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**Department of Defense
Fiscal Year (FY) 2023 Budget Estimates**

April 2022



Air Force

Justification Book Volume 1 of 1

Research, Development, Test & Evaluation, Space Force

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Air Force • Budget Estimates FY 2023 • RDT&E Program

Volume 1 Table of Contents

Introduction and Explanation of Contents.....Volume 1 - iii
Comptroller Exhibit R-1..... Volume 1 - v
Program Element Table of Contents (by Budget Activity then Line Item Number).....Volume 1 - xvii
Program Element Table of Contents (Alphabetically by Program Element Title).....Volume 1 - xxiii
Exhibit R-2s..... Volume 1 - 1

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Fiscal Year (FY) 2023 Budget Estimates RDT&E Descriptive Summaries Budget Activities April 2022

INTRODUCTION AND EXPLANATION OF CONTENTS

GENERAL

- This document has been prepared to provide information on the United States Space Force (USSF) Research, Development, Test and Evaluation (RDT&E) program elements and projects in the FY 2023 President's Budget (PB).
 - All exhibits in this document have been assembled in accordance with DoD 7000.14R, Financial Management Regulation, Volume 2B, Chapter 5.
 - Other comments on exhibit contents in this document:
 - Exhibits R-2/2a and R-3 provide narrative information for all RDT&E program elements and projects within the USAF FY 2023 RDT&E program with the exception of classified program elements. The format and contents of this document are in accordance to the guidelines and requirements of the Congressional committees in so far as possible.
 - The "Other Program Funding Summary portion of the R-2 includes, in addition to RDTE& funds, Procurement funds and quantities, Military Construction appropriation funds on specific development programs, Operations and Maintenance appropriation funds where they are essential to the development effort described, and where appropriate, Department of Energy (DOE) costs.

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- All exhibits contained in Volumes I, II, and III are unclassified. Classified exhibits are not included in the submission due to the level of security classification and necessity of special security clearances.

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Department of the Air Force
 FY 2023 President's Budget
 Exhibit R-1 FY 2023 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

25 Mar 2022

	FY 2021 (Base + OCO)	FY 2022 Less Supplementals Enactment	FY 2022 Division B Division C P.L.117-43 Enactment*	FY 2022 Division B P.L.117-70 Enactment**	FY 2022 Division A P.L. 117-86 Enactment***	FY 2022 Division N P.L. 117-103 Enactment****
Summary Recap of Budget Activities -----						
Applied Research	214,494	286,505				
Advanced Technology Development		238,584				
Advanced Component Development & Prototypes	1,335,818	1,598,560				
System Development & Demonstration	3,638,636	3,167,810				
Management Support	537,965	471,142				
Operational System Development	4,624,888	5,680,275				
Software & Digital Technology Pilot Programs	155,067	154,529				
Total Research, Development, Test & Evaluation	10,506,868	11,597,405				
Summary Recap of FYDP Programs -----						
Research and Development						
Space	6,969,975	7,034,096				
Classified Programs	3,536,893	4,563,309				
Total Research, Development, Test & Evaluation	10,506,868	11,597,405				

R-123PBP: FY 2023 President's Budget (Total Base Published Version), as of March 25, 2022 at 15:49:52

*Includes enacted funding pursuant to the Extending Government Funding and Delivering Emergency Assistance Act (Public Law 117-43).

**Includes enacted funding pursuant to the Further Extending Government Funding Act (Public Law 117-70).

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 (Dollars in Thousands)

25 Mar 2022

	FY 2022 Total Supplemental Enactment	FY 2022 Total Enactment	FY 2023 Request
Summary Recap of Budget Activities -----			
Applied Research		286,505	243,737
Advanced Technology Development		238,584	564,215
Advanced Component Development & Prototypes		1,598,560	2,992,458
System Development & Demonstration		3,167,810	5,335,659
Management Support		471,142	424,943
Operational System Development		5,680,275	6,103,307
Software & Digital Technology Pilot Programs		154,529	155,053
Total Research, Development, Test & Evaluation		11,597,405	15,819,372
Summary Recap of FYDP Programs -----			
Research and Development			816
Space		7,034,096	10,845,198
Classified Programs		4,563,309	4,973,358
Total Research, Development, Test & Evaluation		11,597,405	15,819,372

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Appropriation: 3620F RDTE, Space Force

Line No	Program Element Number	Item	Act	FY 2021 (Base + OCO)	FY 2022 Less Supplementals Enactment	FY 2022 Division B P.L.117-43 Enactment*	FY 2022 Division B P.L.117-70 Enactment**	FY 2022 Division A P.L. 117-86 Enactment***	FY 2022 Division N P.L. 117-103 Enactment****	S e c
1	1202212SF	Defense Laboratories R&D Projects	02	5,238						U
2	1206601SF	Space Technology	02	209,256	286,505					U
		Applied Research		214,494	286,505					
3	1206310SF	Space Science and Technology Research and Development	03							U
4	1206616SF	Space Advanced Technology Development/Demo	03		238,584					U
		Advanced Technology Development			238,584					
5	0604002SF	Space Force Weather Services Research	04							U
6	1203164SF	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04	367,652	434,194					U
7	1203622SF	Space Warfighting Analysis	04							U
8	1203710SF	EO/IR Weather Systems	04	125,110	162,274					U
9	1203905SF	Space System Support	04		37,000					U
10	1206410SF	Space Technology Development and Prototyping	04							U
11	1206422SF	Weather System Follow-on	04	77,379	53,421					U
12	1206425SF	Space Situation Awareness Systems	04	30,356	105,062					U
13	1206427SF	Space Systems Prototype Transitions (SSPT)	04	163,796	91,851					U

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Appropriation: 3620F RDTE, Space Force

Line No	Program Element Number	Item	Act	FY 2022 Total Supplemental Enactment	FY 2022 Total Enactment	FY 2023 Request	Se
---	-----	----	---	-----	-----	-----	-
1	1202212SF	Defense Laboratories R&D Projects	02				U
2	1206601SF	Space Technology	02		286,505	243,737	U
		Applied Research			286,505	243,737	
3	1206310SF	Space Science and Technology Research and Development	03			460,820	U
4	1206616SF	Space Advanced Technology Development/Demo	03		238,584	103,395	U
		Advanced Technology Development			238,584	564,215	
5	0604002SF	Space Force Weather Services Research	04			816	U
6	1203164SF	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04		434,194	382,594	U
7	1203622SF	Space Warfighting Analysis	04			44,791	U
8	1203710SF	EO/IR Weather Systems	04		162,274	96,519	U
9	1203905SF	Space System Support	04		37,000		U
10	1206410SF	Space Technology Development and Prototyping	04			986,822	U
11	1206422SF	Weather System Follow-on	04		53,421		U
12	1206425SF	Space Situation Awareness Systems	04		105,062	230,621	U
13	1206427SF	Space Systems Prototype Transitions (SSPT)	04		91,851	106,252	U

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Line	Program Element	Item	Act	FY 2021 (Base + OCO)	FY 2022 Less Supplementals Enactment	FY 2022 Division B Division C P.L.117-43 Enactment*	FY 2022 Division B P.L.117-70 Enactment**	FY 2022 Division A P.L. 117-86 Enactment***	FY 2022 Division N P.L. 117-103 Enactment****	S e c e c
14	1206438SF	Space Control Technology	04	42,400	35,931					U
15	1206458SF	Tech Transition (Space)	04		50,000					U
16	1206730SF	Space Security and Defense Program	04	56,311	53,896					U
17	1206760SF	Protected Tactical Enterprise Service (PTES)	04	105,718	100,320					U
18	1206761SF	Protected Tactical Service (PTS)	04	193,291	229,329					U
19	1206855SF	Evolved Strategic SATCOM (ESS)	04	69,009	172,089					U
20	1206857SF	Space Rapid Capabilities Office	04	104,796	73,193					U
	Advanced Component Development & Prototypes			1,335,818	1,598,560					
21	1203269SF	GPS III Follow-On (GPS IIIIF)	05	275,819	246,332					U
22	1203940SF	Space Situation Awareness Operations	05	35,749	42,008					U
23	1206421SF	Counterspace Systems	05	55,592	48,063					U
24	1206422SF	Weather System Follow-on	05	2,440	1,438					U
25	1206425SF	Space Situation Awareness Systems	05	165,008	127,026					U
26	1206431SF	Advanced EHF MILSATCOM (SPACE)	05	86,918	26,942					U
27	1206432SF	Polar MILSATCOM (SPACE)	05	123,519	112,170					U
28	1206433SF	Wideband Global SATCOM (SPACE)	05							U
29	1206440SF	Next-Gen OPIR -- Ground	05		542,477					U

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14	1206438SF	Space Control Technology	04		35,931	57,953	U
15	1206458SF	Tech Transition (Space)	04		50,000		U
16	1206730SF	Space Security and Defense Program	04		53,896	59,169	U
17	1206760SF	Protected Tactical Enterprise Service (PTES)	04		100,320	121,069	U
18	1206761SF	Protected Tactical Service (PTS)	04		229,329	294,828	U
19	1206855SF	Evolved Strategic SATCOM (ESS)	04		172,089	565,597	U
20	1206857SF	Space Rapid Capabilities Office	04		73,193	45,427	U
		Advanced Component Development & Prototypes					
						1,598,560	2,992,458
21	1203269SF	GPS III Follow-On (GPS IIIIF)	05		246,332	325,927	U
22	1203940SF	Space Situation Awareness Operations	05		42,008	49,628	U
23	1206421SF	Counterspace Systems	05		48,063	21,848	U
24	1206422SF	Weather System Follow-on	05		1,438	48,870	U
25	1206425SF	Space Situation Awareness Systems	05		127,026	105,140	U
26	1206431SF	Advanced EHF MILSATCOM (SPACE)	05		26,942	11,701	U
27	1206432SF	Polar MILSATCOM (SPACE)	05		112,170	67,465	U
28	1206433SF	Wideband Global SATCOM (SPACE)	05			48,438	U
29	1206440SF	Next-Gen OPIR -- Ground	05		542,477		U

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						Division B Division C P.L.117-43 Enactment*	Division B P.L.117-70 Enactment**	Division A P.L. 117-86 Enactment***	Division N Division S P.L. 117-103 Enactment**** e
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30	1206442SF	Next Generation OPIR	05	2,318,864	125,853				U
31	1206443SF	Next-Gen OPIR -- GEO	05		1,199,193				U
32	1206444SF	Next-Gen OPIR -- Polar	05		471,398				U
33	1206445SF	Commercial SATCOM (COMSATCOM) Integration	05	41,711	23,400				U
34	1206446SF	Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)	05						U
35	1206447SF	Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)	05						U
36	1206448SF	Resilient Missile Warning Missile Tracking - Integrated Ground Segment	05						U
37	1206853SF	National Security Space Launch Program (SPACE) - EMD	05	533,016	201,510				U
		System Development & Demonstration		3,638,636	3,167,810				
38	1205502SF	Small Business Innovation Research	06	256,920					U
39	1206116SF	Space Test and Training Range Development	06	19,724	69,819				U
40	1206392SF	ACQ Workforce - Space & Missile Systems	06	193,631	214,051				U
41	1206398SF	Space & Missile Systems Center - MHA	06	9,765	12,119				U

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Appropriation: 3620F RDTE, Space Force

Line	Program Element No Number	Item -----	Act ---	FY 2022 Total Supplemental Enactment -----	FY 2022 Total Enactment -----	FY 2023 Request -----	S e c -
30	1206442SF	Next Generation OPIR	05		125,853	3,479,459	U
31	1206443SF	Next-Gen OPIR -- GEO	05		1,199,193		U
32	1206444SF	Next-Gen OPIR -- Polar	05		471,398		U
33	1206445SF	Commercial SATCOM (COMSATCOM) Integration	05		23,400	23,513	U
34	1206446SF	Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)	05			499,840	U
35	1206447SF	Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)	05			139,131	U
36	1206448SF	Resilient Missile Warning Missile Tracking - Integrated Ground Segment	05			390,596	U
37	1206853SF	National Security Space Launch Program (SPACE) - EMD	05		201,510	124,103	U
	System Development & Demonstration						
					3,167,810	5,335,659	
38	1205502SF	Small Business Innovation Research	06				U
39	1206116SF	Space Test and Training Range Development	06		69,819	21,453	U
40	1206392SF	ACQ Workforce - Space & Missile Systems	06		214,051	253,716	U
41	1206398SF	Space & Missile Systems Center - MHA	06		12,119	13,962	U

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42	1206616SF	Space Advanced Technology Development/Demo	06							U
43	1206759SF	Major T&E Investment - Space	06		86,503					U
44	1206860SF	Rocket Systems Launch Program (SPACE)	06	17,710	17,769					U
45	1206862SF	Tactically Responsive Launch	06	14,549	50,000					U
46	1206864SF	Space Test Program (STP)	06	25,666	20,881					U
		Management Support		537,965	471,142					
48	1201017SF	Global Sensor Integrated on Network (GSIN)	07	5,411	4,731					U
49	1203001SF	Family of Advanced BLoS Terminals (FAB-T)	07	224,242	156,788					U
50	1203040SF	DCO-Space	07		2,150					U
51	1203109SF	Narrowband Satellite Communications	07		110,012					U
52	1203110SF	Satellite Control Network (SPACE)	07	58,509	36,810					U
53	1203165SF	NAVSTAR Global Positioning System (Space and Control Segments)	07	1,643	1,966					U
54	1203173SF	Space and Missile Test and Evaluation Center	07	4,273	1,699					U
55	1203174SF	Space Innovation, Integration and Rapid Technology Development	07	35,824	18,054					U

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Line	Program Element No Number	Item -----	Act ---	FY 2022 Total Supplemental Enactment -----	FY 2022 Total Enactment -----	FY 2023 Request -----	S e c -
42	1206616SF	Space Advanced Technology Development/Demo	06			2,773	U
43	1206759SF	Major T&E Investment - Space	06		86,503	89,751	U
44	1206860SF	Rocket Systems Launch Program (SPACE)	06		17,769	17,922	U
45	1206862SF	Tactically Responsive Launch	06		50,000		U
46	1206864SF	Space Test Program (STP)	06		20,881	25,366	U
		Management Support				471,142	424,943
48	1201017SF	Global Sensor Integrated on Network (GSIN)	07		4,731	5,321	U
49	1203001SF	Family of Advanced BLoS Terminals (FAB-T)	07		156,788	128,243	U
50	1203040SF	DCO-Space	07		2,150	28,162	U
51	1203109SF	Narrowband Satellite Communications	07		110,012	165,892	U
52	1203110SF	Satellite Control Network (SPACE)	07		36,810	42,199	U
53	1203165SF	NAVSTAR Global Positioning System (Space and Control Segments)	07		1,966	2,062	U
54	1203173SF	Space and Missile Test and Evaluation Center	07		1,699	4,157	U
55	1203174SF	Space Innovation, Integration and Rapid Technology Development	07		18,054	38,103	U

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						Division B Division C P.L.117-43 Enactment*	Division B P.L.117-70 Enactment**	Division A P.L. 117-86 Enactment***	Division N P.L. 117-103 Enactment****	
56	1203182SF	Spacelift Range System (SPACE)	07	20,358	31,115					U
57	1203265SF	GPS III Space Segment	07	10,398	7,207					U
58	1203330SF	Space Superiority ISR	07	16,810	18,109					U
59	1203620SF	National Space Defense Center	07	2,590	1,280					U
60	1203873SF	Ballistic Missile Defense Radars	07	21,817	12,292					U
61	1203906SF	NCMC - TW/AA System	07	6,752	9,858					U
62	1203913SF	NUDET Detection System (SPACE)	07	29,157	45,887					U
63	1203940SF	Space Situation Awareness Operations	07	68,070	64,763					U
64	1206423SF	Global Positioning System III - Operational Control Segment	07	460,942	402,532					U
68	1206770SF	Enterprise Ground Services	07	121,199	191,713					U
9999	9999999999	Classified Programs		3,536,893	4,563,309					U
		Operational System Development		4,624,888	5,680,275					
69	1203614SF	JSpOC Mission System	08	155,067	154,529					U
70	1208248SF	Space Command & Control - Software Pilot Program	08							U
		Software & Digital Technology Pilot Program		155,067	154,529					
Total RDTE, Space Force				10,506,868	11,597,405					

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Line No	Program Element Number	Item	Act	FY 2022 Supplemental Enactment	FY 2022 Total Enactment	FY 2023 Request	Se
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56	1203182SF	Spacelift Range System (SPACE)	07		31,115	11,658	U
57	1203265SF	GPS III Space Segment	07		7,207	1,626	U
58	1203330SF	Space Superiority ISR	07		18,109	29,128	U
59	1203620SF	National Space Defense Center	07		1,280	2,856	U
60	1203873SF	Ballistic Missile Defense Radars	07		12,292	18,615	U
61	1203906SF	NCMC - TW/AA System	07		9,858	7,274	U
62	1203913SF	NUDET Detection System (SPACE)	07		45,887	80,429	U
63	1203940SF	Space Situation Awareness Operations	07		64,763	80,903	U
64	1206423SF	Global Positioning System III - Operational Control Segment	07		402,532	359,720	U
68	1206770SF	Enterprise Ground Services	07		191,713	123,601	U
9999	9999999999	Classified Programs			4,563,309	4,973,358	U
		Operational System Development			5,680,275	6,103,307	
69	1203614SF	JSpOC Mission System	08		154,529		U
70	1208248SF	Space Command & Control - Software Pilot Program	08			155,053	U
		Software & Digital Technology Pilot Program			154,529	155,053	
Total RDTE, Space Force					11,597,405	15,819,372	

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Program Element Table of Contents (by Budget Activity then Line Item Number)

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
1	02	1202212SF	Defense Laboratories R&D Projects.....	Volume 1 - 1
2	02	1206601SF	Space Technology.....	Volume 1 - 5

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
3	03	1206310SF	Space Science and Technology Research and Development.....	Volume 1 - 29
4	03	1206616SF	Space Advanced Technology Development/Demo.....	Volume 1 - 33

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
5	04	0604002SF	Space Force Weather Services Research.....	Volume 1 - 47

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Air Force • Budget Estimates FY 2023 • RDT&E Program

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
6	04	1203164SF	NAVSTAR Global Positioning System (User Equipment) (SPACE).....	Volume 1 - 53
7	04	1203622SF	Space Warfighting Analysis.....	Volume 1 - 67
8	04	1203710SF	EO/IR Weather Systems.....	Volume 1 - 75
9	04	1203905SF	Space System Support.....	Volume 1 - 83
10	04	1206410SF	Space Technology Development and Prototyping.....	Volume 1 - 89
11	04	1206422SF	Weather System Follow-on.....	Volume 1 - 111
12	04	1206425SF	Space Situation Awareness Systems.....	Volume 1 - 121
13	04	1206427SF	Space Systems Prototype Transitions (SSPT).....	Volume 1 - 129
14	04	1206438SF	Space Control Technology.....	Volume 1 - 155
15	04	1206458SF	Tech Transition (Space).....	Volume 1 - 165
16	04	1206730SF	Space Security and Defense Program.....	Volume 1 - 171
17	04	1206760SF	Protected Tactical Enterprise Service (PTES).....	Volume 1 - 179
18	04	1206761SF	Protected Tactical Service (PTS).....	Volume 1 - 187
19	04	1206855SF	Evolved Strategic SATCOM (ESS).....	Volume 1 - 197
20	04	1206857SF	Space Rapid Capabilities Office.....	Volume 1 - 209

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Air Force • Budget Estimates FY 2023 • RDT&E Program

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
21	05	1203269SF	GPS III Follow-On (GPS IIIF).....	Volume 1 - 217
22	05	1203940SF	Space Situation Awareness Operations.....	Volume 1 - 237
23	05	1206421SF	Counterspace Systems.....	Volume 1 - 245
24	05	1206422SF	Weather System Follow-on.....	Volume 1 - 265
25	05	1206425SF	Space Situation Awareness Systems.....	Volume 1 - 281
26	05	1206431SF	Advanced EHF MILSATCOM (SPACE).....	Volume 1 - 291
27	05	1206432SF	Polar MILSATCOM (SPACE).....	Volume 1 - 301
28	05	1206433SF	Wideband Global SATCOM (SPACE).....	Volume 1 - 309
29	05	1206440SF	Next-Gen OPIR -- Ground.....	Volume 1 - 315
30	05	1206442SF	Next Generation OPIR.....	Volume 1 - 323
31	05	1206443SF	Next-Gen OPIR -- GEO.....	Volume 1 - 361
32	05	1206444SF	Next-Gen OPIR -- Polar.....	Volume 1 - 367
33	05	1206445SF	Commercial SATCOM (COMSATCOM) Integration.....	Volume 1 - 373
34	05	1206446SF	Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO).....	Volume 1 - 387
35	05	1206447SF	Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO).....	Volume 1 - 393
36	05	1206448SF	Resilient MW/MT Ground.....	Volume 1 - 401

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UNCLASSIFIED

Air Force • Budget Estimates FY 2023 • RDT&E Program

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
37	05	1206853SF	National Security Space Launch Program (SPACE) - EMD.....	Volume 1 - 411

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
38	06	1205502SF	Small Business Innovation Research.....	Volume 1 - 421
39	06	1206116SF	Space Test and Training Range Development.....	Volume 1 - 425
40	06	1206392SF	ACQ Workforce - Space & Missile Systems.....	Volume 1 - 431
41	06	1206398SF	Space & Missile Systems Center - MHA.....	Volume 1 - 435
42	06	1206616SF	Space Advanced Technology Development/Demo.....	Volume 1 - 439
43	06	1206759SF	Major T&E Investment - Space.....	Volume 1 - 441
44	06	1206860SF	Rocket Systems Launch Program (SPACE).....	Volume 1 - 447
45	06	1206862SF	Tactically Responsive Launch.....	Volume 1 - 451
46	06	1206864SF	Space Test Program (STP).....	Volume 1 - 455

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Air Force • Budget Estimates FY 2023 • RDT&E Program

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
48	07	1201017SF	Global Sensor Integrated on Network (GSIN).....	Volume 1 - 459
49	07	1203001SF	Family of Advanced BLoS Terminals (FAB-T).....	Volume 1 - 471
50	07	1203040SF	DCO-Space.....	Volume 1 - 491
51	07	1203109SF	Narrowband Satellite Communications.....	Volume 1 - 499
52	07	1203110SF	Satellite Control Network (SPACE).....	Volume 1 - 509
53	07	1203165SF	NAVSTAR Global Positioning System (Space and Control Segments).....	Volume 1 - 519
54	07	1203173SF	Space and Missile Test and Evaluation Center.....	Volume 1 - 525
55	07	1203174SF	Space Innovation, Integration and Rapid Technology Development.....	Volume 1 - 535
56	07	1203182SF	Spacelift Range System (SPACE).....	Volume 1 - 543
57	07	1203265SF	GPS III Space Segment.....	Volume 1 - 553
58	07	1203330SF	Space Superiority ISR.....	Volume 1 - 561
59	07	1203620SF	National Space Defense Center.....	Volume 1 - 569
60	07	1203873SF	Ballistic Missile Defense Radars.....	Volume 1 - 575
61	07	1203906SF	NCMC - ITW/AA System.....	Volume 1 - 583
62	07	1203913SF	NUDET Detection System (SPACE).....	Volume 1 - 591
63	07	1203940SF	Space Situation Awareness Operations.....	Volume 1 - 601

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Air Force • Budget Estimates FY 2023 • RDT&E Program

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
64	07	1206423SF	Global Positioning System III - Operational Control Segment.....	Volume 1 - 631
68	07	1206770SF	Enterprise Ground Services.....	Volume 1 - 653

Appropriation 3620F: Research, Development, Test & Evaluation, Space Force

Line #	Budget Activity	Program Element Number	Program Element Title	Page
69	08	1203614SF	JSpOC Mission System.....	Volume 1 - 661
70	08	1208248SF	Space Command & Control - Software Pilot Program.....	Volume 1 - 669

UNCLASSIFIED

UNCLASSIFIED

Air Force • Budget Estimates FY 2023 • RDT&E Program

Program Element Table of Contents (Alphabetically by Program Element Title)

Program Element Title	Program Element Number	Line #	BA	Page
ACQ Workforce - Space & Missile Systems	1206392SF	40	06.....	Volume 1 - 431
Advanced EHF MILSATCOM (SPACE)	1206431SF	26	05.....	Volume 1 - 291
Ballistic Missile Defense Radars	1203873SF	60	07.....	Volume 1 - 575
Commercial SATCOM (COMSATCOM) Integration	1206445SF	33	05.....	Volume 1 - 373
Counterspace Systems	1206421SF	23	05.....	Volume 1 - 245
DCO-Space	1203040SF	50	07.....	Volume 1 - 491
Defense Laboratories R&D Projects	1202212SF	1	02.....	Volume 1 - 1
EO/IR Weather Systems	1203710SF	8	04.....	Volume 1 - 75
Enterprise Ground Services	1206770SF	68	07.....	Volume 1 - 653
Evolved Strategic SATCOM (ESS)	1206855SF	19	04.....	Volume 1 - 197
Family of Advanced BLoS Terminals (FAB-T)	1203001SF	49	07.....	Volume 1 - 471
GPS III Follow-On (GPS III F)	1203269SF	21	05.....	Volume 1 - 217
GPS III Space Segment	1203265SF	57	07.....	Volume 1 - 553
Global Positioning System III - Operational Control Segment	1206423SF	64	07.....	Volume 1 - 631
Global Sensor Integrated on Network (GSIN)	1201017SF	48	07.....	Volume 1 - 459
JSpOC Mission System	1203614SF	69	08.....	Volume 1 - 661
Major T&E Investment - Space	1206759SF	43	06.....	Volume 1 - 441

UNCLASSIFIED

UNCLASSIFIED

Air Force • Budget Estimates FY 2023 • RDT&E Program

Program Element Title	Program Element Number	Line #	BA	Page
NAVSTAR Global Positioning System (Space and Control Segments)	1203165SF	53	07.....	Volume 1 - 519
NAVSTAR Global Positioning System (User Equipment) (SPACE)	1203164SF	6	04.....	Volume 1 - 53
NCMC - ITW/AA System	1203906SF	61	07.....	Volume 1 - 583
NUDET Detection System (SPACE)	1203913SF	62	07.....	Volume 1 - 591
Narrowband Satellite Communications	1203109SF	51	07.....	Volume 1 - 499
National Security Space Launch Program (SPACE) - EMD	1206853SF	37	05.....	Volume 1 - 411
National Space Defense Center	1203620SF	59	07.....	Volume 1 - 569
Next Generation OPIR	1206442SF	30	05.....	Volume 1 - 323
Next-Gen OPIR -- GEO	1206443SF	31	05.....	Volume 1 - 361
Next-Gen OPIR -- Ground	1206440SF	29	05.....	Volume 1 - 315
Next-Gen OPIR -- Polar	1206444SF	32	05.....	Volume 1 - 367
Polar MILSATCOM (SPACE)	1206432SF	27	05.....	Volume 1 - 301
Protected Tactical Enterprise Service (PTES)	1206760SF	17	04.....	Volume 1 - 179
Protected Tactical Service (PTS)	1206761SF	18	04.....	Volume 1 - 187
Resilient MW/MT Ground	1206448SF	36	05.....	Volume 1 - 401
Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)	1206446SF	34	05.....	Volume 1 - 387
Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)	1206447SF	35	05.....	Volume 1 - 393
Rocket Systems Launch Program (SPACE)	1206860SF	44	06.....	Volume 1 - 447
Satellite Control Network (SPACE)	1203110SF	52	07.....	Volume 1 - 509

UNCLASSIFIED

UNCLASSIFIED

Air Force • Budget Estimates FY 2023 • RDT&E Program

Program Element Title	Program Element Number	Line #	BA	Page
Small Business Innovation Research	1205502SF	38	06.....	Volume 1 - 421
Space & Missile Systems Center - MHA	1206398SF	41	06.....	Volume 1 - 435
Space Advanced Technology Development/Demo	1206616SF	4	03.....	Volume 1 - 33
Space Advanced Technology Development/Demo	1206616SF	42	06.....	Volume 1 - 439
Space Command & Control - Software Pilot Program	1208248SF	70	08.....	Volume 1 - 669
Space Control Technology	1206438SF	14	04.....	Volume 1 - 155
Space Force Weather Services Research	0604002SF	5	04.....	Volume 1 - 47
Space Innovation, Integration and Rapid Technology Development	1203174SF	55	07.....	Volume 1 - 535
Space Rapid Capabilities Office	1206857SF	20	04.....	Volume 1 - 209
Space Science and Technology Research and Development	1206310SF	3	03.....	Volume 1 - 29
Space Security and Defense Program	1206730SF	16	04.....	Volume 1 - 171
Space Situation Awareness Operations	1203940SF	22	05.....	Volume 1 - 237
Space Situation Awareness Operations	1203940SF	63	07.....	Volume 1 - 601
Space Situation Awareness Systems	1206425SF	12	04.....	Volume 1 - 121
Space Situation Awareness Systems	1206425SF	25	05.....	Volume 1 - 281
Space Superiority ISR	1203330SF	58	07.....	Volume 1 - 561
Space System Support	1203905SF	9	04.....	Volume 1 - 83
Space Systems Prototype Transitions (SSPT)	1206427SF	13	04.....	Volume 1 - 129
Space Technology	1206601SF	2	02.....	Volume 1 - 5

UNCLASSIFIED

UNCLASSIFIED

Air Force • Budget Estimates FY 2023 • RDT&E Program

Program Element Title	Program Element Number	Line #	BA	Page
Space Technology Development and Prototyping	1206410SF	10	04.....	Volume 1 - 89
Space Test Program (STP)	1206864SF	46	06.....	Volume 1 - 455
Space Test and Training Range Development	1206116SF	39	06.....	Volume 1 - 425
Space Warfighting Analysis	1203622SF	7	04.....	Volume 1 - 67
Space and Missile Test and Evaluation Center	1203173SF	54	07.....	Volume 1 - 525
Spacelift Range System (SPACE)	1203182SF	56	07.....	Volume 1 - 543
Tactically Responsive Launch	1206862SF	45	06.....	Volume 1 - 451
Tech Transition (Space)	1206458SF	15	04.....	Volume 1 - 165
Weather System Follow-on	1206422SF	11	04.....	Volume 1 - 111
Weather System Follow-on	1206422SF	24	05.....	Volume 1 - 265
Wideband Global SATCOM (SPACE)	1206433SF	28	05.....	Volume 1 - 309

UNCLASSIFIED

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 2: Applied Research</i>	R-1 Program Element (Number/Name) PE 1202212SF / <i>Defense Laboratories R&D Projects</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	-	5.238	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.238
622030: <i>Defense Lab R&D Projects</i>	-	5.238	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.238

A. Mission Description and Budget Item Justification

Implementation of 10 U.S.C. Section 2363, amendment to PL 110-417, 10 U.S.C. Section 2358 and 10 U.S.C. 2805(d)(1)(B), to fund: innovative basic and applied research conducted at the defense laboratory and supports military missions; development programs supporting the transition of technologies developed by the defense laboratory into operational use; workforce development activities improving the capacity of the defense laboratory to recruit and retain personnel with necessary scientific and engineering expertise that support military missions; and the repair or minor military construction of the laboratory infrastructure and equipment.

The United States Space Force (USSF) is dependent on technological advances in response to emerging threats and to maintain a competitive advantage. The USSF has a comprehensive and deliberative planning process to identify and fund research that is expected to have the greatest benefit to the USSF and the warfighter. 10 U.S.C. Section 2363 provides the Commander of the Air Force Research Laboratory (AFRL), in consultation with the Department of the Air Force Science and Technology Executive, a degree of flexibility to rapidly exploit scientific breakthroughs or respond to emerging threats, to include developing a skilled workforce and necessary infrastructure. This flexibility increases the rate of innovation and accelerates the development and fielding of needed military capabilities to address current and future problems.

In FY 2021 the USSF established Program Element (PE) 1202212SF, which internally reprograms 10 U.S.C. Section 2363 funds to this program element in the year of execution after receipt of the appropriation. This allows increased transparency to Congress on 10 U.S.C. Section 2363 funding and additional execution flexibility for 10 U.S.C. Section 2363 activities to cross all technology areas. This is a parallel effort to United States Air Force PE 0602212F, Defense Laboratories R&D Projects (10 U.S.C, Sec 2358).

This program is in Budget Activity 2, Applied Research because this budget activity includes studies, investigations, and non-system specific technology efforts directed toward general military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 2: Applied Research</i>	R-1 Program Element (Number/Name) PE 1202212SF / <i>Defense Laboratories R&D Projects</i>
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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	0.000	0.000	0.000	0.000	0.000
Current President's Budget	5.238	0.000	0.000	0.000	0.000
Total Adjustments	5.238	0.000	0.000	0.000	0.000
• 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	5.238	0.000	0.000	0.000	0.000

Change Summary Explanation

Increase in FY 2021 in Other Adjustments is due to realignment of funds to PE 1202212SF to support Research and Development Projects, 10 U.S.C. Section 2358, as amended by 10 U.S.C. 2805(d)(1)(B) and 10 U.S.C. Section 2363.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Defense Laboratories R&D Projects - Air Force Research Laboratory	5.238	0.000	0.000
Description: Implementation of 10 U.S.C. Section 2363, amendment to PL 110-417, 10 U.S.C. Section 2358 and 10 U.S.C. 2805(d)(1)(B), to fund: innovative basic and applied research conducted at the Air Force Research Laboratory (AFRL) and supports military missions; development programs supporting the transition of technologies developed by AFRL into operational use; workforce development activities improving the capacity of AFRL to recruit and retain personnel with necessary scientific and engineering expertise that support military missions; and the repair or minor military construction of the laboratory infrastructure and equipment.			
FY 2022 Plans: The budget for this program is implemented after an appropriation is passed as directed in provisions of 10 U.S.C. Section 2363			
FY 2023 Plans: N/A			
Accomplishments/Planned Programs Subtotals	5.238	0.000	0.000

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

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity
3620F: *Research, Development, Test & Evaluation, Space Force I BA 2: Applied Research*

R-1 Program Element (Number/Name)
PE 1202212SF / *Defense Laboratories R&D Projects*

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

Remarks

E. Acquisition Strategy

Not Applicable

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 2: Applied Research	R-1 Program Element (Number/Name) PE 1206601SF / Space Technology
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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	-	209.256	286.505	243.737	0.000	243.737	257.886	202.880	202.129	205.297	Continuing	Continuing
621010: Space Survivability & Surveillance	-	41.807	37.956	61.734	0.000	61.734	74.375	67.819	64.142	64.645	Continuing	Continuing
624846: Spacecraft Payload Technologies	-	29.796	29.850	83.122	0.000	83.122	83.583	32.111	32.818	33.469	Continuing	Continuing
624847: Rocket Propulsion Technology	-	0.000	22.446	14.221	0.000	14.221	14.418	15.567	15.896	16.206	Continuing	Continuing
624866: Lasers & Imaging Technology	-	0.000	16.124	16.527	0.000	16.527	16.999	16.950	17.326	17.664	Continuing	Continuing
625018: Spacecraft Protection Technology	-	11.639	53.327	12.180	0.000	12.180	13.672	14.051	14.356	14.643	Continuing	Continuing
628809: Spacecraft Vehicle Technologies	-	126.014	126.802	55.953	0.000	55.953	54.839	56.382	57.591	58.670	Continuing	Continuing

Note

Due to FY 2022 funds being applied to the incorrect line item in enactment, \$5.0M will be realigned to PE 1206601SF/Space Technology from PE 0602203F/Aerospace Propulsion through an internal reprogramming. This change will be recorded in next year's Justification Documentation.

A. Mission Description and Budget Item Justification

This program focuses on six major areas. First, the space survivability and surveillance area develops technologies to understand space weather and the geophysics environment for mitigation and exploitation of these effects to Department of Air Force systems. Second, the spacecraft payload technologies area improves satellite payload operations by developing advanced component and subsystem capabilities. Third, the rocket propulsion technology area develops rocket propulsion technologies for space access, space maneuver, and the sustainment of strategic systems. Fourth, the lasers & imaging technology area conducts research supporting ground-based optical space domain awareness. Fifth, the spacecraft protection area develops technologies for protecting United States space assets in potential hostile settings. The last major area, spacecraft vehicles, focuses on spacecraft platform and control technologies, and their interactions. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of such program funds would be in addition to civilian pay expenses budgeted in program element 1206616SF.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 2: Applied Research</i>	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>
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This program is in Budget Activity 2, Applied Research because this budget activity includes studies, investigations, and non-system specific technology efforts directed toward general military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	216.874	175.796	0.000	0.000	0.000
Current President's Budget	209.256	286.505	243.737	0.000	243.737
Total Adjustments	-7.618	110.709	243.737	0.000	243.737
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-7.500			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	118.200			
• Congressional Directed Transfers	0.000	0.009			
• Reprogrammings	-5.235	0.000			
• SBIR/STTR Transfer	-2.383	0.000			
• Other Adjustments	0.000	0.000	243.737	0.000	243.737

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 624847: *Rocket Propulsion Technology*

Congressional Add: *Congressional Add: Program increase - non-toxic fuels*

Congressional Add: *Congressional Add: Program increase - adaptive medium-lift engine architecture*

Congressional Add Subtotals for Project: 624847

Project: 625018: *Spacecraft Protection Technology*

Congressional Add: *Congressional Add: Program increase - autonomy in space*

Congressional Add: *Congressional Add: Program increase - ground-based interferometry*

Congressional Add: *Congressional Add: Program increase - open architecture payloads*

Congressional Add: *Congressional Add: Program increase - architecture for space domain awareness beyond GEO*

Congressional Add Subtotals for Project: 625018

Project: 628809: *Spacecraft Vehicle Technologies*

Congressional Add: *Congressional Add: Program increase - operational cryogenic upper stage augmentation Kit*

Congressional Add: *Congressional Add: Program increase - thin-film photovoltaic energy*

	FY 2021	FY 2022
	-	3.000
	-	5.000
Congressional Add Subtotals for Project: 624847	-	8.000
	-	10.000
	-	6.000
	-	10.000
	-	15.400
Congressional Add Subtotals for Project: 625018	-	41.400
	6.923	-
	6.923	-

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 2: Applied Research</i>	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>
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<u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u>	FY 2021	FY 2022
Congressional Add: <i>Congressional Add: Program increase - hybrid space architecture</i>	9.890	-
Congressional Add: <i>Congressional Add: Program increase - resilient solar power</i>	2.967	-
Congressional Add: <i>Congressional Add: Program increase - ultra-lightweight solar arrays</i>	14.835	-
Congressional Add: <i>Congressional Add: Program increase - link-16 space experiment</i>	8.901	-
Congressional Add: <i>Congressional Add: Program increase - advanced space power systems</i>	6.923	-
Congressional Add: <i>Congressional Add: Program increase - digital engineering for future space systems</i>	4.945	-
Congressional Add: <i>Congressional Add: Program increase - laser communications</i>	11.868	-
Congressional Add: <i>Congressional Add: Program increase - lithium-sulfur battery development</i>	4.945	-
Congressional Add: <i>Congressional Add: Program increase - small satellite mission control facility</i>	5.934	-
Congressional Add: <i>Congressional Add: Program increase - radiation hardened microprocessor</i>	-	8.900
Congressional Add: <i>Congressional Add: Program increase - lithium sulfur battery development</i>	-	4.000
Congressional Add: <i>Congressional Add: Program increase - thin-film photovoltaic energy</i>	-	3.000
Congressional Add: <i>Congressional Add: Program increase - multi-mission distributed antenna technology</i>	-	10.000
Congressional Add: <i>Congressional Add: Program increase - hybrid space architecture</i>	-	5.000
Congressional Add: <i>Congressional Add: Program increase - ultra-lightweight space solar arrays</i>	-	5.000
Congressional Add: <i>Congressional Add: Program increase - university consortia for space technology</i>	-	10.000
Congressional Add: <i>Congressional Add: Program increase - advanced multi-physics thermal management</i>	-	5.000
Congressional Add: <i>Congressional Add: Program increase - fundamental research</i>	-	15.000
Congressional Add: <i>Congressional Add: Program increase - space solar power inc demonstration</i>	-	2.900
Congressional Add Subtotals for Project: 628809	85.054	68.800
Congressional Add Totals for all Projects	85.054	118.200

Change Summary Explanation

FY 2022: *-\$7.5M congressional reduction for inadequate justification*

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 FY 2023 cannot be made in a relevant manner.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 2					R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>				Project (Number/Name) 621010 / <i>Space Survivability & Surveillance</i>			
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
621010: <i>Space Survivability & Surveillance</i>	-	41.807	37.956	61.734	0.000	61.734	74.375	67.819	64.142	64.645	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops technologies to understand and control the space environment for warfighter's future capabilities. The focus is on characterizing and forecasting the battlespace environment for more realistic space system design, modeling, and simulation, as well as the battlespace environment's effect on space systems' performance. This includes technologies to specify and forecast the space environment for planning operations, ensure uninterrupted system performance, optimize space-based surveillance operations, and provide capability to mitigate or exploit the space environment for both offensive and defensive operations.

