud IaaS/PaaS hosting platform. Also in FY 2021, AOC WS Modifications activities evolve the AOC utilizing Agile Methodologies, including User Centered Design, and embracing DevOps practices to deliver improved capabilities in support of mission requirements at Geographic and Global (formerly Functional) AOCs, as well as Support and Manpower Augmentation units, keeping the AOC current and interoperable with the Combatant Commands (CCMDs), cyber requirements, and next generation weapon systems/weapons.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AOC weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	104.954	114.864	116.000	0.000	116.000
Current President's Budget	98.854	114.864	51.187	0.000	51.187
Total Adjustments	-6.100	0.000	-64.813	0.000	-64.813
• Congressional General Reductions	0.000	0.000			
• 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	-2.450	0.000			
• SBIR/STTR Transfer	-3.650	0.000			
• Other Adjustments	0.000	0.000	-64.813	0.000	-64.813

Change Summary Explanation

FY 2019: Decreased \$2.45M for Below Threshold Reprogramming.

FY 2021: Realigned \$52M to O&M to maintain AOC 10.1 baseline; funding request was reduced by \$12.7M to account for the availability of prior year execution balances.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: AOC WS Modifications Development	77.699	84.798	39.533	0.000	39.533
Description: Conduct AOC WS infrastructure software engineering solutions and mission capability software engineering solutions as a National Defense Authorization Act for 2016, Section 804, Middle Tier of Acquisition for Rapid Prototyping/Rapid Fielding effort. Leverage agile engineering solution methodologies to engineer, integrate, and test modification updates to the AOC WS leveraging test-driven development. Provide engineering solutions, test, and deliver effective operational capabilities utilizing continuous integration and continuous delivery (CI/CD) processes.					
FY 2020 Plans:					
- Modify the AOC 10.1 legacy system to achieve cloud-enabled operations; develop applications to perform in the cloud environment					
- Evolve the AOC through Agile DevOps engineering solutions, integration, and test of progressively improving capabilities in support of mission requirements					
FY 2021 Base Plans:					

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C. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>- Will continue rapid fielding of software capabilities to enable the retirement of Theater Battle Management Control System - Force Level (TBMCS FL) and Master Air Attack Plan Tool Kit (MAAPTK)</p> <p>- Will continue development and establishment of an enterprise infrastructure baseline to support hosting a virtual private cloud</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to funding realignment to O&M to maintain AOC 10.1 baseline and reduction to account for the availability of prior year execution balances.</p>						
<p>Title: AOC WS Modifications Direct Mission Support</p> <p>Description: Plan and execute strategies to adopt commercial best practices for software development, scale out a modern IaaS/PaaS solution to the AOC WS enterprise, implement improved solutions for platform architecture and CI/CD pipeline, and maintain continuous Authority to Operate (ATO).</p> <p>FY 2020 Plans: - Develop virtual private cloud architecture and execute platform scaling strategy to AOC enterprise - Enable scaling software product teams and provide the necessary competencies to adopt commercial best practices for agile software development</p> <p>FY 2021 Base Plans: - Will continue to provide the competencies necessary to scale software development capacity and enable retirement of TBMCS FL - Will continue to enable development and establishment of extensible cloud-based IaaS/PaaS hosting platform/ enterprise architecture baseline environment</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to funding realignment to O&M to maintain AOC 10.1 baseline and reduction to account for the availability of prior year execution balances.</p>		7.417	30.066	11.654	0.000	11.654
<p>Title: Multi-Domain Command and Control (MDC2) Development</p>		13.738	0.000	0.000	0.000	0.000

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: Development of enduring capability for a scalable operational infrastructure and data architecture to acquire and develop MDC2 capability; procure/lease a virtualized (cloud-based) data structure for all relevant information (mission data, business data, applications, enterprise services, etc.). Experiment, explore, and develop innovative C2 tools designed for multi-domain; multi-level security tools and capabilities to enhance C2 interoperability and data sharing for the 2030 and beyond fight. Utilize for program support and other activities that may include, but are not limited to experiments, infrastructure/architecture needs, coding, technical analysis, etc.</p> <p>FY 2020 Plans: See PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.</p> <p>FY 2021 Base Plans: See PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>					
Accomplishments/Planned Programs Subtotals	98.854	114.864	51.187	0.000	51.187

D. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
• OPAF 03 Line Item 834520: <i>Theater Battle Mgt C2 System</i>	2.923	5.514	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.437
• OPAF 03 Line Item 834530: <i>Air and Space Operations Ctr-WPN SYS</i>	38.589	33.243	24.983	0.000	24.983	13.593	18.185	17.313	32.315	Continuing	Continuing	

