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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force										Date: March 2023		
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 1203173SF / <i>Space and Missile Test and Evaluation Center</i>							
COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	1.651	4.157	22.039	0.000	22.039	22.408	22.893	23.088	23.642	Continuing	Continuing
67A014: <i>R&D Space & Missile Operations</i>	-	1.651	4.157	22.039	0.000	22.039	22.408	22.893	23.088	23.642	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Research and Development Space and Missile Operations (RDSMO) program, executed by the Acquisition Delta - Innovation and Prototyping, Space Systems Command at Kirtland Air Force Base (KAFB), NM, conducts Space Vehicle and Ground technology transition, prototype development, Developmental Test and Evaluation (DT&E) and Initial Operational Test and Evaluation (IOT&E). RDSMO develops and evaluates ground systems for prototype experimental, demonstration, and operational satellites within the RDT&E Support Complex (RSC) at KAFB, NM and at Schriever Space Force Base (SSFB), CO. Additionally, this program augments the Space Force Satellite Control Network (SCN) with the Mobile Range Flight (MRF) while prototyping new antenna systems and networking technologies worldwide. The RDSMO program develops, acquires, delivers, integrates, tests, operates and sustains the Multi-Mission Satellite Operations Center (MMSOC) satellite command and control (C2) Ground System Enterprise (GSE) for existing experimental and prototype missions. RDSMO develops, acquires, delivers integrates, tests and operates new tactical space C2 architectures from ground stations (including government, commercial, and a local Kirtland station) through their networks to the RSC. RDSMO then ensures users receive the highest quality data at the required latency in support of USSF, Department of Defense (DoD), and other government mission partners. This program also leads the transfer of approved on-orbit missions to operational command organizations such as Space Operations Command. It performs prototype and technology evaluation for multiple USSF missions to include the Enterprise Ground Services, Space Domain Awareness missions, and other mission areas as required.

The objective of the RDSMO Program is to innovate, prototype, and evaluate USSF ground systems to support USSF, DoD, and other government mission partners while speeding transition of war winning capabilities. The program is centered at the RSC in KAFB, but is developing, testing and evaluating architectures with distributed cloud based operations, integration in existing and future USSF data distribution networks as well as evaluating resiliency and availability to meet future warfighter needs. RDSMO develops and integrates new space technologies to maximize operator usability, such as refining software operator interfaces and developing and evaluating novel TTP. The RDSMO program provides beneficial ground and space vehicle technology directly to the warfighting organizations, for continued experimentation or operations. RDSMO uses a combination of standard hardware and software to:

- (1) perform satellite C2 in support of launch and on-orbit requirements;
- (2) develop tactics, techniques, and procedures to conduct satellite operations;
- (3) provide a satellite C2 incremental or revolutionary (as required) ground resource for RDT&E of new satellite and C2 systems and concepts;
- (4) deliver operational flexibility for new and legacy satellite missions designed to out-pace adversary on-orbit systems;.
- (5) maximize flexible satellite operations to support multi-mission prototype operations to move to Cloud-based systems;
- (6) explore and implement innovative ground automation, C2, and data dissemination in concert with experimental, demonstration and prototype space missions;

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- (7) ensure a stable and reliable C2 and ground baseline as necessary for experiment and prototype space missions;
- (8) provide an environment to mature technology for developmental satellites and payloads; and
- (9) transition and provide best practices for satellites and ground systems to operational squadrons if necessary

Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Command (SSC) has transformed 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 authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or re-purpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver RDSMO weapon system 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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	1.699	4.157	4.237	0.000	4.237
Current President's Budget	1.651	4.157	22.039	0.000	22.039
Total Adjustments	-0.048	0.000	17.802	0.000	17.802
• 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	-0.048	0.000			
• Other Adjustments	0.000	0.000	17.802	0.000	17.802

Change Summary Explanation

FY2022: -0.048M SBIR reduction.

FY 2024: +17.830M for evolution of the Ground Services Architecture (GSA) toward a more cloud-based operations posture and to continue to advance experiment and prototype operations; and inflation adjustment.

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FY 2024: -0.028M to realign funding to APPN 3410, PE 1207804SF (SAG 13C), for fiscal policy compliance as Space Systems Command (SSC) establishes Headquarters functions and a Chief Information Office (CIO) for integrated cybersecurity