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

	FY 2021	FY 2022	FY 2023
Title: Space Environment Research	20.235	11.031	16.474
Description: Develop techniques, forecasting tools, sensors, and technologies for specifying, monitoring, predicting, and controlling space environmental conditions hazardous to Department of Defense operational space and radar systems.			
FY 2022 Plans: Complete exploitation of radiation aged materials to enhance predictive models. Continue developing generation-beyond-next trapped and untrapped particle specification model development efforts. Complete demonstrations of space environment sensor and anomaly attribution tool. Continue developing technologies to exploit and mitigate space environment effects. Continue to prototype and demonstrate new ground-based and space-based sensors for monitoring and specifying the state of the space environment for military applications, and continue to develop modelling capabilities to better enable accurate forecasting of the state of the space environment. Continue research into the physics and dynamics of the sun to better specify and forecast solar events and better understand how those events impact the near-earth space environment. Continue to explore fundamental radio frequency and chemical interactions in the near-earth space environment to inform potential utility for military applications. Continue work on hybrid supersonic solver code development and validation with emphasis on developing an end-to-end modeling Suite for re-entry systems. Initiate development of capabilities using environmental interactions such as radio frequency interference, material aging, and plume luminescence to enable coupled local and enterprise space domain awareness. Initiate integration with local multi-agent autonomous threat sensing and characterization to accurately sense and specify the space environmental impacts on military radio-frequency systems. Initiate demonstration of controlled radio-frequency propagation effects across relevant frequency ranges for operations. Initiate improvement in efficiency of plasma generation systems to enable practical applications, and validate plasma cloud formation models and evolution for engineered solutions.			
FY 2023 Plans: Continue advancement of regional space environment specification and modeling to enable tactical applications. Complete development of next generation ionospheric observing systems. Continue development of controlled-radio frequency propagation			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 621010 / <i>Space Survivability & Surveillance</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>effects across relevant frequency ranges for operations. Continue improvements in efficiency of plasma generation systems to enable practical applications. Complete plasma cloud formation models and evolution for engineered solutions. Complete next generation system for specifying and predicting space environment impacts on radio frequency services at relevant frequencies. Continue developing and enhancing space environment modelling capabilities to better enable accurate specification and forecasting of the state of the space environment, and the resulting impacts to Department of Defense and national systems. Initiate advanced research into beyond-geosynchronous space environment impacts to national systems. Continue applied research of space environment interactions and effects for space domain awareness. Initiate transition of basic research in solar and space environment physics to applied research efforts.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$5.443 million. Funding increased due to new requirements to expand space environment research into beyond-geosynchronous and arctic impacts to national systems.</p>			
<p>Title: Surveillance Technologies</p> <p>Description: Develop advanced target detection techniques, spectral signature libraries, and decision aids for space-based sensors and surveillance systems.</p> <p>FY 2022 Plans: Complete development of capability metrics for new satellite constellation architectures, advanced data analytics, and satellite demonstration concepts. Continue development of advanced surveillance and detection technologies, including innovative data analytics and sensor concepts, to track targets that pose new challenges for missile warning systems and an expanded range of tactical threat warning systems. Complete study and transition findings for decreasing satellite bandwidth for down-link of missile warning data to Missile Warning System Program Office. Transition findings of hyper-temporal imaging demonstration of new early missile warning concept to Missile Warning System Program Office and Other Government Agencies. Continue development of automated data analytics for data processing on-board satellites, and initiate development for cloud platforms, to meet tactical mission timelines. Continue study of tactical surveillance technologies for target detection by autonomous sensing grids operating across multiple-domains.</p> <p>FY 2023 Plans: Continue development of novel sensing technologies, including innovative data analytics and sensor concepts, to track targets that pose new challenges for missile warning systems and an expanded range of tactical threat warning systems. Continue development of automated data analytics for data processing on-board satellites, and cloud platforms, to meet tactical mission timelines. Continue study of tactical surveillance technologies for target detection by autonomous sensing grids operating across multiple-domains to meet the information timeliness, track custody and data access requirements necessary to detect, track and target emerging hypersonic missile threats.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>	5.864	8.300	9.508

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 621010 / <i>Space Survivability & Surveillance</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY 2023 increased compared to FY 2022 by \$1.208 million. Funding increased due to increased emphasis in automated data analytics and sensing technologies to meet tactical mission timelines.				
<p>Title: Radiation Remediation Research</p> <p>Description: Conduct Radiation Belt Remediation research through development and validation of analytical performance models for remediation of Earth radiation belts following high altitude nuclear detonation.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: N/A</p>		1.744	0.000	0.000
<p>Title: Seismic Technologies</p> <p>Description: Develop seismic technologies to support national requirements for monitoring nuclear explosions with special focus on regional distances less than 2,000 kilometers from the sensors.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: N/A</p>		5.660	0.000	0.000
<p>Title: Alternative Navigation Technologies</p> <p>Description: Develop new technologies based on cold atom physics and photonics that provide autonomous jam-proof precision inertial navigation to augment Global Positioning System in case of Global Positioning System-denial. Develop atomic clocks and methods to disseminate time based on new technologies to replace legacy Global Positioning System atomic clocks and networks.</p> <p>FY 2022 Plans: Complete transition of advanced atomic clocks to industry. Continue testing of cold atom 3-axis accelerometers for improved Internal Navigation Systems in Global Position System-denied environments. Initiate development of advanced photonic systems</p>		8.304	18.625	13.752

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 621010 / <i>Space Survivability & Surveillance</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>for high-performance time transfer. Initiate development of advanced components for quantum systems such as very low noise amplifiers, power efficient narrow-bandwidth lasers, and optical frequency comb technology. Initiate development of quantum timing systems for advanced communication applications. Initiate demonstration of 3-axis accelerometer outside of laboratory environment.</p> <p>FY 2023 Plans: Continue testing of cold atom 3-axis accelerometers for improved Internal Navigation Systems in Global Position System-denied environments. Continue development of advanced photonic systems for high performance time transfer. Continue development of advanced components for quantum systems such as very low noise amplifiers, power efficient narrow-bandwidth lasers, and optical frequency comb technology. Continue development of quantum timing systems for advanced communication applications. Initiate preparation for second demonstration of 3-axis accelerometer outside of laboratory environment.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to FY 2022 by \$4.873 million. Funding decreased due to a decreased emphasis on optical frequency technology development.</p>			
<p>Title: Strategic Radiation Hardened Electronics</p> <p>Description: Develop, produce, and acquire strategic radiation hardened non-volatile memory for strategic missiles, missile defense, and military space systems.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Initiate identification of electrical and radiation performance requirements and specification development for strategic radiation hardened non-volatile memory. Initiate design, fabrication, test and evaluation of test articles to support technical development. Initiate space qualification of the strategic radiation hardened non-volatile memory family and supporting design support kit. Initiate efforts to ensure durability of a domestic source of readout integrated circuits and focal plane array technologies. Initiate efforts to enable maturation of large format high-dynamic range focal plane arrays.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$22.000 million. Funding increased due to the initiation of this effort to increase emphasis on strategic radiation hardened electronics technology development.</p>	0.000	0.000	22.000
Accomplishments/Planned Programs Subtotals	41.807	37.956	61.734

C. Other Program Funding Summary (\$ in Millions)
N/A

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force Date: April 2022

Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 621010 / <i>Space Survivability & Surveillance</i>
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C. Other Program Funding Summary (\$ in Millions)

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 2					R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>				Project (Number/Name) 624846 / <i>Spacecraft Payload Technologies</i>			
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
624846: <i>Spacecraft Payload Technologies</i>	-	29.796	29.850	83.122	0.000	83.122	83.583	32.111	32.818	33.469	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops advanced technologies that enhance spacecraft payload operations by improving component and subsystem capabilities. The project focuses on development of advanced, space-qualified, survivable electronics, and electronics packaging technologies; development of advanced space data generation and exploitation technologies, including infrared sensors; and development of high-fidelity space simulation models that support space-based surveillance and space asset protection research and development for the warfighter.

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

	FY 2021	FY 2022	FY 2023
Title: Space-Based Detector Technologies	6.149	6.325	6.216
Description: Develop advanced infrared device technologies that enable hardened space detector arrays with improved detection to perform acquisition, tracking, and discrimination of space objects and missile warning.			
FY 2022 Plans: Continue design, development, and assessment of low-cost, high-volume infrared detectors and focal plane arrays for proliferated space architecture layers. Continue development of focal plane array optical data outputs for higher speed and data throughput and continue radiation tolerance characterization of photonic devices. Continue development of alternative infrared focal plane array materials and device architectures. Complete development of resilient scanning and staring digital focal plane arrays. Initiate development and assessment of event based sensing concepts and hardware. Initiate development of high dynamic range, laser hardened 8192 x 8192 pixels, 10 micron pixel pitch focal plane arrays.			
FY 2023 Plans: Complete design, development, and assessment of low-cost, high-volume infrared detectors and focal plane arrays for proliferated space architecture layers. Continue development of focal plane array optical data outputs for higher speed and data throughput and continue radiation tolerance characterization of photonic devices. Continue development and refinement of alternative infrared focal plane array materials and device architectures. Continue development and assessment of event based sensing concepts and hardware and initiate partnerships with other Government agencies to explore potential transition paths. Continue development of high dynamic range, laser hardened 8192 x 8192 pixels, 10 micron pixel pitch focal plane arrays to provide resilience against emerging threats.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to FY 2022 by \$0.109 million. Justification for this decrease is described in the plans above.			
Title: Space Electronics Research	6.928	4.675	8.761

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 624846 / <i>Spacecraft Payload Technologies</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Description: Develop technologies for space-based payload components such as radiation-hardened electronic devices, microelectro-mechanical system devices, and advanced electronics packaging.

FY 2022 Plans:

Continue leadership role in Deputy Assistant Secretary of Defense Systems Engineering trusted and assured microelectronics strategy efforts to develop trusted manufacturing techniques that reduce risk to National Security Space systems. Continue adapting bench-marking capabilities on new electronics using the latest spacecraft algorithms and transitioning bench-marking capabilities and results to the acquisition community to enable data-informed payload architecture design decisions. Complete space qualification planning for next generation space processor. Complete development of alternative memory approaches. Continue research and development of ultra-low power and neuromorphic/cortical processing architectures and advanced transistor research to enable game-changing capabilities in future National Security Space systems. Initiate small satellite, high-performance processing to enable on-orbit autonomy, data fusion, and machine learning.

FY 2023 Plans:

Continue leadership role in Deputy Assistant Secretary of Defense Systems Engineering trusted and assured microelectronics strategy efforts to develop trusted manufacturing techniques that reduce risk to National Security Space systems. Continue adapting bench-marking capabilities on new electronics using the latest spacecraft algorithms and transitioning bench-marking capabilities and results to the acquisition community to enable data-informed payload architecture design decisions. Initiate prototype memory manufacturing, testing and design improvements. Complete research and development of ultra-low power and neuromorphic/cortical processing architectures and advanced transistor research to enable game-changing capabilities in future National Security Space systems. Continue research and development of high-performance processing for small satellites to enable revolutionary on-orbit edge processing, autonomy, data fusion, and machine learning.

FY 2022 to FY 2023 Increase/Decrease Statement:

FY 2023 increased compared to FY 2022 by \$4.086 million. Funding increased due to increased emphasis on memory manufacturing and testing, along with small satellite high-performance processing.

Title: Modeling and Simulation Tools for Space Applications

Description: Provide modeling, simulation, and analysis for technology evolution in space-based terrestrial surveillance systems, precision navigation and timing, space domain awareness, satellite communications, space environment monitoring, and space control payloads.

FY 2022 Plans:

Initiate next generation mission-level military utility analyses of technology and associated architectures and employment concepts across multi-domain mission applications. Continue refining guidelines and checkpoints for concept maturation evaluations in context of emerging space technologies. Complete development of models and mission simulations of the National Space

	8.789	5.682	5.784

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 624846 / <i>Spacecraft Payload Technologies</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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<p>Defense Center's capabilities. Initiate model-based systems engineering into technology decision-making and flight experiment design.</p> <p>FY 2023 Plans: Continue mission-level military utility analyses of technology and associated architectures and employment concepts across multi-domain mission areas. Continue refining guidelines and checkpoints for concept maturation evaluations in context of emerging space technologies. Continue to evolve processes for applying model-based systems engineering into technology decision-making and flight experiment design.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$0.102 million. Justification for this increase is described in the plans above.</p>			
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<p>Title: Alternative Positioning, Navigation, and Timing Technology</p> <p>Description: Identify and develop technologies that enable new, or enhance existing, United States positioning, navigation, and timing satellite capabilities by increasing resiliency and availability of accuracy, and/or increasing the affordability of providing current capabilities. Develop technologies to meet identified Air Force Space Command/Space and Missile Systems Center positioning, navigation, and timing space payload technology needs.</p> <p>FY 2022 Plans: Complete transition of advanced precision navigation, and timing waveforms via publication of interface control document and continue to examine the interaction of signals between the space, ground, and user equipment segments. Continue development of new technologies for positioning, navigation, and timing payloads that will improve performance and affordability. Continue development of technologies for multi-layer space-based positioning, navigation, and timing architecture in order to improve resiliency of the space architecture and reduce burden on the user. Continue development of modeling and simulations of next generation space architecture and the impact of developing technologies. Initiate laboratory and field testing capabilities of new signals and architecture concepts.</p> <p>FY 2023 Plans: Initiate flight experiments to examine the interaction of signals between the space, ground, and user equipment segments in contested environments and exercise potential CONOPs. Continue development of technologies for multi-layer space-based positioning, navigation, and timing architecture in order to improve resiliency of the space architecture, affordability, and reduce burden on the user. Continue development of physics level modeling and simulations of next generation space architecture and the impact of developing technologies. Continue laboratory and field testing capabilities of new signals and architecture concepts.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>	7.930	13.168	11.361
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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 624846 / <i>Spacecraft Payload Technologies</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 decreased compared to FY 2022 by \$1.807 million. Funding decreased due to a decreased emphasis on field testing of new signals.			
<p>Title: Resilient Positioning, Navigation, and Timing Solutions</p> <p>Description: Develop technology solutions providing diversity of signal and orbit to increase resilience of space-based positioning, navigation, and timing.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Initiate development of technologies for frequency and waveform agility that can use alternate signal sources for positioning, navigation, and timing solutions in jammed environments. Initiate development of technologies for path diversity and alternate signal processing with the ability to provide solutions to modifiable software defined user equipment.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$51.000 million. Funding increased due to the initiation of this effort to increase emphasis in resilient positioning, navigation, and timing technology development.</p>	0.000	0.000	51.000
Accomplishments/Planned Programs Subtotals	29.796	29.850	83.122

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 2					R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>				Project (Number/Name) 624847 / <i>Rocket Propulsion Technology</i>			
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
624847: <i>Rocket Propulsion Technology</i>	-	0.000	22.446	14.221	0.000	14.221	14.418	15.567	15.896	16.206	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops rocket propulsion technologies for space access and space maneuver. Analytical and experimental areas of emphasis are propellants, propellant management, combustion, rocket material applications, and innovative space propulsion concepts. Technologies of interest will improve reliability, performance, survivability, affordability, and environmental compatibility of these systems. Develop technologies to reduce the weight and cost of components using new materials and improved designs and manufacturing techniques. All efforts in this project contribute to the sustainment of the space and rocket propulsion industry, providing rocket propulsion technology for the entire Department of Defense (DoD). Technologies under this project enable capabilities of interest to both DoD and National Aeronautics and Space Administration (NASA). Tasks include: modeling and simulation; proof of concept tests of critical components; advanced component development; and ground-based tests. All thrusts are part of the Rocket Propulsion for the 21st Century (RP21) collaboration and are reviewed by a DoD level steering committee yearly for relevance to DoD missions and progress towards RP21 Goals.

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

	FY 2021	FY 2022	FY 2023
Title: Liquid Engine Combustion Technologies	0.000	6.800	6.013
Description: Develop advanced liquid engine combustion technology for improved performance, while preserving chamber lifetime and reliability needs for engine uses in heavy lift space vehicles.			
FY 2022 Plans: Complete evaluation of methane multi-injector designs in hot-fire conditions. Complete hot fire tests in combustion stability rig. Complete combustion stability modeling critical for future hydrocarbon fueled liquid rocket engines. Complete developing understanding of hydrocarbon fuel production, expanding testing into methane fuels and other cryogenic cooling. Continue the employment of new fuel and material operating limitations, manufacturing processes, and launch goals in cycle analysis to identify trade space for future engines. Continue to develop and evaluate advanced material solutions for high temperature components in rocket propulsion. Continue installation of new test facility that will fill the current capability gap and allow for fast, low-cost testing of multi-injector designs and stability strategies at conditions relevant to the demands of both Department of Defense and industry for next-generation engines (including use of liquid oxygen and higher pressures and thrust). Continue development and payoff determination of rotating detonation rocket engine technologies.			
FY 2023 Plans: Complete installation of new test facility that will fill the current capability gap and allow for fast, low-cost testing of multi-injector designs and stability strategies at conditions relevant to the demands of both Department of Defense and industry for next-generation engines (including use of liquid oxygen and higher pressures and thrust). Continue the employment of new fuel and material operating limitations, manufacturing processes, and launch goals in cycle analysis to identify trade space for future			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 624847 / <i>Rocket Propulsion Technology</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
engines. Continue to develop and evaluate advanced material solutions for high temperature components in rocket propulsion. Continue development and payoff determination of rotating detonation rocket engine technologies. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to FY 2022 by \$0.787 million. Justification for this decrease is described in the plans above.				
Title: Advanced Liquid Engine Technologies Description: Develop advanced liquid engine technologies for improved performance, while increasing life and reliability needs for engine uses in expendable and reusable launch vehicles. FY 2022 Plans: Continue sub-scale risk mitigation and technology maturation activities to incorporate into next generation engine concepts. Continue modular component integration and interaction research activities supporting next generation engine concepts. FY 2023 Plans: Continue sub-scale risk mitigation and technology maturation activities to incorporate into next generation engine concepts. Continue modular component integration and interaction research activities supporting next generation engine concepts. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$0.221 million. Justification for this increase is described in the plans above.		0.000	3.009	3.230
Title: On-Orbit Propulsion Technologies Description: Develop solar electric, solar thermal, chemical, and advanced propulsion technologies for station-keeping, repositioning, and orbit transfer for satellites and satellite constellations. FY 2022 Plans: Continue advanced chemical propellants development focusing on flight-weight systems to assist in transition to industry partners. Continue to support the maturation of advanced diagnostics for both chemical and electric propulsion thruster plumes with potential for integrated state-of-health application. Continue to expand the validation and verification programs (both experimental and flight) to quantify accuracy of modeling and simulation tools developed to support thruster-spacecraft integration. Continue transition and support of thruster/ plume modeling framework to spacecraft industry to propulsion community. Continue expanding exploration of advanced integrated electric propulsion and chemical thruster concepts and assess new spacecraft propulsion requirements. FY 2023 Plans: Continue advanced chemical propellants development focusing on flight-weight systems to assist in transition to industry partners. Continue to support the maturation of advanced diagnostics for both chemical and electric propulsion thruster plumes with potential for integrated state-of-health application. Continue to expand the validation and verification programs (both experimental		0.000	4.637	4.978

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 624847 / <i>Rocket Propulsion Technology</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
and flight) to quantify accuracy of modeling and simulation tools developed to support thruster-spacecraft integration. Continue transition and support of thruster/plume modeling framework to spacecraft industry to propulsion community. Continue expanding exploration of advanced integrated electric propulsion and chemical thruster concepts and assess new spacecraft propulsion requirements.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to FY 2022 by \$0.341 million. Justification for this increase is described in the plans above.			
Accomplishments/Planned Programs Subtotals	0.000	14.446	14.221

	FY 2021	FY 2022
<i>Congressional Add:</i> Congressional Add: Program increase - non-toxic fuels <i>FY 2022 Plans:</i> Conduct Congressionally directed effort.	-	3.000
<i>Congressional Add:</i> Congressional Add: Program increase - adaptive medium-lift engine architecture <i>FY 2022 Plans:</i> Conduct Congressionally directed effort.	-	5.000
Congressional Adds Subtotals	-	8.000

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

N/A

Remarks

D. Acquisition Strategy

N/A

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 2					R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>				Project (Number/Name) 624866 / <i>Lasers & Imaging Technology</i>			
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
624866: <i>Lasers & Imaging Technology</i>	-	0.000	16.124	16.527	0.000	16.527	16.999	16.950	17.326	17.664	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project conducts research supporting ground-based optical space domain awareness.

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

	FY 2021	FY 2022	FY 2023
Title: Optical Space Situational Awareness and Satellite Vulnerability	0.000	16.124	16.527
<p>Description: Develop advanced, long-range, electro-optical technologies that enable ground-based optical Space Domain Awareness (SDA) and quantum-based optical communications. Develop and use technologies to quantitatively assess the vulnerability of blue satellite systems and components to lasers and other directed energy sources. Operate the Starfire Optical Range (SOR) to conduct research meeting internal and customer requirements.</p> <p>FY 2022 Plans: Continue research & development of laser-enabled space domain awareness (SDA) focused on full-dark imaging using laser illumination. Continue to mature component technologies for 24/7 real-time optical imaging of near-earth and geosynchronous objects enabling characterization on tactical timelines. Continue investigation through measurement, modeling, and simulation of the susceptibility of satellite components to laser and other directed energy threats to inform practical designs for protective equipment and for employing protection methods on tactically-rapid timelines. Continue to mature daylight detection of satellites allowing custody through daytime hours when satellites cannot normally be detected by ground-based optical systems. Continue development of laser-enabled options for both ranging to and imaging of geosynchronous satellites from apertures smaller than 3 meters. Continue development of long-range secure optical network technology leveraging quantum science, especially for free space lasercom channels during daylight. Continue project to apply machine-learning to automatically identify geosynchronous-orbit objects more accurately and rapidly than current "hard-wired" algorithms can. Conduct research into maintaining custody of space craft in 3-body pseudo-orbits, such as in cis-lunar space and Earth-Sun equilibrium zones. Continue to maintain the Starfire Optical Range (SOR) R&D facilities and experimental equipment in a mission-ready state."</p> <p>FY 2023 Plans: Continue research & development of laser-enabled space domain awareness (SDA) focused on full-dark imaging using laser illumination. Continue to mature component technologies for 24/7 real-time optical imaging of near-earth and geosynchronous objects enabling characterization on tactical timelines. Continue investigation through measurement, modeling, and simulation of the susceptibility of satellite components to laser and other directed energy threats to inform practical designs for protective equipment and for employing protection methods on tactically-rapid timelines. Continue to mature daylight detection of satellites allowing custody through daytime hours when satellites cannot normally be detected by ground-based optical systems. Continue</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 624866 / <i>Lasers & Imaging Technology</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
development of laser-enabled options for both ranging to and imaging of geosynchronous satellites from apertures smaller than 3 meters. Continue development of long-range secure optical network technology leveraging quantum science, especially for free space lasercom channels during daylight. Continue project to apply machine-learning to automatically identify geosynchronous-orbit objects more accurately and rapidly than current ""hard-wired"" algorithms. Conduct research into maintaining custody of space craft in 3-body pseudo-orbits, such as in cis-lunar space and Earth-Sun equilibrium zones. Continue to maintain the Starfire Optical Range (SOR) R&D facilities and experimental equipment in a mission-ready state.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to FY 2022 by \$0.403 million. Justification for this increase is described in the plans above.			
Accomplishments/Planned Programs Subtotals	0.000	16.124	16.527

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 2					R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>				Project (Number/Name) 625018 / <i>Spacecraft Protection Technology</i>			
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
625018: <i>Spacecraft Protection Technology</i>	-	11.639	53.327	12.180	0.000	12.180	13.672	14.051	14.356	14.643	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops the technologies for protecting United States space assets in potentially hostile environments to assure continued space system operation without performance loss in support of warfighter requirements. The project focuses on identifying and assessing spacecraft system vulnerabilities, developing threat warning technologies, and development of technologies to mitigate the effects of both intentional and unintentional threats.

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

	FY 2021	FY 2022	FY 2023
Title: Threat Warning Research	11.639	11.927	12.180
Description: Develop satellite threat warning technologies and tools for space defense with an emphasis on new orbital regimes such as cislunar, speed-of-light threats such as cyber, and many-on-many engagement.			
FY 2022 Plans: Continue to develop techniques to detect, track, identify, and characterize satellites using multi-phenomenology techniques with an emphasis on space domain awareness beyond geosynchronous equatorial orbit all the way to the moon. Assessment includes sensors, data integration, and operator tools, to include government, commercial, and allies. Complete research and development on an integrated ground and space indications and warnings experiment. Continue development of on-orbit threat warning sensing and assessment with emphasis on spectrum awareness and inherent, on-board satellite sensors. Continue research on cyber hardening of space assets with laboratory testbeds transitioning regularly to on-orbit experimentation. Continue experimentation and exercises with Department of Defense ground architectures, operations centers, and commercial and international partners. Complete demonstration of advanced sensor data fusion algorithms. Continue engagements with commercial space data providers for testing new enabling technologies on commercial satellites. Continue to develop on-board autonomous satellite technologies and plan for next generation flight experiments.			
FY 2023 Plans: Continue to develop techniques to detect, track, identify, and characterize satellites using multi-phenomenology techniques with particular focus on space domain awareness beyond geosynchronous equatorial orbit all the way to the moon; investigate potential flight experiments that will demonstrate utility of cislunar domain awareness for deterring threats from deep space. Continue development of on-orbit threat warning sensing and assessment with emphasis on spectrum awareness and inherent, on-board satellite sensors. Continue research on cyber hardening of space assets with laboratory testbeds and solidify a pipeline for continuously transitioning cyber hardening techniques to on-orbit experiments. Continue experimentation and exercises with Department of Defense ground architectures, operations centers, and commercial and international partners, with an emphasis on employing agile space operations software development techniques. Continue engagements with commercial space data			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 625018 / <i>Spacecraft Protection Technology</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
providers for testing new enabling technologies on commercial satellites. Continue to develop on-board autonomous satellite technologies and plan for next generation flight experiments.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to FY 2022 by \$0.253 million. Justification for this increase is described in the plans above.			
Accomplishments/Planned Programs Subtotals	11.639	11.927	12.180

	FY 2021	FY 2022
<i>Congressional Add:</i> Congressional Add: Program increase - autonomy in space <i>FY 2022 Plans:</i> Conduct Congressionally directed effort.	-	10.000
<i>Congressional Add:</i> Congressional Add: Program increase - ground-based interferometry <i>FY 2022 Plans:</i> Conduct Congressionally directed effort.	-	6.000
<i>Congressional Add:</i> Congressional Add: Program increase - open architecture payloads <i>FY 2022 Plans:</i> Conduct Congressionally directed effort.	-	10.000
<i>Congressional Add:</i> Congressional Add: Program increase - architecture for space domain awareness beyond GEO <i>FY 2022 Plans:</i> Conduct Congressionally directed effort.	-	15.400
Congressional Adds Subtotals	-	41.400

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 2					R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>				Project (Number/Name) 628809 / <i>Spacecraft Vehicle Technologies</i>			
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
628809: <i>Spacecraft Vehicle Technologies</i>	-	126.014	126.802	55.953	0.000	55.953	54.839	56.382	57.591	58.670	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project focuses on spacecraft platforms (for example: structures, power, and thermal management); satellite control (signal processing and control); and space experiments of maturing technologies for space qualification.

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

	FY 2021	FY 2022	FY 2023
Title: Space Power/Thermal Research	3.834	6.184	10.922
Description: Develop technologies for advanced space platform subsystems such as compact, high efficiency solar power cells and arrays, and innovative power generation concepts.			
FY 2022 Plans: Continue developing high power arrays and storage capability for small satellites including solar array structures tailored for small missions but scalable to all missions with specific power greater than 100 watts per kilogram. Complete transition of technologies developed for advanced space solar cells, solar array, and energy storage for current heritage space systems, to include solar cells with end of life performance, which depends on the mission, above 28% power conversion efficiency, energy storage chemistries with cell-level specific energy greater than 300 watt-hours per kilogram, and array hardening approaches to provide drop-in replacement panels. Initiate development of power system sensing and protection capabilities across the applicable threat matrix for proliferated low Earth orbit constellations and next generation US Space Force satellite buses. Initiate exploration of alternative power generation sources beyond solar including nuclear. Initiate research to enable high-pulsed power systems including generation, storage, and heat rejection technologies for small satellites.			
FY 2023 Plans: Continue development of high power arrays and storage capability for small satellites including solar array structures scalable to all missions with specific power greater than 100 watts per kilogram. Continue development of power system protection capabilities to sense and warn of directed energy threats for proliferated low Earth orbit constellations and next generation US Space Force satellite buses. Continue exploration of alternative power generation sources, such as nuclear to characterize the limitations and challenges underpinning operating space systems in non-traditional orbital regimes. Continue research to enable high-pulsed power systems including generation, storage, and heat rejection technologies for small satellites.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$4.738 million. Funding increased due to increased emphasis on alternative space power generation for non-traditional orbit regimes.			
Title: Space Structures and Controls Research	9.924	12.484	20.504

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 628809 / <i>Spacecraft Vehicle Technologies</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Description: Develop revolutionary and enabling technologies, including lighter weight, lower cost, high performance structures for space platforms; guidance, navigation, and controls hardware and software for next generation of space superiority systems.</p> <p>FY 2022 Plans: Complete transition of reactive maneuver strategies for spacecraft resiliency for hardware-in-the-loop testbeds, on-orbit navigation estimation algorithms for traditional orbits, and on-orbit experiment planning for reactive maneuver strategies. Continue research in autonomous spacecraft flight software including verification and validation and techniques for high-fidelity simulations. Continue transition efforts in agile manufacturing, additive manufacturing, and high-performance phased arrays and antennas. Initiate research to enable space logistics concepts including autonomous rendezvous, proximity operations, and docking; refueling and module upgrade; and on-orbit assembly. Initiate research to develop guidance and navigation algorithms for cislunar space including novel orbits. Initiate research efforts in high-performance, resilient small satellite technologies and development efforts in deployable structures, metrology, power and thermal management for tactical intelligence, surveillance, and reconnaissance missions in contested environments.</p> <p>FY 2023 Plans: Continue research in autonomous spacecraft flight software including verification and validation and techniques for high-fidelity simulations. Complete transition efforts in agile manufacturing, additive manufacturing, and high-performance phased arrays and antennas. Continue research to enable space logistics concepts including autonomous rendezvous, proximity operations, and docking; refueling and module upgrade; and on-orbit assembly. Continue research to develop guidance and navigation algorithms for cislunar space including novel orbits. Continue research efforts in high-performance, resilient small satellite technologies and development efforts in deployable structures, metrology, power and thermal management for tactical intelligence, surveillance, and reconnaissance missions in contested environments.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$8.020 million. Funding increased due to increasing interest in potential operations in cis-lunar space and other novel orbits.</p>			
<p>Title: Space Experiments</p> <p>Description: Develop flight experiments to improve the capabilities of existing operational space systems and to enable new transformational space capabilities.</p> <p>FY 2022 Plans: Complete on-orbit demonstration of Link-16 experiment from space and transition mission data experimental findings to Space Development Agency for future architecture proliferation. Complete on-orbit small satellite demonstration capable of measuring radiation in the inner magnetosphere giving insight into the particle radiation space environment. Continue requirements development and preliminary concept feasibility and preliminary designs of follow-on space experiments in areas that include</p>	21.456	26.316	9.357

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 628809 / <i>Spacecraft Vehicle Technologies</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>autonomy, cyber security, and development of small satellite sub-systems to improve performance and military utility. Continue working long lead items such as contracting strategy, parts, frequency allocation, and information assurance strategies. Initiate development and on-orbit experiment of a space-to-air/ground mesh-network concept.</p> <p>FY 2023 Plans: Continue design and build of satellite experiments demonstrating small satellite systems/sub-systems to prove performance, military utility, and enabling capabilities in autonomy, cyber resiliency and integration of commercial and government space networks for command and control (C2) of a hybrid space architecture.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to FY 2022 by \$16.959 million. Funding decreased due to higher USSF priorities.</p>				
<p>Title: Space Communication Technologies</p> <p>Description: Develop technologies for next-generation space communications terminals and equipment and methods/techniques to enable future space system operational command and control concepts.</p> <p>FY 2022 Plans: Continue to support W/V-band payload operations, telemetry analysis, and health and status monitoring. Initiate deployment of laser communications onto V/W-band test set-ups to show synergy between terminals. Complete development of technology demonstrations to address future military satellite communications capability and technology needs, for example, high-gain antenna, high-power amplifiers, low-noise amplifiers, cognitive / resilient networks, reconfigurable satellite radios / transponders, and anti-jam signal processing technologies. Complete development and demonstration of novel laser communications technologies such as multi-wave length optical routers. Initiate development of router that supports multi-spacecraft network and network traffic. Initiate developing methods for multi-access laser communications, reconfigurable laser communications, and positioning, navigation, and timing over laser communication links.</p> <p>FY 2023 Plans: Continue scientific research and technology development for space communications with focus on W/V-band spectrum options, laser communications, and adaptive technologies. Complete demonstration of multi-wavelength optical router. Initiate development of reconfigurable laser communication technology. Initiate demonstration of technology for positioning, navigation, and timing over laser communication links.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$2.152 million. Funding increased due to new requirements for optical and laser communication links development.</p>		5.746	13.018	15.170
Accomplishments/Planned Programs Subtotals		40.960	58.002	55.953

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)	
3620F / 2	PE 1206601SF / <i>Space Technology</i>	628809 / <i>Spacecraft Vehicle Technologies</i>	
		FY 2021	FY 2022
Congressional Add: Congressional Add: Program increase - operational cryogenic upper stage augmentation Kit		6.923	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - thin-film photovoltaic energy		6.923	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - hybrid space architecture		9.890	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - resilient solar power		2.967	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - ultra-lightweight solar arrays		14.835	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - link-16 space experiment		8.901	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - advanced space power systems		6.923	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - digital engineering for future space systems		4.945	-
FY 2021 Accomplishments: Conduct Congressionally directed effort. This effort will be executed in PE 1206601SF, Space Technology, Project 625018, Spacecraft Protection Technology.			
Congressional Add: Congressional Add: Program increase - laser communications		11.868	-
FY 2021 Accomplishments: Conduct Congressionally directed effort. This effort will be executed in PE 1206601SF, Space Technology, Project 624846, Spacecraft Payload Technologies.			
Congressional Add: Congressional Add: Program increase - lithium-sulfur battery development		4.945	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - small satellite mission control facility		5.934	-
FY 2021 Accomplishments: Conduct Congressionally directed effort.			
Congressional Add: Congressional Add: Program increase - radiation hardened microprocessor		-	8.900

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 2	R-1 Program Element (Number/Name) PE 1206601SF / <i>Space Technology</i>	Project (Number/Name) 628809 / <i>Spacecraft Vehicle Technologies</i>
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	FY 2021	FY 2022
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - lithium sulfur battery development	-	4.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - thin-film photovoltaic energy	-	3.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - multi-mission distributed antenna technology	-	10.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - hybrid space architecture	-	5.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - ultra-lightweight space solar arrays	-	5.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - university consortia for space technology	-	10.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - advanced multi-physics thermal management	-	5.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - fundamental research	-	15.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
<i>Congressional Add:</i> Congressional Add: Program increase - space solar power inc demonstration	-	2.900
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
Congressional Adds Subtotals	85.054	68.800

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

N/A

Remarks

D. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206310SF / <i>Space Science and Technology Research and Development</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	-	0.000	0.000	460.820	0.000	460.820	690.386	527.806	540.040	550.556	Continuing	Continuing
634869: <i>Space Science and Technology Research and Development</i>	-	0.000	0.000	460.820	0.000	460.820	690.386	527.806	540.040	550.556	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2023, PE 1206310SDA, Space Technology Development and Prototyping efforts were transferred from Appropriation 0400, Research, Development, Test & Evaluation (RDT&E), Defense-Wide, Budget Activity (BA) 3 to Appropriation 3620, RDT&E, Space Force, PE 1206310SF, due to the transfer of the Space Development Agency to the U.S. Space Force (USSF) in accordance with the William M. (Mac) Thornberry National Defense Authorization Act (NDAA) for FY 2021. This is an administrative realignment.

A. Mission Description and Budget Item Justification

The Space Development Agency (SDA) is developing and demonstrating next generation space capabilities for the joint warfighter enabled by proliferation of satellites and a new acquisition model utilizing rapid spiral development. SDA is developing capabilities to address a wide range of Department of Defense (DoD) space needs as stated in the National Defense Strategy and DoD Space Vision, including low-latency tactical communication, beyond line of sight targeting, and advanced missile tracking. Specifically, SDA will demonstrate and field persistent, resilient capabilities needed to be responsive to emerging multi-domain threats against the U.S. national interest. SDA is responsible for the overall programmatic development and execution of a National Defense Space Architecture (NDSA). In coordination with other DoD Space stakeholders, SDA will drive the development of space capabilities to achieve the DoD Space Vision and reduce overlap and inefficiency. SDA will expand the DoD's space warfighting capability and foster growth in the U.S. space industrial base, by developing enhanced government-commercial relationships and international collaborations with key allies and partners.

While SDA is not responsible for building and fielding all capabilities within the NDSA, the Agency is responsible for orchestrating and architecting the NDSA and ensuring capability delivery to the warfighter following a spiral development approach. SDA is building and fielding the Transport Layer, a proliferated constellation of satellites to provide low-latency, high-volume data to the warfighter. This transport layer will provide the space-based data transport backbone for Joint All-Domain Command and Control (JADC2).

The establishment of a proliferated data transport layer is essential to developing a new and responsive space architecture. SDA will integrate additional constellations with this transport layer to provide multiple warfighting capabilities, such as advanced missile warning, 24/7/365 custody of time critical targets, and alternative position, navigation and timing (PNT) capabilities in navigation warfare (NAVWAR) resilient environments.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206310SF / <i>Space Science and Technology Research and Development</i>
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This program element funds the research and development activity to deliver capabilities to U.S. joint warfighting forces in two-year tranches, beginning in FY 2022, including performing trade studies, technical analyses, or modeling and simulation; identifying and maturing enabling technologies; defining and conducting risk reduction demonstrations, prototyping hardware or software systems; and exploring novel concepts for future warfighting capabilities.

This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	460.820	0.000	460.820
Total Adjustments	0.000	0.000	460.820	0.000	460.820
• 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	460.820	0.000	460.820

Change Summary Explanation

In FY 2022 and prior, funds for this effort were in Appropriation 0400, RDT&E BA 03, PE 126310SDA.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Space Development Agency R&E	0.000	0.000	460.820	0.000	460.820
Description: Research and development activities to support development, demonstration, and fielding of a resilient military sensing and data transport capability via a proliferated space architecture in Low Earth Orbit (LEO).					
FY 2022 Plans: For FY 2022 and prior, this work is performed under the Space Development Agency R&E effort in Appropriation 0400, Budget Activity (BA) 3, PE 1206310SDA, Space Science and Technology Research and Development, Project 012, Space Development Agency R&E.					
FY 2023 Base Plans:					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206310SF / <i>Space Science and Technology Research and Development</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>Tranche 0</p> <ul style="list-style-type: none"> - Demonstrate optical inter-satellite communication links from space-to-space, space-to-air, and space-to-ground. - Begin tracking on-orbit operations demonstration. - Begin testing the developed algorithms for integrated battle management command, control, and communications (BMC3) applications on-orbit. - Demonstrate Link-16 connectivity from space vehicle to ground users. - Complete satellites launches and conduct capstone demonstration. <p>Tranche 1</p> <ul style="list-style-type: none"> - Complete Transport segment space vehicle system design. - Complete ground operations and network integration interoperability testing. - Conduct early initial launch vehicle studies. - Design the Tranche 1 network mission management systems hardware and software. - Complete radio frequency payload design. - Design the BMC3 software architecture. <p>Tranche 2</p> <ul style="list-style-type: none"> - Begin formulating requirements with the warfighter community. <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: The increase in FY 2023 (as compared to the FY 2022 in the corresponding Defense-Wide PE 1206310SDA) is required to invest in the development of an increasingly broad set of technologies (including alternative navigation solutions, advanced missile tracking, multi-INT fusion algorithms, and integrated battle management algorithms) that are critical to delivering a robust initial warfighting capability in the NDSA.</p>					
Accomplishments/Planned Programs Subtotals	0.000	0.000	460.820	0.000	460.820

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206310SF / <i>Space Science and Technology Research and Development</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 03 1206310SDA: <i>Space Development Agency R&E</i>	72.422	172.638	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

For FY 2022 and prior, this work is performed under the Space Development Agency R&E effort in Appropriation 0400, BA 3, PE 1206310SDA, Space Science and Technology Research and Development, Project 012, Space Development Agency R&E.

E. Acquisition Strategy

Partners for these activities include DoD research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, University Affiliated Research Centers, Missile Defense Agency (MDA), Space Systems Command (SSC), and Defense Advanced Research Projects Agency (DARPA). SDA is also a transition partner for technology developers seeking to conduct on-orbit experimentation and prototyping.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</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	-	0.000	238.584	103.395	0.000	103.395	104.937	102.793	105.087	107.133	Continuing	Continuing
633834: <i>Integrated Space Technology Demonstrations</i>	-	0.000	75.571	48.401	0.000	48.401	57.936	60.755	62.131	63.340	Continuing	Continuing
634868: <i>Maui Space Surveillance System</i>	-	0.000	20.162	13.148	0.000	13.148	13.516	13.880	14.192	14.468	Continuing	Continuing
634922: <i>Space & Missile Rocket Propulsion</i>	-	0.000	61.445	21.942	0.000	21.942	22.528	23.195	23.685	24.147	Continuing	Continuing
63682J: <i>Spacecraft Vehicles</i>	-	0.000	81.406	19.904	0.000	19.904	10.957	4.963	5.079	5.178	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program focuses on four major areas. First, integrated space technology demonstrations, is a series of advanced technology demonstrations designed to address mission needs by applying emerging technologies from the Air Force Research Laboratory, other United States government laboratories, and industry. Second, the program focuses on ground-based optical space situational awareness technology development and demonstration at the Maui Space Surveillance System in Hawaii, as well as the operation and upgrade of the facility. Third, the program develops and demonstrates advanced and innovative low-cost high performance satellite propulsion technologies and components. The last major area, spacecraft vehicles, focuses on developing technologies for next-generation space communications terminals and equipment. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of such program funds would be in addition to civilian pay expenses budgeted in program element 1206601SF.

The Department of the Air Force technologies in this program are both enabling and enduring as we invest in maturing emerging technologies that address established mission gaps, and transformational technologies that address integrated enterprise capabilities intended to reshape the future force across air, space, and cyber warfighting domains. Development of transformational operational capabilities through advanced technology solutions focuses on five strategic capabilities: Global Persistent Awareness; Resilient Information Sharing; Rapid, Effective Decision-Making; Complexity, Unpredictability, and Mass; and Speed and Reach of Disruption and Lethality.

This program is in Budget Activity 3, Advanced Technology Development because this budget activity includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>
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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	0.000	76.653	0.000	0.000	0.000
Current President's Budget	0.000	238.584	103.395	0.000	103.395
Total Adjustments	0.000	161.931	103.395	0.000	103.395
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	162.665			
• Congressional Directed Transfers	0.000	-0.734			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	103.395	0.000	103.395

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 633834: *Integrated Space Technology Demonstrations*

Congressional Add: *Congressional Add: Project increase - core manipulator joint*

Congressional Add: *Congressional Add: Program increase - accelerate cislunar flight experiment*

Congressional Add Subtotals for Project: 633834

Project: 634868: *Maui Space Surveillance System*

Congressional Add: *Congressional Add: Program increase - accelerate cislunar flight experiment*

Congressional Add Subtotals for Project: 634868

Project: 634922: *Space & Missile Rocket Propulsion*

Congressional Add: *Congressional Add: Program increase - tridyne multi-mode propulsion*

Congressional Add: *Congressional Add: Program increase - accelerate cislunar flight experiment*

Congressional Add: *Congressional Add: Program increase - upper stage engine technology*

Congressional Add Subtotals for Project: 634922

Project: 63682J: *Spacecraft Vehicles*

Congressional Add: *Congressional Add: Program increase - nuclear propulsion technologies for cislunar flight*

	FY 2021	FY 2022
	-	1.665
	-	37.035
Congressional Add Subtotals for Project: 633834	-	38.700
	-	8.000
Congressional Add Subtotals for Project: 634868	-	8.000
	-	7.000
	-	15.965
	-	23.000
Congressional Add Subtotals for Project: 634922	-	45.965
	-	70.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)

	FY 2021	FY 2022
Congressional Add Subtotals for Project: 63682J	-	70.000
Congressional Add Totals for all Projects	-	162.665

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 FY 2023 cannot be made in a relevant manner.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 3					R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>				Project (Number/Name) 633834 / <i>Integrated Space Technology Demonstrations</i>			
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
633834: <i>Integrated Space Technology Demonstrations</i>	-	0.000	75.571	48.401	0.000	48.401	57.936	60.755	62.131	63.340	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project is a series of advanced technology demonstrations designed to address mission needs by applying emerging technologies from the Air Force Research Laboratory, other United States government laboratories, and industry. These technologies are integrated into system-level demonstrations that are used to test, evaluate, and validate the technologies in a relevant environment.