Remarks

E. Acquisition Strategy
 The acquisition strategy builds on agile software engineering solutions and modification of existing capabilities using evolutionary acquisition to standardize and modify the AOC WS. The initial capability was AOC WS Increment 10.0, which fielded the 10.0 configuration to five operational sites, plus a Help Desk and a Formal Training

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<p>Unit. The second increment, Increment 10.1, upgraded these locations to an integrated baseline and fielded the baseline to additional operational and reserve units worldwide. The AOC 10.2 sought to evolve the AOC to a Net-Centric environment compliant with DoD Services Oriented Architecture standards but proved late to need using legacy approaches, so the contract was terminated in July 2017 and Program of Record was canceled in January 2018. AOC WS Modifications will utilize FY16 NDAA Section 804, Middle Tier of Acquisition for Rapid Prototyping and Rapid Fielding, leveraging commercial best practices of Agile DevOps to scale out a modern virtual private cloud to the AOCs and scale up additional software product teams in support of retiring TBMCS FL and other legacy mission critical applications allowing for eventual disposal of the AOC 10.1 infrastructure. Using Sec 804 authority, time lines are reduced by modularizing both the development work and the associated contracting and funding strategies. This enables dynamic resource allocation based on current warfighter needs. The desired end state is continuous delivery of all AOC WS software.</p> <p>AOC WS Modifications will leverage the AOC WS Long-Term Modification and Sustainment (LTM&S) contract which will provide support to government led integration of the AOC WS enterprise. AOC WS Modifications will also use Other Transaction Authority (OTA) to adopt commercial best practices for software development and to scale out a modern Infrastructure as a Service/Platform as a Service (IaaS/PaaS) solution. Activities are also accomplished via Military Interdepartmental Purchase Requests (MIPR). Additionally, significant technical expertise will be sought after via modular contracting approach and provided by Government Agencies, DoD Laboratory, Federally Funded Research and Development Centers (FFRDC), Academia, and Engineering & Professional Acquisition Support Services contractors as well as commercial industry partners.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207410F / Air & Space Operations Center (AOC)	Project (Number/Name) 674596 / AOC WS Modifications
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
AOC WS Modifications Development	C/Various	Various : Multiple	0.000	50.757	Dec 2018	64.758	Dec 2019	23.982	Dec 2020	0.000		23.982	Continuing	Continuing	-
AOC WS Modifications Other Transaction	Various	Pivotal : Multiple	0.000	13.688	Dec 2018	7.483	Dec 2019	4.069	Dec 2020	0.000		4.069	Continuing	Continuing	-
Multi-Domain Command and Control (MDC2)	MIPR	Various : Multiple	0.000	13.738	Apr 2019	0.000		0.000		0.000		0.000	0.000	13.738	-
Subtotal			0.000	78.183		72.241		28.051		0.000		28.051	Continuing	Continuing	N/A

Remarks
MDC2 funding transferred to PE 0304115F, Multi Domain Command and Control (MDC2), Project Number 673380, MDC2.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
AOC WS Modifications Direct Mission Support	C/TBD	Various : Various	0.000	7.417	Oct 2018	30.066	Oct 2019	11.654	Dec 2020	0.000		11.654	Continuing	Continuing	-
Subtotal			0.000	7.417		30.066		11.654		0.000		11.654	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
AOC WS Modifications Engineering Services	Various	Various : Various	0.000	4.015	Oct 2018	3.297	Oct 2019	6.713	Dec 2020	0.000		6.713	Continuing	Continuing	-
AOC WS Modifications Program Support	C/Various	Various : Various	0.000	9.239	Nov 2018	9.260	Nov 2019	4.769	Dec 2020	0.000		4.769	Continuing	Continuing	-
Subtotal			0.000	13.254		12.557		11.482		0.000		11.482	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207410F / Air & Space Operations Center (AOC)	Project (Number/Name) 674596 / AOC WS Modifications

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
AOC WS Modifications																												
AOC WS Modifications Kessel Run																												
AOC WS Modifications Engineering Solutions																												
Multi-Domain Command and Control (MDC2)																												
MDC2 Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AOC WS Modifications</i>				
AOC WS Modifications Kessel Run	1	2019	4	2025
AOC WS Modifications Engineering Solutions	4	2019	4	2025
<i>Multi-Domain Command and Control (MDC2)</i>				
MDC2 Development	3	2019	4	2019