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
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<p>Title: MMSOC Development</p> <p>Description: Evolution of the Ground Services Architecture (GSA) through the 'on-premises' hardware-based Multi-Mission Satellite Operations Center (MMSOC). Development, integration, and test of common services for space vehicle prototype and operational capabilities, including shared orbital analysis and mission planning tools, data distribution and dissemination, cyber defense, on-premises cloud computing, multi-security level operations, and enhanced ground entry points for prototype-operations. This primarily includes development and evaluation of local hardware solutions as required for space experiment and prototype requirements including both security, resiliency and availability where other cloud-based solutions will not work.</p> <p>FY 2023 Plans: Develop MMSOC XPro full cybersecurity-compliance (Public Key Infrastructure (PKI), 2 Factor Authentication, out of band management) and implement a vital capability to host 30 Service, DoD, and Interagency R&D missions with a goal to host all missions at a common classification level. If necessary, develop a separate enclave that provides data separation, encryption and logical segregation, with minimal hardware separation. Designs improve the operation of existing and planned prototype missions that will inform new acquisitions and improve MMSOC's cybersecure posture.</p> <p>Develop automated mission planning tools to decrease the requirement for additional manpower to fly the satellites, thereby decreasing the total cost to operate the 30 satellite missions.</p> <p>Develop and deliver ground solutions and support for prototype, demonstration, and experimental missions, including but not limited to: the Long Duration Propulsive Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adaptor (ESPA) [LDPE] LDPE-1, LDPE-2, and LDPE-3A missions, subsequent ROOSTER and Tetra missions, the Air Force Vanguard Navigation Technology Satellite-3 (NTS-3), and the two Quasi-Zenith Satellite System (QZSS) payloads hosted on Japanese satellites. As part of this, develop Tactics, Techniques & Procedures (TTPs) for next generation USSF satellites.</p> <p>Continue integrating the prototype operations center with EGS development, to include but not limited to developing the EGS Risk Reduction & Integration Plan for each prototype mission.</p> <p>Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2024 Plans:</p>	1.651	4.157	4.640
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
<p>Continue to evolve hardware, "on-premises" based MMSOC XPro architectures for full cybersecurity-compliance (PKI, 2 Factor Authentication, out of band management) and ensure reliable and resilient development and evaluation to meet "on-premises" requirements. Continue to investigate then develop a separate enclave that provides data separation, encryption and logical segregation, with minimal hardware separation as required by the experiment and prototype space mission needs. Continue to improve the operation of existing and planned prototype missions that will inform new acquisitions and improve USSF's ground systems transition for the most cyber-secure posture possible.</p> <p>Begin to develop cyber resiliency strategies and evaluate effects and trades between "on-premises" vs cloud-based architectures. Partner with AFRL and others to speed technology transition of ground system capabilities from experimental to prototype phases.</p> <p>Continue to develop and deliver ground solutions and support for prototype, demonstration, and experimental missions, including but not limited to the LDPE-1 and LDPE-2 missions.</p> <p>Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 due to evaluation of "on-premises" vs cloud-based architectures and transitioning ground system capabilities from experimental to prototype phases.</p>			
<p>Title: Cloud-Enabled Ground System Development</p> <p>Description: This effort continues and expands evolution of the Ground Services Architecture (GSA) effort as captured in previous fiscal years in the MMSOC Development Major Thrust.</p> <p>Develop, integrate, operate, test and evaluate cloud-based space C2 capability that will transform the RSC into a more modular solution for space prototype missions, by enabling the handling and distributing mission data at multiple security levels, resolving a current capability gap on payload mission data. Primary goals of this effort will be to measure cost effectiveness, reliability, cyber resiliency, and mission effectiveness for upcoming technology transitions. Coordinating with mission partners and AFRL to ensure technology transition evaluation is performed as efficiently as possible. Fully transition existing and future space experiment and prototype missions to an off-premises architecture while ensuring minimal risk to space mission support.</p> <p>FY 2023 Plans: N/A</p> <p>FY 2024 Plans:</p>	0.000	0.000	9.099