This project includes the initiation and development of programs addressing Department of the Air Force (DAF) capability gaps and provides technologies for transformational future force capabilities. Transformational efforts will be identified through a competitive process and be responsive to DAF design priorities. Selected efforts will be designated as transformational, indicating enterprise-level priority.

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

	FY 2021	FY 2022	FY 2023
Title: Integrated Satellite Demonstrations	0.000	28.476	20.824
Description: Develop satellite technologies for integrated, robust, and flexible satellite demonstrations building on previous work and leveraging investments by other organizations.			
FY 2022 Plans: Continue to transition formation flying satellites using near autonomous formation control. Complete coordination of manifest timeline for critical space science and technology projects addressing priority US Space Force requirements. Continue to transition hosted secondary satellite system used to quickly fly demonstrations and prototypes. Complete payload maturation and begin fabrication of satellites to operate in Very Low Earth Orbit to examine upper atmosphere ionization processes impacting the propagation of radio frequencies used for warfighter communications and navigation. Initiate the development of satellites for flight beyond the geostationary environment to demonstrate technology required for space domain awareness in cislunar space and the requisite support elements, including communication links, position and timing accuracy, and autonomy, to operate in that orbital regime.			
FY 2023 Plans: Continue mission-level military utility analyses of technology and associated architectures and employment concepts across multi-domain mission areas. Continue refining guidelines and checkpoints for concept maturation evaluations in context of emerging space technologies. Continue to evolve processes for applying model-based systems engineering into technology decision-making and flight experiment design. Continue design and build of satellite experiments demonstrating small satellite systems/			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>	Project (Number/Name) 633834 / <i>Integrated Space Technology Demonstrations</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
sub-systems to prove performance, military utility, and enabling capabilities in autonomy, cyber resiliency and integration of commercial and government space networks for command and control (C2) of a hybrid space architecture.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to FY 2022 by \$7.652 million. Funding decreased due to realignment of space science and technology demonstrations with emerging USSF technology development and demonstration priorities.				
Title: Transformational Technology Development		-	8.395	27.577
Description: Continually funded effort. This funding allocation will initiate new and continue existing Transformational Technology Development efforts. The Transformational Technology Development program will select new projects, in alignment with mission focused areas which include, but are not limited to: Intelligent Planning and Wargaming, Battlespace Awareness, Integrated Base Defense, and Hypersonic Multi-Mission Aircraft. Investments focus on technology development efforts including, but are not limited to technologies to enhance survivability, operability and performance of personnel, sensors, and structures in a threat environment through space technology demonstrations for cislunar space domain awareness and space logistics. This investment is overseen by senior representatives from Air and Space Forces who participate in the submission, initial review, and down-selection of Transformational Technology Development proposed efforts. Final selections will be reviewed by the Air Force Deputy Assistant Secretary for Science, Technology, and Engineering before a final recommendation for Congressional approval is made.				
FY 2022 Plans: Fund the follow-on efforts for projects started in FY 2021. Select Transformational Technology Development efforts in FY 2022 that support the National Defense Strategy and Department of the Air Force priorities.				
FY 2023 Plans: Continue experimentation to demonstrate logistics and domain awareness in orbits beyond Geosynchronous Earth Orbit. Initiate projects selected from the annual WARTECH process that investigate Department of the Air Force prioritized topics. Continue to perform modeling, simulation, and analyses to establish the future force effect of candidate Transformational Component investments and continue the next cycle of WARTECH process.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$19.182 million. Funding increased to scale investment toward the Department of the Air Force target outlined in the Air Force 2030 Science and Technology (S&T) Strategy.				
Accomplishments/Planned Programs Subtotals		0.000	36.871	48.401
		FY 2021	FY 2022	
Congressional Add: Congressional Add: Project increase - core manipulator joint		-	1.665	

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

Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>	Project (Number/Name) 633834 / <i>Integrated Space Technology Demonstrations</i>
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	FY 2021	FY 2022
FY 2022 Plans: Conduct Congressionally directed effort.		
Congressional Add: Congressional Add: Program increase - accelerate cislunar flight experiment	-	37.035
FY 2022 Plans: Conduct Congressionally directed effort.		
Congressional Adds Subtotals	-	38.700

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 3					R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>				Project (Number/Name) 634868 / <i>Maui Space Surveillance System</i>			
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
634868: <i>Maui Space Surveillance System</i>	-	0.000	20.162	13.148	0.000	13.148	13.516	13.880	14.192	14.468	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program funds ground-based optical space situational awareness technology development and demonstration at the Maui Space Surveillance System in Hawaii, as well as the operation and upgrade of the facility. Efforts in this program have been coordinated through the Department of Defense Science and Technology Executive Committee process to harmonize efforts and eliminate duplication.

A civilian pay adjustment that should have been applied to this Project was assigned an incorrect Project code that aligned it in Budget Activity (BA) 06 (RDT&E Management Support) resulting in the unintentional creation of Project C6601Z in PE 1206616SF under BA 06. This line item will be transferred back to this project (PE 1206616SF, Project 634868 under BA 03) in the next cycle.

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

	FY 2021	FY 2022	FY 2023
Title: Operate and Upgrade Maui Space Surveillance System	0.000	12.162	13.148
Description: Operate and upgrade the Maui Space Surveillance System to support development, demonstration, and integration of ground-based optical space domain awareness technologies.			
FY 2022 Plans: Continue to maintain the Maui Space Surveillance System facility and experimental equipment in a mission-ready state, including needed upgrades and modernization to keep facilities and equipment in good working order to perform efficiently and reliably. Continue to operate Maui Space Surveillance System facility for development and demonstration of ground based optical space domain awareness capabilities in conjunction with customer programs and contribute to the US Space Force Space Domain Awareness mission. Continue to collect observations of satellites as requested by mission partners. Operate the prototype regional wide-area-search of the geosynchronous belt in the Pacific AOR ahead of the fielding of the joint Space Systems Command + Australian Space Surveillance Telescope facility.			
FY 2023 Plans: Continue to maintain the Maui Space Surveillance System R&D facilities and experimental equipment in a mission-ready state, including needed upgrades and modernization to keep the R&D facilities and equipment in good working order to perform efficiently and reliably. Continue to operate Maui Space Surveillance System R&D facilities for development and demonstration of ground based space domain awareness capabilities in conjunction with customer programs and contribute to the US Space Force Space Domain Awareness mission. Continue to collect observations of satellites as requested by mission partners. As needed,			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>	Project (Number/Name) 634868 / <i>Maui Space Surveillance System</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
operate the prototype regional wide-area-search of the geosynchronous belt in the Pacific AOR ahead of the fielding of the joint Space Systems Command + Australian Space Surveillance Telescope facility.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to FY 2022 by \$0.986 million. Justification for this increase is described in the plans above.			
Accomplishments/Planned Programs Subtotals	0.000	12.162	13.148

	FY 2021	FY 2022
<i>Congressional Add:</i> Congressional Add: Program increase - accelerate cislunar flight experiment	-	8.000
<i>FY 2022 Plans:</i> Conduct Congressionally directed effort.		
Congressional Adds Subtotals	-	8.000

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 3					R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>				Project (Number/Name) 634922 / <i>Space & Missile Rocket Propulsion</i>			
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
634922: <i>Space & Missile Rocket Propulsion</i>	-	0.000	61.445	21.942	0.000	21.942	22.528	23.195	23.685	24.147	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates advanced and innovative low-cost rocket turbo-machinery and components, and low-cost space launch propulsion technologies. Characteristics such as environmental acceptability, affordability, reliability, responsiveness, reduced weight, and reduced operation and launch costs are emphasized. Increased life and performance of propulsion systems are key goals. Technology areas investigated include ground demonstrations of compact, lightweight, advanced propulsion technologies, higher efficiency energy conversion systems (derived from an improved understanding of combustion fundamentals), and high-energy propellants. Technological advances in this project could improve the performance of expendable payload capabilities by approximately twenty to fifty percent and reduce launch, operations, and support costs by approximately thirty percent. Responsiveness and operability of propulsion systems will be enhanced for reusable launch systems. The efforts in this project contribute to the sustainment of the rocket propulsion industry, providing rocket propulsion technology for the entire Department of Defense (DoD) and National Aeronautics and Space Administration (NASA). The efforts in this project are part of the Rocket Propulsion of the 21st Century (RP21) program. The efforts in this project are reviewed by a DoD level steering committee annually for relevance to DoD missions and achievement of technical goals defined by the RP21 program.

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

	FY 2021	FY 2022	FY 2023
Title: Liquid Rocket Propulsion Technologies	0.000	8.828	9.530
Description: Develop liquid rocket propulsion technology for current and future space launch vehicles.			
FY 2022 Plans: Continue modular engine feasibility to address scalability, applicability, testability, and life cycle cost for National Security Space applications. Initiate development of disruptive engine concepts/cycles for liquid propellant engines, engine system components, and control for space launch system.			
FY 2023 Plans: Continue modular engine feasibility to address scalability, applicability, testability, and life cycle cost for National Security Space applications. Continue development of disruptive engine concepts/cycles for liquid propellant engines, engine system components, and control for space launch system. Initiate evaluation of austere location launch capability with commercial partners and demonstration opportunities. Continue coordination of technology transition opportunities for space access to manage technology insertion and evaluate capabilities for rocket engine hardware and related systems.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>	Project (Number/Name) 634922 / <i>Space & Missile Rocket Propulsion</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 increased compared to FY 2022 by \$0.702 million. Justification for this increase is described in the plans above.			
<p>Title: On-Orbit Propulsion Technologies</p> <p>Description: Develop solar electric, electric, and monopropellant propulsion technologies for existing and future satellites, upper stages, orbit transfer vehicles, and satellite maneuvering.</p> <p>FY 2022 Plans: Continue to develop and transition experimental, modeling and simulation, and theoretical efforts geared towards advanced thruster development with emphasis on understanding thrust scale-up. Complete advancement capabilities to study next generation of hypergolic fuels, including propellant characterization, drop-in testing, and lab-scale thruster demonstration. Continue analysis and development of multi-mode propulsion opportunities to combine high efficiency and high thrust capabilities on a common propellant. Continue thrust scale-up effort for advanced non-toxic for use in monopropellant thrusters and electric propulsion thruster for a multi-mode propulsion capability. Complete electric propulsion thruster effort utilizing advanced non-toxic monopropellant.</p> <p>FY 2023 Plans: Continue to develop and transition experimental, modeling and simulation, and theoretical efforts geared towards advanced thruster development with emphasis on understanding thrust scale-up. Continue analysis and development of multi-mode propulsion opportunities to combine high efficiency and high thrust capabilities on a common propellant. Continue thrust scale-up effort for advanced non-toxic propellant for use in monopropellant thrusters and electric propulsion thruster for a multi-mode propulsion capability. Initiate flight-weight design and development of multimode propulsion flight system combining capabilities of chemical thrusters and electric propulsion thrusters and utilizing a single common propellant for greater operational potentiality.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$5.760 million. Funding increased due to increased emphasis on flight-weight design and development on multimode propulsion for planned flight opportunity in later years.</p>	0.000	6.652	12.412
Accomplishments/Planned Programs Subtotals	0.000	15.480	21.942

	FY 2021	FY 2022
Congressional Add: Congressional Add: Program increase - tridyne multi-mode propulsion	-	7.000
FY 2022 Plans: Conduct Congressionally directed effort.		
Congressional Add: Congressional Add: Program increase - accelerate cislunar flight experiment	-	15.965

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>	Project (Number/Name) 634922 / <i>Space & Missile Rocket Propulsion</i>

	FY 2021	FY 2022
FY 2022 Plans: Conduct Congressionally directed effort.		
Congressional Add: Congressional Add: Program increase - upper stage engine technology	-	23.000
FY 2022 Plans: Conduct Congressionally directed effort.		
Congressional Adds Subtotals	-	45.965

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

N/A

Remarks

D. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>	Project (Number/Name) 63682J / <i>Spacecraft Vehicles</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
63682J: <i>Spacecraft Vehicles</i>	-	0.000	81.406	19.904	0.000	19.904	10.957	4.963	5.079	5.178	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops and demonstrates technologies critical to addressing documented military satellite communications capability gaps and top-ranked Space Force and/or Space and Missile Systems Center technology needs.

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

	FY 2021	FY 2022	FY 2023
Title: Space Communication Technologies	0.000	11.406	19.904
Description: Develop technologies for next-generation space communications terminals and equipment, along with methods/techniques to enable future space system operational command and control concepts.			
FY 2022 Plans: Continue support of W/V-band propagation flight experiment. Continue beacon ground terminal operations, maintenance, and re-deployments. Continue collection and analysis of additional data to statistically characterize atmospheric propagation effects and correlate to meteorological parameters. Continue technology research and development work to address military space communications capability needs. Continue fabrication and space-qualify V-band high power amplifiers. Continue development of W/V-band transponder flight experiment, coupled with cross-links. Continue systems engineering and technology risk-reduction for W/V-band ground terminals.			
FY 2023 Plans: Continue support of W/V-band propagation flight experiment. Continue beacon ground terminal operations, maintenance, and redeployments. Continue collection and analysis of additional data to statistically characterize atmospheric propagation effects and correlate to meteorological parameters. Continue technology research and development work to address military space communications capability needs. Complete fabrication and space-qualification of V-band high power amplifiers. Complete development of W/V-band transponder flight experiment, coupled with cross-links. Initiate integration and testing of flight experiment engineering unit in preparation for launch and demonstration. Continue systems engineering and technology risk-reduction for W/V-band ground terminals.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$8.498 million. Funding increased due to program requirements to complete technology development and prepare for scheduled launch and demonstration.			
Accomplishments/Planned Programs Subtotals	0.000	11.406	19.904

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 3	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>	Project (Number/Name) 63682J / <i>Spacecraft Vehicles</i>
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	FY 2021	FY 2022
Congressional Add: Congressional Add: Program increase - nuclear propulsion technologies for cislunar flight	-	70.000
FY 2022 Plans: Conduct congressionally directed effort.		
Congressional Adds Subtotals	-	70.000

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

N/A

Remarks

D. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604002SF / <i>Space Force Weather Services Research</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	-	0.000	0.000	0.816	0.000	0.816	0.845	0.860	0.880	0.897	0.000	4.298
645353: <i>SF Weather Services Research</i>	-	0.000	0.000	0.816	0.000	0.816	0.845	0.860	0.880	0.897	0.000	4.298
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
 This program, BA 4, PE 0604002SF, project 645353, Space Weather Analysis and Forecast System (SWAFS) Scintillation Nowcast and Forecast Technology (SNFT) software upgrade, is a new start.

In FY 2023, PE 0604002F Air Force Weather Services Research, Project 643560, AF Weather Services Research efforts were transferred to PE 0604002S, Space Force Weather Services Research, Project 645353, SF Weather Services Research in order to align current USAF ground-based space-sensing projects to the USSF.

A. Mission Description and Budget Item Justification

This budget activity funds the development necessary to evaluate integrated technologies and models for future operationalization into segments of the Space Force Weather Services (SFWS) in support of the 2018 National Defense Strategy's (NDS) three lines of effort. To improve readiness for a more lethal force, SFWS provides timely, accurate, resilient and relevant environmental information, to include space and terrestrial weather, for global battlespace situational awareness for Air Force (AF), Army, Special Operations Forces (SOF), Space Force (USSF), combatant commands, the Intelligence Community (IC), and other government agencies. SFWS capabilities at home station and deployed provide critical environmental information in support of decision makers to gain the asymmetric advantage during the full spectrum of air and space combat operations. SFWS development enhances the lethality, effectiveness, and survivability of AF & SF weapon systems and precision munitions by modernizing capability and seeking the military advantage to accurately predict friendly and foe environmental impacts to optimize mission execution and planning, targeting, weaponeering, battle damage assessment, and space systems operations. To strengthen alliances and partnerships, SFWS development efforts integrate Department of Defense (DoD), government agency, commercial, and international partner environmental data with SFWS information system equipment for processing, storing, exploiting, and disseminating all-domain weather information for analysis, forecasting, mission integration, and greater interoperability. To ensure greater performance and affordability for the AF and SF, SFWS systems are being modernized through improvements to architecture and system efficiency, cybersecurity, joint all-domain command and control (JADC2) and sensing grid integration, migration to cloud computing, and expanding agile software development practices.

SFWS aligns activities under four capability areas: Weather Data Collection, Weather Data Analysis and Dissemination, Weather Forecasting, and Product Tailoring/Warfighter Applications (PTWA). This alignment ensures an integrated and systems-oriented approach to program management decisions. A portion of the Weather Forecasting capability is addressed by RDT&E, BA 04, PE 0604002S, Project 645353 - Space Force Weather Services Research.

Weather Forecasting provides global and regional advanced scientific numerical weather prediction capabilities for automated, high-resolution forecast products for mission planning and execution. Space weather modeling assists in characterizing and forecasting the near-earth environment to the sun and enables space weather

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604002SF / <i>Space Force Weather Services Research</i>
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anomaly and space weather impact assessments. Weather Forecasting includes activities for Numerical Weather Modeling (NWM) and Space Weather Analysis and Forecast System (SWAFS). SWAFS is a software suite of 47 models and applications to ingest, process, and store space environmental data, run space environmental models to specify and forecast the near-earth environment, and run space effects characterization applications.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SFWS for 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 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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	0.816	0.000	0.816
Total Adjustments	0.000	0.000	0.816	0.000	0.816
• 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	0.816	0.000	0.816

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Space Weather Analysis and Forecast System (SWAFS) Scintillation Nowcast and Forecast Technology (SNFT) software upgrade	0.000	0.000	0.816
Description: SWAFS SNFT AFRL AoA to upgrade software allowing use of model algorithms that utilize sensor packages on the Constellation Observing System to monitor Meteorology, Ionosphere, and Climate (COSMIC II) to understand space environment conditions affecting satellites and communications.			
FY 2022 Plans: N/A			
FY 2023 Plans:			

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604002SF / <i>Space Force Weather Services Research</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Develop and integrate an upgrade to the SET4D Ovation Prime 2013 Auroral boundary model. This model informs pilots of the hazards to radio communication operations when flying near the poles and it supports early warning radar operators in determining environment impacts to operate their radars during high peak aurora times.			
Complete Spiral 2 development of the Radio Frequency Ionospheric Scintillation Analysis Tool (RISA) upgrade applications for data exploitation of advanced data Integrity tools that include: Wideband Satellite Communication Support (Mobile User Objective System (MUOS); Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC-2) electron density Ion Velocity Meter (IVM) Algorithm; Global-scale Observations of the Limb and Disk/Ionospheric Connection Explorer (GOLD/ICON) Ultraviolet Variability Data Assimilation; Global Navigation Satellite Systems (GNSS) Integration, and Rate of Total Electron Content Index (ROTI) exploitation.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Funds transferred from USAF to USSF.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.816

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 07 0305111F: <i>Weather Service</i>	4.099	4.362	-	-	-	-	-	-	-	0.000	8.461
• RDTE 07 1203940S: <i>Space Situation Awareness Operations</i>	-	-	3.144	-	3.144	3.816	3.022	3.113	3.175	0.000	0.000

Remarks

E. Acquisition Strategy
 SWAFS will use individual Federal Acquisition Regulation (FAR) based and rapid acquisition contracting methods, as well as AFRL for development works (Technology Readiness Level (TRL) 6 and below) to develop AoA, design solutions, and prototype code.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force											Date: April 2022		
Appropriation/Budget Activity 3620F / 4					R-1 Program Element (Number/Name) PE 0604002SF / <i>Space Force Weather Services Research</i>				Project (Number/Name) 645353 / <i>SF Weather Services Research</i>				

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	Cost To Complete	Total Cost	Target Value of Contract	
SWAFS Scintillation Nowcast Forecast Model Update AoA	PO	AFRL : Kirtland AFB, NM	-	-		-		0.816	Jan 2023	-		0.816	Continuing	Continuing	-	
Subtotal			-	-		-		0.816		-		0.816	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		
-	-		-		0.816		-		0.816	Continuing	Continuing	N/A			
Project Cost Totals			-	-		-		0.816		-		0.816	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force			Date: April 2022		
Appropriation/Budget Activity 3620F / 4		R-1 Program Element (Number/Name) PE 0604002SF / <i>Space Force Weather Services Research</i>		Project (Number/Name) 645353 / <i>SF Weather Services Research</i>	

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

Scintillation Nowcast	
Continuous Spiral Development of SFWS applications	
Forecast Model Update Analysis of Alternatives	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 0604002SF / <i>Space Force Weather Services Research</i>	Project (Number/Name) 645353 / <i>SF Weather Services Research</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Scintillation Nowcast</i>				
Continuous Spiral Development of SFWS applications	1	2023	4	2027
Forecast Model Update Analysis of Alternatives	2	2023	2	2024

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)
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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	0.000	367.652	434.194	382.594	0.000	382.594	301.005	88.742	55.913	57.012	Continuing	Continuing
643833: MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP	0.000	367.652	434.194	382.594	0.000	382.594	301.005	88.742	55.913	57.012	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Program MDAP/MAIS Code: 447

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space-based radio Positioning, Navigation, and Timing (PNT) distribution system. GPS User Equipment (UE) consists of standardized receivers, antennas, antenna electronics, and other related equipment, grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by the Department of Defense (DoD). Research, Development, Test and Evaluation (RDT&E) funds UE development, integration, test, and analysis for new PNT receiver capabilities in Navigation Warfare (NAVWAR) across all military platforms using GPS services.

The Military Global Positioning System User Equipment (MGUE) Increment (Inc) 1 program is responsible for the development of standard modernized receiver form factors for the Service-nominated lead platforms. The MGUE Inc 1 Capability Development Document (CDD) was approved by the Joint Requirements Oversight Council (JROC) on 24 July 2014. MGUE Inc 1 is initiating a new family of modernized GPS receivers that will deliver significantly improved capability to counter current and emerging PNT threats and enable military operations in a NAVWAR environment where current legacy receiver performance would be compromised. MGUE Inc 1 received a Milestone A decision in April 2012. The program received direction in February 2014, from the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) to execute a new acquisition strategy, accelerating the program to provide test units faster to facilitate military end users. The MGUE program received a Milestone B decision in January 2017.

The MGUE Inc 2 effort will continue to expand Military-Code (M-Code) receiver technology into additional applications (space receivers and precision guided munitions), and develop a modernized Handheld (HH) device to meet Service requirements. This effort leverages the MGUE Inc 1 technology to the maximum extent while addressing the production of M-Code integrated circuits far into the future. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) Miniature Serial Interface (MSI) Receiver Card Middle Tier Acquisition (MTA) rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver Middle Tier Acquisition rapid prototyping effort. The JROC approved the MGUE Inc 2 CDD on 6 April 2018. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) MSI Receiver Cards to include Next-Generation (Next Gen) Application Specific Integrated Circuit (ASIC) and 2) Joint, Modernized Handheld Receiver.

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

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)
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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

The total cost of the MGUE Inc 2 MSI Middle Tier of Acquisition effort is \$1,429.446 million. The MGUE Inc 2 MSI program is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways.

This Program Element (PE) may include necessary civilian pay expenses required to manage, execute, and deliver MGUE weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392SF and 1206398SF.

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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	380.704	434.194	0.000	0.000	0.000
Current President's Budget	367.652	434.194	382.594	0.000	382.594
Total Adjustments	-13.052	0.000	382.594	0.000	382.594
• 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	-13.052	0.000			
• Other Adjustments	0.000	0.000	382.594	0.000	382.594

Change Summary Explanation

FY 2023: +358.137M; 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: MGUE Inc 1 Product Development	73.793	75.346	66.000
Description: The MGUE Inc 1 program develops standard modernized receiver form factors for the Service-nominated lead platforms in accordance with the MGUE Inc 1 CDD.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR <i>Global Positioning System (User Equipment) (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>FY 2022 Plans: Continue towards completion of the following: Assist the Air Force B-2 bomber (B-2) and the Navy Arleigh Burke Guided Missile Destroyer (DDG) lead platform offices in integrating and testing M-Code receivers in their respective platforms. Card level PEO Certification for Operational Test and Evaluation (OT&E) or Field Test. Continue Verification Testing, Qualification Testing, Technical Requirements Verification for remaining MGUE cards. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: Complete the following receiver modernization Activities: Verification Testing, Qualification Testing, Technical Requirements Verification, and Manufacturing Readiness Assessment (MRA) for remaining MGUE card. Conduct GPS Enterprise Engineering updates to Ground Based - GRAM - Modernized - Module (GB-GRAM-M) and GPS Receiver Application Module - Standard Electronic Module (GRAM-S/M). Conduct deficiency resolution for test problems resulting from lead platform testing. Continue preparation for PEO Certification of Readiness for B-2 and DDG Platform OT&E (or field test). Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to completion of Raytheon Firm Fixed Price contract performance based payments and completion of enterprise engineering modernization efforts on the ground card.</p>				
<p>Title: Advanced Technology</p> <p>Description: Advanced Technology/Pre-Tech includes efforts to mature technology for future GPS receivers called out in the MGUE CDDs. These efforts aim to find innovative solutions to increase resiliency in GPS performance and improve on size, weight, power, and cost (SWAP/C) of military receivers.</p> <p>FY 2022 Plans: Continue developing technologies and prototypes to increase the robustness and resilience of GPS receiver / PNT system solutions. Continue the integration of the next-generation, Government developed intellectual property identified as Modernized Protection Device (MoPD), GPS security architecture, into a multi-Global Navigation Satellite System (GNSS) software defined radio platform and demonstrate functional performance, programmability / flexibility, and certifiability. Continue the M-Code Military Underwater Navigation System (MUNS-M) Government test activities and work with US Special Forces and Foreign Military Sales (FMS) customers on transition opportunities. Complete fabrication of initial integrated antenna, antenna electronics and M-Code prototype and conduct design validation testing to evaluate Technical Requirement Document (TRD) compliance and access</p>		0.000	12.760	16.367

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force / BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>effort for production representative units. Select advanced anti-spoof / trust / integrity algorithms to implement and test that might permit military use of other GNSS signals for delivering assured PNT.</p> <p>FY 2023 Plans: Continue developing technologies and prototypes to increase the robustness and resilience of Modernized GPS receivers and PNT system solutions. Complete the development and security certifiability testing of MoPD. Continue integration into a multi-GNSS software defined radio platform and begin to demonstrate functional performance, programmability, and flexibility. Mature the MUNS-M software and displays based on feedback from US Special Forces test activity. Continue working with FMS customers on transition opportunities. Complete fabrication of IMAS (Integrated M-Code/Antenna System prototype) and conduct design validation testing to evaluate TRD compliance and access effort for production representative units. Continue Multi-GNSS prototyping including M-code and "covered signals" to increase the resilience and capability of military PNT to meet National Defense Authorization Act objectives.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased due to added support integrating the next-generation, government developed MoPD intellectual property into a multi-GNSS software defined radio platform and demonstrating functional performance, programmability / flexibility, and certifiability. Additionally, both the IMAS and the MUNS-M prototypes will be undergoing testing and maturation.</p>				
<p>Title: MGUE Inc 1 System/Platform Integration and Performance Certification</p> <p>Description: Integration of MGUE Inc 1 receiver form factors into the Service-nominated lead platforms in support of developmental and operational (or field) test events. Conduct technical and operational modernization impact analysis for MGUE Service lead platform integration.</p> <p>FY 2022 Plans: Continue verification testing of remaining GRAM-S/M cards. Continue requirements verification and reliability test activities as required to include approved engineering changes. Complete lead platform development efforts to on-board minimum viable product GRAM-S/ M capabilities, and begin final B-2 and DDG integration and qualification efforts in support of developmental and operational or field test events. Assist DoD integration of M-Code GPS receivers for joint Service non-lead platforms.</p> <p>FY 2023 Plans: Continue platform-level verification testing of the GRAM-S/M. Continue platform-level requirements verification and reliability test activities as required to include approved engineering changes. Complete lead platform development efforts to integrate GRAM-S/M capabilities, and begin final B-2 and DDG integration and qualification efforts in support of developmental and operational or field test events. Conduct DDG independent verification and validation testing (IV&V), field testing in a threat environment and system level integration testing. Complete B-2 combined developmental/operational test. Assist DoD integration of M-Code GPS</p>		26.550	33.571	53.255

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 Program Element (Number/Name) PE 1203164SF I NAVSTAR Global Positioning System (User Equipment) (SPACE)		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
receivers for joint Service non-lead platforms. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to the shift of lead platform development efforts into FY 2023, after addressing technical issues on one of the MGUE cards. Increase reflects continued lead platform technical staff in addition to previously planned test execution costs to validate the GRAM -S/M integration in the B-2 and DDG lead platforms.				
Title: Information Assurance, Security/Compatibility Certification, and Test/Evaluation Description: Develop, implement, and maintain GPS security certification programs. Develop policy, strategy and resource requirements for MGUE security certification and compatibility certification. Security certification, compatibility certification, and security approval ensures future military GPS receivers protect critical program information and continue working in all environments and concepts of operations called for by U.S. Strategic Command. FY 2022 Plans: Continue to conduct security certification activities for all M-Code receivers, as required. Continue modernized security evaluations/tests for Selective Availability Anti-Spoofing Module (SAASM) and other legacy GPS receiver equipment. Continue to review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD. Continue the GPS Receiver Application Module-Standard Electronic Module/M-Code (GRAM-S/M) verification testing for all remaining MGUE cards. Continue to conduct delta certifications, as required. Continue requirements verification and reliability test activities as required to include approved engineering changes. Continue Lead Platform Integration Test and Operational Test (OT) activities for MGUE and Lead Platform vendors. FY 2023 Plans: Continue to conduct initial and delta security certification activities for all M-Code receivers, as required. Continue modernized security evaluations/tests for SAASM and other legacy GPS receiver equipment. Review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD. Continue technical support to develop, validate and process engineering changes. Continue SAASM and modernize Key Loading Installation Facility (KLIF) effort. Conduct GPS Enterprise Integrated System Test (IST) activities for MGUE Lead Platforms. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to a reduction in test and evaluation related requirements.		2.459	18.421	9.966
Title: MGUE Inc 2 Risk Reduction Description: The MGUE Inc 2 program will develop M-Code receiver technology to meet Service requirements. MGUE Inc 2 Risk Reduction activities include, but are not limited to, acquisition strategy development, early design efforts through Preliminary		71.173	7.736	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR <i>Global Positioning System (User Equipment) (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Design Review (PDR) for the next generation ASIC using 14nm (nanometer) ASIC technology node, handheld design activities and early user demonstrations, advanced concept studies, receiver component prototyping to include MGUE Inc 2 requirements.				
FY 2022 Plans: Continue M-Code Handheld risk reduction activities, to include prototype demonstrations. Continue additional Handheld risk reduction activities to address challenging Increment 2 performance requirements, improve user functionality, and reduce unit cost. Implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.				
FY 2023 Plans: N/A				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to contract completion in 2QFY2022 and transfer of Handheld activities into the MGUE Inc 2 HH Major Thrust.				
Title: MGUE Inc 2 Miniature Serial Interface (MSI) Receiver Card Rapid Prototyping		193.677	286.360	223.085
Description: The MGUE Inc 2 program will develop M-Code receiver technology for additional applications (space receivers, precision guided munitions, and handheld receivers) to meet Service requirements. MGUE Inc 2 MSI Receiver Card Rapid prototyping builds on the Application Specific Integrated Circuit (ASIC) post-PDR progress and will develop, integrate, produce, and test M-Code capable, low size & power GPS MSI form factor to include a Next Gen ASIC. The MSI receiver card is to meet the needs of low size, weight and power (SWaP) ground-embedded users. However, The Next Gen ASIC must meet the needs of the MSI form factor and be backwards compatible with Inc 1 performance requirements as a potential functional replacement due to Inc 1 ASIC obsolescence. MGUE Inc 2 MSI Receiver Card Rapid Prototyping has been broken out into a separate major thrust for additional visibility.				
FY 2022 Plans: Continue three development contract(s) for new low size/power MSI receiver card to include Next Gen ASIC, hardware, and software. Begin all efforts related to the prototypes, including, but not limited to, ordering of components for early integrated testing, long-lead parts planning and purchase, procurement of test equipment and articles, facilities planning, manufacturing prototypes, and manpower. Begin preparations for Critical Design Review (CDR) planned for 4th quarter FY 2023. In addition to preparing for CDR, the contractors will be verifying through demonstrations and testing that performance requirements will be met. Continue security certification and design activities. Continue investments in core ASIC technology, early ASIC fabrication,				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR <i>Global Positioning System (User Equipment) (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>manufacturing, and Intellectual Property procurement. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: Continue three development contract(s) for new low size/power MSI receiver card to include Next Gen ASIC, hardware, and software. Continue efforts related to the prototypes including, but not limited to, ordering of components for early integrated testing, long-lead parts planning and purchase, procurement of test equipment and articles, manufacturing prototypes, and manpower. Complete Release to Manufacture (RTM) of the Next Gen ASIC and facilities planning. Complete CDR for all three vendors. Contractors will continue to verify performance requirements are met through demonstrations and testing. Continue security certification and design activities. Continue investments in core ASIC technology, early ASIC fabrication, manufacturing and Intellectual Property procurement. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to the completion of the CDR campaign for all three development contractor efforts. The CDR campaign is a critical event to ensure stable design, performance, and delivery of a first test article in FY 2024.</p>				
<p>Title: MGUE Inc 2 Handheld</p> <p>Description: The Military GPS User Equipment (MGUE) Increment (Inc) 2 Handheld (HH) effort will develop a joint common modernized HH receiver that will provide M-code, anti-spoof, and anti-jam capabilities, with significant improvements in size, weight, and power. The goal of the MGUE Inc 2 HH risk reduction activities is to reduce development risk for the MGUE Inc 2 HH receiver through feedback from the rapid prototyping process and multiple joint service demonstration events. The MGUE Inc 2 Handheld activities transferred from the MGUE Inc 2 Risk Reduction Major Thrust to provide increased Middle Tier Acquisition (MTA) transparency.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Transition HH risk reduction activities to a MTA Rapid Prototyping effort in line with the 2018 SAE-approved MGUE Inc 2 Acquisition Strategy. Ground Application Technical Requirements Document compliant prototype that is M-Code capable and ready for security approval. Joint service demonstration events will continue to inform HH development, burning down user acceptance risk. Integrate the MSI into HH advanced prototype and perform limited operational testing, security testing and power model analysis. Multiple competitive contracts will be awarded in FY 2023 for the MTA Rapid Prototyping effort. Rapidly respond</p>		0.000	0.000	13.921

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to MGUE Inc 2 Handheld activities transfer from the MGUE Inc 2 Risk Reduction Major Thrust to provide increased MTA transparency.			
Accomplishments/Planned Programs Subtotals	367.652	434.194	382.594

D. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• SPAF 01 0305164F: NAVSTAR Global Positioning System (User Equipment) (SPACE)	2.256	2.274	0.950	-	0.950	0.901	0.838	0.888	0.840	0.000	8.947

Remarks
Procurement, Space Force (PSF) funding in this PE supports legacy SAASM efforts. Similar work for the MGUE is in the planning phase.

E. Acquisition Strategy
The MGUE program has developed a comprehensive acquisition strategy to provide modernized GPS capabilities to U.S. and Allied Forces by developing a competitive market driven approach. This strategy establishes the signal compatibility and security criteria along with a process for evaluating components to enable rapid movement from development to fielding. The pillars of this effort are: (a) establishing time certain and low risk development; (b) bounding requirements to leverage mature technology to the maximum extent possible; (c) focusing on the development of form factors based on well-defined standards to support lead platform integration; and (d) implementing a proactive, collaborative MGUE platform integration activity to mitigate risk and reduce cost for DoD force structure modernization.

The MGUE program awarded three sole source contracts for the Inc 1 Technology Development Phase effort in September 2012, as follow-on efforts to the competitively awarded Modernized User Equipment (MUE) contracts awarded in June 2006. The effort spans the Technology Maturation and Risk Reduction Phase through design and includes integration and test of M-Code receivers into Service-nominated lead platforms. In 1QFY2021, the program office converted the remaining Raytheon GRAM-S/M development effort to a Firm Fixed Price contract type at the direction of the Air Force Service Acquisition Executive. The contracts of the other two vendors remain primarily a Cost Plus Incentive Fee type contract. This effort also includes the security and compatibility certification of GPS receiver cards as a part of the integration effort. The Service lead platforms will select from the available vendors to integrate and perform operational testing with funding from the MGUE program. This supports compliance with PL 111-383, section 913.

The MGUE Inc 2 program developed an Acquisition Strategy to continue MGUE development by: addressing long term producibility of MGUE ASICs, identifying a U.S. owned trusted foundry for ASIC development, delivering GPS receiver cards to meet stringent Inc 2 requirements, and developing a modernized GPS handheld receiver

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)

to meet the needs of the Services. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) MSI MTA rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver MTA rapid prototyping effort. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two MTA Rapid Prototype efforts: 1) Miniature Serial Interface Receiver Card (includes Next-Gen ASIC) and 2) Joint, Modernized Handheld Receiver. MGUE Inc 2 awarded three full and open competitive contracts in Nov 2020 for MSI. The program office plans to award full and open competitive Handheld contracts beginning in FY 2023.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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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			
MGUE Inc 1 Technology Development (1)	C/CPIF	Collins Aerospace : Cedar Rapids, IA	0.000	0.012	Nov 2020	12.210	Nov 2021	6.000	Nov 2022	-		6.000	0.150	18.372	130.555
MGUE Inc 1 Technology Development (2)	C/CPIF	Raytheon : El Segundo, CA	0.000	41.136	Nov 2020	46.329	Nov 2021	45.787	Nov 2022	-		45.787	15.028	148.280	142.013
MGUE Inc 1 Technology Development (3)	C/CPIF	L3 Harris : Anaheim, CA	0.000	1.000	Nov 2020	0.637	Nov 2021	0.000	Nov 2022	-		0.000	0.000	1.637	83.670
MGUE Inc 1 Platform Integration	Various	Various : Various	0.000	26.550	Nov 2020	33.571	Nov 2021	53.255	Nov 2022	-		53.255	65.614	178.990	-
MGUE Inc 1 Information Assurance	Various	Various : Various	0.000	2.710	Jan 2021	0.000	Jan 2022	0.000	Jan 2023	-		0.000	0.000	2.710	-
MGUE Inc 1 Technical Mission Analysis	Various	Aerospace/MITRE : Various, CA	0.000	7.384	Oct 2020	1.908	Nov 2021	1.210	Nov 2022	-		1.210	1.120	11.622	-
MGUE Inc 1 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	0.000	1.596	Oct 2020	1.597	Dec 2021	3.971	Dec 2022	-		3.971	5.467	12.631	-
MGUE Advanced Technology/Pre-Tech	Various	Various : Various, CA	0.000	5.000	Jan 2021	12.760	Jan 2022	16.367	Jan 2023	-		16.367	Continuing	Continuing	-
MGUE Inc 2 MSI Receiver Card Rapid Prototyping	Various	Various : Various	0.000	69.783	Dec 2020	64.318	Dec 2021	18.451	Dec 2022	-		18.451	Continuing	Continuing	-
MGUE Security Certification	Various	Various : Various	0.000	5.307	Jan 2021	5.299	Nov 2021	5.459	Nov 2022	-		5.459	Continuing	Continuing	-
MGUE Inc 2 Technology Development (1)	C/CPIF	BAE Systems : Cedar Rapids, IA	0.000	37.309	Dec 2020	68.933	Nov 2021	69.474	Nov 2022	-		69.474	Continuing	Continuing	-
MGUE Inc 2 Technology Development (2)	C/CPAF	L3 Harris : Anaheim, CA	0.000	28.850	Dec 2020	44.707	Nov 2021	39.208	Nov 2022	-		39.208	Continuing	Continuing	-
MGUE Inc 2 Technology Development (3)	C/CPIF	Raytheon : El Segundo, CA	0.000	35.185	Dec 2020	63.673	Nov 2021	48.024	Nov 2022	-		48.024	Continuing	Continuing	-
MGUE Inc 2 Risk Reduction	Various	Various : Various	0.000	71.173	Jan 2021	7.737	Nov 2021	0.000		-		0.000	0.000	78.910	-
MGUE Inc 2 Information Assurance	Various	Various : Various	0.000	0.000		3.870	Nov 2021	3.960	Nov 2022	-		3.960	Continuing	Continuing	-
MGUE Inc 2 Handheld	Various	Various : Various	0.000	0.000		0.000		13.921	Nov 2022	-		13.921	Continuing	Continuing	-

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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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			
MGUE Inc 2 Technical Mission Analysis	Various	Aerospace/MITRE : El Segundo, CA	0.000	6.820	Jan 2021	12.379	Nov 2021	11.309	Nov 2022	-		11.309	Continuing	Continuing	-
MGUE Inc 2 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	0.000	5.069	Jan 2021	2.340	Jan 2022	5.753	Jan 2023	-		5.753	Continuing	Continuing	-
Subtotal			0.000	344.884		382.268		342.149		-		342.149	Continuing	Continuing	N/A

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			
MGUE Inc 1 Test and Evaluation	Various	Various : Various	0.000	0.944	Jan 2021	2.593	Jan 2022	0.000	Jan 2023	-		0.000	0.000	3.537	-
MGUE Inc 2 Test and Evaluation	Various	Various : Various	0.000	2.459	Jan 2021	6.290	Jan 2022	0.548	Jan 2023	-		0.548	Continuing	Continuing	-
Subtotal			0.000	3.403		8.883		0.548		-		0.548	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			
MGUE Inc 1 FFRDC	RO	Aerospace/MITRE : Various	0.000	7.876	Dec 2020	3.249	Dec 2021	2.059	Dec 2022	-		2.059	1.907	15.091	-
MGUE Inc 2 FFRDC	RO	Aerospace/MITRE : Various	0.000	4.882	Dec 2020	7.745	Dec 2021	8.449	Dec 2022	-		8.449	Continuing	Continuing	-
MGUE Inc 1 A&AS	Various	Various : Various	0.000	0.831	Dec 2020	6.466	Dec 2021	6.673	Dec 2022	-		6.673	10.400	24.370	-
MGUE Inc 2 A&AS	Various	Various : Various	0.000	5.598	Dec 2020	25.007	Dec 2021	22.192	Dec 2022	-		22.192	Continuing	Continuing	-
MGUE Inc 1 and Inc 2 Other Support	Various	Various : TBD	0.000	0.178	Dec 2020	0.576	Oct 2021	0.524	Oct 2022	-		0.524	0.450	1.728	-
Subtotal			0.000	19.365		43.043		39.897		-		39.897	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force							Date: April 2022				
Appropriation/Budget Activity 3620F / 4			R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)				Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP				
	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	0.000	367.652		434.194		382.594	-	382.594	Continuing	Continuing	N/A

Remarks
 Target value of MGUE inc 1 tech development lines includes AF funding.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

MGUE Increment 1	
MGUE Inc 1 M-Code & Legacy Receiver Security Certification	
MGUE Inc 1 Developmental & Modernization	
MGUE Inc 1 Development Test	
MGUE Inc 1 Card level PEO Certification	
MGUE Inc 1 Lead Platform Integration and Test	
Advanced Technology/Pre-Tech	
ADV/Pre-Tech IMAS TRD Design, Validation, Testing and Evaluation	
ADV/Pre-Tech IMAS Fabrication	
ADV/Pre-Tech MoPD Development and Security Certification Testing	
MGUE Increment 2	
MGUE Inc 2 Risk Reduction	
MGUE Inc 2 MSI Receiver Card w/Next Gen ASIC Rapid Prototyping	
MGUE Inc 2 M-Code & Legacy Receiver Security Certification	
MGUE Inc 2 Critical Design Review	
MGUE Inc 2 Modernized Handheld Receiver	
MGUE Inc 2 MSI Contingent ASIC Respin & Integration	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203164SF / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MGUE Increment 1				
MGUE Inc 1 M-Code & Legacy Receiver Security Certification	1	2021	3	2022
MGUE Inc 1 Developmental & Modernization	1	2021	3	2023
MGUE Inc 1 Development Test	1	2021	4	2023
MGUE Inc 1 Card level PEO Certification	1	2021	2	2024
MGUE Inc 1 Lead Platform Integration and Test	1	2021	2	2025
Advanced Technology/Pre-Tech				
ADV/Pre-Tech IMAS TRD Design, Validation, Testing and Evaluation	4	2022	1	2023
ADV/Pre-Tech IMAS Fabrication	1	2023	2	2023
ADV/Pre-Tech MoPD Development and Security Certification Testing	1	2023	4	2023
MGUE Increment 2				
MGUE Inc 2 Risk Reduction	1	2021	2	2022
MGUE Inc 2 MSI Receiver Card w/Next Gen ASIC Rapid Prototyping	1	2021	1	2026
MGUE Inc 2 M-Code & Legacy Receiver Security Certification	1	2022	4	2026
MGUE Inc 2 Critical Design Review	3	2022	4	2023
MGUE Inc 2 Modernized Handheld Receiver	2	2023	4	2026
MGUE Inc 2 MSI Contingent ASIC Respin & Integration	3	2024	3	2027

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203622SF / Space Warfighting Analysis
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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	-	0.000	0.000	44.791	0.000	44.791	76.217	103.870	99.986	100.001	Continuing	Continuing
646021: Space Warfighting Analysis Center (SWAC)	-	0.000	0.000	44.791	0.000	44.791	76.217	103.870	99.986	100.001	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 In FY 2023, funds were transferred from BA04 PE 1203905SF, (Space System Support, Project 646021 Space Warfighting Analysis Center Efforts) to this program-specific, BA04 PE 1203622SF, (Space Warfighting Analysis).

