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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1206770SF / <i>Enterprise Ground Services</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	0.000	116.791	0.000	116.791	194.090	121.447	125.539	58.329	Continuing	Continuing
673140: <i>Enterprise Ground Services EGS</i>	-	0.000	0.000	116.791	0.000	116.791	194.090	121.447	125.539	58.329	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206770F, Enterprise Ground Services efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206770SF, Enterprise Ground Services from Appropriation 3600, Budget Activity 07 due to the creation of a new Appropriation for Space Force.

The Enterprise Ground Services (EGS) program will provide a robust enterprise ground architecture for Space Force space systems. The EGS capability will become the primary ground command and control (C2) suite of services for the Space Force Space Enterprise to meet evolving current and future space domain demands. EGS is based on Multi-Mission Satellite Operations Center (MMSOC) C2 capabilities developed under the Research and Development Space and Missile Operations (RDSMO) program.

The EGS C2 program will perform technology maturation, experiments, prototyping and operational mission transition for increased commonality and resiliency in space program systems. EGS will focus efforts on the rapid development and deployment of tactical C2 services, developing and integrating on-premises and cloud infrastructure and laboratories at multiple sites, advanced concept exploration, prototype development and demonstrations, user experience maturation, training and Concept of Operations (CONOPS) refinement, cyber operations and operational mission training support. These efforts will require support such as systems engineering, integration and test, standards and interface development, architecture development, enhanced cyber security development and implementation. Programs and projects in the space warfighting enterprise are evaluating ways to maximize innovation, resiliency, and our ability to rapidly respond to known and emerging threats. Space enterprise efforts aim to execute technology risk reduction efforts, integration of new or repurposed capabilities, enterprise decision-making tools, experimentation, and rapid prototyping and fielding via all appropriate acquisition authorities and contract mechanisms.

Over the Future Years Defense Program (FYDP) EGS will be developing and deploying C2 services and software applications that support transitioning legacy and new missions such as Missile Warning, Missile Defense, MILSATCOM, Space Situational Awareness and various classified and experimental satellites and missions to the EGS open architecture. The modifications to core software applications provided by EGS are being made in an Agile DevSecOps environment, which has been fundamentally designed into EGS since its inception.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition

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authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

The program element may include necessary civilian pay expenses required to manage, execute, and deliver EGS capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

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.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	116.791	0.000	116.791
Total Adjustments	0.000	0.000	116.791	0.000	116.791
• 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	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	116.791	0.000	116.791

Change Summary Explanation

FY 2021: +\$116.791M; Funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Enterprise Ground Services (EGS) Development	0.000	0.000	71.291
Description: Perform prototype Mission Partner Demonstrations, cybersecurity and crypto development and implementation, standards and interface refining, training and CONOPs refinement, advance concept maturation, integration and test of mission unique software, and integration of common application and services. Expand development environment in order to develop software applications and services in support of onboarding additional satellite missions.			
FY 2020 Plans: N/A			
FY 2021 Plans:			

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Continue maturation of EGS laboratories including providing an on-premises and cloud based DevSecOps capability at the Space Management Battle Lab at the Catalyst Campus in Colorado. Continue the development and deployment of C2 services, prototype mission partner demonstrations, crypto development and implementation, platform development and interface refining, training and CONOPs refinement, advance concept maturation, support integration and test of mission unique software, and integration of common applications and services at the distributed System Integration Lab, and cybersecurity for EGS related systems only. EGS developed cyber services to-date have utility outside of EGS and this position only supports cyber services for EGS. EGS plans to leverage USSF HQ enterprise cyber services to support mission needs and has removed those efforts from its request. Expand User Experience guidelines and user interface specifications to include multiple services beyond TT&C, Ground Resource Manager, and Mission Management. Expand EGS core services based on mission needs. Mature EGS deployment automation and testing. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, demonstrations, prototyping, etc.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>				
<p>Title: EGS Pre-Operations (Pre-Ops) Support</p> <p>Description: Maintain EGS hardware and software baselines, update software licenses, cyber security, help desk operations, and associated training.</p> <p>FY 2020 Plans: N/A</p> <p>FY 2021 Plans: Conduct pre-ops support activities for satellites using enterprise services to include maintaining EGS hardware and software baselines, updating software licenses, prototyping and extending help desk operations at multiple locations, as well as associated training and cyber security support for EGS only. Implement state of the art hardware components at key EGS operational locations as needed.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>		0.000	0.000	19.600
<p>Title: EGS Deployment</p> <p>Description: Rapidly deploy tactical C2 services and space domain capabilities to support customer-funded mission transition activities including future mission acquisition planning and risk reduction efforts.</p>		0.000	0.000	25.900