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
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<p>Begin to develop, field, and evaluate cloud-based space mission operations using commercially available architectures to increase system reliability, data distribution, and decrease system life cycle costs for future missions consistent with the GSA. Begin to prototype and demonstrate a modernized cloud-based off-premise GSA solution and follow-on EGS capabilities, to include critical technology maturation of new mission on-boarding solutions, the stand-up of integration and test environments, enabling of data distribution at multiple security levels, transition to a cloud service provider, and stand-up of shared EGS services into a combined GSA and EGS architecture. Develop, integrate and evaluate trades and implementations between hybrid (on-premises and cloud-based solutions) to determine the most cost- and mission-effective optimization.</p> <p>Continue integrating the prototype operations center with EGS development, including developing the EGS Risk Reduction & Integration Plan for each prototype mission.</p> <p>Continue to develop and deliver ground solutions and support for prototype, demonstration, and experimental missions, including but not limited to the LDPE-3A mission and subsequent ROOSTER and Tetra (Tetra 3, 4, & 5) missions.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased compared to FY 2023 due to continued evolution of the GSA with an emphasis on cloud-based space mission operations.</p>			
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<p>Title: Prototype Baseline Support</p> <p>Description: This effort continues and expands development of automated mission planning tools, data distribution and dissemination, and cyber defense effort as captured in previous fiscal years in the MMSOC Development Major Thrust.</p> <p>Purchase hardware and software as needed to maintain and advance experiment and prototype operations including: mission planning, ground equipment configuration, real-time satellite commanding, telemetry processing, mission data & cyber-defense.</p> <p>FY 2023 Plans: N/A</p> <p>FY 2024 Plans: Continue to develop automated mission planning tools to decrease the requirement for additional manpower to fly the satellites, thereby decreasing the total cost to operate the anticipated 20+ experimental and prototype satellite missions.</p> <p>Use Federally-Funded Research and Development Contractor (FFRDC), Systems Engineering and Technical Assistance (SETA), and/or University Affiliated Research Center support to develop and evaluate TTP procedures across on- and off-premise systems.</p>	0.000	0.000	8.300
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
Monitor, develop, and mitigate cyber risks. Ensure cyber accreditations to receive approval to operate (ATO), and coordinate cyber-defense capabilities.			
Develop and integrate ground antenna system capabilities for USSF mission needs. Update and include full networked integration of KAFB antenna assets, enhance needs for energy sustainability and portability of ground system support, and develop, integrate and evaluate cost-effective sustainment methodologies for hardware based systems.			
Continue to develop and deliver ground solutions and support for prototype, demonstration, and experimental missions, including but not limited to: the Air Force Vanguard Navigation Technology Satellite-3 (NTS-3), and the two QZSS payloads hosted on Japanese satellites. As part of this, develop TTPs for next generation USSF satellites.			
Provide for necessary infrastructure needs to perform system operations and continue evolution of system capabilities both for off- and on-premise architectures.			
<i>FY 2023 to FY 2024 Increase/Decrease Statement:</i> FY 2024 increased compared to FY 2023 to advance experiment and prototype operations including: mission planning, ground equipment configuration, real-time satellite commanding, telemetry processing, mission data & cyber-defense, and ground antenna system capabilities for USSF mission needs.			
Accomplishments/Planned Programs Subtotals	1.651	4.157	22.039

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• SPAF 01 GNRLIT: <i>General Information Tech - Space</i>	1.938	2.046	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.984

Remarks
Beginning in FY 2024, RDSMO transferred funds from Procurement, Space Force (PSF), General Information Tech - Space (GNRLIT) to RDT&E PE 1203173SF, Space and Missile Test and Evaluation Center, Project R&D Space & Missile Operations (RDSMO).

E. Acquisition Strategy
RDSMO will continue to use the competitively awarded Engineering, Development, Integration, and Sustainment (EDIS) contract (awarded Feb 2020) to support MMSOC, RSC, MRF, and EGS activities. RDSMO will use the competitively awarded Prototype Operations (POPS)-I contract (awarded May 2022). RDSMO will use existing mission partner contracts to leverage cost savings or technological efficiencies, including EGS contracts, partnerships with AFRL (including UARC support), and

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<p>other mission partners. Acquisition strategies will be developed to determine the need for additional contracts to meet the full system requirements, and new contracts may be required as development plans evolve. Additionally, RDSMO uses an SSC Advisory & Assistance Support (A&AS) contract and a SSC Systems Engineering and Technical Assistance (SETA) contract, as well as Federally-Funded Research and Development Contractor (FFRDC) support through Aerospace.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Ground Services R&D Engineering, Development, Integration, and Test	C/CPAF	SAIC : Albuquerque, NM	-	0.749	Apr 2022	2.012	Nov 2022	9.316	Nov 2023	-		9.316	Continuing	Continuing	-
Naval Research Lab (NRL)	C/CPAF	Not specified. : TBD	-	0.300	Apr 2022	-		0.000		-		0.000	Continuing	Continuing	-
EGS and Mission Partner Contracts	Various	TBD : TBD	-	-		-		1.425	Feb 2024	-		1.425	Continuing	Continuing	-
UARC - Space & Nuclear Advanced Prototypes/ Experiments/Tech Contract (through AFRL)	SS/CPFF	Space Dynamics Laboratory : Logan, UT	-	-		-		3.380	Feb 2024	-		3.380	Continuing	Continuing	-
SBIR/STTR	Various	Not specified. : TBD	-	-		-		0.681	Mar 2024	-		0.681	Continuing	Continuing	-
Subtotal			-	1.049		2.012		14.802		-		14.802	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Space Test and Engineering Contract (STEC)	C/CPFF	Linquest : Kirtland AFB, NM	-	0.381	Dec 2021	-		-		-		-	Continuing	Continuing	-
Prototype Operations-I (POPS-I)	C/CPFF	a.i. solutions, Inc. : Kirtland AFB, NM	-	0.187	May 2022	1.453	Oct 2022	1.007	May 2024	-		1.007	Continuing	Continuing	-
Subtotal			-	0.568		1.453		1.007		-		1.007	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
A&AS - STS-III	C/FFP	MEI : Los Angeles, CA	-	0.034	Apr 2022	0.692	Nov 2022	0.400		-		0.400	Continuing	Continuing	-
A&AS - SAFS-II	C/FFP	Tecolote : Kirtland AFB, NM	-	-		-		1.327		-		1.327	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
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FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
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