 Continuing this program in FY2023 under the program-specific PE is not a "New Start".

A. Mission Description and Budget Item Justification

As part of the continuing organizational development of the United States Space Force (USSF), a number of analytic functions and missions were aligned under a dedicated Service Force Design activity. To lead Force Design analysis for the Service, USSF established the Space Warfighting Analysis Center (SWAC), aligned under Space Operations Command, in mid-FY 2021, and programmed/budgeted FY 2022 funding to begin their analytic efforts, leveraging an existing USSF Program Element (PE) line tied to architecture/ capability analysis functions. Starting in FY 2023, the SWAC will continue its force design analysis efforts from a dedicated PE (PE 1203622SF Space Warfighting Analysis) and the 3620 Research, Development, Test, & Evaluation (RDT&E) appropriation.

This FY2023 request provides funding for the USSF's SWAC to conduct on-site and off-site analysis, modeling, wargaming, and experimentation to create operational concepts and force design guidance for existing and emerging USSF missions that are realistic, affordable, and resilient. Informed by strategic guidance, SWAC force design analysis identifies the integrated suite of operational capabilities that fulfills USSF imperatives to preserve the United States' freedom of action in space; enable Joint Force lethality and effectiveness; and provide the Department options for developing capabilities operating in, from, and to space. The SWAC will lead physics-based and data-driven analysis, teaming with relevant stakeholders from across the National Security Space enterprise from an independent, "clean slate" perspective, and will provide analytic insight to the Service to inform and/or validate operational requirements and provide a basis for future capability development programs. USSF force design analyses are organized in mission areas aligned to USSF priorities, and follow a disciplined approach to discover, analyze, and validate concepts and the associated family of systems required to satisfy current/future mission needs. The resulting force design products will help define and inform future USSF mission requirements, capabilities/architectures, funding needs and priorities, and interface standards for USSF developed systems, Allied capabilities, and leveraged commercial services. Additionally, USSF intends to rely on these analyses to inform corporate decision making processes for resourcing, policy development, and Joint operational planning. Evaluation of potential force design options includes testing through wargaming and simulation activities; such efforts also support development and maturation of rigorously tested USSF tactics, techniques and procedures (TTP).

SWAC's force design activities are organized in three specific focus areas; Multi-Domain Awareness (MDA), Spectrum Warfare (SW), and Force Design Integration (FDI). Multi-Domain Awareness includes terrestrial sensing from space. This focus area will develop concepts, perform analysis, and conduct validation activities

UNCLASSIFIED

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203622SF / <i>Space Warfighting Analysis</i>
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involving Missile Warning/Missile Tracking (MW/MT), Multi-Spectral Sensing (MSS) (including Tactical Intelligence, Surveillance, and Reconnaissance (T-ISR)), and Space Based Environmental Monitoring (SBEM) mission areas. The Spectrum Warfare focus area will develop concepts, perform analysis, and conduct validation activities in Space Data Transport (SDT) (includes traditional Satellite Communications), Navigational Warfare (includes Position, Navigation, and Timing (PNT), and space Command and Control (C2)). The Spectrum Warfare focus area will also conduct Space Logistics force design analysis efforts (including space launch and On-orbit Servicing). The Force Design Integration focus area involves the integrated assessment of all space capabilities operating collectively. Specifically, this area creates integrated modeling and simulation environments, assesses combined operational and strategic employment, wargames force design options, provides initial cost effectiveness trades, and evaluates integration of the space and ground capabilities in a joint fight. These rigorous analyses across all three SWAC focus areas will provide detailed and physics-based force design recommendations to USSF leadership which incorporate factors of capability performance, system resilience, and program cost.

The collective force design analytic results of SWAC activities are integrated across the Services and with mission partners, and are a foundational element of the USSF's strategy for building capabilities that are technologically feasible, affordable, and resilient.

Ultimately, the SWAC supports a position of strategic stability, United States advantage in space, and a space warfighting posture that deters aggression and ensures Joint and Coalition warfighters can employ forces in the time, place, manner, and domain of their choosing; ultimately fostering a continued posture enabling the United States to fight and win in space.

It is important to note that this PE is distinctly different and intentionally separate from the Space Security and Defense Program (SSDP) PE. The SWAC's mission is aligned with Service authorities and focuses on USSF-specific priorities, while SSDP, by charter, focuses its efforts on Space Control and related mission areas on behalf of the National Security Space (NSS) enterprise (including DoD and Intelligence Community stakeholders). The SWAC leverages SSDP modeling, simulation, research, and analytic findings for counter-space threats and space control force designs and will execute the non-space control force design activities under this PE.

This program element may include necessary emergent/unanticipated civilian pay expenses required to manage and execute the Force Design mission assigned to the SWAC and/or deliver products for evolving weapon system capabilities.

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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203622SF / Space Warfighting Analysis
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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	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	44.791	0.000	44.791
Total Adjustments	0.000	0.000	44.791	0.000	44.791
• 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	44.791	0.000	44.791

Change Summary Explanation

In FY 2022, PE 1203905SF, Space System Support, Project 646021 was used for Space Warfighting Analysis Center (SWAC) force design analysis activities. These activities will continue in FY 2023 from a program-specific PE (PE 1203622SF, Space Warfighting Analysis), utilizing the 3620 Research, Development, Test, & Evaluation appropriation.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Space Warfighting Analysis Center (SWAC)	-	0.000	44.791
Description: Space Warfighting Analysis Center (SWAC) concepts, analysis, modeling, wargaming, and experimentation providing Force Design guidance for United States Space Force (USSF).			
FY 2022 Plans: N/A			
FY 2023 Plans: FY2023 funding will expand the USSF's capability to discover, analyze, and validate mission requirements, operational concepts, and capability development options by creating force designs for prioritized USSF missions. The SWAC will conduct research studies, system design analysis, and wargaming integration prototyping demonstrations across a variety of domains and mission areas to inform USSF force designs for Research, Development, Testing, and Evaluation (RDT&E) purposes. The Multi-Domain Awareness focus area will define options to incorporate multiple phenomenology sensing to address the tactical need to maintain custody of moving targets in the Multi-Spectral Sensing mission area including options for Airborne Moving Target Indicator (AMTI). For the MW/MT mission area, analysis will evaluate options to further integrate tasking and ground processing across the mission to improve capability and resiliency for Missile Defense. The Spectrum Warfare focus area will analyze the Space Data Transport mission area's ability to deliver Narrowband and Tactical Data Links (TDL) capabilities in addition to NAVWAR/			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203622SF / <i>Space Warfighting Analysis</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>PNT resiliency options and preparation for C2 mission area analyses. Activities will discover, analyze, and validate technologies, systems, and architectures for the highest priority mission areas, and may expand or contract as dictated by resourcing and priorities. SWAC products will inform USSF resourcing, policy, and development decisions, as well as operational planning through SWAC's Force Design Integration and Wargaming activities.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to FY 2022 (PE 1203905SF, Space System Support, Project 646021, Space Warfighting Analysis Center Efforts) by \$7.791M due to the expansion of Force Design efforts to a broader spectrum of USSF mission areas. The development of expertise, concepts, modeling environments, and experimentation activities across all focus and mission areas will be built up over several years. The increase in FY22 to FY23 adds the initial M&S and assessment of the PNT and NAVWAR areas, adds capability to assess TDL in a multi-domain environment, and begins the evaluation of replacements to narrowband and wideband architectures. It will also initiate validation activities by developing a networked data simulation capability which can evaluate combinations of government and commercial constellations.</p>			
Accomplishments/Planned Programs Subtotals	-	0.000	44.791

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

N/A

Remarks

N/A

E. Acquisition Strategy

SWAC collaborates with stakeholders and mission partners to access appropriate and existing contract vehicles to focus resources on USSF mission priorities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022			
Appropriation/Budget Activity 3620F / 4					R-1 Program Element (Number/Name) PE 1203622SF / <i>Space Warfighting Analysis</i>					Project (Number/Name) 646021 / <i>Space Warfighting Analysis Center (SWAC)</i>					
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Space Warfighting Analysis Center (SWAC)	Various	Various - TBD : TBD : TBD	-	-		-		44.791	Dec 2022	-		44.791	Continuing	Continuing	-
Subtotal			-	-		-		44.791		-		44.791	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			-	-		-		44.791		-		44.791	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203622SF / <i>Space Warfighting Analysis</i>	Project (Number/Name) 646021 / <i>Space Warfighting Analysis Center (SWAC)</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Space Warfighting Analysis Center (SWAC)	
Multi-Domain Awareness (MDA) Force Design	
MDA-Missile Warning/Missile Tracking (MW/MT)	
MDA-Tactical Intelligence, Surveillance, and Reconnaissance (T-ISR)	
MDA-Multi-Spectral Sensing (MSS)	
MDA-Space-Based Environmental Monitoring (SBEM)	
Spectrum Warfare (SW) Force Designs	
SW-Space Data Transport (SDT)	
SW-Navigation Warfare (NAVWAR) & Position, Navigation & Timing (PNT)	
SW-Space Logistics	
Force Design Integration (FDI)	
FDI-Concepts & Wargaming	
FDI-Integrated Modeling & Simulation	
FDI-Planning, Programming & Costing (P2C)	
FDI- Annual Conferences; Capability Area Design(s), and Chief of Space Operations' Force Design Guidance	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203622SF / <i>Space Warfighting Analysis</i>	Project (Number/Name) 646021 / <i>Space Warfighting Analysis Center (SWAC)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Warfighting Analysis Center (SWAC)</i>				
Multi-Domain Awareness (MDA) Force Design	1	2023	4	2027
MDA-Missile Warning/Missile Tracking (MW/MT)	1	2023	4	2027
MDA-Tactical Intelligence, Surveillance, and Reconnaissance (T-ISR)	1	2023	4	2027
MDA-Multi-Spectral Sensing (MSS)	1	2023	4	2027
MDA-Space-Based Environmental Monitoring (SBEM)	1	2024	4	2027
Spectrum Warfare (SW) Force Designs	1	2023	4	2027
SW-Space Data Transport (SDT)	1	2023	4	2027
SW-Navigation Warfare (NAVWAR) & Position, Navigation & Timing (PNT)	1	2023	4	2027
SW-Space Logistics	1	2024	4	2027
Force Design Integration (FDI)	1	2023	4	2027
FDI-Concepts & Wargaming	1	2023	4	2027
FDI-Integrated Modeling & Simulation	1	2023	4	2027
FDI-Planning, Programming & Costing (P2C)	1	2023	4	2027
FDI- Annual Conferences; Capability Area Design(s), and Chief of Space Operations' Force Design Guidance	1	2023	4	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203710SF / <i>EO/IR Weather Systems</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	-	125.110	162.274	96.519	0.000	96.519	95.817	78.566	80.308	81.872	Continuing	Continuing
643730: <i>EO/IR Weather System Dev</i>	-	125.110	162.274	96.519	0.000	96.519	95.817	78.566	80.308	81.872	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In compliance with 2016 National Defense Authorization Act (NDAA) and Joint Requirements Oversight Council (JROC) Memo 062-17, dated 20 Jun 2017, EWS will provide global Low-Earth Orbit (LEO) coverage to meet Space-Based Environmental Monitoring (SBEM) EO/IR Gaps 1) Cloud Characterization (CC) and 2) Theatre Weather Imagery (TWI), and succeed the aging Defense Meteorological Satellite Program (DMSP) constellation. Without the CC and TWI data, Space Force production of global predictive weather data will be severely impacted, affecting daily air operations and intelligence gathering for strategic mission planning, especially around the contested environment.

Based on SBEM Capability Assessment and Strategy Review (CASR) in April 2019, the current EWS acquisition strategy focuses on a distributed LEO architecture, for scalability and increased operational resilience. The Space Force will pursue prototyping of latest industry capabilities for simplified sensor designs, while meeting CC and TWI requirements and data latencies in a distributed architecture.

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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver EWS for 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. In FY 2021 \$0.00 was expended for civilian pay expenses in this program element, and in FY 2022 \$0.00 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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203710SF I EO/IR Weather Systems
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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	131.000	162.274	0.000	0.000	0.000
Current President's Budget	125.110	162.274	96.519	0.000	96.519
Total Adjustments	-5.890	0.000	96.519	0.000	96.519
• 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	-1.395	0.000			
• SBIR/STTR Transfer	-4.495	0.000			
• Other Adjustments	0.000	0.000	96.519	0.000	96.519

Change Summary Explanation

FY 2021: $-\$5.890\text{M}$; $-\$1.395$ reduction for Below Threshold Reprogramming; $-\$4.495\text{M}$ reduction for SBIR.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Electro-Optical/Infrared Weather System (EWS)	125.110	162.274	96.519
Description: EWS will focus on an overlapping three-phased approach intended to mature multi-spectral imaging capabilities to collect and disseminate terrestrial atmospheric phenomena to support Department of Defense operations. This effort includes competitive prototyping of the sensor and bus design, development, integration, test, launch and on-orbit demonstrations. This effort will also assess industrial capabilities to provide CC and TWI data in a viable commercial business hosted on a proliferated LEO mesh network. To minimize risks associated with competitive sensor/satellite vehicle prototyping, and the need to replace the DMSP constellation in a timely manner, the Program Office is simultaneously requesting solution papers to inform a decision to pursue a competitively-awarded, more technically-mature EO/IR system design prototype from industry. Per the SECAF-approved SBEM Acquisition Strategy, EWS will continue supporting smaller sensor development and data utility assessment (Phase I), competitively prototype sensor and bus designs for a proliferated-LEO architecture while leveraging the existing SBEM Family of Systems (Phase II), and on-ramp to an operational system (Phase III) based on the success of Phase II in time for DMSP replacement. Leveraging the success of these efforts, the Program Office intends to field an affordable and highly capable operational system in Phase III.			
FY 2022 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203710SF / <i>EO/IR Weather Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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<p>For Phase II Modernized Pathfinder efforts: Under Space Enterprise Consortium Other Transaction (SpEC OT) 1a, complete competitive prototype sensor and bus build between Vendor A and the program office's choice of either Vendor B or Vendor C. Continue integration, test, and associated launch activities between the two prototype competitors, launching in FY 2022 and FY 2023 respectively. Knowledge gained from Phase II will inform the analysis for the Phase III Operational Follow-on decision, culminating in presentation of the Acquisition Strategy to Milestone Decision Authority for approval.</p> <p>For Phase III Operational Follow-on: Use the sensor test and on-orbit demo results from the Phase II prototype launches to conduct all relevant acquisition strategy development and associated activities leading to award for Phase III Operational Follow-on in FY 2022. Begin all efforts related to the operational follow-on, including but not limited to, ordering of flight and ground components for early integrated testing, long-lead parts planning and purchase, procurement of contractor and government provided test equipment, manufacturing prototypes, and manpower ramp-up. These efforts will support the NDAA mandated 2025 Initial Launch Capability (ILC) requirement.</p> <p>Additionally, FY 2022 funding will allow the program to 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, etc.</p> <p>FY 2023 Plans:</p> <p>For Phase II Modernized Pathfinder efforts: Under SpEC OT 1a, continue associated post-launch activities to include the on-orbit demonstration for Vendor A's prototype sensor.</p> <p>For Phase III Operational Follow-on: The program office is executing the Phase III Follow-on effort via two increments of capability.</p> <p>1) Increment 0 - The original down-selection between Vendor B and C expected to launch as an FY 2023 prototype demonstration; however, based on positive vendor progress the vendors were pivoted to develop a prototype with residual operations to launch no later than FY 2025. This pivot has been re-designated as "Phase III Operational Follow-on Launch (Inc 0)." In FY 2023, continue integration, test and build efforts including but not limited to, ordering of flight and ground components for early developmental testing, long-lead parts planning and purchase, procurement of contractor and government provided test equipment, manufacturing prototypes, and manpower ramp-up. Maintain schedule for launch by FY 2025.</p> <p>2) Increment 1 - Begin pre-acquisition work to include finalizing an Acquisition Strategy Panel (ASP), releasing the solicitation, evaluating proposals and performing contract negotiations.</p>			
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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203710SF / <i>EO/IR Weather Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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, experimentation, prototyping, etc.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 funding decreased due to progression of Phase II demonstration activities and ramp-up for development of operational follow-on phase.			
Accomplishments/Planned Programs Subtotals	125.110	162.274	96.519

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

Remarks

E. Acquisition Strategy
In accordance with the SECAF-approved SBEM Acquisition Strategy (Sep 2020), the Space Force will continue to address Joint SBEM gaps with a combination of DoD materiel and non-materiel solutions, partnerships, and commercial, civil, and allied data. EWS will continue to use Section 815, Other Transaction Authority (OTA), to competitively pursue a scalable, proliferated-LEO architecture based on technological advancements in smaller sensor design and leveraging commercial-based capabilities.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203710SF / EO/IR Weather Systems	Project (Number/Name) 643730 / EO/IR Weather System Dev
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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			
Phase I	C/Various	Various : TBD	-	5.900	Dec 2020	-		-		-		-	Continuing	Continuing	-
Phase II	C/Various	Various : TBD	-	110.100	Dec 2020	116.239	Dec 2021	2.862	Dec 2022	-		2.862	Continuing	Continuing	-
Phase III	TBD	TBD : TBD	-	-		30.500	Jul 2022	81.361	Dec 2022	-		81.361	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	1.204	Mar 2021	3.311	Jan 2022	2.326	Jan 2023	-		2.326	Continuing	Continuing	-
Enterprise Systems Engineering & Integration	C/CPIF	Engility Corp : Andover, WA	-	2.124	Nov 2020	2.590	Jan 2022	2.527	Jan 2023	-		2.527	Continuing	Continuing	-
Subtotal			-	119.328		152.640		89.076		-		89.076	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			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	1.806	Mar 2021	3.040	Jan 2022	3.489	Jan 2023	-		3.489	Continuing	Continuing	-
A&AS	Various	Various : Various	-	3.961	Nov 2020	6.513	Jan 2022	3.867	Jan 2023	-		3.867	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.015	Jun 2021	0.081	Oct 2021	0.087	Oct 2022	-		0.087	Continuing	Continuing	-
Subtotal			-	5.782		9.634		7.443		-		7.443	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			-	125.110	162.274	96.519	-	96.519	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203710SF / EO/IR Weather Systems	Project (Number/Name) 643730 / EO/IR Weather System Dev
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

EO/IR Weather Systems (EWS)	
Phase II Modernized Pathfinder (multiple vendors)	
Phase II Vendor A Launch	
Phase III Operational Follow-on	
Phase III Operational Follow-on Launch (Inc 0)	
Phase III Operational Follow-on Launch (Inc 1)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203710SF / <i>EO/IR Weather Systems</i>	Project (Number/Name) 643730 / <i>EO/IR Weather System Dev</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>EO/IR Weather Systems (EWS)</i>				
Phase II Modernized Pathfinder (multiple vendors)	1	2021	1	2024
Phase II Vendor A Launch	1	2023	1	2023
Phase III Operational Follow-on	2	2022	4	2027
Phase III Operational Follow-on Launch (Inc 0)	4	2024	4	2024
Phase III Operational Follow-on Launch (Inc 1)	3	2027	3	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203905SF / <i>Space System Support</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	-	0.000	37.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	37.000
646021: <i>Space Warfighting Analysis Center (SWAC)</i>	-	0.000	37.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	37.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
 In FY 2023, this program, BA 4 PE 1203905SF, Space System Support, Project 646021 Space Warfighting Analysis Center efforts were transferred to PE 1203622SF, Space Warfighting Analysis Center.

In FY 2022, Space Warfighting Analysis Center is a new start.

A. Mission Description and Budget Item Justification

The United States Space Force (USSF) initiated and activated the Space Warfighting Analysis Center (SWAC) in mid-FY 2021, and programmed FY 2022 funding to enable the organization to begin conducting its specialized mission. In the absence of a newly-created, SWAC-specific Program Element (PE) at the time of the budget request (FY 2022 President's Budget), the SWAC conducted FY 2022 efforts from Program Element 1203905SF (Space System Support) in the 3620 Research, Development, Test, and Evaluation (RDT&E) appropriation. In FY 2023, SWAC will begin using the newly established PE 1203622SF for all activities, thus, no further funding in FY 2023 will be directed to PE 1203905SF.

It is important to note that PE 1206730SF, Space Security Defense Program (SSDP) mission is distinctly different and intentionally separate from the USSF's SWAC; SSDP focuses its reach across the National Security Space spectrum and Space Control mission area while the SWAC's mission is aligned with Service authorities and focuses on USSF-specific priorities.

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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203905SF / Space System Support
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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	0.000	37.000	0.000	0.000	0.000
Current President's Budget	0.000	37.000	0.000	0.000	0.000
Total Adjustments	0.000	0.000	0.000	0.000	0.000
• 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	0.000	0.000	0.000

Change Summary Explanation

In FY 2022, PE 1203905SF, Space System Support, Project 646021 was used for Space Warfighting Analysis Center (SWAC) activities. SWAC activities will continue efforts in FY 2023 from PE 1203622SF, Space Warfighting Analysis Center, 3620 Research, Development, Test, & Evaluation appropriation.

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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Space Warfighting Analysis Center (SWAC)	0.000	37.000	0.000
Description: Space Warfighting Analysis Center (SWAC) will be resourced to inform operational concepts and Force Design guidance for United States Space Force (USSF) missions by conducting analysis, modeling, wargaming, and experimentation for Research, Development, Testing, and Evaluation (RDT&E) purposes.			
FY 2022 Plans: FY 2022 funding enables the Space Warfighting Analysis Center (SWAC) to organize and initiate the capability to conduct analysis, modeling, wargaming and experimentation to create operational concepts and develop Force Designs for the full spectrum of United States Space Force (USSF) missions. The SWAC's initial operational capability in FY 2022 specifically focuses on its Multi-Domain Awareness and Spectrum Warfare Centers of Excellence (COE) to plan and execute activities that inform the USSF's most pressing Force Design guidance. The Multi-Domain Awareness and Spectrum Warfare COEs conduct research studies, system design analysis and wargaming experimentation prototyping demonstrations across a variety of domains and mission areas to inform USSF Force designs for Research, Development, Testing, and Evaluation (RDT&E) purposes. SWAC activities discover, analyze, and validate technologies, systems, and architectures for the highest priority mission areas;			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203905SF / <i>Space System Support</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>their products inform USSF resourcing, policy, and development decisions, as well as operational planning. Embedded in this work, SWAC establishes foundational modeling standards, guidelines, and identifies best practices to enable critical analysis, simulation, and wargaming. Under the Multi-Domain Awareness focus area, SWAC will refine the Missile Warning and Missile Tracking (MW/MT) force design and government reference design to inform the performance and resilience of the path forward for this critical mission area. FY 2022 funding provides an initial look at parametrically evaluated options to provide a missile defense fire control capability. Funding also supports an evaluation of Tactical ISR assessments of space based target tracking options enabling a recommendation for Ground Moving Target Indicator (GMTI). In the Spectrum Warfare mission area, SWAC will develop force designs for Space Data Transport (SDT), assessing priorities of the joint force against options to provide transport capacity.</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: N/A</p>			
Accomplishments/Planned Programs Subtotals	0.000	37.000	0.000

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

Remarks

E. Acquisition Strategy
N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203905SF / <i>Space System Support</i>	Project (Number/Name) 646021 / <i>Space Warfighting Analysis Center (SWAC)</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027							
	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				
Space Warfighting Analysis Center (SWAC)																																
Multi-Domain Awareness (MDA) Force Design																																
MDA Missile Warning/Missile Tracking (MW.MT)																																
MDA-Tactical Intelligence, Surveillance, and Reconnaissance (T-ISR)																																
Spectrum Warfare (SW) Force Designs																																
SW-Space Data Transport (SDT)																																
SW-Navigation Warfare (NAVWAR) &Position, Navigation & Timing (PNT)																																
Force Design Integration (FDI)																																
FDI-Planning, Programming & Costing (P2C)																																
FDI- Annual Conferences; Capability Area Design(s), and Chief of Space Operations' Force Design Guidance																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1203905SF / <i>Space System Support</i>	Project (Number/Name) 646021 / <i>Space Warfighting Analysis Center (SWAC)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Space Warfighting Analysis Center (SWAC)				
Multi-Domain Awareness (MDA) Force Design	3	2022	4	2022
MDA Missile Warning/Missile Tracking (MW.MT)	3	2022	4	2022
MDA-Tactical Intelligence, Surveillance, and Reconnaissance (T-ISR)	3	2022	4	2022
Spectrum Warfare (SW) Force Designs	3	2022	4	2022
SW-Space Data Transport (SDT)	3	2022	4	2022
SW-Navigation Warfare (NAVWAR) & Position, Navigation & Timing (PNT)	3	2022	4	2022
Force Design Integration (FDI)	3	2022	4	2022
FDI-Planning, Programming & Costing (P2C)	3	2022	4	2022
FDI- Annual Conferences; Capability Area Design(s), and Chief of Space Operations' Force Design Guidance	3	2022	4	2022

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and 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	-	0.000	0.000	986.822	0.000	986.822	1,680.407	1,506.619	1,528.316	1,554.869	Continuing	Continuing
643729: <i>Integration and Battle Management</i>	-	0.000	0.000	89.072	0.000	89.072	126.094	152.605	43.879	36.978	Continuing	Continuing
643731: <i>Transport</i>	-	0.000	0.000	816.442	0.000	816.442	1,448.089	1,317.715	1,484.437	1,517.891	Continuing	Continuing
643732: <i>Sensing</i>	-	0.000	0.000	81.308	0.000	81.308	106.224	36.299	0.000	0.000	Continuing	Continuing

Note

In FY 2023, PE 1206410SDA, Space Technology Development and Prototyping efforts were transferred from Appropriation 0400, Research, Development, Test & Evaluation (RDT&E), Defense-Wide, Budget Activity (BA) 4 to Appropriation 3620, RDT&E, Space Force, PE 1206410SF, due to the transfer of the Space Development Agency to the U.S. Space Force (USSF) in accordance with the William M. (Mac) Thornberry National Defense Authorization Act (NDAA) for FY 2021. This is an administrative realignment.

This program element includes funds for the Tranche 1 Transport Layer program, which is a Middle Tier of Acquisition effort. The total cost of the program is \$3,199.000 million, including RDT&E and procurement of prototype units. The Tranche 1 Transport Layer program is fully funded across the Future Years Defense Program.

A. Mission Description and Budget Item Justification

SDA is responsible for developing and demonstrating the next generation national defense space architecture to enable U.S. military operations to be responsive to emerging multi-domain threats against our national security. To achieve that goal, SDA will help inform the Department of Defense (DoD)'s decision to develop and implement a proliferated architecture enabled by lower-cost, mass-produced space vehicles and routine space access; and shift the DoD to a development organization focused on experimentation, prototyping, and accelerated fielding. SDA will manage, direct, and execute the development of the space capabilities for the joint warfighter in accordance with DoD's Space Vision and field space capabilities at speed and scale, with the following goals:

- Bold breakthroughs designed to out-pace our competitors,
- Mission-focused technology maturation and systems engineering,
- Value-based lean engineering, manufacturing, and support,
- Industrial base expansion; streamlined development and acquisition processes, and
- Increased acquisition cooperation with the National Reconnaissance Office (NRO).

SDA will rapidly deploy critical elements of next-generation space capabilities, initially focusing on these essential capabilities:

- Indications, warnings, targeting, and tracking for defense against advanced missile threats,
- Alternate position, navigation, and timing (PNT) for a navigation warfare (NAVWAR) resilient environment,

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>
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- Responsive, resilient, common ground-based space support infrastructure (e.g., ground stations and launch capability),
- Cross-domain, networked, node-independent battle management command, control, and communications (BMC3), and
- Highly-scaled, low-latency, persistent, artificial intelligence-enabled global surveillance for advanced missile targeting.

The establishment of a proliferated data transport layer in Low Earth Orbit (LEO) is essential to developing a new, responsive space architecture, and will be SDA's primary initial focus within the National Defense Space Architecture (NDSA). SDA will develop an initial set of sub-constellations in conjunction with this Transport Layer to provide additional capabilities, such as advanced missile warning.

This program element funds efforts to develop and demonstrate a prototype proliferated Low Earth Orbit (pLEO) communications and data transport layer and its sub-constellations in support of the DoD Space Vision.

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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	986.822	0.000	986.822
Total Adjustments	0.000	0.000	986.822	0.000	986.822
• 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	986.822	0.000	986.822

Change Summary Explanation

The worked performed in this program element is a continuation of efforts that in FY 2022 are funded in Appropriation 0400, RDT&E, Defense-Wide, BA 4, PE 1206410SDA.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 4					R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>				Project (Number/Name) 643729 / <i>Integration and Battle Management</i>			
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
643729: <i>Integration and Battle Management</i>	-	0.000	0.000	89.072	0.000	89.072	126.094	152.605	43.879	36.978	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2023, PE 1206410SDA, Space Technology Development and Prototyping efforts were transferred from Appropriation 0400, Research, Development, Test & Evaluation (RDT&E), Defense-Wide, Budget Activity (BA) 4 to Appropriation 3620, RDT&E, Space Force, PE 1206410SF, due to the transfer of the Space Development Agency to the U.S. Space Force (USSF) in accordance with the William M. (Mac) Thornberry National Defense Authorization Act (NDAA) for FY 2021. This is an administrative realignment.

A. Mission Description and Budget Item Justification

SDA is developing and demonstrating next generation space capabilities for the joint warfighter enabled by proliferation of satellites in Low Earth Orbit (LEO) and a new acquisition model utilizing rapid spiral development. SDA is developing capabilities to address a wide range of Department of Defense (DoD) space needs as stated in the National Defense Strategy and DoD Space Vision, including space-based battle management and a ground support infrastructure. SDA will orchestrate the rapid development and fielding of the National Defense Space Architecture (NDSA), a resilient military sensing and data transport capability via a proliferated space architecture in LEO. This program element funds the development and demonstration of space technologies to deliver space-based command and control, tasking, mission processing and dissemination capabilities, as well as an integrated, resilient network of ground support capabilities, to U.S. joint warfighting forces in bi-annual tranches, beginning in FY 2022.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Integration and Battle Management	-	0.000	89.072	0.000	89.072
Description: Deliver capabilities to U.S. joint warfighting forces in two-year enhanced capability tranches, beginning in FY 2022. Products include but are not limited to performing trade studies, technical analyses, or modeling and simulation; identifying and maturing enabling technologies; defining and conducting ground-based and on-orbit risk reduction demonstrations, prototyping hardware or software systems; and exploring novel concepts for future warfighting capabilities augmented by a resilient proliferated Low Earth Orbit (pLEO) satellite architecture.					
FY 2022 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force			Date: April 2022		
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643729 / <i>Integration and Battle Management</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
For 2022 and prior, this work is performed under the Integration and Battle Management effort in Appropriation 0400, BA 4, PE 1206410SDA, Space Technology Development and Prototyping, Project 003, Integration and Battle Management.					
FY 2023 Base Plans:					
Tranche 0:					
<ul style="list-style-type: none"> - Complete launch vehicle integration and services. - Complete design, integration, and installation of ground operations center. - Conduct on-orbit command and control operations from ground operations center. - Begin conducting Capstone demonstration. 					
Tranche 1:					
<ul style="list-style-type: none"> - Define CONOPS for Tranche 1 for Ground based mission segment and define the government-owned contractor-operated (GOCO) architecture. - Finalize Operations Center modifications. - Develop Ground Segment Ground Entry Strategy, Operations Center Vision, and Basing Actions and prepare for readiness tests. - Leverage Tranche 0 radio frequency (RF) antenna options and identify potential to increase antenna capability. - Fund mission unique hardware and integration of the Tranche 1 space vehicles on the National Security Space Launch (NSSL) Launch vehicles. - Begin developing the Application Factory that will serve as the foundation of the Battle Management Command, Control, and Communications (BMC3) Layer. - Begin coordinating software-in-the-loop (SIL) and hardware-in-the-loop (HIL) activities to ensure compatibility and interoperability of Factory with Operations and Integration (O&I). 					
FY 2023 OCO Plans:					
N/A					
FY 2022 to FY 2023 Increase/Decrease Statement:					
In FY 2022, this effort was funded in RDT&E BA 4, PE 1206410SDA. The increase between the FY 2022 amount in PE 1206410SDA, Project 003 and the FY 2023 amount in PE 1206410SF, Project 643729 supports					
FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643729 / <i>Integration and Battle Management</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
the concurrent execution of Tranche 0 efforts to support capstone demonstrations and an increase in Tranche 1 activities.					
Accomplishments/Planned Programs Subtotals	-	0.000	89.072	0.000	89.072

C. Other Program Funding Summary (\$ in Millions)										
Line Item	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
• RDTE 04 1206410SDA: <i>Space Technology Development and Prototyping/Project 003 Integration and Battle Management</i>	-	106.586	-	-	-	-	-	-	-	Continuing Continuing

Remarks
The work performed in this PE continues efforts that were previously funded in RDT&E BA 4, PE 1206410SDA, in FY 2022.

D. Acquisition Strategy
Partners for these activities may include Missile Defense Agency (MDA), Space Systems Command (SSC), DoD Combatant Commands, DoD research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022					
Appropriation/Budget Activity 3620F / 4						R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>				Project (Number/Name) 643729 / <i>Integration and Battle Management</i>							
Product Development (\$ in Millions)																	
				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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		
Operations & Integration Tranche 1 and Other Related Efforts		TBD	TBD : TBD	-	0.000			0.000		89.072	Nov 2022	0.000		89.072	Continuing	Continuing	-
Subtotal			-	0.000			0.000		89.072			0.000		89.072	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			-	0.000		0.000		89.072		0.000		89.072	Continuing	Continuing	N/A		
Remarks																	

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643729 / <i>Integration and Battle Management</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

<i>Integration and Battle Management</i>																												
Complete the development of an initial battle management architecture.																												
Complete the development of Tranche 0 ground support infrastructure.																												
Manage Tranche 0 constellation operations.																												
Tranche 1 integration activities.																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643729 / <i>Integration and Battle Management</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Integration and Battle Management</i>				
Complete the development of an initial battle management architecture.	1	2022	1	2024
Complete the development of Tranche 0 ground support infrastructure.	1	2022	4	2023
Manage Tranche 0 constellation operations.	1	2022	4	2023
Tranche 1 integration activities.	1	2022	4	2024

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643731 / <i>Transport</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
643731: <i>Transport</i>	-	0.000	0.000	816.442	0.000	816.442	1,448.089	1,317.715	1,484.437	1,517.891	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2023, PE 1206410SDA, Space Technology Development and Prototyping efforts were transferred from Appropriation 0400, Research, Development, Test & Evaluation (RDT&E), Defense-Wide, Budget Activity (BA) 4 to Appropriation 3620, RDT&E, Space Force, PE 1206410SF, due to the transfer of the Space Development Agency to the U.S. Space Force (USSF) in accordance with the William M. (Mac) Thornberry National Defense Authorization Act (NDAA) for FY 2021. This is an administrative realignment.

A. Mission Description and Budget Item Justification

SDA is developing and demonstrating next generation space capabilities for the joint warfighter enabled by proliferation of satellites in Low Earth Orbit (LEO) and a new acquisition model utilizing rapid spiral development. SDA is developing capabilities to address a wide range of Department of Defense (DoD) space needs as stated in the National Defense Strategy and DoD Space Vision, including low-latency tactical communication enabling beyond line of sight targeting and advanced missile tracking. SDA is orchestrating the rapid development and fielding of the National Defense Space Architecture (NDSA), a resilient military sensing and data transport capability via a proliferated space architecture in LEO. This program element funds the development and demonstration of space technologies to deliver low-latency data transport and alternate position, navigation, and timing capabilities to U.S. joint warfighting forces in bi-annual tranches, beginning in FY 2022.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Transport	0.000	0.000	796.242	0.000	796.242
Description: Rapidly develop, deploy and demonstrate prototypes that enable a resilient and unified military data transport layer, sensor capabilities, and alternate position, navigation, and timing (APNT) capabilities enabled by a proliferated Low Earth Orbit (pLEO) architecture. This effort will define, demonstrate, and deliver the architectures and standards necessary to rapidly prototype and field new satellite capabilities in LEO.					
FY 2022 Plans: For 2022 and prior, this work is performed under the Transport effort in Appropriation 0400, BA 04, PE 1206410SDA, Space Technology Development and Prototyping, Project 001, Transport.					
FY 2023 Base Plans: Tranche 0: - Complete second launch of remaining Transport and Tracking satellites.					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643731 / <i>Transport</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>- Complete on-orbit flight operations and verify satellite-to-satellite and satellite-to-ground communications on Tranche 0 satellites.</p> <p>- Conduct Tranche 0 Capstone operational demonstration.</p> <p>- Leverage Tranche 0 satellites as a testbed for investigating additional capabilities after Capstone demonstration.</p> <p>- Integrate additional interoperable massless payload capabilities within Tranche 0 satellites.</p> <p>- Conduct Tranche 0 capstone operational demonstration.</p> <p>Tranche 1:</p> <p>- Finalize design through Critical Design Review (CDR) for the Transport Layer Tranche 1 space vehicles.</p> <p>- Investigate interoperable payloads for optical inter-satellite links for communications, radio-frequency (RF) communications, and Link-16.</p> <p>- Begin assembly, integration, and testing (AI&T) of satellite buses.</p> <p>- Continue ground systems site development, integration, and installation in advance of operations and integration efforts at Tranche 1 Mission Operations Centers being planned for Grand Forks AFB, ND and Redstone Arsenal, AL.</p> <p>- Complete design through Critical Design Review (CDR) for the Operations and Integration Layer Tranche 1 ground operations centers.</p> <p>- Begin development of battle management command, control, and communications (BMC3) Layer Application Factory software to enable common data processing and fusion across all Transport Layer satellites.</p> <p>Tranche 2:</p> <p>- Leverage lessons learned and accomplishments from Tranches 0 and 1 to inform space vehicle, ground, and interoperability design requirements for Tranche 2 and start development of the next set of capabilities.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: In FY 2022, this effort was funded in RDT&E BA 4, PE 1206410SDA. The increase between the FY 2022 amount in PE 1206410SDA, Project 001 and the FY 2023 amount in PE 1206410SF, Project 643731 reflects</p>					

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643731 / <i>Transport</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
the concurrent execution of Tranche 0 to include capstone demonstrations, the significant increase in Tranche 1 activities, and Tranche 2 activities.					
<p>Title: Classified Program</p> <p>Description: Due to the classified nature of this project, specific details are available at a higher classification level.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Base Plans: Due to the classified nature of this project, specific details are available at a higher classification level.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: This is a new effort in FY 2023.</p>	0.000	0.000	20.200	0.000	20.200
Accomplishments/Planned Programs Subtotals	0.000	0.000	816.442	0.000	816.442

C. Other Program Funding Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 04 1206410SDA: <i>Space Technology Development and Prototyping/ Project 001 Transport</i>	-	260.481	-	-	-	-	-	-	-	-	Continuing Continuing

Remarks
The worked performed in this PE continues efforts that were previously funded in RDT&E BA 4, PE 1206410SDA, in FY 2022.

D. Acquisition Strategy
Partners for these activities may include Missile Defense Agency (MDA), Space Systems Command (SSC), DoD Combatant Commands, DoD research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643731 / <i>Transport</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Transport Tranche 0	TBD	TBD : TBD	-	0.000		0.000		56.449	Jan 2023	0.000		56.449	Continuing	Continuing	-
Transport Tranche 1 (Lockheed)	C/FFP	Lockheed Martin : Littleton, CO	-	0.000		0.000		242.673	Oct 2022	0.000		242.673	Continuing	Continuing	-
Transport Tranche 1 (York)	C/FFP	York Space Systems : Denver, CO	-	0.000		0.000		137.828	Oct 2022	0.000		137.828	Continuing	Continuing	-
Tranche 1 Demonstration and Experimentation System and Other Related Efforts	TBD	TBD : TBD	-	0.000		0.000		255.546	Dec 2022	0.000		255.546	Continuing	Continuing	-
Transport Tranche 2	TBD	TBD : TBD	-	0.000		0.000		103.746	Jun 2023	0.000		103.746	Continuing	Continuing	-
Classified Project	TBD	TBD : TBD	-	0.000		0.000		20.200	Dec 2022	0.000		20.200	Continuing	Continuing	-
Subtotal			-	0.000		0.000		816.442		0.000		816.442	Continuing	Continuing	N/A
Project Cost Totals			-	0.000		0.000		816.442		0.000		816.442	Continuing	Continuing	N/A

Remarks	
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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643731 / <i>Transport</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Transport	
Launch and operations of Tranche 0 Transport satellites.	████████████████████
Conduct activities for Tranche 1 development and delivery.	██
Begin activities for Tranche 2 capabilities.	████████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643731 / <i>Transport</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Transport</i>				
Launch and operations of Tranche 0 Transport satellites.	4	2022	1	2024
Conduct activities for Tranche 1 development and delivery.	1	2022	4	2024
Begin activities for Tranche 2 capabilities.	1	2023	4	2024

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643732 / <i>Sensing</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
643732: <i>Sensing</i>	-	0.000	0.000	81.308	0.000	81.308	106.224	36.299	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2023, PE 1206410SDA, Space Technology Development and Prototyping efforts were transferred from Appropriation 0400, Research, Development, Test & Evaluation (RDT&E), Defense-Wide, Budget Activity (BA) 4 to Appropriation 3620, RDT&E, Space Force, PE 1206410SF, due to the transfer of the Space Development Agency to the U.S. Space Force (USSF) in accordance with the William M. (Mac) Thornberry National Defense Authorization Act (NDAA) for FY 2021. This is an administrative realignment.