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: N/A</p> <p>FY 2021 Plans: Continue the operational deployment of C2 services, and maturation of networks and links across the EGS enterprise. Continue integration efforts with current and future space domain capabilities. Expand service offerings and functionality for both existing and new satellites that will use EGS. Continue developing the programmatic, technical and architectural roadmap to enable the phased transition of mission partners to EGS. Support customer-funded mission transition plans including future mission acquisition planning and risk reduction efforts.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>			
Accomplishments/Planned Programs Subtotals	0.000	0.000	116.791

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

N/A

Remarks

E. Acquisition Strategy

The EGS acquisition strategy focuses on rapidly delivering C2 prototypes and operational capabilities to warfighters, while leveraging industry best practices for agile development and continuous integration /delivery (CI/CD). One of the key tenets of the EGS acquisition strategy is to maintain government ownership of the technical baseline. As a result, EGS uses a combination of existing and new contracts, and agreements with industry and academia to procure prototypes, platform as a service (PaaS) capabilities, system engineering services, and pre-operations support for mission users. Leverage the two SBIR Phase 3 contracts that were awarded in late FY 2019 to scale EGS capabilities and enable more rapid development and deployment of tactical C2 services to operational users.

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

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Pre-Ops Support	Various	Various : Various	-	-	-	-		19.600	Nov 2020	-		19.600	Continuing	Continuing	-
HW, SW and Integration	Various	Various : Various	-	-	-	-		6.900	Dec 2020	-		6.900	Continuing	Continuing	-
Development	Various	Various : Various	-	-	-	-		50.091	Nov 2020	-		50.091	Continuing	Continuing	-
Technical Mission Analysis (FFRDC Aerospace Costs)	MIPR	Aerospace : El Segundo, CA	-	-	-	-		4.500	Oct 2020	-		4.500	Continuing	Continuing	-
Enterprise Systems Engineering and Integration (SE&I)	Various	MITRE : Bedford, MA	-	-	-	-		19.000	Oct 2020	-		19.000	Continuing	Continuing	-
Subtotal			-	-	-	-		100.091		-		100.091	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
FFRDC (Aerospace)	MIPR	Aerospace : El Segundo, CA	-	-	-	-		6.500	Oct 2020	-		6.500	Continuing	Continuing	-
A&AS Support	Various	Various : Various	-	-	-	-		9.600	Dec 2020	-		9.600	Continuing	Continuing	-
Other Support	Various	Various : El Segundo, CA	-	-	-	-		0.600	Dec 2020	-		0.600	Continuing	Continuing	-
Subtotal			-	-	-	-		16.700		-		16.700	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-	0.000	116.791	-	116.791	Continuing	Continuing	N/A

Remarks

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

EGS Development	
System Integration Lab (SIL)	
Space Management Battle Lab (SMBL)	
Development to Operations (DevOps)	
Initial Enterprise Capability	■
EGS Deployment	
EGS Deployment	
Schriever AFB Initial Capability	■
Kirtland AFB Initial Capability	■
EGS Pre-Ops Support	
EGS Pre-Ops Support	
Mission Integration	
-GNOME (GEO Non-ITW/AA Operations Migration to EGS)	■

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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
EGS Development				
System Integration Lab (SIL)	1	2021	4	2025
Space Management Battle Lab (SMBL)	1	2021	4	2025
Development to Operations (DevOps)	1	2021	4	2025
Initial Enterprise Capability	1	2022	1	2022
EGS Deployment				
EGS Deployment	1	2021	4	2025
Schriever AFB Initial Capability	1	2022	1	2022
Kirtland AFB Initial Capability	1	2023	1	2023
EGS Pre-Ops Support				
EGS Pre-Ops Support	1	2021	4	2025
Mission Integration	1	2021	4	2025
-GNOME (GEO Non-ITW/AA Operations Migration to EGS)	1	2022	1	2022

Note

Singular events depicted above represent milestones. All milestones include effort prior-to and after the event.
 EGS Initial Enterprise Capability milestone includes initial delivery and maturation of tactical C2 enterprise services and space domain capabilities.
 EGS Deployment milestones include initial build-outs of EGS enclaves at operational sites. Continuous Integration/Continuous Deployment is on-going.
 EGS Pre-Ops support milestones include phased initial integration of mission partners and EGS. Pre-ops support is on-going.