MMSOC Development	
Ground Services Architecture (GSA) Evolution (On-Premise Cloud)	
CloudSat (Customer Funded)	
Space Test Program Satellite-2 (STPSat-2) (Customer Funded)	
Space Test Program Satellite-3 (STPSat-3) (Customer Funded)	
Operationally Responsive Space (ORS-5) (Customer Funded)	
Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) Augmented Geostationary Laboratory Experiment (EAGLE) Support (Customer Funded)	
Mycroft Support (Customer Funded)	
Jaguar (Customer Funded)	
Long Duration Propulsive ESPA-1 (LDPE-1) (Customer Funded)	
USSF-12 (Customer Funded)	
Long Duration Propulsive ESPA -2 (LDPE-2) (Customer Funded)	
Tetra-1 (Customer Funded)	
LDPE-3A (Customer Funded)	
Tetra-3 (Customer Funded)	
Navigation Technology Satellite NTS-3 (Customer Funded)	

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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	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

Continue Operationally Responsive Space (ORS-5) (Customer Funded)																												
Continue USSF-12 (Customer Funded)																												
Continue Navigation Technology Satellite NTS-3 (Customer Funded)																												
Continue Quasi-Zenith Satellite System (Customer Funded)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MMSOC Development</i>				
Ground Services Architecture (GSA) Evolution (On-Premise Cloud)	1	2022	4	2027
CloudSat (Customer Funded)	1	2022	1	2024
Space Test Program Satellite-2 (STPSat-2) (Customer Funded)	1	2022	4	2023
Space Test Program Satellite-3 (STPSat-3) (Customer Funded)	1	2022	2	2022
Operationally Responsive Space (ORS-5) (Customer Funded)	1	2022	4	2028
Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) Augmented Geostationary Laboratory Experiment (EAGLE) Support (Customer Funded)	1	2022	4	2024
Mycroft Support (Customer Funded)	1	2022	2	2022
Jaguar (Customer Funded)	1	2022	4	2028
Long Duration Propulsive ESPA-1 (LDPE-1) (Customer Funded)	1	2022	1	2023
USSF-12 (Customer Funded)	1	2022	1	2024
Long Duration Propulsive ESPA -2 (LDPE-2) (Customer Funded)	1	2022	1	2024
Tetra-1 (Customer Funded)	1	2022	1	2024
LDPE-3A (Customer Funded)	1	2022	1	2024
Tetra-3 (Customer Funded)	1	2022	1	2024
Navigation Technology Satellite NTS-3 (Customer Funded)	1	2022	4	2023
Quasi-Zenith Satellite System (Customer Funded)	1	2022	4	2023
Rooster-4 (Customer Funded)	1	2022	4	2023
Tetra-4 (Customer Funded)	3	2023	4	2023
Space Rapid Capabilities Office Mission Support (Customer Funded)	2	2022	4	2023
<i>Off-Premises Cloud-Enabled Ground System Development</i>				

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force **Date:** March 2023

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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Begin Off-Premises Cloud-Enabled Ground System Development and Integration	1	2024	4	2028
Begin On/Off Premise Cloud-Enabled Ground System Evaluation	1	2024	4	2026
Continue LDPE-3A (Customer Funded)	1	2024	1	2024
Continue Tetra-3 (Customer Funded)	1	2024	1	2024
Begin Rooster-4 (Customer Funded)	1	2024	4	2028
Begin Tetra-4 (Customer Funded)	1	2024	4	2028
Begin Rooster-5 (Customer Funded)	2	2025	4	2028
Begin Tetra-5 (Customer Funded)	2	2025	4	2028
Continue Space Rapid Capabilities Office Mission Support (Customer Funded)	1	2024	4	2028
Prototype Baseline Support				
Continue to monitor cyber and coordinate cyber defense capabilities	1	2024	4	2028
Continue to develop and evaluate Tactics, Techniques & Procedures (TTPs)	1	2024	4	2028
Continue to develop and integrate ground antenna system capabilities at the Mobile Range Flight (MRF)	1	2024	4	2028
Continue Operationally Responsive Space (ORS-5) (Customer Funded)	1	2024	4	2028
Continue USSF-12 (Customer Funded)	1	2024	4	2028
Continue Navigation Technology Satellite NTS-3 (Customer Funded)	1	2024	4	2028
Continue Quasi-Zenith Satellite System (Customer Funded)	1	2024	4	2028