A. Mission Description and Budget Item Justification

SDA is developing and demonstrating next generation space capabilities for the joint warfighter enabled by proliferation of satellites in Low Earth Orbit (LEO) and a new acquisition model utilizing rapid spiral development. SDA is developing capabilities to address a wide range of Department of Defense (DoD) space needs as stated in the National Defense Strategy and DoD Space Vision, including advanced missile tracking and global surveillance enabling beyond-line-of-sight targeting. SDA will orchestrate the rapid development and fielding of the National Defense Space Architecture (NDSA), a resilient military sensing and data transport capability via a proliferated space architecture in LEO. This program element funds the development and demonstration of space technologies to deliver advanced missile tracking, global surveillance and surface moving target custody, and enhanced space domain awareness and deterrence capabilities to U.S. joint warfighting forces in bi-annual tranches, beginning in FY 2022.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>Title: Sensing</p> <p>Description: Develop and demonstrate payload prototypes compatible with a proliferated Low Earth Orbit (pLEO) architecture. This effort will focus on developing and demonstrating sensors for beyond-line-of-sight targeting, space-to-space data links, space-to-tactical data links, and advanced missile warning capabilities to enable enhanced space domain awareness. On-orbit demonstrations will be tied to existing mission-specific ground infrastructure, when it exists. Ground infrastructure will be linked or developed to support payload integration and data processing.</p> <p>FY 2022 Plans: For FY 2022 and prior, this work is performed under the Sensing effort in Appropriation 0400, BA 4, PE 1206410SDA, Space Technology Development and Prototyping, Project 002, Sensing.</p> <p>FY 2023 Base Plans:</p>	0.000	0.000	23.456	0.000	23.456

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force				Date: April 2022	
Appropriation/Budget Activity 3620F / 4		R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>		Project (Number/Name) 643732 / <i>Sensing</i>	
B. Accomplishments/Planned Programs (\$ in Millions)					
<p>Tranche 0:</p> <ul style="list-style-type: none"> - Conduct second launch of Tracking Tranche 0 satellites. - Leverage operating Tranche 0 satellites to investigate potential developmental capabilities. - Characterize high-resolution background clutter in wide range of spectral bands. - Collect data to inform medium field of view (MFOV) and wide field of view (WFOV) trades. - Demonstrate WFOV performance and cost that enables proliferation. - Launch additional WFOV satellite systems to demonstrate potential for operational use. - Conduct Tranche 0 capstone operational demonstration to validate key NDSA mission capabilities including 2D tracks generated on-board, passed to Ground and to Tranche 0 space vehicles for 3D fusion, and 3D tracks disseminated to user interface. <p>Tranche 1:</p> <ul style="list-style-type: none"> - Funds the integration of commercial and mission partners' satellite constellations into the NDSA to enable mission partner data to move directly into the hands of the warfighter via the SDA connected tactical data links. This investment creates synergy between mission partners' (commercial and government) investments in ISR satellite, and the SDA Transport Layer. <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: In FY 2022, this effort was funded in RDT&E BA 4, PE 1206410SDA. The decrease between the FY 2022 amount in PE 1206410SDA, Project 002 and the FY 2023 amount in PE 1206410SF, Project 643732 reflects the shift from Tranche 0 to Tranche 1 activities. Funds for the Tranche 1 Tracking Layer continue in PE 1206446SF.</p>					
Title: Space Based Range					
Description: Space Based Range is a joint partnership executed/managed by Space Development Agency (SDA) and supported by OSD Test Resource Management Center (TMRC), and Army Futures Command. This project will provide a four space vehicle demonstration for continuous real-time monitoring of telemetry data transmitted by Test Vehicles (missiles or interceptors) during flight testing. Payloads onboard the Low Earth Orbit (LEO) satellites will collect the upward radiating emission from test vehicles (TV) during flight. Data on a collecting host satellite will be transmitted rapidly to other satellites by Optical Inter-Satellite Links. A ground station will forward the data to a Space Based Range Operations Center where the data will be decrypted, assembled from the independent receiver streams into a coherent data stream, re-encrypted, and distributed					
	0.000	0.000	21.252	0.000	21.252

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643732 / <i>Sensing</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
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to the end user. Space Based Range will demonstrate the ability to augment or replace DoD's decades-long approach of staging ships and airplanes along ground tracks of TV of the System Under Test (SUT) for the purpose of telemetry collection, tracking, and flight safety. This Space Based Range demonstration project will leverage previously funded OSD Test Resources Management Center (TRMC) investments for payload design. This project will also consider other missions of opportunity to enhance Joint Warfighter capabilities in LEO.

FY 2022 Plans:
N/A

FY 2023 Base Plans:
Conduct mission analysis and integration, initiate procurement of space vehicle busses, initiate procurement payloads, payload software development, design integration and interfaces of busses and payload and define space to ground interfaces.

FY 2023 OCO Plans:
N/A

FY 2022 to FY 2023 Increase/Decrease Statement:
This is a new effort in FY 2023.

Title: Classified Program	0.000	0.000	36.600	0.000	36.600
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Description: Due to the classified nature of this project, specific details are available at a higher classification level.

FY 2022 Plans:
N/A

FY 2023 Base Plans:
Due to the classified nature of this project, specific details are available at a higher classification level.

FY 2023 OCO Plans:
N/A

FY 2022 to FY 2023 Increase/Decrease Statement:
This is a new effort in FY 2023.

Accomplishments/Planned Programs Subtotals	0.000	0.000	81.308	0.000	81.308
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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643732 / <i>Sensing</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 1206410SDA: <i>Space Technology Development and Prototyping / Project 002 Sensing</i>	0.000	837.112	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

Partners for these activities may include Missile Defense Agency (MDA), Space Systems Command (SSC), DoD Combatant Commands, DoD research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force

Date: April 2022

Appropriation/Budget Activity

3620F / 4

R-1 Program Element (Number/Name)

PE 1206410SF / *Space Technology Development and Prototyping*

Project (Number/Name)

643732 / *Sensing*

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Sensing</i>																												
Complete the development of Tracking Tranche 0 space vehicles and integrate with Transport Layer.																												
Launch and operations of Tranche 0 Tracking satellites.																												
Conduct capstone demonstration to validate mission capabilities.																												
Integrate commercial and mission partners satellite payloads and constellations.																												
<i>Space Based Range</i>																												
Mission systems engineering and integration																												
Payload development																												
Procure and deliver space vehicle busses																												
Bus and payload integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206410SF / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 643732 / <i>Sensing</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Sensing				
Complete the development of Tracking Tranche 0 space vehicles and integrate with Transport Layer.	1	2022	2	2023
Launch and operations of Tranche 0 Tracking satellites.	4	2022	1	2024
Conduct capstone demonstration to validate mission capabilities.	3	2023	4	2024
Integrate commercial and mission partners satellite payloads and constellations.	1	2023	4	2024
Space Based Range				
Mission systems engineering and integration	1	2023	4	2024
Payload development	1	2023	4	2023
Procure and deliver space vehicle busses	1	2023	4	2023
Bus and payload integration	4	2023	2	2024

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206422SF / Weather System Follow-on
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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	0.000	77.379	53.421	0.000	0.000	0.000	10.562	7.043	0.000	0.000	0.000	148.405
644289: Weather Satellite Follow-On	0.000	77.379	53.421	0.000	0.000	0.000	10.562	7.043	0.000	0.000	0.000	148.405

A. Mission Description and Budget Item Justification

In FY 2023, PE 1206422SF, Weather System Follow-On, Project 644289, Weather Satellite Follow-On, R-1 Line #8 efforts were transferred to PE 1206422SF, Weather System Follow-On, Project 65A039, Weather System Follow-on - Microwave (WSF-M), R-1 Line #20 to reflect the successful completion of Milestone B on 15 May 2020. Residual budget in FY24-25 funds will be transferred from BA04 to BA05 in future budget cycle.

Weather System Follow-on (WSF) is a Low-Earth Orbit (LEO) microwave imaging system developed and delivered by the United States Space Force's Space Systems Command (SSC). WSF is the next generation of space-based passive microwave sensing technology. It will provide U.S. and Allied warfighters with essential weather data, including the measurement of ocean surface wind speed and direction, ice thickness, snow depth, soil moisture, and local spacecraft energetic charged particle environment. The ocean surface wind speed measurement enables tropical cyclone intensity determination by the Joint Typhoon Warning Center. The data gathered by WSF will be provided to meteorologists in support of the generation of a wide variety of weather products necessary to conduct mission planning and operations globally.

WSF is an Acquisition Category IB program comprised of two Space Vehicles (SV) and their associated command, control, and data dissemination network. Global environmental monitoring data is gathered, stored, and down-linked through the Satellite Control Network (SCN) and disseminated to Air Force and Navy weather centers. Additionally, data is broadcast real time by the satellite for utilization by heritage Direct Readout Terminals that use the data for local weather forecasting.

WSF is a Major Defense Acquisition Program (MDAP) with the Space Force as the lead component. Founded on the Space-Based Environmental Monitoring (SBEM) Analysis of Alternatives (AoA) results, the WSF will be to enable:

- 1) Timely weather collection over broad oceans in support of maneuvering forces;
- 2) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

Compact Ocean Wind Vector Radiometer (COWVR) is an on-orbit demonstration project of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI).

Energetic Charged Particles (ECP) supports the SBEM Weather Gap #11, Low Earth Orbit Energetic Charged Particle Characterization. To support this requirement, the ECP sensor will be integrated on the WSF-M satellites.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>
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Space acquisition must respond with speed and agility to emerging adversary threats. 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 repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF 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 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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	83.384	61.521	0.000	0.000	0.000
Current President's Budget	77.379	53.421	0.000	0.000	0.000
Total Adjustments	-6.005	-8.100	0.000	0.000	0.000
• Congressional General Reductions	-2.662	0.000			
• Congressional Directed Reductions	0.000	-8.100			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.343	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2021: -3.343M transferred for higher SF priorities.
 FY 2022: -8.1M product development excess to need.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 4					R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>				Project (Number/Name) 644289 / <i>Weather Satellite Follow-On</i>			
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
644289: <i>Weather Satellite Follow-On</i>	0.000	77.379	53.421	0.000	0.000	0.000	10.562	7.043	0.000	0.000	0.000	148.405
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2023, PE 1206422SF, Weather System Follow-On, Project 644289, Weather Satellite Follow-On, R-1 Line #8 efforts were transferred to PE 1206422SF, Weather System Follow-On, Project 65A039, Weather System Follow-on - Microwave (WSF-M), R-1 Line #20 to reflect the successful completion of Milestone B on 15 May 2020. Residual budget in FY24-25 funds will be transferred from BA04 to BA05 in future budget cycle.

Weather System Follow-on (WSF) is a Low-Earth Orbit (LEO) microwave imaging system developed and delivered by the United States Space Force's Space Systems Command (SSC). WSF is the next generation of space-based passive microwave sensing technology. It will provide U.S. and Allied warfighters with essential weather data, including the measurement of ocean surface wind speed and direction, ice thickness, snow depth, soil moisture, and local spacecraft energetic charged particle environment. The ocean surface wind speed measurement enables tropical cyclone intensity determination by the Joint Typhoon Warning Center. The data gathered by WSF will be provided to meteorologists in support of the generation of a wide variety of weather products necessary to conduct mission planning and operations globally.

WSF is an Acquisition Category IB program comprised of two Space Vehicles (SV) and their associated command, control, and data dissemination network. Global environmental monitoring data is gathered, stored, and down-linked through the Satellite Control Network (SCN) and disseminated to Air Force and Navy weather centers. Additionally, data is broadcast real time by the satellite for utilization by heritage Direct Readout Terminals that use the data for local weather forecasting.

WSF is a Major Defense Acquisition Program (MDAP) with the Space Force as the lead component. Founded on the Space-Based Environmental Monitoring (SBEM) Analysis of Alternatives (AoA) results, the WSF will be to enable:

- 1) Timely weather collection over broad oceans in support of maneuvering forces;
- 2) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

Compact Ocean Wind Vector Radiometer (COWVR) is an on-orbit demonstration project of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI).

Energetic Charged Particles (ECP) supports the SBEM Weather Gap #11, Low Earth Orbit Energetic Charged Particle Characterization. To support this requirement, the ECP sensor will be integrated on the WSF-M satellites.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather Satellite Follow-On</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF 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.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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<p>Title: WSF Microwave Satellite (SV1-2)</p> <p>Description: Develop, build, integrate, and test the WSF Microwave (WSF-M) satellites, including bus, payloads, and ground upgrades to satisfy JROC-directed SBEM Capability gaps.</p> <p>FY 2022 Plans: Complete the manufacturing of MWI payload and continue SV-1 I&T. Receive all Spacecraft hardware deliveries from the subcontractors, and continue Bus Integration. Complete WSF-M Ground Segment Development to include, but not limited to Command and Control System MUS to operate the WSF-M SV. Initiate and complete WSF-M Ground Segment Integration & Test, to include, but not limited to Day-In-The-Life Compatibility testing. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to the transfer of funding from PE 1206422SF BA04, Weather System Follow-On, Project 644289 to PE 1206442SF, BA05, Weather System Follow-On, Project 65A039.</p>	73.799	52.766	0.000
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<p>Title: COWVR Tech Demo</p> <p>Description: The Compact Ocean Surface Wind Vector Radiometer (COWVR) launch objective supports Category A Weather Requirements, as codified in JROC Memo 092-014, providing on-orbit technology demonstration of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI). This will be a cooperative mission with NASA for integrating the sensor onto the International Space Station (ISS) as a weather technology demonstration project. The new mission designation for the COWVR launch will be Space Test Program Houston Mission #8 (STP-H8). Demonstrating COWVR technology in the space environment remains an important milestone for the microwave data weather mission in lieu of the ORS-6 cancellation. Unlike ORS-6, COVWR will fly on the ISS and the residual operational capability is not guaranteed as a result.</p> <p>FY 2022 Plans: Complete the COWVR sensor calibration and validation onboard the ISS. Continue operating the sensor and gathering data for potential inclusion into current weather models. This funding includes but is not limited to payload commanding, data interpretation and dissemination, and other ground operational support.</p> <p>FY 2023 Plans:</p>	1.180	0.275	0.000
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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather Satellite Follow-On</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
N/A			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 funding decreased due to the transfer of funding from PE 1206422SF BA04, Weather System Follow-On, Project 644289 to PE 1206442SF, BA05, Weather System Follow-On, Project 65A039.			
<i>Title:</i> ECP <i>Description:</i> Energetic Charged Particles (ECP) will support the SBEM Weather Gap 11 and address the Secretary of the Air Force (SECAF) policy which directs each Space Force Satellite Office to plan for and integrate ECP sensors on all pre-Milestone B new satellite acquisitions. To support this requirement, the ECP sensor will be integrated on the WSF-M satellite. <i>FY 2022 Plans:</i> Pull WSF-M ECP sensor from storage/deliver flight unit to the prime contractor, along with associated integration and test support. Complete ECP sensor data processing software and all applicable pre-launch efforts. <i>FY 2023 Plans:</i> N/A <i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 funding decreased due to the transfer of funding from PE 1206422SF BA04, Weather System Follow-On, Project 644289 to PE 1206442SF, BA05, Weather System Follow-On, Project 65A039.	2.400	0.380	0.000
Accomplishments/Planned Programs Subtotals	77.379	53.421	0.000

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

N/A

Remarks

D. Acquisition Strategy

The acquisition strategy for WSF is based on validated SBEM AoA results from FY 2014 and subsequent acquisition strategy development activities that were conducted in FY 2015. The WSF acquisition strategy focuses on streamlined acquisition processes for providing materiel solutions to OSVW, TCI & LEO ECP, as validated by the JROC; deliver microwave sensing solution to address DoD needs for OSVW and TCI capabilities and deliver space environment sensing solution to address LEO ECP capabilities for on-orbit attributions and support of anomaly resolutions.

The Space Force is conducting a technology demonstration of the Compact Ocean Wind Vector Radiometer (COWVR) sensor on the International Space Station (ISS), utilizing its unique technology demonstration capabilities for on-orbit demonstration of COWVR technology. The Space Systems Command (SSC) Space Test Program

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
3620F / 4	PE 1206422SF / <i>Weather System Follow-on</i>	644289 / <i>Weather Satellite Follow-On</i>

Office is the lead Space Force organization spearheading the NASA partnership, with the SSC Development Corps responsible for the COWVR sensor and providing programmatic support to enable COWVR sensor to ISS integration/technology demonstration.

The program awarded a contract for WSF-M with up to two satellites through a full and open competition. The WSF-M first satellite (SV-1) Initial Launch Capability is 1st quarter FY 2024. The WSF-M SV-2 priced option will be exercised by Nov 2023. WSF-M SV-2 ILC is 4th quarter FY 2027. The WSF SV-2 will be functionally equivalent to SV-1. The Naval Research Lab Blossom Point Tracking Facility (BPTF) will be the Satellite Operations Center (SOC) for WSF-M.

The WSF ECP sensor is developed by AFRL and will be integrated onto the WSF-M satellites.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather Satellite Follow-On</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			
COWVR Technology Demonstration	Various	Various : Various	0.000	1.180	Apr 2021	0.275	Apr 2022	-		-		-	0.000	1.455	-
WSF Microwave System (SV1-2)	C/FFP	Ball Aerospace : Boulder, CO	0.000	58.062	Nov 2020	34.901	Nov 2021	-		-		-	0.000	92.963	-
ECP	Various	Various : Various	0.000	2.400	Jan 2021	0.380	Jan 2022	-		-		-	0.000	2.780	-
Enterprise Systems Engineering & Integration	C/CPAF	Engility Corp : Andover, MA	0.000	0.924	Dec 2020	2.306	Dec 2021	-		-		-	0.000	3.230	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	0.000	5.927	Oct 2020	5.293	Oct 2021	-		-		-	0.000	11.220	-
Ground	MIPR	NRL : Welcome, MD	0.000	3.236	Dec 2020	3.193	Dec 2021	-		-		-	0.000	6.429	-
Subtotal			0.000	71.729		46.348		-		-		-	0.000	118.077	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			
FFRDC	RO	Aerospace Corp : El Segundo, CA	0.000	2.261	Oct 2020	2.491	Oct 2021	-		-		-	0.000	4.752	-
A&AS	Various	Various : El Segundo, CA	0.000	3.220	Feb 2021	4.174	Feb 2022	-		-		-	0.000	7.394	-
Other Support	Various	Various : El Segundo, CA	0.000	0.169	Nov 2020	0.408	Nov 2021	-		-		-	0.000	0.577	-
Subtotal			0.000	5.650		7.073		-		-		-	0.000	12.723	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		0.000	77.379	53.421	-	-	0.000	130.800	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather Satellite Follow-On</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

<i>Weather System Follow-On</i>																												
WSF ECP Production/Integration																												
WSF ECP Storage/Delivery to Prime Contractor																												
WSF SV-1 Production/Integration and Test																												
COWVR Technology Demonstration I&T																												
COWVR Technology Demonstration Launch Ops																												
COWVR Technology Demonstration On-Orbit Operations																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather Satellite Follow-On</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Weather System Follow-On</i>				
WSF ECP Production/Integration	1	2021	3	2021
WSF ECP Storage/Delivery to Prime Contractor	4	2021	4	2022
WSF SV-1 Production/Integration and Test	1	2021	4	2022
COWVR Technology Demonstration I&T	1	2021	4	2021
COWVR Technology Demonstration Launch Ops	4	2021	4	2021
COWVR Technology Demonstration On-Orbit Operations	4	2021	4	2022

Note

FY 2023+ scheduled activities are captured within the budget justification exhibit for program 1206422SF, Weather System Follow-On, Project 65A039, Weather Satellite Follow-On, R-1 Line #20.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</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	-	30.356	105.062	230.621	0.000	230.621	215.192	254.466	288.246	293.867	Continuing	Continuing
640290: <i>Deep Space Advanced Radar Concept</i>	-	30.356	105.062	230.621	0.000	230.621	215.192	254.466	288.246	293.867	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Space Domain Awareness (SDA) is one of five core competencies of the Space Force and is the effective identification, characterization, and understanding of any factor, passive or active, associated with the space domain that could affect space operations and thereby impact the security, safety, economy, or environment of our nation. As the foundation for space control, SDA encompasses surveillance of all space objects and activities; detailed surveillance of specific space assets; monitoring space environmental conditions; monitoring cooperative space assets; gathering indications and warning on adversary space operations; and conducting integrated command, control, communications, processing, analysis, dissemination, and archiving activities.

This program element develops new network sensors and improved information integration capabilities across the space surveillance network (SSN) while companion program element 1203940SF fields, upgrades, operationalizes, operates, and maintains Space Force sensors and information integration capabilities within the SSN. Activities funded in this program element (1206425SF) also support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, modernization initiatives, systems engineering, system development, and test & evaluation, and may include prototyping and technology demonstration.

Deep Space Advanced Radar Capability (DARC) is a ground-based, SDA radar system to detect, track, and maintain custody of deep space objects 24/7, through the solar exclusion gap. DARC will augment the SSN as an additional sensor with increased capacity and capability for deep space object custody, providing full global coverage.

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, to increase 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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver DARC 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.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>
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The total cost of the DARC Site 1 Middle Tier of Acquisition effort is \$866.3 million, including RDT&E and procurement of prototype units. DARC Site 1 is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways

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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	33.359	123.262	0.000	0.000	0.000
Current President's Budget	30.356	105.062	230.621	0.000	230.621
Total Adjustments	-3.003	-18.200	230.621	0.000	230.621
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-18.200			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-2.123	0.000			
• SBIR/STTR Transfer	-0.880	0.000			
• Other Adjustments	0.000	0.000	230.621	0.000	230.621

Change Summary Explanation

FY 2021: -2.123 decrease for higher Space Force priorities and -0.880 decrease for SBIR.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: DARC Site 1 Operational Capability	30.356	105.062	230.621
Description: The DARC Middle Tier of Acquisition (MTA) activity will develop, test, and deliver one DARC site with a current estimated completion date of CY 2025. It will also provide a foundation for up to two more future sites located strategically around the world to provide global deep space radar capability to support SDA. The system will be responsive to regularly scheduled and un-scheduled tasks to locate, identify, characterize deep space objects and report the results to Battle Management Command and Control locations and SSN.			
FY 2022 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>The DARC Site 1 competitive development contract award moved from FY 2021 to FY 2022 in order to complete technology maturation and risk reduction efforts. Slight delay in development contract award is not expected to impact timely funding execution nor anticipated 2025 delivery of Site 1 capability.</p> <p>Complete source selection and award contract for Site 1 design, development and build. Begin Site 1 design and development activities, including hardware purchases, initiate software development and integration, and conduct Design Reviews to support the build of the operational system. Award contracts for continuous third-party mission software development. Continue to negotiate host nation agreements with Pacific and European partners, finalize agreement with Pacific partner. Conduct Environmental Assessment (EA) for Site 1.</p> <p>Additionally, FY 2022 funding allows the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2023 Plans: Continue Site 1 design and development activities including design reviews, hardware purchases, software development and integration, and construction. Complete Site 1 EA. Complete final Facility Design Review (90%) and Critical Design Review. Purchase, install and check out hardware including, but not limited to, the antennas, transmitters, receiver hardware, and associated processing, cabling, communications subsystems. Begin construction of Site 1 including roads, buildings, utilities, foundations, and installation of all antenna structures. Perform additional site development efforts such as the construction of facility-support and site infrastructure to include backup generator buildings, fuel storage (tank farms), electrical substations for power site distribution, wastewater treatment/septic & leach, non-potable water storage / fire protection distribution (site & buildings), water treatment (potable) and physical security equipment to meet protection level 3 (PL3) requirements. Finalize plans for and begin implementing physical security for Site 1, to include any required equipment such as site perimeter fencing, and standalone fencing for both antenna arrays and site main power station to meet site safety requirements. Begin preparation for and install of fiber optics (COMM) as well as connection to existing and/or new infrastructure such as power grid, backup generators, and main water line. Complete purchases for all long-lead facility equipment for Site 1 as rapidly as possible in order to minimize schedule, these will have been initiated in parallel with completing required EAs.</p> <p>Award additional contracts for continuous third-party mission software development and begin to integrate that software into the system. Continue to negotiate and finalize host nation agreements with Pacific and European partners.</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Additionally, FY 2023 funding will allow the program to continue implementing system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased due to continued ramp-up of the DARC Site 1 Rapid Prototype design, development and build contracts to include site preparation and hardware purchases.</p>			
Accomplishments/Planned Programs Subtotals	30.356	105.062	230.621

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

N/A

Remarks

E. Acquisition Strategy

Project utilizes existing DoD engineering and study contracts and activities to conduct science and technology development and data analysis activities. Preliminary/critical design effort for the technology maturation and prototype commenced in FY 2017. A Broad Agency Announcement (BAA) was used to award seven Integrated System Engineering Team (ISET) contracts which allow for organizations to participate, advise the government, and gain insight into the prototype design and build. In May of 2019, DARC was designated as an MTA under Section 804 of the 2016 National Defense Authorization Act (NDAA). In 2020, DARC was directed to pursue a Rapid Prototyping Middle Tier Acquisition program for Site 1. The DARC Site effort will be executed through two separate contract elements: The Prime System Integrator (PSI) will be acquired via a single, competitive award through the Space Enterprise Consortium (SpEC) Other Transaction Authority (OTA) agreement and third-party software development through multiple SpEC OTA agreements. The Space Force intends to develop and field two additional DARC sites in the future to culminate in a final operational system of three global sites to ensure SDA coverage. A follow-on MTA pathway strategy based on the success of the Site 1 rapid prototype and an MTA transition plan are being developed for Sites 2 and 3 in accordance with DoDI 5000.80.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 640290 / <i>Deep Space Advanced Radar Concept</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			
DARC Non-Recurring Engineering (NRE)/ Advanced Hardware Purchase	Various	Various : Various	-	21.242	Jun 2021	49.714	Jan 2022	-		-		-	0.000	70.956	-
DARC Technical Mission Analysis	Various	Various : Various	-	-		-		6.195	Jan 2023	-		6.195	Continuing	Continuing	-
DARC System Development	C/CPIF	Northrop Grumman : Colorado Springs, CO	-	-		45.297	Feb 2022	212.409	Jan 2023	-		212.409	0.000	257.706	-
Subtotal			-	21.242		95.011		218.604		-		218.604	Continuing	Continuing	N/A

Support (\$ 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			
DARC Prototype System and Sustainment Analyses	Various	Various : Various	-	0.150	May 2021	0.150	May 2022	1.005	May 2023	-		1.005	Continuing	Continuing	-
Subtotal			-	0.150		0.150		1.005		-		1.005	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			
A&AS	Various	Various : Various	-	5.134	Jun 2021	5.031	Nov 2021	8.525	Nov 2022	-		8.525	Continuing	Continuing	-
FFRDC	RO	MITRE Corp. : Colorado Springs, CO	-	3.730	Nov 2020	4.670	Nov 2021	2.287	Nov 2022	-		2.287	Continuing	Continuing	-
Other Support	Various	Various : Colorado Springs, CO	-	0.100	Nov 2020	0.200	Nov 2021	0.200	Nov 2022	-		0.200	Continuing	Continuing	-
Subtotal			-	8.964		9.901		11.012		-		11.012	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force							Date: April 2022				
Appropriation/Budget Activity 3620F / 4			R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>				Project (Number/Name) 640290 / <i>Deep Space Advanced Radar Concept</i>				
	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	-	30.356	105.062		230.621	-	230.621	Continuing	Continuing	N/A	

Remarks

The DARC project has minimal organic resources. The FY 2023 increase in Management Services is due to parallel efforts to finalize international agreements, complete source selection, award the Site 1 contract, begin development work on Site 1 including roads, buildings, utilities, foundations and installation of all antenna structures, continue third-party mission software development and begin to integrate third-party software into the system, and begin planning and strategy development for Sites 2 and 3.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 640290 / <i>Deep Space Advanced Radars Concept</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

Prototype Risk Reduction Build and Test																												
Tech Demo Build and Test	████████																											
Develop Documentation and Request for Proposal	████████																											
Operational Demonstrations	████████																											
Site 1 MTA Start	████																											
Request for DARC Site 1 MTA Prototype Proposal Release	████																											
Site 1 MTA Source Selection	████████																											
Site 1 Environmental Assessment	████████████████																											
Site 1 MTA Contract Award	████																											
Software Development	████████████████████																											
Preliminary Design Review	████																											
Site 1 MTA Development	████████████████████████████																											
Critical Design Review	████																											
Site 1 Construction	████████████████████																											
Site 2 Development	████████████████████████████████																											
Site 1 MTA End (Operational Leave Behind Capability)	████████																											
Site 3 Development	████████████████																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 640290 / <i>Deep Space Advanced Radar Concept</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Prototype Risk Reduction Build and Test</i>				
Tech Demo Build and Test	1	2021	3	2021
Develop Documentation and Request for Proposal	1	2021	3	2021
Operational Demonstrations	2	2021	3	2021
Site 1 MTA Start	3	2021	3	2021
Request for DARC Site 1 MTA Prototype Proposal Release	4	2021	4	2021
Site 1 MTA Source Selection	4	2021	2	2022
Site 1 Environmental Assessment	4	2021	1	2023
Site 1 MTA Contract Award	2	2022	2	2022
Software Development	2	2022	2	2024
Preliminary Design Review	2	2022	2	2022
Site 1 MTA Development	2	2022	1	2025
Critical Design Review	1	2023	1	2023
Site 1 Construction	1	2023	1	2025
Site 2 Development	2	2024	3	2026
Site 1 MTA End (Operational Leave Behind Capability)	2	2025	4	2025
Site 3 Development	3	2025	2	2026

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206427SF / Space Systems Prototype Transitions (SSPT)
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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	-	163.796	91.851	106.252	0.000	106.252	110.073	76.925	74.833	76.310	Continuing	Continuing
645601: <i>Space Defense Capabilities</i>	-	163.796	86.851	101.099	0.000	101.099	110.073	76.925	74.833	76.310	Continuing	Continuing
645611: <i>Assault Breaker II</i>	-	0.000	5.000	5.153	0.000	5.153	0.000	0.000	0.000	0.000	0.000	10.153

Note

This program, BA 4, PE 1206427SF, project 645601, Digital Engineering Interconnected, Cloud-based Ecosystem (DEICE) Tech Stack, is a new start.

A. Mission Description and Budget Item Justification

The Space System Prototype Transition (SSPT) Program will identify and address space technology and capability gaps in order to facilitate technology transition to military space prototypes and programs of record. It will conduct a wide array of activities to model, integrate, test, and provide launch integration and support on-orbit testing of prototype technologies. The supported activities include: systems engineering, technology planning, development, demonstrations and testing, as well as modeling, simulations and exercises to support the development and maturation of tactics and procedures. This includes the development and prototyping of critical technology within the Department of Defense, across other government agencies, academic institutions and industry partners that are identified and the necessary systems engineering to effectively employ such systems.

Specifically the SSPT Program establishes a cost-effective framework to identify, mature and transition demonstrations and prototypes to:

- Rapidly address identified technology or capability gaps
- Accelerate the maturation of systems intended for demonstrations/prototypes that enhance/compliment/replace an existing capability
- Support a more reliable, available, maintainable and survivable military space enterprise
- Energize the space industrial base supporting U.S. national security
- Focus S&T Innovation and facilitate its transition to military space programs of record

This program includes projects for Long Duration Propulsive Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) (LDPE) and its follow-on activities called Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER), Tetra, Blackjack, Quasi-Zenith Satellite System (QZSS)-Hosted Payload (HP), Military Application of the Space Environment (MASE), Space Combat Cloud, Digital Engineering Interconnected, Cloud-based Ecosystem (DEICE) Tech Stack, and Assault Breaker II (ABII).

LDPE and ROOSTER provide a low-cost, rapid, and flexible on-orbit capability to host and deploy numerous prototypes and payloads utilizing excess payload margin available on US Space Force (USSF) launch missions. Each LDPE/ROOSTER on-orbit platform is currently designed to fly multiple payloads per mission, thus fully utilizing launch potential and providing the only recurring rideshare option for prototypes and experiments to geosynchronous orbit. The LDPE acquisition baseline includes the following mission scope: LDPE-1, -2 and -3A. All missions beyond LDPE-3A are planned as part of ROOSTER activities. The objectives of the ROOSTER

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	
<p>project are to rapidly and cost-effectively enable on-orbit checkout and testing of prototypes and demonstration payloads and to mature operational concepts and Techniques, Tactics and Procedures (TTPs) for future use in the USSF space enterprise architecture.</p> <p>Tetra is a project that will provide a training platform for operators to develop and demonstrate TTPs for pathfinder mission sets. This project directly supports the evolution of operations to include space situational awareness and control in alignment with objectives from organizations such as the National Space Test and Training Center (NSTTC) and USSF Test and Evaluation (TE).</p> <p>Blackjack is a joint technology demonstration project led by DARPA and the Space Force to evaluate military utility and concepts of operation for a Proliferated Low Earth Orbit (P-LEO) satellite constellation. The project leverages industry innovation in commercial P-LEO concepts by integrating military payloads onboard commercial commoditized satellite vehicles, demonstrating onboard data processing and autonomous tasking, and transmitting encrypted data through a mesh network of satellites in LEO with the goals of augmenting existing warfighter capability, increasing national security space resiliency, and decreasing per-unit satellite costs.</p> <p>QZSS-HP is a "pacesetter" hosted payload that is a high priority for the U.S. and Japan, paving the way for future Allied collaborations. It enhances Geostationary Earth Orbit (GEO) Space Domain Awareness (SDA) capabilities over the Eurasian theater and facilitates resilient capabilities in the Space Surveillance Network (SSN).</p> <p>MASE effort will demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. It contributes to satisfying Gaps 4 and 7 of the Space-Based Environment Monitoring (SBEM) requirements. In FY 2021, Congress transferred FY 2021 funds from Air Force to Space Force appropriations to fix an appropriation error.</p> <p>Space Combat Cloud activity includes enterprise standards definition and synchronizes space-to-space C2 needs across the space community. Activity also includes technology maturation, network definition and prototype planning.</p> <p>DEICE Tech Stack is a New Start in FY 2023. Prototypes and develops the Space Force Digital Engineering Ecosystem (DEE) as a cloud-based, remotely accessible, multilevel security, interconnected infrastructure, providing the technical methodology used to store, access, analyze, and visualize evolving systems' data and models throughout systems' acquisition lifecycles.</p> <p>ABII is an all-Service, classified, multi-year effort, led by DARPA, to analyze, research, and recommend material and non-material all domain counter-anti-access/area denial solutions to the Joint Requirements Oversight Council (JROC).</p> <p>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 repurpose existing capabilities.</p>		

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver SSPT capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	151.595	101.851	0.000	0.000	0.000
Current President's Budget	163.796	91.851	106.252	0.000	106.252
Total Adjustments	12.201	-10.000	106.252	0.000	106.252
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-15.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	17.200	0.000			
• SBIR/STTR Transfer	-4.999	0.000			
• Other Adjustments	0.000	0.000	106.252	0.000	106.252

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 645601: *Space Defense Capabilities*

Congressional Add: *Space Combat Cloud*

Congressional Add Subtotals for Project: 645601

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	-	5.000
	-	5.000
	-	5.000

Change Summary Explanation

FY 2021: -4.999M; SBIR reduction.

FY 2021: +17.200M; Above Threshold Reprogramming (ATR) to address COVID-19 impacts and cost increases to Space Domain Awareness (SDA) sensor development as well as to support the initial stand up of the Assault Breaker II initiative.

FY 2022: -15.000M; Congressional Directed Reduction for ROOSTER development delay

FY 2022: +5.000M; Congressional Add for Space Combat Cloud

FY 2023: 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.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 4					R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>				Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>			
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
645601: <i>Space Defense Capabilities</i>	-	163.796	86.851	101.099	0.000	101.099	110.073	76.925	74.833	76.310	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 4, PE 1206427SF, project 645601, Digital Engineering Interconnected, Cloud-based Ecosystem (DEICE) Tech Stack, is a new start.

A. Mission Description and Budget Item Justification

The Space System Prototype Transition (SSPT) Program will identify and address space technology and capability gaps in order to facilitate technology transition to military space prototypes and programs of record. It will conduct a wide array of activities to model, integrate, test, and provide launch integration and support on-orbit testing of prototype technologies. The supported activities include: systems engineering, technology planning, development, demonstrations and testing, as well as modeling, simulations and exercises to support the development and maturation of tactics and procedures. This includes the development and prototyping of critical technology within the Department of Defense, across other government agencies, academic institutions and industry partners that are identified and the necessary systems engineering to effectively employ such systems.

Specifically the SSPT Program establishes a cost-effective framework to identify, mature and transition demonstrations and prototypes to:

- Rapidly address identified technology or capability gaps
- Accelerate the maturation of systems intended for demonstrations/prototypes that enhance/compliment/replace an existing capability
- Support a more reliable, available, maintainable and survivable military space enterprise
- Energize the space industrial base supporting U.S. national security
- Focus S&T Innovation and facilitate its transition to military space programs of record

This program includes projects for Long Duration Propulsive Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) (LDPE) and its follow-on activities called Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER), Tetra, Blackjack, Quasi-Zenith Satellite System (QZSS)-Hosted Payload (HP), Military Application of the Space Environment (MASE), Space Combat Cloud, Digital Engineering Interconnected, Cloud-based Ecosystem (DEICE) Tech Stack.

LDPE and ROOSTER provide a low-cost, rapid, and flexible on-orbit capability to host and deploy numerous prototypes and payloads utilizing excess payload margin available on US Space Force (USSF) launch missions. Each LDPE/ROOSTER on-orbit platform is currently designed to fly multiple payloads per mission, thus fully utilizing launch potential and providing the only recurring rideshare option for prototypes and experiments to geosynchronous orbit. The LDPE acquisition baseline includes the following mission scope: LDPE-1, -2 and -3A. All missions beyond LDPE-3A are planned as part of ROOSTER activities. The objectives of the ROOSTER project are to rapidly and cost-effectively enable on-orbit checkout and testing of prototypes and demonstration payloads and to mature operational concepts and Techniques, Tactics and Procedures (TTPs) for future use in the USSF space enterprise architecture.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>

Tetra is a project that will provide a training platform for operators to develop and demonstrate TTPs for pathfinder mission sets. This project directly supports the evolution of operations to include space situational awareness and control in alignment with objectives from organizations such as the National Space Test and Training Center (NSTTC) and USSF Test and Evaluation.

Blackjack is a joint technology demonstration project led by DARPA and the Space Force to evaluate military utility and concepts of operation for a Proliferated Low Earth Orbit (P-LEO) satellite constellation. The project leverages industry innovation in commercial P-LEO concepts by integrating military payloads onboard commercial commoditized satellite vehicles, demonstrating onboard data processing and autonomous tasking, and transmitting encrypted data through a mesh network of satellites in LEO with the goals of augmenting existing warfighter capability, increasing national security space resiliency, and decreasing per-unit satellite costs.

QZSS-HP is a "pacesetter" hosted payload that is a high priority for the U.S. and Japan, paving the way for future Allied collaborations. It enhances Geostationary Earth Orbit (GEO) Space Domain Awareness (SDA) capabilities over the Eurasian theater and facilitates resilient capabilities in the Space Surveillance Network (SSN).

MASE effort will demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. It contributes to satisfying Gaps 4 and 7 of the Space-Based Environment Monitoring (SBEM) requirements. In FY 2021, Congress transferred FY 2021 funds from Air Force to Space Force appropriations to fix an appropriation error.

Space Combat Cloud activity includes enterprise standards definition and synchronizes space-to-space C2 needs across the space community. Activity also includes technology maturation, network definition and prototype planning.

DEICE Tech Stack is a New Start in FY 2023. Prototypes and develops the Space Force Digital Engineering Ecosystem (DEE) as a cloud-based, remotely accessible, multilevel security, interconnected infrastructure, providing the technical methodology used to store, access, analyze, and visualize evolving systems' data and models throughout systems' acquisition lifecycles.

A FY 2021 Omnibus Above Threshold Reprogramming added \$5M to support initial stand up of the Assault Breaker II (ABII) initiative, quick turn studies to examine various aspects of warfighting architectures, and an analysis of the current Modeling, Simulation, and Analysis (MS&A) environment. ABII transitions to a dedicated Project 645611 in FY 2022.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Technology Maturation and Prototype Development	59.200	35.100	49.700	0.000	49.700
Description: Plan, develop, test and transition advanced technologies into space system prototypes and capabilities to meet known and emerging threats. Conduct architecture studies, modeling and simulation, technical development, integration and test activities in preparation for transition of critical technologies into					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
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prototypes or space programs of record. Develop advanced capabilities for rapid prototyping and integration into space system programs of record and, if requested, to warfighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs). Develop, test and integrate on-orbit platforms for checkout and testing of prototypes and experimental payloads to mature operational concepts and TTPs for future use in the USSF space enterprise architecture. Provide rideshare platform hosting opportunities to geosynchronous orbit.

FY 2022 Plans:

- Continue prototype/technology developments across multiple mission areas, including but not limited to:
 - ROOSTER: Continue risk-reduction, technical analysis, and technology maturation efforts on a propulsive multi-mission payload adapter ring and components to inform ROOSTER prototype requirements and design in order to reduce cost per ring, shorten payload integration timeline, and enable flexible swap of prototype and demonstration payload.
 - Tetra: Continue development of Tetra-3 prototype to support experimentation and TTP development at GEO. Deliver Tetra-3 for launch. Award the development of Tetra-5 prototype.
 - Blackjack: Complete integration and delivery of prototype, cyber, ground and data processing architecture as well as develop concepts of operations to support C2 system integration.
 - QZSS-HP development (International Cooperation): Complete development, and begin build and test of two SDA sensors intended for hosting on two Japanese Quasi-Zenith Satellites.
 - Pursue technology investment to support the space enterprise investment strategy: commercial and allied opportunities; cross mission data transport, proliferated payloads and buses; orbital maneuver; alternative orbits; dynamic communication networks; and Fighting PNT and SATCOM, etc.
 - Additionally, FY2022 funding will allow the program 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, experimentation, prototyping, etc.

FY 2023 Base Plans:

- ROOSTER: Continue prototype development, including ground segment and payload integration efforts. Begin Space Vehicle factory test campaign, launch vehicle mission unique integration efforts, and whole of program security accreditation efforts.
- Tetra: Continue development of Tetra space vehicles to include development of Tetra-4 through integration and test and Tetra-5 through assembly.
- QZSS-HP: Continue the international cooperation with Japan by testing the two SDA with the two Japanese Quazi-Zenith Satellites.

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UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>- Pursue technology investment to support the space enterprise investment strategy: commercial and allied opportunities; cross mission data transport, proliferated payloads and buses; orbital maneuver; alternative orbits; dynamic communication networks; and Fighting PNT and SATCOM, etc.</p> <p>- Additionally, FY 2023 funding will allow the program 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, experimentation, prototyping, etc.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to ramp up of ROOSTER development activities.</p>					
<p>Title: Prototype Integration, Test and On-Orbit Prototype Demonstration</p> <p>Description: Provide rideshare opportunities for prototypes and experiments, fund mission-unique payload integration to the rideshare or launch system, and conduct launch base integration, testing and launch operations. Conduct prototype integration and testing into the designated Command and Control system and provide operational support to conduct prototype testing, demonstration and operations.</p> <p>FY 2022 Plans: -ROOSTER: Perform evaluations in preparation for and award contract for ROOSTER platforms as a follow-on to LDPE-3A. Begin fabrication and assembly of the first ROOSTER platform to support FY 2024 launch and execution of on-orbit operations of prototype and technology demonstration payloads. Begin associated ground segment and early payload integration risk reduction efforts. -Tetra: Perform on-orbit demonstrations, operations and provide reach back support for Tetra-1 and Tetra-2. Provide satellite, payload and LDPE integration, and testing for Tetra-3 and Tetra-4. Provide launch and on-orbit operations for Tetra-3. -Blackjack: Deliver remaining flight hardware for assembly, integration, and test and provide technical reach back engineering during on-orbit demonstration activities. Conduct technical reviews, integration and testing of prototypes with launch vehicle in support of launch and on-orbit demonstrations. Continue integration of fully assembled and tested Blackjack satellites with launch vehicles, launch the remaining satellites into LEO to complete the constellation, and conduct early orbit testing and demonstration.</p>	42.802	19.140	18.434	0.000	18.434

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>-QZSS-HP (International Cooperation): Start integration and testing of hosted payload prototypes with Japan's QZSS satellite buses and launch vehicles in support of the Quasi-Zenith Satellite 6 launch in FY 2023.</p> <p>FY 2023 Base Plans:</p> <ul style="list-style-type: none"> - ROOSTER: Continue development of the first ROOSTER platform to support FY 2025 launch and execution of on-orbit operations of prototype and technology demonstration payloads. Begin on-orbit satellite vehicle operations procedures development, conduct operations training, rehearsals, and exercises. - Tetra: Continue development and integration efforts for Tetra-2,3, 4,and 5 vehicles to include launch and operations of Tetra 3. - Blackjack: Finalize remaining assembly, integration, and test and provide technical reach back engineering during on-orbit demonstration activities. Conduct technical reviews, integration and testing of prototypes with launch vehicle in support of launch and on-orbit demonstrations. Launch remaining satellites into LEO to complete the constellation, and conduct early orbit testing and full architecture demonstration. - QZSS-HP: Finish integration and testing of hosted payload prototypes with Japan's QZSS satellite buses and launch vehicles in support of the Quasi-Zenith Satellite-6 launch in FY 2023. Start integration and testing of hosted payload prototypes in support of the Quasi-Zenith Satellite-7 launch in FY 2024. <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to ramp down of Blackjack integration activities.</p>					
<p>Title: Long Duration Propulsive ESPA (LDPE)</p> <p>Description: The LDPE platform provides a standard rideshare service for a wide variety of secondary payload options. It features 6 ports and accommodates ten to twelve fixed and/or separable prototype payloads. After the forward payload separates, the LDPE platform separates and propels to mission orbit, typically GEO, approximately 22,000 miles above the earth. The LDPE platform can maneuver to allow prototype/experimental payloads to be dropped off at different locations or remain hosted to the ring based on mission requirements.</p> <p>FY 2022 Plans: Conduct LDPE-1 & 2 on-orbit test and demonstration to enable technology maturation of the platform and prototype/experimental payloads. Continue planned 12-month execution of LDPE-1 & LDPE-2 on-orbit prototype testing, demonstration, and operational support for LDPE hosted payloads. Finalize LDPE-3A mission payload integration/test and ground development while initializing launch site processing and operational</p>	39.600	19.096	4.900	0.000	4.900

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
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<p>readiness campaign. Support launch of LDPE-3A and begin the planned 12-month on-orbit prototype testing and demonstration phase.</p> <p>FY 2023 Base Plans: Support the transition of LDPE-1 and LDPE-2 to operational and/or test USSF units to conduct residual operations. Support the launch of LDPE-3A aboard the USSF-67 mission and conduct on-orbit test and demonstration to enable technology maturation of the platform and prototype/experimental payloads. Continue planned 12-month execution of LDPE-3A on-orbit prototype testing, demonstration, and operational support for LDPE hosted payloads.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to LDPE-1 and 2 completion.</p>					
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<p>Title: Digital Engineering Interconnected, Cloud-based Ecosystem (DEICE) Tech Stack</p> <p>Description: The Digital Engineering (DE) tech stack provides a common cloud-base, remotely accessible, multi-level security, interconnected infrastructure. The DEICE tech stack provides specialized tools required to perform model based systems engineering (MBSE) activities to create system models, perform simulations, and analyze the results to accelerate the pace of acquisition across the lifecycle from requirements generation, to design reviews, through manufacturing and test, and finally supporting fielding with digital twins. The DEICE tech stack provides the program offices, government stakeholders, and industry partners with a common DE as a Service (DEaaS) capability. The building of the DEICE capabilities will be accomplished using 6-month increments based on Agile management techniques. The needed capabilities will be collected from across the SSC programs and stored in a Product Backlog. Twice a year, this list will be prioritized by an enterprise governance board to direct the activities of adding new capabilities to the Ecosystem. The capabilities will be delivered when competed, tested and approved.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Base Plans: - Prototype, develop, test and establish the Space Force Digital Engineering as a Service (DEaaS) Environments hosted on the Air Force Cloud One platform for cloud-computing and database storage (compute & store).</p>	-	0.000	19.100	0.000	19.100
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UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>- Develop and test the minimum viable product (MVP) for DEaaS by providing a virtual desktop with digital engineering tools and collaboration work spaces for the architects and systems engineers of the initial programs; Protected Anti-Jam Tactical SATCOM, Evolved Strategic SATCOM, and Space Integration Office System of Systems Engineering Division.</p> <p>- Continue development and testing of DEaaS with Increment 1 to link to DEaaS Environments with acquisition and operational databases, and add additional programs into the DEaaS Environment from across SSC.</p> <p>- Implement Integration and Operational practices for system monitoring and security procedures.</p> <p>- 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, experimentation, prototyping, etc.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to DEICE Tech Stack being a New Start in FY 2023.</p>					
<p>Title: Assault Breaker II</p> <p>Description: Assault Breaker II is an all-Service, classified, multi-year effort, led by DARPA, to analyze, research, and recommend material and non-material all domain counter-anti-access/area denial solutions to the JROC.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Base Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: N/A</p>	5.000	0.000	0.000	-	0.000
<p>Title: MASE</p> <p>Description: Demonstrates mature space environment technology to improve combat operations. Enhances regional ionospheric (nowcasts) and predictions (forecasts) affecting signal propagation paths. Uses traditional</p>	11.000	0.000	0.000	0.000	0.000

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force				Date: April 2022	
Appropriation/Budget Activity 3620F / 4		R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>		Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>	
B. Accomplishments/Planned Programs (\$ in Millions)					
and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems.					
FY 2022 Plans: N/A					
FY 2023 Base Plans: N/A					
FY 2023 OCO Plans: N/A					
Title: Management Services					
Description: Management Services					
FY 2022 Plans: Management Services					
FY 2023 Base Plans: Management Services					
FY 2023 OCO Plans: Management Services					
FY 2022 to FY 2023 Increase/Decrease Statement: Management Services					
Accomplishments/Planned Programs Subtotals					
	6.194	8.515	8.965	0.000	8.965
	163.796	81.851	101.099	0.000	101.099
Congressional Add: Space Combat Cloud					
FY 2022 Plans: Complete enterprise standards and define security infrastructure. Evolve concepts, preliminary designs, and architectural solutions. Explore key technologies for maturation including exquisite high powered amplifiers, low SWaP ASIC subsystems, and scalable affordable components for enterprise construct. Evaluate network topology and mesh solutions. Activities may also include, but are not limited to program office support,					
	-	5.000			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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	FY 2021	FY 2022
studies, technical analyses, experimentation, prototyping, operational testing, and participation/integration into joint warfighting exercises.		
Congressional Adds Subtotals	-	5.000

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

N/A

Remarks

D. Acquisition Strategy

All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. The SSPT program consists of numerous projects in which the program office will leverage rapid prototyping authorities to the maximum extent possible.

LDPE is an ACAT III program and all systems are on contract and on schedule to achieve their projected Initial Launch Capability (ILC). The acquisition strategy is in coordination for the follow-on effort to LDPE, called ROOSTER. ROOSTER platforms are expected to be competitively awarded. Contract award is expected in FY 2022 which supports the ROOSTER 4 ILC of 4th Quarter FY 2024.

Tetra's acquisition strategy is based on an annualized satellite procurement, development, and launch integration effort. Each Tetra satellite is a unique design intended to further the capabilities of small-satellites and mature emerging technologies. The first two unique Tetras were procured simultaneously as the first award on Space Enterprise Consortium (SpEC) Other Transaction Authority (OTA), followed by two subsequent Tetra missions. A fifth Tetra is planned for procurement in FY 2022.

For the Digital Engineering Interconnected, Cloud-based Ecosystem (DEICE) Tech Stack effort, the Space Force plans to employ agile software development practices and techniques, such as flexible requirements, frequent user interaction, and rapid delivery. The program will acquire tools and capabilities through an agile-based Rapid Delivery Framework that develops, integrates, and delivers new features and capabilities through 180 day program increments. To provide the cloud-based environment, an existing contract with Cloud One providers will be utilized to provide the software licenses, computer hosting, and cybersecurity. In addition, FFRDCs will provide expertise to develop needed Digital Engineering capabilities as well as optimizing the software configurations to support needed features. Finally, a current SBIR Phase 3 contract will be used to implement new Digital Engineering capabilities based on industry best practices including the management of the Product Backlog, assisting with on-boarding new programs, building training for new users, providing system admin support, and creating scripts and features allowing Digital Engineering activities to be automated.

For ABII, funds are sent to DARPA via a Military Interdepartmental Purchase Request (MIPR).

UNCLASSIFIED

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
LDPE-1, 2 & 3A Launch Vehicle Integration & Ops	Various	Various: Various : TBD	-	29.335	Jul 2021	13.427	Jan 2022	4.150	Dec 2022	-		4.150	Continuing	Continuing	-
LDPE-2, 3A Launch Support Activities	Various	Various: Various : TBD	-	7.705	Jul 2021	5.669	Jan 2022	0.780	Dec 2022	-		0.780	Continuing	Continuing	-
LDPE-3A Development	Various	Various: Various : TBD	-	2.529	Mar 2021	-		-		-		-	0.000	2.529	-
ROOSTER Development	C/FFP	TBD : TBD : TBD	-	1.424	Apr 2021	4.273	May 2022	21.494	Jan 2023	-		21.494	Continuing	Continuing	-
ROOSTER Ops, LV, Payload Integration	C/TBD	TBD : TBD : TBD	-	-		-		7.450	Jan 2023	-		7.450	Continuing	Continuing	-
Tetra 3 & 4 Development	C/FFP	York Space Systems : CO : TBD	-	1.020	Nov 2020	2.076	Jan 2022	0.747	Jan 2023	-		0.747	Continuing	Continuing	-
Tetra 5 Development	C/FFP	TBD : TBD : TBD	-	-		10.549	May 2022	10.695	Feb 2023	-		10.695	Continuing	Continuing	-
Tetra-1,2 & 3 Prototype Integration, Test & On-Orbit Prototype Demonstration	C/CPFF	Various : Various : TBD	-	5.575	Nov 2020	3.967	Jan 2022	4.785	Jan 2023	-		4.785	Continuing	Continuing	-
Tetra-1 , 2, 3 & 4 Payload Integration into LDPE/ ROOSTER Ring	C/CPAF	Various : Various : TBD	-	-		0.018	Jan 2022	0.851	Jan 2023	-		0.851	Continuing	Continuing	-
Blackjack Development	MIPR	Various : Various : TBD	-	24.800	Nov 2020	-		-		-		-	0.000	24.800	-
Blackjack Assembly, Integration & Test	MIPR	Various : Various : TBD	-	1.400	Dec 2021	5.088	Jan 2022	2.500	Jan 2023	-		2.500	Continuing	Continuing	-
Blackjack Launch/Support Activities	MIPR	Various : Various : TBD	-	35.826	Nov 2020	9.150	Jan 2022	-		-		-	Continuing	Continuing	-
QZSS-HP Development	Various	Various : Various : TBD	-	27.878	Nov 2020	14.578	Oct 2021	13.468	Nov 2022	-		13.468	Continuing	Continuing	-
QZSS-HP Launch Support Activities	Various	Various : Various : TBD	-	-		0.917	Apr 2022	2.848	Nov 2022	-		2.848	Continuing	Continuing	-
Military Application of the Space Environment (MASE)	TBD	Not specified. : TBD	-	11.021	Feb 2021	-		-		-		-	0.000	11.021	-

UNCLASSIFIED

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</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			
Space Combat Cloud	TBD	TBD: TBD : TBD	-	-		5.000	May 2022	-		-		-	0.000	5.000	-
Digital Engineering Ecosystem	Various	Not specified. : TBD	-	-		-		12.558	Jan 2023	-		12.558	Continuing	Continuing	-
Digital Engineering MITRE	TBD	Not specified. : TBD	-	-		-		1.520	Jan 2023	-		1.520	Continuing	Continuing	-
Technical Mission Analysis	Various	Various : Various : TBD	-	4.132	Nov 2020	3.554	Jan 2022	3.329	Jan 2023	-		3.329	Continuing	Continuing	-
Assault Breaker II	MIPR	Radiance Technologies : Huntsville, AL	-	5.000	Dec 2021	-		-		-		-	Continuing	Continuing	-
Subtotal			-	157.645		78.266		87.175		-		87.175	Continuing	Continuing	N/A

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			
Digital Engineering Test Environment	TBD	Not specified. : TBD	-	-		-		5.000	Jan 2023	-		5.000	Continuing	Continuing	-
Subtotal			-	-		-		5.000		-		5.000	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			
FFRDC	RO	Various : Various : TBD	-	2.391	Jan 2021	3.136	Jan 2022	3.558	Jan 2023	-		3.558	Continuing	Continuing	-
A&AS	Various	Various : Various : TBD	-	3.342	Feb 2021	4.963	Nov 2021	4.977	Nov 2022	-		4.977	Continuing	Continuing	-
Other Support	Various	Various : Various : TBD	-	0.418	Oct 2020	0.486	Nov 2021	0.389	Nov 2022	-		0.389	Continuing	Continuing	-
Subtotal			-	6.151		8.585		8.924		-		8.924	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force							Date: April 2022				
Appropriation/Budget Activity 3620F / 4			R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>				Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>				
	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	-	163.796	86.851		101.099	-	101.099	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force			Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>	

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
LDPE-1																												
Integration																												
Launch/Ops																												
LDPE-2																												
Integration																												
Launch/Ops																												
LDPE-3A																												
Development & Integration																												
Launch/Ops																												
ROOSTER-4																												
Development																												
Integration																												
Launch/Ops																												
ROOSTER-5																												
Development																												
Integration																												
Launch/Ops																												
Tetra-1																												
Launch/Ops																												
Tetra-2																												
Development																												
Integration																												
Launch/Ops																												
Tetra-3																												

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
Development	█	█																										
Integration			█	█	█	█	█																					
Launch/Ops								█	█	█	█																	
<i>Tetra-4</i>																												
Development	█	█	█	█																								
Integration					█	█	█	█	█																			
Launch/Ops										█	█	█	█															
<i>Tetra-5</i>																												
Development					█	█	█	█	█	█	█	█																
Integration															█	█												
Launch/Ops																█	█	█	█									
<i>Blackjack</i>																												
Integration					█	█	█	█																				
Launch/Ops									█	█	█	█																
<i>QZS 6-Hosted Payload</i>																												
Development	█	█	█	█																								
Integration								█	█																			
Launch/Ops										█	█	█	█	█	█													
<i>QZS 7-Hosted Payload</i>																												
Development	█	█	█	█	█																							
Integration									█	█	█																	
Launch/Ops													█	█	█	█	█											
<i>MASE</i>																												
Development		█	█																									
<i>Space Combat Cloud</i>																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

Development																												
<i>DEICE Tech Stack</i>																												
Platform Compute and Store																												
Minimum Viable Product - Development																												
Increment 1																												
Increment 2-3																												
Increment 4-5																												
Increment 6-7																												
Increment 8																												
Integration & Operations																												
<i>Assault Breaker II</i>																												
Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
LDPE-1				
Integration	1	2021	4	2021
Launch/Ops	1	2022	1	2023
LDPE-2				
Integration	1	2021	2	2022
Launch/Ops	3	2022	3	2023
LDPE-3A				
Development & Integration	1	2021	4	2022
Launch/Ops	1	2023	1	2024
ROOSTER-4				
Development	3	2022	1	2024
Integration	2	2024	3	2025
Launch/Ops	4	2025	4	2027
ROOSTER-5				
Development	2	2024	3	2025
Integration	4	2025	3	2026
Launch/Ops	4	2026	4	2027
Tetra-1				
Launch/Ops	3	2022	3	2023
Tetra-2				
Development	4	2021	4	2022
Integration	1	2023	1	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Launch/Ops	2	2024	2	2025
Tetra-3				
Development	1	2021	2	2021
Integration	3	2021	4	2022
Launch/Ops	1	2023	1	2024
Tetra-4				
Development	1	2021	2	2022
Integration	3	2022	1	2024
Launch/Ops	2	2024	2	2025
Tetra-5				
Development	3	2022	4	2024
Integration	1	2025	3	2025
Launch/Ops	4	2025	4	2026
Blackjack				
Integration	1	2022	4	2022
Launch/Ops	1	2023	2	2024
QZS 6-Hosted Payload				
Development	1	2021	4	2022
Integration	1	2023	3	2023
Launch/Ops	4	2023	4	2025
QZS 7-Hosted Payload				
Development	1	2021	1	2023
Integration	2	2023	1	2024
Launch/Ops	2	2024	4	2025
MASE				

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space Defense Capabilities</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Development	2	2021	4	2021
<i>Space Combat Cloud</i>				
Development	3	2022	4	2023
<i>DEICE Tech Stack</i>				
Platform Compute and Store	2	2023	4	2027
Minimum Viable Product - Development	2	2023	3	2023
Increment 1	4	2023	1	2024
Increment 2-3	2	2024	1	2025
Increment 4-5	2	2025	1	2026
Increment 6-7	2	2026	1	2027
Increment 8	2	2027	3	2027
Integration & Operations	4	2023	4	2027
<i>Assault Breaker II</i>				
Development	1	2022	4	2027

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645611 / <i>Assault Breaker II</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
645611: <i>Assault Breaker II</i>	-	0.000	5.000	5.153	0.000	5.153	0.000	0.000	0.000	0.000	0.000	10.153
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Assault Breaker II (ABII) is an all-Service, classified, multi-year effort, led by DARPA, to analyze, research, and recommend material and non-material all domain counter-anti-access/area denial solutions to the Joint Requirements Oversight Council (JROC).

In FY 2021, an Omnibus Above Threshold Reprogramming of \$5.000M is captured in Project 645601.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Assault Breaker II	-	5.000	5.153	0.000	5.153
Description: Assault Breaker II is an all-Service, classified, multi-year effort, led by DARPA, to analyze, research, and recommend material and non-material all domain counter-anti-access/area denial solutions to the JROC.					
FY 2022 Plans: Classified details available upon request.					
FY 2023 Base Plans: Provide warfighter analysis, experiments, and development of modelling and simulation tools to support warfighting objectives established by DARPA.					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: N/A					
Accomplishments/Planned Programs Subtotals	-	5.000	5.153	0.000	5.153

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

N/A

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645611 / <i>Assault Breaker II</i>

D. Acquisition Strategy

Funds are sent to DARPA via a Military Interdepartmental Purchase Request (MIPR).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022			
Appropriation/Budget Activity 3620F / 4				R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>				Project (Number/Name) 645611 / <i>Assault Breaker II</i>							
Product Development (\$ in Millions)															
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Assault Breaker II	MIPR	Radiance Technologies : Huntsville, AL	-	-	5.000	Dec 2021	5.153	Dec 2022	-	-	5.153	Continuing	Continuing	-	
Subtotal			-	-	5.000		5.153		-		5.153	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			-	-	5.000		5.153		-		5.153	Continuing	Continuing	N/A	
<u>Remarks</u>															

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force							Date: April 2022													
Appropriation/Budget Activity 3620F / 4							R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>							Project (Number/Name) 645611 / <i>Assault Breaker II</i>						

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Assault Breaker II</i>																												
Development	[REDACTED]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / <i>Space Systems Prototype Transitions (SSPT)</i>	Project (Number/Name) 645611 / <i>Assault Breaker II</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Assault Breaker II</i>				
Development	1	2022	4	2023

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</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	-	42.400	35.931	57.953	0.000	57.953	62.765	62.171	62.579	63.481	Continuing	Continuing
642611: <i>Technology Insertion Planning and Analysis</i>	-	42.400	35.931	57.953	0.000	57.953	62.765	62.171	62.579	63.481	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports a range of activities including systems engineering, technology planning, development, demonstrations and prototyping, and testing, as well as modeling, simulations and exercises to support development and maturation of tactics and procedures for a responsive and resilient Space Control mission area. This includes technology development and prototyping for Defensive Counterspace (DCS) and Offensive Counterspace (OCS) and the necessary systems engineering for the warfighter to effectively employ such systems.

Specifically supported are DCS and Space Domain Awareness (SDA) activities, which include developing threat warning payloads for monitoring, detecting, identifying, tracking, assessing, verifying, categorizing, and characterizing objects and events in space. Additionally, this activity supports the development of payload prototypes and space defense force packages for protecting U.S. space systems, resources, and operations from enemy attempts to negate, interfere, or destroy them.

Specific OCS activities include disruption, denial, or degradation (and associated Electronic Support) of adversary space systems that may be used for purposes hostile to U.S. national security interests. Rapid Reaction Capabilities in response to immediate warfighter needs in the Space Control mission area are developed within this program. Depending on the magnitude of Combatant Command Urgent Operational Needs (UON), this program may not include necessary funding for all contingency deployments. As required, necessary funding will be requested through established Joint Urgent Operational Need (JUON) and Overseas Contingency Operations (OCO) processes.

Joint Space Technology Integration leverages knowledge of the space environment and impacts on weapon systems to prototype, develop, test, and field joint multi-domain software and modeling solutions to fill Combatant Commander gaps. Decades of space environment science and technology advancements require significant maturity to integrate with joint force systems in all domains to address immediate and evolving threats to U.S. forces operating in harm's way. Rapid and agile demonstrations, exercises, and war games provide essential validation of delivered capabilities to increase commanders confidence when used operationally.

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, to increase 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 repurpose existing capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver SCT 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. In CY 2021 \$0.160M was expended 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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	40.575	32.931	0.000	0.000	0.000
Current President's Budget	42.400	35.931	57.953	0.000	57.953
Total Adjustments	1.825	3.000	57.953	0.000	57.953
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	3.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.895	0.000			
• SBIR/STTR Transfer	-1.070	0.000			
• Other Adjustments	0.000	0.000	57.953	0.000	57.953

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 642611: *Technology Insertion Planning and Analysis*

Congressional Add: *NEXT-C Gridded Ion Thruster Development*

Congressional Add Subtotals for Project: 642611

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	5.000	3.000
Congressional Add Subtotals for Project: 642611	5.000	3.000
Congressional Add Totals for all Projects	5.000	3.000

Change Summary Explanation

FY 2021: \$2.895M reprogramming for Space Safari effort and -\$1.070 decrease for SBIR.

FY 2022: \$3.000M increase for gridded ion thruster.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Rapid Reaction Branch	20.064	19.490	18.934

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Description: Develops advanced capabilities for rapid prototyping and integration into space control programs of record and, if requested, to warfighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs). Conducts prototype capability development, testing, training and rapid transition of technology and techniques to space control systems. Sustains deployed quick reaction capabilities until transition to program of record or mission completion.</p> <p>FY 2022 Plans: Develop, test, train, field, transition and sustain advanced rapid reaction capabilities in response to emergent requirements from multiple Combatant Commands. Conduct initial technical development and integration activities against relevant threat systems and technologies in preparation for operational requirements. Develop and test advanced prototypes in support of activities within the Space Control Technology portfolio. Based on technological advances relevant to the mission area, develop, integrate and evaluate next generation capabilities into Government Reference Architecture (GRA) Increment 5. Develop, test, train, deliver and sustain urgent/emergent operational needs using Increment 4 or Increment 5 GRA technologies as appropriate for urgent need timelines. Integrate information assurance constructs and controls into developmental platforms to expedite fielding. Execute field development & test activities, at all locations, to verify system performance in the operational environment. Enhance fielded rapid reaction capabilities in response to evolving threats and operator feedback.</p> <p>Additionally, FY 2022 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2023 Plans: Develop, test, train, field, transition and sustain advanced rapid reaction capabilities in response to emergent requirements from multiple Combatant Commands. Conduct initial technical development and integration activities against relevant threat systems and technologies in preparation for operational requirements. Develop and test advanced prototypes in support of activities within the Space Control Technology portfolio. Based on technological advances relevant to the mission area, develop, integrate and evaluate next generation capabilities into (GRA) Increment 5. Develop, test, train, deliver and sustain urgent/emergent operational needs using Increment 4 or Increment 5 GRA technologies as appropriate for urgent need time-lines, and start Increment 6. Integrate information assurance constructs and controls into developmental platforms to expedite fielding. Execute field development & test activities, at all locations, to verify system performance in the operational environment. Enhance fielded rapid reaction capabilities in response to evolving threats and operator feedback.</p> <p>Additionally, FY 2023 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to inflation.				
Title: Integration and Technology Futures, changed from Warfighting and Technology Futures		17.336	13.441	14.319
Description: In FY 2023, "Warfighting and Technology Futures" effort title was changed to "Integration and Technology Futures" to capture overall mission and activities. This is not a new start.				
Foundational architecture and prototype development will enable the integration, interoperability and compatibility of new Space Control Technology into space systems. Funds sensor and other capability technologies for transition into programs to meet space control mission requirements.				
FY 2022 Plans: Capture OCS and DCS enterprise capabilities in digital engineering models that represent the space enterprise assets, operations, and related key performance characteristics. Exercise the digital engineering models to analyze the performance, operational capabilities, and interdependencies of space systems at the enterprise level to inform the space control mission area. Define and perform various digital engineering functions, tools, procedures, and best practices to accelerate acquisition of successful and affordable space control systems. Conduct IRON JAR space experimentation activities with programs of record and mission partners to demonstrate and evaluate space technologies, mature space operations processes, conduct operator training, develop tactics, techniques, and procedures (TTPs), and validate digital engineering models. Identify and prioritize solution development of new space technologies. FY 2022 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/ combat range events, and office support etc.				
FY 2023 Plans: Capture OCS and DCS enterprise capabilities in digital engineering models that represent the space enterprise assets, operations, related key performance characteristics, and threat response. Exercise the digital engineering models and establish secure networks for data sharing with mission partners to analyze the performance, operational capabilities, and interdependencies of space systems at the enterprise level to inform the counterspace mission areas. Define standards and perform various digital engineering functions, tools, procedures, and best practices to accelerate acquisition of successful and affordable counterspace systems.				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Conduct IRON JAR space experimentation activities with programs of record and mission partners to demonstrate and evaluate space technologies, mature space operations processes, conduct operator training, develop tactics, techniques, and procedures (TTPs), and validate digital engineering models. Identify and prioritize solution development of new space technologies. FY 2023 funding will allow the program to 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: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to inflation.</p>				
<p>Title: Military Application of the Space Environment (MASE)</p> <p>Description: MASE is not a new start as it was previously funded in Appropriation 3620, RDT&E, Space Force, PE 1206427S, Space Systems Prototype Transitions (SSPT).</p> <p>MASE provides commanders an operational risk assessment tool to improve air and maritime campaign mission effectiveness. Develops, tests, and delivers weapon system tailored visualizations/decision aids supporting operational level mission planning and tactical execution.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Research, develop and validate enhanced regional ionospheric and signal propagation models to predict (forecast) space domain impacts on weapon systems. Integrate model output into weapon system tailored visualizations to improve multi-domain mission planning and execution. Conduct demonstrations of new capabilities and validate results during campaign planning, exercises, and war games. Develop, test, and train new (or updated) tactics, techniques, and procedures for use by operational users. Integrate new traditional and non-traditional data sources into models to improve support to decision makers. Rapidly develop, test, and deploy new system features in response to Combatant Commander needs and a continuously evolving threat to U.S. forces.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to increased efforts for MASE, which is a multi-phase prototype being turned into a program of record and was sustained by the Unfunded Requirements (UFR) process in FY 2022.</p>		-	0.000	24.700
Accomplishments/Planned Programs Subtotals		37.400	32.931	57.953

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>
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	FY 2021	FY 2022
Congressional Add: NEXT-C Gridded Ion Thruster Development FY 2021 Accomplishments: N/A FY 2022 Plans: Project will partner with NASA to develop gridded ion thruster hardware based on the NASA Evolutionary Xenon Thruster - Commercial (NEXT-C) hardware development contract. The activity will include both in-house risk reduction tasks and contracted activities with industry through an existing contract mechanism. The objective for the project is to develop and test key components of a higher Thrust-to-Power (T/P) NEXT derivative for dual commercial and military applications. Development is planned to include the two key components of a propulsion system, including NEXT-C electric propulsion device and the associated higher power processing unit (PPU).	5.000	3.000
Congressional Adds Subtotals	5.000	3.000

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

N/A

Remarks

E. Acquisition Strategy

All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>	Project (Number/Name) 642611 / <i>Technology Insertion Planning and Analysis</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			
SCT Counterspace Technology Prototyping/ Rapid Reaction Development	Various	Various : Various	-	18.505	Oct 2020	17.443	Oct 2021	17.750	Oct 2022	-		17.750	Continuing	Continuing	-
SCT Integration and Technology Futures	C/Various	Various : Various	-	17.336	Dec 2020	12.701	Nov 2021	12.674	Nov 2022	-		12.674	Continuing	Continuing	-
NEXT-C Gridded Ion Thruster Development	TBD	TBD : TBD	-	5.000	Mar 2022	3.000	Sep 2022	-		-		-	Continuing	Continuing	-
MASE	Various	Various : Various	-	-		-		24.700	Oct 2022	-		24.700	Continuing	Continuing	-
Subtotal			-	40.841		33.144		55.124		-		55.124	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			
A&AS	Various	Various : Various	-	1.559	Jan 2021	2.787	Jan 2022	2.829	Jan 2023	-		2.829	Continuing	Continuing	-
Subtotal			-	1.559		2.787		2.829		-		2.829	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		-	42.400	35.931	57.953	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>	Project (Number/Name) 642611 / <i>Technology Insertion Planning and Analysis</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

RRB	
Rapid Prototyping/Demo/Testing/Fielding & Transition of UON/JUON/JEON Weapon System Capabilities	
Ongoing Capability Tests & DT Planning/ Execution	
Signal Processing Lab GRA (dev) Increment 5	
Signal Processing Lab GRA (dev) Increment 6	
Signal Processing Lab GRA (dev) Increment 7	
Integration and Technology Futures	
Enterprise Systems Engineering	
IRON JAR	
Space Control Technology Development & Transition	
Congressional Add	
NEXT-C Gridded Ion Thruster Development	
MASE	
Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206438SF / <i>Space Control Technology</i>	Project (Number/Name) 642611 / <i>Technology Insertion Planning and Analysis</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>RRB</i>				
Rapid Prototyping/Demo/Testing/Fielding & Transition of UON/JUON/JEON Weapon System Capabilities	1	2021	4	2027
Ongoing Capability Tests & DT Planning/Execution	1	2021	4	2027
Signal Processing Lab GRA (dev) Increment 5	3	2021	2	2024
Signal Processing Lab GRA (dev) Increment 6	4	2023	4	2026
Signal Processing Lab GRA (dev) Increment 7	3	2026	4	2027
<i>Integration and Technology Futures</i>				
Enterprise Systems Engineering	1	2021	4	2027
IRON JAR	1	2021	4	2027
Space Control Technology Development & Transition	1	2021	4	2027
<i>Congressional Add</i>				
NEXT-C Gridded Ion Thruster Development	1	2021	4	2022
<i>MASE</i>				
Development	1	2023	4	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206458SF / <i>Tech Transition (Space)</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	-	0.000	50.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
64S444: <i>Experimentation (Space)</i>	-	0.000	50.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Tech Transition (Space) Program addresses the gap between initial system-level technology or concept development and demonstration, and successful acquisition and operational capability implementation. This program also matures new warfighting concepts to rapidly develop and experiment with fieldable prototypes to assess military utility of transition-ready weapon systems. Following the guidance in the National Defense Strategy, the Department of the Air Force has institutionalized Experimentation and Prototyping to achieve smarter, faster, and more efficient acquisitions that move technologies rapidly to support the most critical warfighting capabilities. Project 64S444, Experimentation (Space), explores new space-related concepts and their applications in potential future operating environments within a system-of-systems context, taking risks early in the acquisition process to drive a more optimized and efficient acquisition process and significantly reduce overall acquisitions costs. The Tech Transition Program allows acquisition program managers (the capability developers) and warfighters (the capability recipients and end users) to prototype, integrate, and demonstrate candidate technologies and assess them in an operational system-of-systems environment in partnership with Combatant Commanders, Major and Field Commands, Program Executive Officers, schoolhouses, simulation facilities, and development planning organizations.

This Program was a Congressionally-directed new start in FY 2022. It is a parallel effort to United States Air Force Program Element (PE) 0604858F, Tech Transition Program, Project 645350, Experimentation, and continues space-related work executed in that Program in prior fiscal years.

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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206458SF / <i>Tech Transition (Space)</i>
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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	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	50.000	0.000	0.000	0.000
Total Adjustments	0.000	50.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	50.000			
• 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	0.000	0.000	0.000

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 64S444: *Experimentation (Space)*

Congressional Add: *Program Increase - Arctic Communications*

Congressional Add Subtotals for Project: 64S444

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	0.000	50.000
Congressional Add Subtotals for Project: 64S444	0.000	50.000
Congressional Add Totals for all Projects	0.000	50.000

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

Congressional Add: Program Increase - Arctic Communications

FY 2021 Accomplishments: N/A

FY 2022 Plans: Conduct Congressionally directed effort.

	FY 2021	FY 2022
Congressional Add: Program Increase - Arctic Communications	0.000	50.000
FY 2021 Accomplishments: N/A		
FY 2022 Plans: Conduct Congressionally directed effort.		
Congressional Adds Subtotals	0.000	50.000

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

N/A

Remarks

E. Acquisition Strategy

United States Space Force (USSF) Futures and Integration and the Office of the Assistant Secretary of the Air Force for Acquisition, Technology and Logistics direct experimentation campaigns within this Program. The Air Force Research Lab (AFRL) at Wright-Patterson Air Force Base, Ohio manages and executes these efforts.

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

Appropriation/Budget Activity
3620F: *Research, Development, Test & Evaluation, Space Force I BA 4:
Advanced Component Development & Prototypes (ACD&P)*

R-1 Program Element (Number/Name)
PE 1206458SF / *Tech Transition (Space)*

The contracting approach includes full-and-open competition using the existing Defense Experimentation Using the Commercial Space Internet (DEUCSI) Acquisition Strategy. A specific Call for this effort has already been released. Contracts are expected to be awarded to Terminal Vendors and Test and Integration Groups.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206458SF / <i>Tech Transition (Space)</i>	Project (Number/Name) 64S444 / <i>Experimentation (Space)</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			
Congressional Add Arctic Comm terminals	Various	Various : Various	-	-		40.000	Jul 2022	-		-		-	Continuing	Continuing	-
Subtotal			-	-		40.000		-		-		-	Continuing	Continuing	N/A

Support (\$ 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			
Congressional Add Arctic Comm Test and Evaluation	Various	Various : Various	-	-		10.000	Dec 2022	-		-		-	Continuing	Continuing	-
Subtotal			-	-		10.000		-		-		-	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	-	-	50.000	-	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206458SF / <i>Tech Transition (Space)</i>	Project (Number/Name) 64S444 / <i>Experimentation (Space)</i>
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Congressional Add Arctic Comm</i>	
Congressional Add - Arctic Comm	██████████
<i>Experimentation Campaign</i>	
Experimentation Campaign	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206458SF / <i>Tech Transition (Space)</i>	Project (Number/Name) 64S444 / <i>Experimentation (Space)</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Congressional Add Arctic Comm</i>				
Congressional Add - Arctic Comm	1	2022	4	2022
<i>Experimentation Campaign</i>				
Experimentation Campaign	1	2023	4	2023

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730SF / <i>Space Security and Defense Program</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	-	56.311	53.896	59.169	0.000	59.169	60.151	51.623	52.792	53.820	Continuing	Continuing
64A025: <i>Space Protection Program</i>	-	56.311	53.896	59.169	0.000	59.169	60.151	51.623	52.792	53.820	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) 1206730F, Space Security and Defense Program (SSDP) funds Department of Defense (DoD)/United States Space Force (USSF) Space Security and Defense Program. SSDP is a Joint DoD and Office of the Director of National Intelligence (ODNI) organization established to function as the center of excellence for options and strategies (materiel, nonmateriel, cross-Title, cross-domain) leading to a more resilient National Security Space (NSS) Enterprise to support stakeholders including the DoD, Intelligence Community (IC), civil, commercial, and international space entities/missions; supporting national security missions in both peacetime and throughout all phases of conflict. SSDP operates under the authority of the Deputy Secretary of Defense (DEPSECDEF) and Principal Deputy Director of National Intelligence (PDDNI) to lead and collaborate on NSS susceptibility and vulnerability assessments, and lead threat mitigation processes. SSDP's unique position within the DoD and ODNI, authorities from DEPSECDEF and PDDNI, and broad NSS-scoped mission-set provides a crucial and objective protection competency; advancing the highest priority efforts to deliver economical, programmatically-executable, and operationally-relevant space protection solutions for the Nation.

SSDP's scope includes the capability to conduct rigorous foundational analyses in order to understand the threat and operations environments, and plan and execute projects to discover, analyze, and validate near-term and far-term options to mitigate these threats, render adversary capabilities ineffective, and result in more resilient space effects for national security missions. Validated options/solutions to mitigate/defeat adversary counterspace threats are proposed to NSS stakeholders and introduced into their requisite requirements, budgetary, and investment decision processes; manifesting themselves (as appropriate) in Tactics, Techniques, and Procedures (TTP), Concepts of Operations (CONOPS), space policy, and Space Control mission area force design recommendations including technical system and/or architectural recommendations.

It is important to note that SSDP's mission is distinctly different from the USSF's Space Warfighting Analysis Center (SWAC); focusing its efforts on the Space Control mission area for the NSS enterprise while the SWAC's mission is aligned with Service authorities and focuses on USSF-specific priorities. SSDP will continue to share their extensive threat models and analyses with the SWAC to ensure efficiency and speed of analysis.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage and execute SSDP and/or deliver products for emergent or unanticipated weapon system capabilities.

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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206730SF / Space Security and Defense Program
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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	56.311	56.546	0.000	0.000	0.000
Current President's Budget	56.311	53.896	59.169	0.000	59.169
Total Adjustments	0.000	-2.650	59.169	0.000	59.169
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-2.650			
• 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	59.169	0.000	59.169

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.

NOTE: SSDP received an FY22 Congressional reduction, -\$2.65M for forward financing.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Space Protection and Survivability	56.311	53.896	59.169	0.000	59.169
Description: SSDP efforts are deliberately organized to make meaningful contributions to discover, analyze, and validate near-term and far-term options to improve the resilience of space effects for national security missions; in doing so SSDP applies physics-based models and simulation environments, and high fidelity data-driven technical analysis to mitigate adversary counterspace threats consistent with NSS priorities. SSDP has conducted foundational work with key stakeholders to assess current and emerging adversary threat capabilities and concepts with Intelligence Community (IC) partners and counterspace subject matter experts; and to organize, plan, and execute a series of policy, doctrine, strategic messaging, fire control, and wargaming efforts to inform its force design and system/architecture recommendations. Rigorously-validated threat mitigation research, analyses, and demonstrations are closely-coupled with this foundational work, and yield actionable, timely, and efficient protection products that shape integrated force design guidance in Space Control-related mission areas, and inform requisite requirements, budgetary, and investment decision processes; manifesting themselves (as appropriate) in programs and architectures, as well as CONOPS TTPs, and space policy. SSDP					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730SF / <i>Space Security and Defense Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>activities ultimately prepare options and strategies to increase NSS capabilities' resilience and availability for national security missions in both peacetime and throughout all phases of conflict.</p> <p>FY 2022 Plans: In FY 2022 SSDP organized its data-driven technical analysis, physics-based models and simulation environments and capabilities toward prior years' enduring product areas/objectives including: 1) Foundational Work, 2) Defend the Legacy, 3) Pivot to Offense, and 4) Prepare for the Future Fight, with FY 2022-specific focus areas. The 90-Day Study, SecAF Space Strategy, and OSD-requested Space Program Reviews shaped the specific activities, and SSDP is also increasing its weight of effort toward objectives 3) Pivot to Offense and 4) Prepare for the Future Fight.</p> <p>In FY 2022 there were multiple efforts aligned with SSDP's first foundational objective. All efforts leveraged prior accomplishments toward NSS priorities, and advanced or commenced threat characterization and definition packages to meet ongoing and new-priority needs. SSDP also started promulgating a new Model-Based Systems Engineering (MBSE) standards/style guide through its space protection simulations, Wargaming and other analyses efforts to communicate the counterspace threat environment with internal and external transition partners, and its interplay with Force Designs and warfighting concepts, doctrine, and policy.</p> <p>Objectives to defend legacy capabilities and establish a more offensive space protection posture required efforts to discover, analyze, and validate space control force design recommendations, and some continued partnership investments to transition specific system/technology solutions and concepts with key stakeholders including planned and programmed future capabilities. Examples include a variety of efforts to advance Electronic Warfare (EW) and Command and Control (C2), dissect blue kill chains, produce design reference missions, and analyze multi-domain space and terrestrial scenarios to maximize NSS space effects to the warfighters in and through a space fight.</p> <p>SSDP recognized a need to increase focus toward options that increase NSS resilience and effectiveness in future fights through new ways of looking at space protection. Activities aligned with this fourth objective and non-traditional solution-space will create opportunity to manage escalation through exploring a diverse portfolio of activities to better understand and mature non-traditional kill chains and mechanisms, diversify data transport and processing, harden systems, and improve the C2 required to successfully employ these efforts.</p> <p>FY 2023 Base Plans:</p>					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730SF / <i>Space Security and Defense Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>In FY 2023 SSDP will remain focused on its three enduring objective areas: Defend the Legacy Architecture, Pivot to Offense, and Prepare for the Future Fight; emerging and backlogged priorities will be emphasized as FY 2022 mitigation work completes or transitions. Foundational work must continue to mature and drive threat assessments with stakeholders to inform concepts, doctrine, policy, space control force designs, fire control solutions, and MBSE products through wargaming and other NSS stakeholder activities. SSDP will remain committed to research, study, and demonstrate in the best interest of and in accordance with the priorities of the NSS stakeholders it represents and serves, with ever-maturing technical rigor as this counterspace and space protection landscape continue to unfold and evolve.</p> <p>In FY 2023, foundational efforts to promulgate MBSE across space protection analyses and solutions as well as threat definition documentation will increase the value of SSDP's foundational work toward NSS priorities. Space protection simulations, Wargaming and other analyses will continue to mature with space protection capabilities NSS Force Designs, warfighting concepts, doctrine, and policy.</p> <p>Program efforts to defend legacy capabilities and establish offensive space protection capabilities will continue to mature ongoing space control force designs and associated design-specific system/technology solutions and concepts with key stakeholders. FY 2022 efforts to advance EW and C2, dissect blue kill chains, produce design reference missions, and analyze multi-domain space and terrestrial scenarios will produce opportunities to prototype and/or demonstrate, and transition to NSS stakeholders. 2023 will focus on evolving 2022 force designs to enable the US to more flexibly hold adversary capabilities at risk without increased risk of escalation.</p> <p>SSDP's diverse portfolio of FY 2022 activities and accomplishments further advanced the landscape of space protection and substantiated a more pronounced focus on preparing for the future fight. This heightened focus on the non-traditional solution-space will further-refine kill chains and mechanisms, diversify data transport and processing, harden systems, and validate the readiness of prospective C2 solutions for subsequent demonstration and prototyping; ultimately providing options to manage escalation and increase NSS resilience and effectiveness in future fights.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730SF / <i>Space Security and Defense Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
FY 2023 funds increased due to inflation and to reflect annual funding levels necessary to support the space protection and survivability analysis mission area.					
Accomplishments/Planned Programs Subtotals	56.311	53.896	59.169	0.000	59.169

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

Remarks
N/A

E. Acquisition Strategy
All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. The program consists of numerous efforts/projects.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3620F / 4				PE 1206730SF / Space Security and Defense Program				64A025 / Space Protection Program							
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Space Protection and Survivability	Various	Various : TBD	-	50.133	May 2021	47.665	May 2022	52.524	Jan 2023	-		52.524	Continuing	Continuing	-
Subtotal			-	50.133		47.665		52.524		-		52.524	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Program Support and Infrastructure	Various	Various : TBD	-	1.995	Mar 2021	2.138	Mar 2022	2.326	Nov 2022	-		2.326	Continuing	Continuing	-
Oversight, Advisory and other Technical Support	Various	Various : TBD	-	4.183	Mar 2021	4.093	Mar 2022	4.319	Nov 2022	-		4.319	Continuing	Continuing	-
Subtotal			-	6.178		6.231		6.645		-		6.645	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			-	56.311	53.896	59.169	-	59.169	Continuing	Continuing	N/A				
Remarks															
N/A															

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206730SF / <i>Space Security and Defense Program</i>	Project (Number/Name) 64A025 / <i>Space Protection Program</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Space Security and Defense Program	
Foundational Adversary Space, Counterspace, and Enabling Analyses	
Foundational Multi/Cross-Domain & Space-To-Space Analyses	
Foundational Space Policy & Strategy Analyses	
Foundational Fire Control & Space Domain Awareness	
Foundational Concepts & Wargaming	
Foundational Modeling & Simulation	
Defend the Legacy Architecture-Space Control, C2, & TTP	
Pivot to Offense (PTO)-Electronic Warfare Force Design	
PTO-Space Control, C2, & TTP	
PTO-Integrated Targeting Event	
Prepare for the Future Fight (PFF)-Multi-Domain Effects	
PFF-Cyber Fires	
PFF-Space Control, C2 & TTP	
PFF-Adversary Analyses	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206730SF / <i>Space Security and Defense Program</i>	Project (Number/Name) 64A025 / <i>Space Protection Program</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Security and Defense Program</i>				
Foundational Adversary Space, Counterspace, and Enabling Analyses	1	2021	4	2027
Foundational Multi/Cross-Domain & Space-To-Space Analyses	1	2021	4	2027
Foundational Space Policy & Strategy Analyses	1	2021	4	2027
Foundational Fire Control & Space Domain Awareness	1	2021	4	2027
Foundational Concepts & Wargaming	1	2021	4	2027
Foundational Modeling & Simulation	1	2021	4	2027
Defend the Legacy Architecture-Space Control., C2, & TTP	1	2021	4	2027
Pivot to Offense (PTO)-Electronic Warfare Force Design	1	2021	4	2027
PTO-Space Control, C2, & TTP	1	2021	4	2027
PTO-Integrated Targeting Event	1	2022	2	2024
Prepare for the Future Fight (PFF)-Multi-Domain Effects	1	2021	4	2027
PFF-Cyber Fires	1	2022	4	2024
PFF-Space Control, C2 & TTP	1	2022	4	2027
PFF-Adversary Analyses	1	2022	1	2024

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206760SF I Protected Tactical Enterprise Service (PTES)
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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	-	105.718	100.320	121.069	0.000	121.069	91.814	149.112	121.455	235.519	Continuing	Continuing
643726: PTES	-	105.718	100.320	121.069	0.000	121.069	91.814	149.112	121.455	235.519	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The global threat of electronic warfare attacks against space systems will expand in the coming years in both number and types of weapons. Threat development will very likely focus on jamming capabilities against dedicated military satellite communications (MILSATCOM). To address this critical threat, the Space Force is developing the Protected Tactical Enterprise Service (PTES) ground system to provide worldwide, anti-jam, Low Probability of Intercept (LPI) communications for tactical warfighters. PTES will use the Protected Tactical Waveform (PTW) to provide anti-jam communications via military and commercial satellite systems for tactical users in all Services. Initially, PTES will utilize the Wideband Global SATCOM (WGS) system and may be expanded later to include commercial satellites and the Protected Tactical SATCOM (PTS) system.

The PTES program is developing a Mission Management System (MMS), a Key Management System (KMS), and Joint Hubs to enable PTW via transponded WGS satellites, with future extension to commercial SATCOM. Production-representative PTW modems for user terminals were developed by the Protected Tactical Service Field Demonstration (PTSFD) and separately acquired by each Service and by international partners.

To meet the warfighter requirements for protected tactical MILSATCOM and the capability gaps identified in these studies, RDT&E funding is required for architectural development, acquisition strategy development, system requirements and system trades analysis, and engineering, manufacturing, developing, testing and evaluating PTES systems and segments.

The PTES Rapid Prototype addresses an operational need in the Pacific region by achieving Initial Operational Capability (IOC) in FY 2024. IOC provides ground elements for PTW over WGS and consists of PTES installation at two WGS Gateway sites utilizing one WGS satellite. The Navy Wideband Anti-Jam Modem System (WAMS), the Air Force-Army Anti-Jam Modem (A3M), and other stakeholders rely on PTES to provide PTW ground infrastructure. The Space Force is utilizing FY 2016 National Defense Authorization Act, Middle Tier of Acquisition for Rapid Prototyping authority to deliver a PTES Operational Demonstration meeting IOC threshold capabilities in FY 2022. At Full Operational Capability (FOC) PTES will provide worldwide PTW operations using up to all WGS satellites.

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 repurpose existing capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206760SF I Protected Tactical Enterprise Service (PTES)
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTES 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.

The total cost of the PTES Middle Tier of Acquisition effort is \$332 million, including RDT&E prototype units. The PTES Rapid Prototype Middle Tier Acquisition effort is fully funded across the Future Years Defense Program.

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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	109.390	100.320	0.000	0.000	0.000
Current President's Budget	105.718	100.320	121.069	0.000	121.069
Total Adjustments	-3.672	0.000	121.069	0.000	121.069
• 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	-3.672	0.000			
• Other Adjustments	0.000	0.000	121.069	0.000	121.069

Change Summary Explanation

FY 2021: -3.672M; SBIR/STTR Transfer

FY 2023: +121.069M; 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: PTES Prototype Development	105.718	100.320	121.069
Description: After competitive contract award, the PTES team will develop a prototype consisting of three segments: a MMS, a KMS, and joint hubs integrated into existing SATCOM gateways. PTES will enable an anti-jam communications capability via PTW over WGS for tactical users in all Services and International Partners. The PTES team will be responsible for developing all PTES segments and performing all system integration, including end-to-end tests of the complete PTES prototype.			
FY 2022 Plans:			

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206760SF I Protected Tactical Enterprise Service (PTES)
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Complete Agile Build 3 and 4 of the PTES Prototype Development and commence Build 5. Conduct Operational Demonstration of PTES Minimum Viable Product. Continue to test and deliver MMS, KMS, and Key Loading Initialization Facility (KLIF) functionality on multiple system-level integration and testing events on the Government approved Data Center environment. Conduct the Build 3 Risk Reduction Test on the PTES Integration, Test and Development Environment. Continue to conduct required cybersecurity assessments and obtain cybersecurity operational Authority to Operate (ATO) and PATS Operations Center (PATSOCC) Authority to Connect (ATC). Complete Joint Hub End Cryptographic Unit (ECU) NSA certification, Joint Hub Space and Missile Defense Command (SMDC) certification, and Joint Hub System Acceptance Testing (SAT). Complete KMS ECU certification. Complete interoperability certification. 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, experimentation, prototyping, etc.</p> <p>FY 2023 Plans: Conduct Risk Reduction Test 4 upon completion of Software Build 4 of the PTES Prototype Development. Complete Software Build 5 and commence Software Build 6. Continue developmental and operational testing efforts to support two SATCOM gateways leading up to IOC in early FY 2024. Continue to test and deliver MMS, KMS, and Key Loading Initialization Facility (KLIF) functionality on multiple system-level integration and testing events on the Government approved Data Center environment. The FY 2023 funding achieves PTES functionality and automation on-time for IOC that was traded in the interest of achieving a mean viable product during the rapid prototyping phase. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increase is due to conducting Risk Reduction Test 4, completion of Software Build 5 and the start of software Build 6. Additionally, execution of Integrated Test and Evaluation (IT&E) and Multi-service Operational Test and Evaluation (MOT&E), completing SMDC certification, and PTW extensibility to commercial architectures.</p>			
Accomplishments/Planned Programs Subtotals	105.718	100.320	121.069

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPSF 01 BA01 PTES00: PTES HUB	-	7.406	40.954	-	40.954	-	-	-	-	0.000	48.360

Remarks

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

Appropriation/Budget Activity
3620F: Research, Development, Test & Evaluation, Space Force I BA 4:
Advanced Component Development & Prototypes (ACD&P)

R-1 Program Element (Number/Name)
PE 1206760SF I Protected Tactical Enterprise Service (PTES)

E. Acquisition Strategy

PTES was designated as a rapid prototype in June 2018 under Middle Tier Acquisition of the National Defense Authorization Act for Fiscal Year 2016 (Public Law 114-92). The objective of the PTES ground system is to provide an operational anti-jam communications capability via WGS using PTW. The PTES acquisition approach is to competitively award a single contract to develop and field PTES, through declaration of FOC. Boeing and sub-contractors will be responsible for developing all PTES segments (MMS, KMS, and Joint Hub) and performing all system integration, including end-to-end tests of the complete PTES prototype. The 45th Test Squadron is planned to be the PTES Developmental Test organization and Air Force Operational Test and Evaluation Center (AFOTEC) is planned to be the Operational Test organization. Current PTES Rapid Prototype MTA is expected to complete by 3Q FY 2022. Plans are being developed to transition from a prototype capability towards providing a PTW worldwide capability through FOC.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)					
3620F / 4				PE 1206760SF / Protected Tactical Enterprise Service (PTES)						643726 / PTES					
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Protected Tactical Enterprise Service Prototype Development	C/CPIF	Boeing : El Segundo, CA	-	87.622	Oct 2020	77.154	Dec 2021	95.518	Oct 2022	-		95.518	Continuing	Continuing	-
Data Center	Various	Various : Various	-	0.216	Dec 2020	0.540	Dec 2021	2.400	Dec 2022	-		2.400	Continuing	Continuing	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	6.210	Nov 2020	5.810	Nov 2021	4.350	Jan 2023	-		4.350	Continuing	Continuing	-
Enterprise SE&I	Various	Various : Various	-	11.075	Oct 2020	10.040	Dec 2021	10.570	Oct 2022	-		10.570	Continuing	Continuing	-
Subtotal			-	105.123		93.544		112.838		-		112.838	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Test Planning & Execution DT/OT	Various	Various : Various	-	0.555	Dec 2020	4.490	Dec 2021	5.600	Nov 2022	-		5.600	Continuing	Continuing	-
Subtotal			-	0.555		4.490		5.600		-		5.600	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
FFRDC	MIPR	Aerospace : El Segundo, CA	-	0.000	Nov 2020	0.160	Nov 2021	0.120	Jan 2023	-		0.120	Continuing	Continuing	-
A&AS	Various	Various : Various	-	0.000	Nov 2020	2.006	Nov 2021	2.421	Jan 2023	-		2.421	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.040	Oct 2020	0.120	Nov 2021	0.090	Oct 2022	-		0.090	Continuing	Continuing	-
Subtotal			-	0.040		2.286		2.631		-		2.631	Continuing	Continuing	N/A
Project Cost Totals			-	105.718		100.320		121.069		-		121.069	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force							Date: April 2022			
Appropriation/Budget Activity 3620F / 4			R-1 Program Element (Number/Name) PE 1206760SF / <i>Protected Tactical Enterprise Service (PTES)</i>			Project (Number/Name) 643726 / PTES				
	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206760SF / <i>Protected Tactical Enterprise Service (PTES)</i>	Project (Number/Name) 643726 / PTES

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027						
	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			
PTES Ground																															
PTES Prototype Development																															
ECU Preliminary Design Review (PDR)																															
Software Build 2																															
Risk Reduction Test (Build 2)																															
Software Build 3																															
Risk Reduction Test (Build 3)																															
ECU Critical Design Review (CDR)																															
Operational Demonstration (IOC Threshold Capability)																															
Software Build 4																															
Risk Reduction Test (Build 4)																															
Software Build 5																															
Initial Operational Capability (IOC)																															
Software Build 6																															
Software Build 7																															
Software Build 8																															
Full Operational Capability (FOC)																															
Developmental/Operational Testing (to include Planning)																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206760SF / <i>Protected Tactical Enterprise Service (PTES)</i>	Project (Number/Name) 643726 / PTES

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>PTES Ground</i>				
PTES Prototype Development	1	2021	4	2026
ECU Preliminary Design Review (PDR)	1	2021	1	2021
Software Build 2	1	2021	3	2021
Risk Reduction Test (Build 2)	4	2021	4	2021
Software Build 3	2	2021	1	2022
Risk Reduction Test (Build 3)	2	2022	2	2022
ECU Critical Design Review (CDR)	4	2021	4	2021
Operational Demonstration (IOC Threshold Capability)	3	2022	3	2022
Software Build 4	1	2022	4	2022
Risk Reduction Test (Build 4)	1	2023	1	2023
Software Build 5	4	2022	3	2023
Initial Operational Capability (IOC)	1	2024	1	2024
Software Build 6	3	2023	2	2024
Software Build 7	2	2024	1	2025
Software Build 8	1	2025	4	2025
Full Operational Capability (FOC)	1	2026	1	2026
Developmental/Operational Testing (to include Planning)	1	2021	4	2026

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</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	-	193.291	229.329	294.828	0.000	294.828	360.442	348.957	345.692	465.268	Continuing	Continuing
643728: <i>Protected Tactical SATCOM</i>	-	193.291	229.329	294.828	0.000	294.828	360.442	348.957	345.692	465.268	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The global threat of electronic warfare attacks against space systems will expand in the coming years in both number and types of weapons. Threat development will very likely focus on jamming capabilities against dedicated military satellite communications. To address this critical threat, the Space Force is developing the Protected Anti-jam Tactical Satellite Communications (PATs) family-of-systems, Protected Tactical Satellite Communications (PTS) program to mitigate adversarial jamming effects. PTS provides worldwide and polar, beyond-line-of-sight, Anti-Jam (AJ), low- probability-of intercept communications in benign and highly-contested environments utilizing the Protected Tactical Waveform (PTW). PTS, with its on-board payload processing and antenna design, enables reliable tactical satellite communications within close proximities to adversarial jammers. The system also employs interfaces consistent with United States Space Force's on-going resilience initiatives; thereby enhancing mission assurance, resiliency, and interoperability.

The Space Force is utilizing FY 2016 National Defense Authorization Act, Middle Tier of Acquisition for Rapid Prototyping authority and Section 815, Other Transaction Authority (OTA), to achieve an affordable, rapid, operational capability for the tactical warfighter. This strategy employs spiral payload development to progressively and incrementally deploy prototypes with residual capabilities demonstrated in an operational environment. These spiral payload prototypes demonstrate innovative anti-jam technologies with modular and scalable payloads to meet validated military needs for protected tactical communications. This includes technical baseline development, systems engineering trade analyses, internal/external system integration and development, candidate system architecture evaluations, risk reduction demonstrations, prototyping concepts development, system testing, and enabling technologies maturation.

PTS includes a space segment, ground segment, and gateway segment. For the space segment, the Space Force strategy utilizes a payload-centric focus to enable an affordable, resilient space architecture. This enables hosting and rideshare opportunities with other US government, commercial, International Partner satellites or integration onto a commodity satellite bus. For the ground segment, PTS leverages the Enterprise Ground Service (EGS) for satellite command and control, and the Protected Tactical Enterprise Service (PTES) rapid prototyping activity for mission and key management planning. The PTS gateway segment enables tactical warfighters reach back to global DoD Information Network. The PTS user terminal segment, not included in this PTS acquisition, will be procured by the military services utilizing low-cost PTW modem upgrades enabled by the Air Force-Army Anti-Jam Modem (A3M) ACAT III program and the Navy Wideband Anti-Jam Modem System (WAMS) technology demonstration program.

Space acquisition must respond with speed and agility to emerging adversary threats. Space System 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

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>
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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTS 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.

The total cost of the PTS program Middle Tier of Acquisition effort is \$916M, including RDT&E and procurement of prototype units. PTS Rapid Prototype Middle Tier of Acquisition effort is fully funded across the Future Years Defense Program.

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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	200.178	243.285	0.000	0.000	0.000
Current President's Budget	193.291	229.329	294.828	0.000	294.828
Total Adjustments	-6.887	-13.956	294.828	0.000	294.828
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-13.956			
• 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	-6.887	0.000			
• Other Adjustments	0.000	0.000	294.828	0.000	294.828

Change Summary Explanation

FY 2021: -\$6.887M SBIR/STTR transfer.

FY 2022: -\$13.956M Congressional Directed Reduction.

FY 2023: +\$294.828M; 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Technical Baseline Management and System Integration	25.146	29.327	38.531
Description: Perform as Government system integrator function through acquiring, designing, testing, and integrating key prototype segments and interfaces. Mature technical baseline and interface requirements for the prototype system. Conduct			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>architectural engineering and system level integration planning for the PTS space, ground, and gateway segments. Support, configure, and conduct integrated testing of the major PTS subsystems, segments, and end-to-end prototype system. Manage the PTS open system architecture, refine interface requirements, and validate concept of operations through integrated system performance demonstrations.</p> <p>FY 2022 Plans: Support prototype capability and interface maturity demonstrations of up to two flight prototype payloads. Iteratively incorporate critical lessons from demonstrations into maturation and refinement of the technical baseline and system architecture. Identify and mitigate program risks through the use of engineering trades, supported by the major design reviews and ongoing progress demonstrations. Continue managing key system interfaces for prototype Ground, Space, and Gateway Segments. Provide integration support for these components, along with the Space Hub End Cryptographic Unit (ECU) to the prototype payload contractors. Support PATS level integration and reduce risks to integrating with PTES and other partner programs. Conduct key interface tests between the PTS prototype and emulators/simulators to reduce risk prior to entering Build and Test phase of the payload.</p> <p>FY 2023 Plans: Continue prototype capability development and interface maturity demonstrations of two prototype payloads. Incorporate critical lessons from demonstrations into maturation and refinement of the technical baseline and system architecture. Engineering trades identified during ongoing progress demonstrations will continue to provide the necessary mitigation steps for program risks. Continue to manage key system interfaces for prototype Ground, Space, and Gateway Segments. Conduct Lead System integration for these components, along with the Space Hub End Cryptographic Unit (ECU) interfaces to the prototype payload contractors. Conduct key interface tests between the PTS prototype and emulators/simulators to reduce risk to PATS level integration with PTES and other partner programs. Continue testing, characterizing, and demonstrating anti-jam communication capabilities. Continue Ground CONOPS architecture development. Begin coordinating with national and international agencies for orbital slots and frequency allocation. Conduct launch planning and activities to include Space Vehicle and Launch Vehicle integration studies and coordination.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to the start of system level integration and testing, to include managing the system interfaces to the Ground, Space, and Gateway segments, and the start of launch planning.</p>				
Title: Space Hub End Cryptographic Unit (ECU)		3.319	6.110	3.418
Description: Develop a single, National Security Agency (NSA) certified, space-flight qualified, production-ready Space Hub ECU for integration with the PTS payloads. Initiate execution of engineering and design work in advance of rapid prototype design and				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
development to alleviate critical path risks to the launch of PTS payloads. Conduct requirements reviews, functional and design reviews, PTS interface development, Interface Control Document (ICD) coordination, and payload integration with PTS vendors.				
FY 2022 Plans: Complete development, and functional tests of Space Hub ECU. Obtain NSA certification. Conduct flight acceptance testing on production ready assemblies. Provide integration support to facilitate final flight delivery to enable payload build and test activities.				
FY 2023 Plans: Continue ECU build and final testing of production (flight ready) units to receive NSA certification and then deliver ECU to payload contractors for integration. Conduct quick reaction for ECU troubleshooting/deficiency resolution during payload integration.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to the completion of the ECU build and test phase.				
Title: PTS Rapid Prototype Design and Development		164.826	179.146	231.369
Description: Rapid prototyping of PTS space, ground, and gateway segments and key system components. Develop, demonstrate, test, and evaluate PTS hardware and software systems. Design and develop modular, scalable payloads to support hosted or free-flyer configurations. Demonstrate prototype payload performance on-orbit. Evaluate PTS concept of operations with user participation and enable potential residual operational capability. Mature and validate user requirements. Continue prototyping and risk reduction efforts.				
FY 2022 Plans: Complete the acquisition of vital prototype Ground and Gateway Segment equipment to enable testing and initial operations of prototype payloads. Continue development and design of Space Segment specific interfaces between the Ground and Gateway Segments of the PTS System. Continue developing, purchasing, and delivering government furnished software and hardware to allow ongoing demonstrations of prototype technology. Conduct Critical Design Review equivalent reviews and critical progress demonstrations to afford important feedback and maturation opportunities to the two remaining prototype contractors. Execute integration of bus and payloads to support capability demonstrations. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.				
FY 2023 Plans: Continue build, integration and testing for two competing prototype payloads. Complete prototype payload build, integration and testing. Continue build and integration of government furnished software and hardware. Continue development, build, integration and test/demonstrations of ground and gateway terminal with payload prototypes to reduce system level risk. Begin payload to space vehicle integration and testing. Conduct space vehicle to launch vehicle integration studies/coordination. Continue Engineering and Manufacturing Development (EMD) Phase acquisition planning. Receive approval of EMD Acquisition Strategy				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
and permission to release Request for Proposal. 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.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased to support final prototype payload build, integration and test activities for two payloads.				
Title: Protected Tactical Testbed		0.000	14.746	21.510
Description: Protected Tactical Testbed provides a government gold standard of reference for risk reduction and experimentation on critical technology elements for the space payload, terminals and networking segments of the PATS system. It enables system integration capabilities with industry and FFRDC partners for interoperability testing and conducting experiments to mature the PATS operations, with a focus on the Protected Tactical Waveform (PTW).				
FY 2022 Plans: This is not a new start. This major thrust was transferred from PE1206431SF, Advanced EHF MILSATCOM (SPACE), in FY 2022. Testbed assets will continue to be used by both the government and contractor teams to support the PATS mission through vital system integration and demonstration events leading into their various major design reviews and essential risk reduction activities. Demonstrate interoperability between the Payload and the MMS, interoperability/interface and control of the Space Hub Integrated ECU Leading Edge Development (SHIELD) to the Payload, and compatibility with PATS user terminals. Perform eleven PTW Lead Service duties the Air Force is required to perform to ensure PTW will support the Department's Core Waveform program, to include verification of the PTW modem interoperability with the joint force. Utilize Joint SATCOM Engineering Center (JSEC) expertise to execute and enable critical testing activities for prototype payload contractors. Support the development and testing of the PTS Ground Entry Terminal Prototype (PGET-P). Support multi-service development of PATS user terminals (Army-Air force Anti-jam Modem and Navy WAMS) and final development stages of the PTES ground elements as they approach Mission Operational Test and Evaluation (MOT&E) and Initial Operational Capability (IOC). Continue use in outreach efforts to potential coalition partners and other emerging users, building upon demonstrations in FY 2020 and FY 2021 to demonstrate capability using their space, ground, and user terminal assets.				
FY 2023 Plans: Demonstrate interoperability between the Payload and the PTES Mission Management System, interoperability/interface and control of the ECU to the Payload, and compatibility with PATS user terminals. Conduct PTW Lead Service duties to demonstrate that PTW will support the department's Core Waveform program, to include verification of the PTW modem interoperability with the joint force. Joint SATCOM Engineering Center (JSEC) executes and enables critical testing activities for prototype payload contractors. Ensures the development process and impending product adhere to the tenets defined by the established requirements. Continue multi-service development of PATS user terminals (Army-Air force Anti-jam Modem and Navy WAMS) and				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
final development stages of the PTES delivery. Continue use in outreach efforts to potential coalition partners and other emerging users to demonstrate capability using their space, ground, and user terminal assets			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased to support requirements for system and payload integration testing as well as launch readiness.			
Accomplishments/Planned Programs Subtotals	193.291	229.329	294.828

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

Remarks

E. Acquisition Strategy

The PTS team utilizes the FY 2016 National Defense Authorization Act Middle Tier Acquisition guidance for Rapid Prototyping/Rapid Fielding and Section 815 OTA guidance in developing the acquisition strategy. This strategy places an emphasis on the rapid prototyping, production, and incremental iteration of PTS capability. This strategy takes the form of a series of successively honed and tailored spirals, focusing on payload development and hosting opportunities and incorporating lessons learned from Milstar, Enhanced Polar System (EPS), EPS-Recapitalization, Advanced Extremely High Frequency, PTES, and commercial SATCOM practices.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>	Project (Number/Name) 643728 / <i>Protected Tactical SATCOM</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			
Protected Tactical SATCOM Rapid Prototyping	C/FFP	Boeing & Northrop Grumman : Various	-	158.347	Jan 2021	172.495	Nov 2021	223.338	Nov 2022	-		223.338	Continuing	Continuing	-
Space Hub End Cryptographic Unit (ECU)	C/CPIF	L3Harris East : Camden, NJ	-	3.319	Jan 2021	6.111	Jan 2022	3.417	Jan 2023	-		3.417	Continuing	Continuing	-
Protected Tactical Testbed	Various	Various : Various	-	-		14.745	Dec 2021	21.510	Dec 2022	-		21.510	Continuing	Continuing	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	9.102	Nov 2020	10.334	Nov 2021	12.428	Nov 2022	-		12.428	Continuing	Continuing	-
Enterprise SE&I	Various	Various : Various	-	16.149	Jan 2021	17.793	Jan 2022	24.904	Jan 2023	-		24.904	Continuing	Continuing	-
Subtotal			-	186.917		221.478		285.597		-		285.597	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			
FFRDC	MIPR	Aerospace : El Segundo, CA	-	1.068	Nov 2020	1.090	Nov 2021	1.334	Nov 2022	-		1.334	Continuing	Continuing	-
A&AS	Various	Various : Various	-	5.300	Nov 2020	6.661	Nov 2021	7.397	Nov 2022	-		7.397	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.006	Nov 2020	0.100	Nov 2021	0.500	Nov 2022	-		0.500	Continuing	Continuing	-
Subtotal			-	6.374		7.851		9.231		-		9.231	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	-	193.291	229.329	294.828	-	294.828	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force

Date: April 2022

Appropriation/Budget Activity
3620F / 4

R-1 Program Element (Number/Name)
PE 1206761SF / *Protected Tactical Service (PTS)*

Project (Number/Name)
643728 / *Protected Tactical SATCOM*

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
<i>Protected Tactical SATCOM</i>																												
Technical Baseline Management and Integration	[Redacted]																											
Space Hub End Cryptographic Unit (ECU)	[Redacted]																											
Space Hub ECU Critical Design Review (CDR)	[Redacted]																											
Space Hub ECU Security Verification Testing	[Redacted]																											
Rapid Prototyping Spiral PTS System Prototype Design & Development	[Redacted]																											
Rapid Prototyping Spiral Major Design Review 1 (3 Contractors)	[Redacted]																											
Rapid Prototyping Spiral Major Design Review 2 (2 Contractors)	[Redacted]																											
PTS Prototype Spiral Available for Launch	[Redacted]																											
PTS Prototype Spiral Launch and Operations	[Redacted]																											
Ground and Gateway Segments	[Redacted]																											
Ground and Gateway Development Spiral Upgrades	[Redacted]																											
Protected Tactical Testbed	[Redacted]																											
Engineering and Manufacturing Development (EMD) Acquisition Planning	[Redacted]																											
Engineering and Manufacturing Development (EMD) Decision (Space Force Review Board)	[Redacted]																											
Engineering and Manufacturing Development (EMD) ATP	[Redacted]																											
Engineering and Manufacturing Development (EMD) PTS System Design	[Redacted]																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>	Project (Number/Name) 643728 / <i>Protected Tactical SATCOM</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
Engineering and Manufacturing Development (EMD) Build and Test	[REDACTED]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206761SF / <i>Protected Tactical Service (PTS)</i>	Project (Number/Name) 643728 / <i>Protected Tactical SATCOM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Protected Tactical SATCOM</i>				
Technical Baseline Management and Integration	1	2021	4	2025
Space Hub End Cryptographic Unit (ECU)	1	2021	2	2023
Space Hub ECU Critical Design Review (CDR)	1	2021	1	2021
Space Hub ECU Security Verification Testing	1	2022	2	2022
Rapid Prototyping Spiral PTS System Prototype Design & Development	1	2021	4	2024
Rapid Prototyping Spiral Major Design Review 1 (3 Contractors)	1	2021	2	2021
Rapid Prototyping Spiral Major Design Review 2 (2 Contractors)	1	2022	3	2022
PTS Prototype Spiral Available for Launch	3	2024	3	2024
PTS Prototype Spiral Launch and Operations	4	2024	4	2025
Ground and Gateway Segments	1	2021	3	2025
Ground and Gateway Development Spiral Upgrades	2	2024	3	2025
Protected Tactical Testbed	1	2022	2	2024
Engineering and Manufacturing Development (EMD) Acquisition Planning	3	2021	4	2023
Engineering and Manufacturing Development (EMD) Decision (Space Force Review Board)	4	2023	4	2023
Engineering and Manufacturing Development (EMD) ATP	1	2024	1	2024
Engineering and Manufacturing Development (EMD) PTS System Design	1	2024	3	2025
Engineering and Manufacturing Development (EMD) Build and Test	3	2025	4	2027

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206855SF I Evolved Strategic SATCOM (ESS)
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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	-	69.009	172.089	565.597	0.000	565.597	670.659	1,274.735	1,351.919	1,588.225	Continuing	Continuing
643725: Evolved Strategic SATCOM (ESS)	-	69.009	172.089	565.597	0.000	565.597	670.659	1,274.735	1,351.919	1,588.225	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

ESS will meet the requirements for strategic communications and capability gaps identified in the Protected Satellite Communications Services (PSCS) Analysis of Alternatives (AoA), the Protected Follow-on for Resiliency (PAFR) Study and the Strategic Tiger Team. The ESS architecture and functionality will be designed in accordance with the United States Strategic Command's signed ESS Concept of Operations and the Joint Requirements Oversight Council's validated Capability Development Document (CDD) satisfying the legacy Advanced Extremely High Frequency (AEHF) strategic requirements and mission performance with enhancements for increased resiliency and cybersecurity. The ESS system continues and adds to the strategic SATCOM mission of the AEHF program by providing space and mission control segments for worldwide and arctic DoD strategic, secure, jam-resistant, communications for ground, sea, and air assets.

ESS will support strategic mission requirements to provide the National Command Authority (NCA) and Combatant Commanders with highly-reliable, secure Military Satellite Communications. ESS will support a strategic need date in the early 2030's in all operational environments and will be compatible with the existing architectures. The ESS system will satisfy emerging requirements using modular open system approaches to support incremental enhancements.

For more rapid and resilient strategic capability risk reduction, the ESS Program Office is executing its approved Space Segment acquisition strategy that leverages Middle Tier Acquisition authorities from the National Defense Authorization Act of 2016 for rapid prototyping, while maintaining the continuity of the AEHF strategic mission.

Activities for the ESS ground segment acquisition includes evolving and enhancing the existing ground segment, space-to-ground segment integration, and modernization in support of Enterprise Ground Services compatibility, in accordance with the acquisition strategies and schedules.

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 existing capabilities.

The FY 2023 funding request was reduced by \$7.746M to account for the availability of prior year execution balances.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206855SF / <i>Evolved Strategic SATCOM (ESS)</i>
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The total cost of the Evolved Strategic SATCOM Space Segment Rapid Prototype Middle Tier of Acquisition effort is \$1,435.6M, including RDT&E and procurement of prototype units. The Evolved Strategic SATCOM Space Segment Rapid Prototype Middle Tier of Acquisition effort is fully funded across the Future Years Defense Program.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ESS 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 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.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	71.395	160.056	0.000	0.000	0.000
Current President's Budget	69.009	172.089	565.597	0.000	565.597
Total Adjustments	-2.386	12.033	565.597	0.000	565.597
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-7.967			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	20.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.386	0.000			
• Other Adjustments	0.000	0.000	565.597	0.000	565.597

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 643725: *Evolved Strategic SATCOM (ESS)*

Congressional Add: *IT upgrades to NC3 Cybersecurity*

Congressional Add Subtotals for Project: 643725

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	-	20.000
	-	20.000
	-	20.000

Change Summary Explanation

FY 2022: +\$20.000M; Congressional add for IT upgrades to NC3 cybersecurity.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206855SF / <i>Evolved Strategic SATCOM (ESS)</i>
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FY 2023: +\$565.597M; 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.

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

	FY 2021	FY 2022	FY 2023
<p>Title: Space Segment Prototyping</p> <p>Description: Award up to three competitive rapid-prototyping contracts. Invest in technology and demonstrations that enable continued development of a modernized, strategic payload and other key technology prototypes, risk reduction, and space segment design. Enables long-term return on investment through an energized Strategic SATCOM industrial base, increased competition, promotion of innovation by driving diverse designs, and increased resiliency. Actively manage contractors through prototyping, demonstration and requirements/criteria needed for contractors to competitively bid on the ESS space segment Build, Integration and Test (I&T) and Delivery follow-on.</p> <p>FY 2022 Plans: Continue execution of up to three rapid prototyping contracts with payload and other key technology demonstrations, risk reduction activities, and space segment design focused on, but not limited to, delivery of initial ESS CONOPS, interoperability concepts, and crosslink demonstrations. Complete System Functional Reviews (SFR). Each of the contracts will have varying prototyping and demonstration plans and schedules, depending on the specific contractor. Each of the contractors will have varying requirements for hardware planning and purchase, procurement of contractor and government provided test equipment, manufacturing prototypes, and manpower ramp-up. Includes all necessary program office, cyber, resiliency, and security support and equipment as well as Government contractor support for oversight and integration. Additionally, FY 2022 funding will allow the program to 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. FFRDC, UARC, and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, and ESS testing assets.</p> <p>FY 2023 Plans: Continue execution of three rapid prototyping contracts through critical year of payload technology development. Capitalize on contractors' System Functional Review technical baselines and artifacts to perform functional demonstrations of key technical elements within the payload using breadboards as necessary. Demonstrate and validate microelectronic designs, hardware producibility, software coding, and performance to derived system requirements. Assess contractor demonstration performance against preliminary design review entrance criteria. Contractor demonstrations are focused on phased arrays, crosslinks, and timing management. Demonstrate that electronics solution can transmit, receive, process and route the ESS waveform and can perform the protocols, modes, and distribution as outlined in the Government-controlled ESS System Specification. Demonstrate ability to produce electronically-steered arrays that can receive and transmit in specific portions of the electromagnetic spectrum. Ensure contractors' sub-array or subset of elements can perform to requirements decomposed from the systems level for power, signal integrity, timing, noise, etc. Validate system performance requirements at the array level. Develop software simulations</p>	54.889	126.577	352.001

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206855SF / <i>Evolved Strategic SATCOM (ESS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>to verify that design for constellation time management can meet the ESS requirements for autonomous operations. Resolve open system engineering trades and populate outstanding requirements in order to progress to a space segment-level preliminary design review in FY 2024. The Systems Engineers will show full traceability that the design satisfies the Capability Development Document and that each requirement has sufficient margin between the expected performance and associated requirement. Expand focus to spacecraft bus design, bus integration, and delivery of bus-to-payload interface control documents. Provide interface control documents for modular open system architecture designs for additional capabilities. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funds increased due to the increased critical payload technology development and demonstration necessary to progress the three firm fixed price competing contractors towards preliminary design maturity. In FY 2023, the demonstrations significantly accelerate in complexity, payload functionality, and validation of key functions.</p>				
<p>Title: ESS Ground Segment and Space-to-Ground Integration</p> <p>Description: Develop and field the ESS ground segment, to include Mission Planning, Command and Control and other architecture and activities required to support the ESS space segment. Includes interoperability with the existing architectures and interfaces for Enterprise Ground Services (EGS) compatibility. Provide for space-to-ground (system) and mission integration for the ESS system of systems (SoS).</p> <p>FY 2022 Plans: Complete five Broad Agency Announcement contracts for ground segment Phase 1 Mission Planning technology readiness. Knowledge gained from Phase 1 will inform analysis for Phase 2 Mission Planning architectural design, culminating in a presentation of the ground segment acquisition strategy to the Milestone Decision Authority for approval. Focus program office and other related activities on ground segment Phase 2 Mission Planning architectural design that includes, but is not limited to studies, technical analysis, market research, engagements with industry, acquisition strategy development, and source selection preparation. Prepare request for proposal and contract awards for ground segment Phase 2 Mission Planning architectural design in FY 2023. Continue ground segment Command and Control studies with design and development to best evolve these legacy systems. Includes all required cryptography, cyber, resiliency, and security activities as well as Government contractor support for management and oversight. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets. Continue development activities in support of the ground segment and system/mission integration schedules.</p> <p>FY 2023 Plans:</p>		9.223	15.360	173.027

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206855SF / <i>Evolved Strategic SATCOM (ESS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Award multiple Ground and SoS Integration contracts. Fund program office, FFRDC, and UARC support to execute a competition which acquires a secure software development framework/pipeline and ensures ESS alignment with EGS. Build a classified development environment to support a Continuous Integration/Continuous Development (CI/CD) Software Pipeline and work with operational mission partners to acquire Authority-to-Operate (ATO) at multiple sites. Onboard mission partners into end-to-end development environment for production, test, war gaming, and cyber testing. Generate strategic framework for mission planning applications and produce a System Developer Kit. Prepare ESS to procure ground system specific applications for satellite control, mission planning, and satellite integration and test. Develop Request for Proposal (RFP) for mission planning applications. Create software catalogue and functionally decompose software into a delivery roadmap aligned with strategic framework. Develop end user agreements with operational sites outlining deliveries and key milestones. Begin integration work to establish connectivity with Public Key Management Architecture (PKMA) and cryptographic modernization efforts with the NSA.</p> <p>Continue ground segment Command and Control (C2) studies with legacy sustainment team and terminal program office to evolve legacy systems by investigating code reuse with AEHF and Enhanced Polar System (EPS) to capitalize on enterprise NC3 efforts. Assess necessary mechanical and cryptographic improvements to the Command Post Terminal to support ESS. Continue development activities in support of the ground segment and system/mission integration schedules. Activities include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc. FFRDC, UARC, and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, and ESS testing assets.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funds increased to support the award of multiple contracts to begin ground system acquisition for the NC3 enterprise to include ramping up software procurement, classified infrastructure development, and systems engineering and integration required to manage the complexity and testing of 32 interfaces across space, ground, terminals, and end users.</p>			
<p>Title: End-Cryptographic Unit (ECU)</p> <p>Description: Develop and deliver the National Security Agency (NSA)-certified ECUs required for secure strategic communications encryption in the ESS payloads, bus, and payload test terminals in accordance with the approved ECU acquisition strategy and schedule. Upon development completion, production ECU units will be delivered as government-furnished equipment (GFE) for integration and testing with the ESS payloads and payload test terminals.</p> <p>FY 2022 Plans: Provide for NSA support on encrypted ECU requirements and standards. Execute the approved space segment payload and payload test terminals ECU acquisition strategy with the Air Force's Lifecycle Management Center (AFLCMC) Cryptologic and Cyber System Division (CCSD) for ECU crypto development. Define and prepare for ECU development contract award to support future delivery of ECUs that meet the ESS control documents. Plan and provide program office support, government-furnished</p>	4.897	10.152	40.569

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206855SF / <i>Evolved Strategic SATCOM (ESS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>equipment, studies or technical analyses, and information or resources in support of prototyping activities. Includes all required cyber, resiliency, and security activities required as well as Government contractor support for management and oversight. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, and ESS testing assets.</p> <p>FY 2023 Plans: Award the ECU development and production contract through a CCSD-led and ESS Program Office-supported competitive solicitation to transition to the Engineering & Manufacturing Development (EMD) phase. Fund CCSD, UARC, and FFRDC to provide program office support, planning, GFE, studies, technical analyses and information or resources in support of prototyping activities. Support ESS ECU requirements for the payload, bus, and test terminal ECUs. Provide NSA-certified crypto solutions to support tracking, telemetry, and commanding (TT&C), mission data (MD), transmission security (TRANSEC), and communications security (COMSEC); includes all required cyber, resiliency, and security activities required, as well as Government support for contractor management and oversight. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, and ESS testing assets to include the Strategic Test Terminal (ST2). Continue to coordinate with the NSA on the development and certification of ECU requirements and the delivery of cryptographic keying material to support the development effort.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funds increase due to ECU contract award and program transition to EMD acquisition phase. This will allow the development contractor to start design work to meet ESS requirements for payload and test terminal ECUs, to include Engineering Development Unit (EDU), Production Representative Article (PRA), and Flight ECUs.</p>			
Accomplishments/Planned Programs Subtotals	69.009	152.089	565.597

	FY 2021	FY 2022
Congressional Add: IT upgrades to NC3 Cybersecurity	-	20.000
FY 2022 Plans: The Congressional add supports: Improve nuclear command, control, and communications (NC3) cybersecurity practices by creating secure IT infrastructure to connect the government and industry partners to protect the critical ESS NC3 SATCOM capability for the nation. This secure IT infrastructure will allow for the full and efficient elevation of the overall ESS program's security posture necessary to enable this protection.		
Congressional Adds Subtotals	-	20.000

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

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

Appropriation/Budget Activity
3620F: Research, Development, Test & Evaluation, Space Force I BA 4:
Advanced Component Development & Prototypes (ACD&P)

R-1 Program Element (Number/Name)
PE 1206855SF I Evolved Strategic SATCOM (ESS)

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

Remarks

E. Acquisition Strategy

The Milestone Decision Authority (MDA) designated the ESS Space Segment as an FY 2016 National Defense Authorization Act Middle Tier Acquisition (Rapid Prototyping) activity and approved the ESS acquisition strategy on 14 December 2018. A rapid prototyping phase effectively replaces the Technology Maturation and Risk Reduction phase from a traditional acquisition under Department of Defense 5000 series Directives and Instructions. The ESS Program Office used this approach to award three (3) space segment contracts in late FY 2020 and early FY 2021 that focus on reducing space segment risks with the objective of maximizing ESS demonstrated capability for the payload and other key technologies. An ESS Program Office-led RFP and source selection will determine which space prototyping contractor(s) is positioned for the space segment Build, Integration and Test, and Delivery follow-on contract. The space prototyping contractors will be carried through the follow-on contract source selection to continue momentum until the follow-on contract is awarded in late FY 2025.

Competition during space prototyping is energizing the industrial base in strategic SATCOM; injecting diverse technical processes and integration approaches; burning down risks early and identifying/correcting issues as early as possible; and decreasing traditional fielding timelines to support a more resilient, responsive architecture against emerging threats. Success during competitive rapid-prototyping determines and informs follow-on Build, I&T, and Delivery.

The initial Ground Segment Acquisition Strategy was approved by the Program Executive Officer (PEO) in 4th Quarter FY 2019 to begin early technology readiness studies for ESS Mission Planning in FY 2020. The Mission Planning phase architectural design will be informed by Mission Planning phase and the ESS program forecasts a contract award in early FY 2023, utilizing competitive solicitation and potentially awarding to multiple contractors. Command and Control studies are underway to best evolve these legacy systems.

An ECU acquisition strategy was approved by the PEO in FY 2021. The ESS program office is partnering with the AFLCMC CCSD for ECU crypto development, both on the space vehicle for payload and bus cryptographic devices and in the test terminal. Using a CCSD-led competitive RFP, a contract for payload and payload test terminal ECU development will be awarded in early FY 2023.

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

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206855SF / Evolved Strategic SATCOM (ESS)	Project (Number/Name) 643725 / Evolved Strategic SATCOM (ESS)
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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			
Space Segment Prototyping	SS/FFP	Various : Various	-	37.513	Oct 2020	98.199	Oct 2021	330.764	Oct 2022	-		330.764	Continuing	Continuing	-
Ground Segment and Space-to-Ground Integration	TBD	TBD : TBD	-	3.877	Mar 2021	6.628	Jan 2022	130.553	Jan 2023	-		130.553	Continuing	Continuing	-
IT Upgrades to NC3 cybersecurity	TBD	TBD : TBD	-	-		20.000	Jun 2022	-		-		-	0.000	20.000	-
End-Cryptographic Unit (ECU)	TBD	TBD : TBD	-	0.888	Mar 2021	3.603	Jan 2022	33.491	Jan 2023	-		33.491	Continuing	Continuing	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	10.828	Feb 2021	16.378	Nov 2021	19.476	Nov 2022	-		19.476	Continuing	Continuing	-
Enterprise SE&I	C/CPIF	Linquest : Los Angeles, CA	-	10.729	Feb 2021	14.255	Feb 2022	21.484	Feb 2023	-		21.484	Continuing	Continuing	-
Subtotal			-	63.835		159.063		535.768		-		535.768	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			
FFRDC	Various	Various : Various	-	3.455	Feb 2021	3.984	Nov 2022	4.869	Nov 2023	-		4.869	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.050	Mar 2021	0.500	Oct 2021	0.750	Oct 2022	-		0.750	Continuing	Continuing	-
A&AS	Various	Various : Various	-	1.669	Mar 2021	8.542	Nov 2021	24.210	Nov 2022	-		24.210	Continuing	Continuing	-
Subtotal			-	5.174		13.026		29.829		-		29.829	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	-	69.009	172.089	565.597	-	565.597	Continuing	Continuing	N/A

Remarks
 Space Segment Prototyping includes three firm-fixed-price contracts to Lockheed Martin, Northrop Grumman, and Boeing and each will be obligated up to \$85.0M in FY23. The Space Segment Prototyping also includes related efforts that are not included in these contracts, such as studies/analyses, test equipment, and additional technology

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force							Date: April 2022		
Appropriation/Budget Activity 3620F / 4			R-1 Program Element (Number/Name) PE 1206855SF / <i>Evolved Strategic SATCOM (ESS)</i>			Project (Number/Name) 643725 / <i>Evolved Strategic SATCOM (ESS)</i>			
	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract

development required for program success. These efforts provide data for requirements trades, technical approaches, threat assessment and mitigation, and test approaches/assets.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206855SF / Evolved Strategic SATCOM (ESS)	Project (Number/Name) 643725 / Evolved Strategic SATCOM (ESS)

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
<i>IT Upgrades to NC3 Cybersecurity</i>																												
Upgrades to NC3 Cybersecurity																												
<i>ESS Development</i>																												
System and Mission Integration																												
Space Segment Prototyping-Execution (up to 3 contractors)																												
Space Segment Build, Integration and Test (I&T) and Delivery follow-on - Contract Award																												
Space segment Build, Integration and Test (I&T) and Delivery follow-on - Execution																												
Ground Segment - Command and Control efforts																												
Ground Segment - Mission Planning Technology Readiness																												
Ground Segment - Mission Planning Architectural Design and Production Planning																												
Ground Segment - Mission Planning Architectural Design and Production - Contract Award																												
Ground Segment - Mission Planning Architectural Design and Production - Execution																												
End-Cryptographic Unit (ECU) - Early Definition & Acquisition Planning																												
End-Cryptographic Unit (ECU) - Contract Award																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206855SF / <i>Evolved Strategic SATCOM (ESS)</i>	Project (Number/Name) 643725 / <i>Evolved Strategic SATCOM (ESS)</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
End-Cryptographic Unit (ECU) - Development & Delivery	[REDACTED]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206855SF / Evolved Strategic SATCOM (ESS)	Project (Number/Name) 643725 / Evolved Strategic SATCOM (ESS)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>IT Upgrades to NC3 Cybersecurity</i>				
Upgrades to NC3 Cybersecurity	2	2022	4	2023
<i>ESS Development</i>				
System and Mission Integration	1	2021	4	2027
Space Segment Prototyping-Execution (up to 3 contractors)	1	2021	3	2025
Space Segment Build, Integration and Test (I&T) and Delivery follow-on - Contract Award	4	2025	4	2025
Space segment Build, Integration and Test (I&T) and Delivery follow-on - Execution	4	2025	4	2027
Ground Segment - Command and Control efforts	1	2021	4	2027
Ground Segment - Mission Planning Technology Readiness	1	2021	4	2022
Ground Segment - Mission Planning Architectural Design and Production Planning	2	2022	1	2023
Ground Segment - Mission Planning Architectural Design and Production - Contract Award	2	2023	2	2023
Ground Segment - Mission Planning Architectural Design and Production - Execution	2	2023	4	2027
End-Cryptographic Unit (ECU) - Early Definition & Acquisition Planning	1	2021	1	2023
End-Cryptographic Unit (ECU) - Contract Award	2	2023	2	2023
End-Cryptographic Unit (ECU) - Development & Delivery	2	2023	3	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206857SF / <i>Space Rapid Capabilities Office</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	-	104.796	73.193	45.427	0.000	45.427	11.982	11.277	9.713	9.903	Continuing	Continuing
64A020: <i>AF Funded ORSSats</i>	-	104.796	73.193	45.427	0.000	45.427	11.982	11.277	9.713	9.903	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Space Rapid Capabilities Office (Space RCO) mission is to expedite the development and fielding of operationally focused capabilities for immediate and near term needs as directed by the Space RCO Board of Directors (BoD). Key operating principles include a short and narrow chain of command, overarching programmatic insight, early and prominent war fighter involvement, and small integrated teams within a single office to rapidly augment existing space capabilities when needed, to expand operational capability, reconstitute/replenish/protect critical space capabilities to reserve "continuity of operations" capability, and exploit space technological or operational innovations to increase U.S. advantage.

The Space RCO is ready to develop, test, train, and equip war fighter needs as they are identified at any time. First, the requirements must be validated by the commander U.S. Space Command; second, the project must be approved by the Space RCO BoD; third, the project will be executed by the Space RCO. If the effort is initiated during execution year, it will be described in the next year's budget exhibit.

Space RCO is supporting the Air Force Research Lab (AFRL) developed Space Solar Power project to collect solar energy and provide uninterrupted, assured, and logistically agile power to expeditionary forces operating in unimproved areas such as forward operating bases. AFRL formulated the Space Solar Power Incremental Demonstrations and Research (SSPIDR) project to rapidly demonstrate this innovative technology via a series of integrated demos and technology development/maturation efforts.

In addition, Space RCO will conduct studies and analyses for future programs to support the BoD.

The FY 2023 funding request was reduced by \$5.0 million to account for the availability of prior year execution balances.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Space RCO weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206857SF I Space Rapid Capabilities Office
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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	108.518	66.193	0.000	0.000	0.000
Current President's Budget	104.796	73.193	45.427	0.000	45.427
Total Adjustments	-3.722	7.000	45.427	0.000	45.427
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	7.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.722	0.000			
• Other Adjustments	0.000	0.000	45.427	0.000	45.427

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 64A020: AF Funded ORSSats

Congressional Add: Space RCO Solar Power Congressional Add

Congressional Add: Space RCO Digital Beamformed Ground-based SATCOM

Congressional Add Subtotals for Project: 64A020

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	5.000	0.000
	0.000	7.000
	5.000	7.000
	5.000	7.000

Change Summary Explanation

FY 2022: +\$7.00M; FY 2023: +\$45.427M; 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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<p>Title: Space RCO Board of Directors (BoD) Projects, Studies, and Analysis</p>	17.033	8.826	8.872
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Description: Execute projects, studies, and analyses under rapid acquisition authorities inherent to the Space RCO, that address emergent capabilities and respond to validated requirements and other BoD approved efforts to meet needs in year of execution. In addition, provide systems engineering, program management support and civilian pay across all the Space RCO activities as well as perform modeling, simulation, analyses, and assess alternative concepts and requirements.

FY 2022 Plans:

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206857SF / <i>Space Rapid Capabilities Office</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Continue to initiate rapid acquisition projects, studies, and analyses that address emergent capabilities requirements and other Space RCO BoD approved efforts. Continue program office and other related support activities that may include, but are not limited to studies, technical analyses, prototyping, etc. Continue ongoing systems engineering support of future mission development as well as Program office support and potentially including Civilian pay. Activities may include, but are not limited to program office support, facilities, and studies.</p> <p>FY 2023 Plans: Continue to initiate rapid acquisition projects, studies, and analyses that address emergent capabilities requirements and other Space RCO BoD approved efforts. Continue ongoing systems engineering support of future mission development. Additionally, FY 2023 funding will allow the program to 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 analyses, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to inflation adjustment.</p>				
<p>Title: Space RCO Solar Power</p> <p>Description: Space RCO is developing the Solar Power project to collect solar energy and provide uninterrupted, assured, and logistically agile power to expeditionary forces operating in unimproved areas such as forward operating bases.</p> <p>FY 2022 Plans: Continue developing space-based solar power collection and transmission technology via a series of integrated demos and technology development/maturation efforts: 1) model updates from solar-to-RF tile and rectenna demo, 2) the space flight demonstration of solar-to-RF panel payload (take delivery of solar-to-RF payload, validate payload, integrate payload-to-bus), and 3) demonstration of scaled array payloads for ground demonstration and validate models; updated operational prototype concept designs/analysis based on tile demonstrations and models; and functional demonstrations for critical technologies in energy generation, deployable structures, thermal technology, and RF transmission.</p> <p>FY 2023 Plans: Continue developing space-based solar power collection and transmission technology via a series of integrated demos and technology development/maturation efforts: 1) continue space flight demonstration of solar-to-RF panel payload (take delivery of solar-to-RF payload emulator, validate payload for delivery, continue pre-integration of payload-to-bus), 2) deliver thermal integrated demonstration for on-orbit demonstration, 3) initiate structural operational prototype based on results from scaled array payload demonstrations and validated models, 4) update operational prototype concept designs/analysis based on tile, rectenna,</p>		82.763	57.367	36.555

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206857SF / <i>Space Rapid Capabilities Office</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
thermal and structure demonstrations and updated models, and 5) continue functional demonstrations for critical technologies in energy generation, deployable structures, thermal technology, RF transmission, and distributed control.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 decreased due to completing individual projects.			
Accomplishments/Planned Programs Subtotals	99.796	66.193	45.427

	FY 2021	FY 2022
<i>Congressional Add:</i> Space RCO Solar Power Congressional Add	5.000	0.000
<i>FY 2021 Accomplishments:</i> The Space Force, through AFRL/RV and in coordination with OSD/RE, initiated the process of establishing a University Affiliated Research Center (UARC)/consortium to aid in executing space cross mission, multi-domain, and community of interest research applicable to Space Solar Power activities that are consistent with USD(R&E) priority focus areas and the National Security Space Strategy.		
<i>FY 2022 Plans:</i> N/A		
<i>Congressional Add:</i> Space RCO Digital Beamformed Ground-based SATCOM	0.000	7.000
<i>FY 2021 Accomplishments:</i> N/A		
<i>FY 2022 Plans:</i> To provide a proof of concept for the Air Force Satellite Control Network with a high-reliability, interoperable production prototype of a Digital Beamformed Ground-based SATCOM system.		
Congressional Adds Subtotals	5.000	7.000

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

Remarks

E. Acquisition Strategy
Expediently award contracts through Space RCO or partner organizations.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206857SF / <i>Space Rapid Capabilities Office</i>	Project (Number/Name) 64A020 / <i>AF Funded ORSSats</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Space Rapid Capabilities Office</i>	
Space RCO Board of Directors (BoD) Projects, Studies, and Analysis	
Space RCO Solar Power	
Digital Beamformed Ground-based SATCOM	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206857SF / <i>Space Rapid Capabilities Office</i>	Project (Number/Name) 64A020 / <i>AF Funded ORSSats</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Rapid Capabilities Office</i>				
Space RCO Board of Directors (BoD) Projects, Studies, and Analysis	1	2021	4	2027
Space RCO Solar Power	1	2021	4	2023
Digital Beamformed Ground-based SATCOM	1	2022	4	2022

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203269SF / <i>GPS III Follow-On (GPS III F)</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	0.000	275.819	246.332	325.927	0.000	325.927	309.651	254.374	193.931	167.388	Continuing	Continuing
653170: <i>GPS III F</i>	0.000	275.819	246.332	265.863	0.000	265.863	247.799	190.704	128.360	100.541	214.192	1,669.610
653171: <i>GPS Enterprise Integration</i>	0.000	0.000	0.000	60.064	0.000	60.064	61.852	63.670	65.571	66.847	Continuing	Continuing

Program MDAP/MAIS Code: 590

Note

In FY 2023, PE 1206423SF, Global Positioning System III - Operational Control Segment, Project 67A025, GPS Enterprise Integrator (EI), R-1 Line #52 efforts were transferred to PE 1203269SF, Global Positioning System III F, Project 653171, GPS Enterprise Integration, R-1 Line #17 in order to continue enterprise integration activities to support GPS III F Space, Ground and User Segment.

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space-based navigation system that fills validated Joint Service requirements for worldwide, accurate, common grid three dimensional positioning/navigation for military aircraft, ships, and ground personnel. The consistent accuracy, unaffected by location or weather and available in real time, significantly improves effectiveness of reconnaissance, weapons delivery, mine countermeasures and rapid deployment for all services. GPS must comply with Title 10 United States Code (USC) Sec. 2281, which requires that the Secretary of Defense ensures the continued sustainment and operation of GPS for military and civilian purposes, and 51 USC Sec. 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

The system is composed of three segments: User Equipment (funded under Program Element (PE) 1203164F, 1203164SF), Space (funded under PE 1203165F, 1203265F, 1203265SF, 1203269F, and 1203269SF), and a Control Network (funded under PE 1206423F, 1206423SF and 1203165F). The satellites broadcast high accuracy data using precisely synchronized signals that are received and processed by user equipment installed in military platforms. The user equipment computes the platform position and velocity and provides steering vectors to target locations or navigation waypoints. The control segment provides daily updates to the navigation messages broadcast from the satellites to maintain system precision in three dimensions to 16 meters (spherical error probable) worldwide. Additionally, GPS supports the United States (US) Nuclear Detonation (NUDET) Detection System (USNDS) mission and provides strategic and tactical support to the following Department of Defense (DoD) missions: Joint Operations by providing capabilities for Positioning, Navigation, and Timing (PNT); Command, Control, Communications, and Intelligence (C3I); Special Operations; Military Operations in Urban Terrain (MOUT); Defense-Wide Mission Support (DWMS); Air Mobility; and Space Launch Orbital Support.

GPS III Follow On (GPS III F) delivers improved satellites beyond the first ten GPS III Space Vehicles (SVs) being delivered (funded in PE 1203265SF GPS III Space Segment). While GPS III F satellites maintain the same capabilities as the GPS III satellites, they deliver significant enhancements to include: potential on-ramping of advanced PNT technology from efforts such as the Navigation Technology Satellite 3 (NTS-3), backward compatibility, Unified S-Band (USB) interface compliance, integration of hosted payloads including a redesigned USNDS payload, Laser Retro-reflector Arrays (LRAs), Search and Rescue/GPS (SAR/GPS), and Regional Military Protection (RMP) capabilities that provide the ability to deliver high-power regional Military Code (M-Code) signals in specific areas of intended effect.

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

Appropriation/Budget Activity
3620F: Research, Development, Test & Evaluation, Space Force I BA 5:
System Development & Demonstration (SDD)

R-1 Program Element (Number/Name)
PE 1203269SF I GPS III Follow-On (GPS III F)

Implementation of RMP into the GPS Enterprise requires integration with the ground and user segments, executed by the GPS Next Generation Operational Control System (OCX), along with the Military GPS User Equipment (MGUE) programs, respectively. The SAR/GPS payload provided by Canada fills a validated National Search and Rescue Committee requirement to provide enduring, space-based distress alerting capability to detect, locate, and relay distress alerts to fulfill its responsibilities under international agreements for Search and Rescue. LRA, built by the Naval Research Lab (NRL), is a passive reflector that improves accuracy and provides better ephemeris data. National Geospatial-Intelligence Agency (NGA) funds the integration costs of the LRA.

This PE funds the Research, Development, Test, and Evaluation (RDT&E) of GPS III F SVs 11-12 (to include Non-Recurring Engineering (NRE) support efforts). This program includes risk-reducing simulators and systems engineering associated with delivering the new capabilities required of GPS III F satellites.

Starting in FY 2023, this program also funds the GPS EI project which includes critical efforts associated with the Government's responsibility to accomplish integration of multiple prime contracts across the three GPS enterprise segments, along with the transition to sustainment and operational communities. GPS EI maintains the current GPS architecture and system definition, controls and validates interfaces, ensures compatibility across current Generation II and III systems, and ongoing developments such as GPS III F space systems, OCX control systems, and MGUE Inc 1 and MGUE Inc 2 systems. GPS EI also develops/manages plans for execution and fielding of new capability like the new M-Code for use at the earliest opportunity. Further, GPS EI provides modeling, simulation, and technical analyses of impacts for Government-directed enterprise level trades among the GPS segments, leading to definition, management, maintenance, and evolution of the GPS Enterprise requirements and interface technical documents to build and ensure the integrity of the enterprise technical baseline, and perform system requirements verification.

In addition, GPS EI funds the technical evolution, risk reduction, enterprise-level testing and delivery of all PNT Enterprise, capabilities. GPS EI also assists in the analysis and assessment of futures technology to continue the advancement of the PNT enterprise ensuring PNT capabilities continue to be at the forefront. Examples for Generation II include electronic protection; for Generation III, additional anti-jamming protection and additional civil signals. To accomplish this, GPS EI delivers Test and Verification capabilities, Requirements and Interface Management, and Systems Integration support across the Space, Control, and User Segments. In this capacity, GPS EI is responsible for managing this cross-program work to provide these and other capabilities.

GPS EI's analyses guide Government decisions to ensure efficient and effective synchronization and execution across all GPS II and III programs. For Enterprise-wide integration to be successful, GPS EI: works with the GPS and NDS prime contractor teams to develop plans for early risk reduction System Integration Demonstrations to ensure system interfaces and functionality meet user and system requirements; ensures all equipment and documentation is ready when needed; integrates and analyzes enterprise schedules; and conducts formal test and verification, including Requirement Verification Plans and System Test Plans and Procedures. GPS EI performs all these efforts across all PNT programs in all acquisition phases. The Government owns the GPS Enterprise system requirements and integration, and highly leverages the GPS EI team to eliminate the need to fund a development prime contractor to perform these functions. This enhances Government control, oversight and program accountability.

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

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203269SF / <i>GPS III Follow-On (GPS IIIIF)</i>
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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program may include necessary civilian pay expenses required to manage, execute, and deliver GPS IIIIF Space Segment weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392SF and 1206398SF.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	285.496	264.265	0.000	0.000	0.000
Current President's Budget	275.819	246.332	325.927	0.000	325.927
Total Adjustments	-9.677	-17.933	325.927	0.000	325.927
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-17.933			
• 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	-9.677	0.000			
• Other Adjustments	0.000	0.000	325.927	0.000	325.927

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 653170: *GPS IIIIF*

Congressional Add: *Navigation Technology Satellite-3 (NTS-3) Payload and Launch*

Congressional Add Subtotals for Project: 653170

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	28.983	-
	28.983	-
	28.983	-

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 FY 2023 cannot be made in a relevant manner.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS III F
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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
653170: GPS III F	0.000	275.819	246.332	265.863	0.000	265.863	247.799	190.704	128.360	100.541	214.192	1,669.610
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The GPS is a space-based navigation system that fills validated Joint Service requirements for worldwide, accurate, common grid three dimensional positioning/navigation for military aircraft, ships, and ground personnel. The consistent accuracy, unaffected by location or weather and available in real time, significantly improves effectiveness of reconnaissance, weapons delivery, mine countermeasures and rapid deployment for all services. GPS must comply with Title 10 USC Sec. 2281, which requires that the Secretary of Defense ensures the continued sustainment and operation of GPS for military and civilian purposes, and 51 USC Sec. 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

The system is composed of three segments: User Equipment (funded under PE 1203164F, 1203164SF), Space (funded under PE 1203165F, 1203265F, 1203265SF, 1203269F, and 1203269SF), and a Control Network (funded under PE 1206423F, 1206423SF and 1203165F). The satellites broadcast high accuracy data using precisely synchronized signals that are received and processed by user equipment installed in military platforms. The user equipment computes the platform position and velocity and provides steering vectors to target locations or navigation waypoints. The control segment provides daily updates to the navigation messages broadcast from the satellites to maintain system precision in three dimensions to 16 meters (spherical error probable) worldwide. Additionally, GPS supports the USNDS mission and provides strategic and tactical support to the following DoD missions: Joint Operations by providing capabilities for PNT; C3I; Special Operations; MOUT; DWMS; Air Mobility; and Space Launch Orbital Support.

GPS III F delivers improved satellites beyond the first ten GPS III SVs being delivered (funded in PE 1203265SF GPS III Space Segment). While GPS III F satellites maintain the same capabilities as the GPS III satellites, they deliver significant enhancements to include: potential on-ramping of advanced PNT technology from efforts such as the NTS-3, backward compatibility, USB interface compliance, integration of hosted payloads including a redesigned USNDS payload, LRAs, SAR/GPS, and RMP capabilities that provide the ability to deliver high-power regional M-Code signals in specific areas of intended effect.

Implementation of RMP into the GPS Enterprise requires integration with the ground and user segments, executed by the OCX, along with the MGUE programs, respectively. The SAR/GPS payload provided by Canada fills a validated National Search and Rescue Committee requirement to provide enduring, space-based distress alerting capability to detect, locate, and relay distress alerts to fulfill its responsibilities under international agreements for Search and Rescue. LRA, built by the NRL, is a passive reflector that improves accuracy and provides better ephemeris data. NGA funds the integration costs of the LRA.

This PE funds the RDT&E of GPS III F SVs 11-12 (to include NRE support efforts). This program includes risk-reducing simulators and systems engineering associated with delivering the new capabilities required of GPS III F satellites.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: GPS III Follow-On (GPS III F) Development	246.836	246.332	265.863

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022	
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS IIIIF	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022
<p>Description: The program utilizes RDT&E funds to develop and deliver SVs 11-12, conduct the NRE of developing risk-reducing simulators, developing support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS IIIIF including backward compatibility, dual band Telemetry, Tracking, and Control, integration of Government Furnished Equipment hosted payloads, and RMP, which delivers high power regional M-Code signals in specific areas of intended effect.</p> <p>FY 2022 Plans: Continue development and NRE efforts to simultaneously support three satellites (SV11, SV12, & GPS IIIIF Non-flight Satellite Testbed (GNST+)) in support of system integration and the final build and checkout of two GPS IIIIF SV Simulators (GSS+). Efforts include hardware purchases of long lead items. Complete GSS+ 1 & 2 subsystem development, procurement and build; continue system integration. Complete GNST+ subsystem development, procurement and build; begin system integration. Complete SV11 subsystem development, procurement and build; begin system integration and test. Continue development, NRE, subsystem procurement, and build of SV12. Continue program office and other related support activities that may include, but not limited to, studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: Complete build, test, and delivery of GNST+.</p> <p>Continue development, build, and test of GSS+ 1 & 2, SV 11, & SV 12 in support of system integration. Conduct Integration and Testing of satellites and GNST+ pathfinder. Receive and process critical components for SVs 11-12 and initiate system module assembly. Conduct and support capability insertion research, and perform risk reduction activities on the Common Bus approach for SVs 13+.</p> <p>Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased due to completing build, test, and delivery of GNST+ while still continuing development activities for SVs 11-12, GSS+ 1 & 2, and risk reduction activities on the Common Bus approach for SVs 13+.</p>			
Accomplishments/Planned Programs Subtotals		246.836	246.332
		FY 2021	FY 2022
Congressional Add: Navigation Technology Satellite-3 (NTS-3) Payload and Launch		28.983	-

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS III F
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	FY 2021	FY 2022
FY 2021 Accomplishments: The Congressional Add supports ground system development, space vehicle development, first year of on-orbit operations, procurement of the space vehicle pre-launch processing facility, mission unique launch vehicle integration, mission unique hardware, mission unique software, and separation system procurement for NTS-3. Continue program office and other related support activities that may include, but not limited to, studies, technical analysis, prototyping, etc.		
Congressional Adds Subtotals	28.983	-

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPSF 01 BA01 GPS03C: <i>GPS III Follow On</i>	597.796	852.918	657.562	-	657.562	664.149	683.441	713.958	748.954	2,100.419	7,019.197

Remarks

D. Acquisition Strategy

In December 2017, Principal Deputy Office of the Assistant Secretary of the Air Force Acquisition & Logistics began the GPS III F program. Beginning in FY 2019 and, consistent with the Fiscal Year 2016 National Defense Authorization Act, the program was categorized as an Acquisition Category 1B Major Defense Acquisition Program (MDAP) with the Service Acquisition Executive serving as the Milestone Decision Authority (MDA). During this time, the MDA approved the second phase of the two-phased GPS III Follow-On acquisition strategy. Executed using funds in PE 1203265F, GPS III Space Segment, the Phase 1 Production Readiness Feasibility Assessments conducted during FY 2016-2017 provided data and insight into contractors' GPS satellite production designs with emphasis on a mature navigation payload and production-ready designs. Phase 1 results affirmed the viability of a competitive approach for Phase 2. The Phase 2 strategy directed the Air Force to conduct a full-and-open competition for GPS III F space vehicles and specified the use of RDT&E funds to deliver SVs 11-12 and conduct associated NRE. In addition to SVs 11-12, the RDT&E effort is comprised of developing risk-reducing simulators, support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS III F. The Air Force awarded the contract to Lockheed Martin in September 2018 and began the 1-year Critical Design Review (CDR) campaign in March 2019. Completion of CDR was done in March 2020 and Milestone C production certification completed in July 2020. Procurement of SVs 13 and 14 awarded on October 7, 2020. Procurement of SVs 15-17 awarded on October 22, 2021. The Space Force will continue to procure future GPS III F satellites via annual contract options exercised using Space Procurement, Air Force and Procurement, Space Force funds consistent with full-funding policy under an annual buy approach.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS IIIIF
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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			
GPS IIIIF Development	C/FPIF	Lockheed Martin : Littleton, CO	0.000	235.662	Dec 2020	230.447	Dec 2021	239.517	Nov 2022	-		239.517	693.438	1,399.064	1,374.851
NTS-3 Payload and Launch	Various	Various : Various	0.000	28.983	Feb 2021	-		-		-		-	0.000	28.983	-
GPS IIIIF Technical Mission Analysis	Various	Various : Various	0.000	5.337	Dec 2020	2.083	Dec 2021	2.324	Dec 2022	-		2.324	50.754	60.498	-
GPS IIIIF Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	0.000	1.562	Dec 2020	2.846	Dec 2021	6.636	Dec 2022	-		6.636	35.040	46.084	-
Subtotal			0.000	271.544		235.376		248.477		-		248.477	779.232	1,534.629	N/A

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			
GPS IIIIF Test and Evaluation	Various	Various : Various	0.000	1.000	Apr 2021	0.000	Dec 2021	-		-		-	0.000	1.000	-
Subtotal			0.000	1.000		0.000		-		-		-	0.000	1.000	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			
GPS IIIIF FFRDC	Various	Various : Various, CA	0.000	1.923	Dec 2020	1.928	Dec 2021	2.131	Dec 2022	-		2.131	42.006	47.988	-
GPS IIIIF A&AS	Various	Various : El Segundo, CA	0.000	0.361	Dec 2020	8.828	Dec 2021	14.855	Dec 2022	-		14.855	76.258	100.302	-
GPS IIIIF Other Support	Various	Various : El Segundo, CA	0.000	0.991	Oct 2020	0.200	Oct 2021	0.400	Oct 2022	-		0.400	2.000	3.591	-
Subtotal			0.000	3.275		10.956		17.386		-		17.386	120.264	151.881	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force								Date: April 2022			
Appropriation/Budget Activity 3620F / 5				R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)				Project (Number/Name) 653170 / GPS III F			
	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	0.000	275.819		246.332		265.863	-	265.863	899.496	1,687.510	N/A

Remarks
 FINANCIAL PERFORMANCE: GPS III F is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. However, unlike many traditional R&D programs, the GPS III F R&D and Production phases fall under a Fixed Price Incentive Firm Target (FPIF) contract type with progress payments. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS IIIIF
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
GPS IIIIF																												
SV11 Subsystem Development, Procurement & Build																												
SV11 System Integration & Test																												
SV11 Available for Launch																												
SV 11 Launch																												
SV 11 Early Orbit Operations and On Orbit Checkout																												
SV12 Subsystem Development, Procurement & Build																												
SV12 System Integration & Test																												
SV12 Available for Launch																												
SV 12 Launch																												
SV 12 Early Orbit Operations and On Orbit Checkout																												
GPS IIIIF Advanced Capabilities Development																												
GNST+																												
GNST+ Subsystem Development, Procurement & Build																												
GNST+ Integration																												
GSS+																												
GSS+ 1 & 2 Subsystem Development, Procurement & Build																												
GSS+ 1 & 2 Hardware Available																												
GSS+ 1 & 2 Integration																												
GSS+ 1 Delivered																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS IIIIF
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
GPS IIIIF				
SV11 Subsystem Development, Procurement & Build	1	2021	3	2022
SV11 System Integration & Test	3	2022	1	2026
SV11 Available for Launch	2	2026	2	2026
SV 11 Launch	1	2027	1	2027
SV 11 Early Orbit Operations and On Orbit Checkout	1	2027	4	2027
SV12 Subsystem Development, Procurement & Build	1	2021	3	2023
SV12 System Integration & Test	3	2023	2	2026
SV12 Available for Launch	3	2026	3	2026
SV 12 Launch	4	2027	4	2027
SV 12 Early Orbit Operations and On Orbit Checkout	4	2027	4	2027
GPS IIIIF Advanced Capabilities Development	1	2022	4	2027
GNST+				
GNST+ Subsystem Development, Procurement & Build	1	2021	2	2022
GNST+ Integration	2	2022	1	2024
GSS+				
GSS+ 1 & 2 Subsystem Development, Procurement & Build	1	2021	3	2022
GSS+ 1 & 2 Hardware Available	3	2021	4	2021
GSS+ 1 & 2 Integration	4	2021	2	2024
GSS+ 1 Delivered	3	2024	3	2024
GSS+ 2 Delivered	1	2025	1	2025
Navigation Technology Satellite-3 (NTS-3)				

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS III F
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
NTS-3 Payload and Launch	2	2021	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)				Project (Number/Name) 653171 / GPS Enterprise Integration			
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
653171: GPS Enterprise Integration	0.000	0.000	0.000	60.064	0.000	60.064	61.852	63.670	65.571	66.847	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a New Start. In FY 2023, PE 1206423SF, Global Positioning System III - Operational Control Segment, Project 67A025, GPS Enterprise Integrator (EI), R-1 Line #52 efforts were transferred to PE 1203269SF, Global Positioning System IIIF, Project 653171, GPS Enterprise Integration, R-1 Line #17 in order to continue enterprise integration activities to support GPS IIIF Space, Ground and User Segment.

A. Mission Description and Budget Item Justification

The GPS Program Office established and maintains the technical baseline and is responsible for the successful fielding of all the GPS Segments (space, control, and user). In order to successfully execute these responsibilities, GPS EI creates an enterprise architecture, integrates segment products, verifies the enterprise requirements are adequately met, develops and implements various Systems Engineering documents, defines methods of verification, conducts integrated system test and test analysis, develops and manages the Enterprise technical baseline which reflect multiple stakeholder requirements; stakeholders include the DoD, foreign governments, industry, and the general public (through four public interface specifications). Furthermore, GPS EI ensures PNT capabilities meet the warfighter's, civil agencies, commercial entities, international treaties, and over four billion global GPS users needs. Moreover, GPS EI is responsible for delivering a reliable PNT signal capability to military operators, the civil user community, and international partners. In addition, GPS EI validates the system performance in various mission threat scenarios during its development as well as provides in-depth technical expertise to enhance government control, oversight and program accountability. GPS EI is also responsible for all aspects of schedule and technical alignment across the GPS segments (space, control, and user).

More specifically, GPS EI is responsible for technical baseline management, integration, synchronizing, testing, and verifying GPS III, GPS IIIF, Operational Control System (OCS), OCX, MGUE Increment 1 and Increment 2, and other PNT investment projects. Additionally, GPS EI is responsible for creating and managing plans that provide early exercise of the products under development, compatibility analysis, and inter-segment testing. The inter-segment tests are required to prove OCX interoperability with GPS III satellites and Modernized User Equipment. More importantly, it ensures backwards compatibility with legacy systems such as GPS Block II satellites, OCS, and legacy user equipment. The GPS EI also manages the process through which the Joint Requirements Oversight Council validated requirements are matured and flowed down to the system segments, while remaining consistent with various interfaces. This enables the GPS system to meet Title 10 of the USC, Sec 2281, mandated PNT capabilities, and various other obligations to the international community that provide inter-operable PNT signals.

GPS EI also supports GPS spectrum protection at international forums such as the International Telecommunications Union. Such support consists of advocating on behalf of the US Government when negotiating with foreign partners. In addition, GPS EI provides technical expertise to maintain relationships with other US government agencies that include the Federal Aviation Administration, NGA, National Aeronautics and Space Administration, and Departments of State, Transportation, Homeland Security, and Commerce. GPS EI Spectrum also ensures GPS priority for eight essential spectrum signals, including those required for civil air navigation and

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653171 / GPS Enterprise Integration
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safety of life. Spectrum Protection prevents encroachment from commercial or foreign entities, which results in the preservation of warfighter's reliable signal. As a result, military operations and the integrity of the global economic infrastructure are protected.

GPS EI also manages GPS and other navigation system performance monitoring and publishes performance specifications and reports to ensure anomalies with GPS can be resolved. In addition GPS EI provides technical expertise for the development for GPS program technical baselines and public specifications to make certain that the DoD fulfills its commitment to the world for civilian GPS Service.

GPS EI also provides the PNT enterprise expertise in System Safety, Enterprise level System Security Engineering covering Acquisition Systems Program Security (i.e., personnel, industrial, operations, information, sensitive compartmented information, communication, and physical), Program Protection, Foreign Disclosure, Public Release reviews, Mission System Certification and Accreditation, and Enterprise Cybersecurity. GPS EI is accountable for the development, execution, and analysis of the PNT Enterprise Segments, cybersecurity, and associated test cases necessary to deliver a secure operational system.

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

	FY 2021	FY 2022	FY 2023
<p>Title: Enterprise Integration</p> <p>Description: This is not a New Start. Funding supports the integration and technical baseline control of all elements of the GPS system (space/control/user) in support of both military and civil users. Test and verification of integrated system performance in preparation for operational test and evaluation.</p> <p>FY 2023 Plans: Continue SSC-led integrated test, operational evaluation, and transition to operations of the OCX Block 1/2 and MGUE Increment 1 receivers. Continue integrated, Government-led development and operational testing using operational assets, facilities and resources; efforts will include OCX Site Acceptance Testing, OCX Transition Risk Reduction to Operations, Integrated System Test (IST) 3-1 for OCX, Multi-service Operational Test and Evaluation (OT&E) for OCX-dependent capabilities, IST 3-3 Phase 4, and OT&E in B-2 and Navy Arleigh Burke Class Destroyer (DDG). Complete OCX Block 1/2 Ready to Operate (RTO) and Operational Acceptance Review. Support MGUE Increment 2 miniature serial interface with Next Generation Application Specific Integrated Circuit prototyping. Support MGUE Handheld program initiation and requirements review. Continue GPS Enterprise-wide systems engineering, systems integration, and technical baseline management to ensure GPS Programs of Record work effectively together.</p> <p>Support GPS III SV09-10 delivery, launch planning and integration. Support integration planning for OCX Block 3F and GPS III Follow-On SVs. Evaluate systems for effectiveness in delivering capabilities of GPS Constellation Management, GPS Enterprise M-Code PNT Determination, GPS L2C signal PNT Determination, and GPS L5 signal PNT Determination. Support operational demonstration of Vanguard NTS-3 program and acquisition planning for transition to operations.</p> <p>Provide increased support for PNT cybersecurity including cyber survivability test and evaluation planning and analysis.</p>	-	-	60.064

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653171 / GPS Enterprise Integration
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increase due to ramp up of support to integration and tests for GPS IIIF SV12 and OCX Block 1 RTO.			
Accomplishments/Planned Programs Subtotals	-	-	60.064

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• RDTE 07 1206423F: <i>Global Positioning System III - Operational Control Segment</i>	515.079	413.766	359.720	0.000	359.720	274.887	82.499	22.871	6.620	0.000	1,675.442
• RDTE 04 1203164F: <i>NAVSTAR Global Positioning System (User Equipment) (SPACE)</i>	367.652	434.194	382.594	0.000	382.594	301.635	88.742	55.913	57.012	0.000	1,687.742
• RDTE 07 1203265F: <i>GPS III Space Segment</i>	10.398	7.207	1.626	0.000	1.626	0.000	0.000	0.000	0.000	0.000	19.231
• RDTE 05 1203269SF: <i>GPS III Follow-On (GPS IIIF)</i>	275.819	264.265	265.863	0.000	265.863	247.799	190.704	128.360	100.541	214.192	1,687.543
• RDTE 07 1203913F: <i>NUDET Detection System (SPACE)</i>	29.157	45.887	80.429	0.000	80.429	93.588	86.600	76.954	78.453	0.000	491.068
• SPSF 01 1203265SF: <i>GPS III Space Segment</i>	24.146	84.452	103.340	0.000	103.340	122.753	76.037	50.443	2.831	0.000	464.002
• SPSF 01 1203269SF: <i>GPS III Follow-On (GPS IIIF)</i>	597.796	601.418	657.562	0.000	657.562	664.149	683.441	713.958	748.954	2,100.419	6,767.697
• SPSF 01 1203164SF: <i>GPS UE Space</i>	2.256	2.274	0.950	0.000	0.950	0.901	0.838	0.888	0.840	0.000	8.947

Remarks

D. Acquisition Strategy
In accordance with a "back to basics" acquisition approach the Space Force is required to exercise complete ownership of the architecture, system definition, technical baseline, and integration of the GPS space, ground, and user segments. This complex inter-segment integration requires the government to be the integrator. To

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / <i>GPS III Follow-On (GPS III F)</i>	Project (Number/Name) 653171 / <i>GPS Enterprise Integration</i>

execute this responsibility, the government leverages systems engineering and integration expertise from both Federally Funded Research and Development Center (FFRDC) contractors and a Systems Engineering & Integration (SE&I) contractor. The GPS EI function of the SE&I contractor is currently funded within this PE. The SE&I effort was awarded in 2015 through a full and open competition. A sole source SE&I Bridge Contract began in 1QFY22. A full and open SE&I follow-on contract is scheduled to be awarded by 2QFY22.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653171 / GPS Enterprise Integration
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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			
GPS EI Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	0.000	-		-		34.513	Nov 2022	-		34.513	Continuing	Continuing	-
GPS EI Technical Mission Analysis 1	RO	Aerospace : El Segundo, CA	0.000	-		-		9.744	Oct 2022	-		9.744	Continuing	Continuing	-
GPS EI Technical Mission Analysis 2	Various	Mitre : Various	0.000	-		-		10.809	Oct 2022	-		10.809	Continuing	Continuing	-
GPS EI Cybersecurity	Various	Various : El Segundo, CA	0.000	-		-		1.892	Nov 2022	-		1.892	Continuing	Continuing	-
GPS EI Additional Product Development	Various	Various : Various	0.000	-		-		0.800	Oct 2022	-		0.800	Continuing	Continuing	-
Subtotal			0.000	-		-		57.758		-		57.758	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			
GPS EI A&AS	Various	Various : El Segundo, CA	0.000	-		-		1.906	Oct 2022	-		1.906	Continuing	Continuing	-
GPS EI Other Support	Various	Various : Various	0.000	-		-		0.400	Oct 2022	-		0.400	Continuing	Continuing	-
Subtotal			0.000	-		-		2.306		-		2.306	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			0.000	-		-		60.064		-		60.064	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653171 / GPS Enterprise Integration

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027							
	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				
Support GPS III and GPS IIIIF AFL																																
GPS III SV09 Available for Launch									■																							
GPS III SV10 Available for Launch													■																			
GPS IIIIF SV11 Available for Launch																					■											
GPS IIIIF SV12 Available for Launch																									■							
GPS IIIIF SV13 Available for Launch																									■							
GPS IIIIF SV14 Available for Launch																									■							
Enterprise Integration Support																																
Mission Integration and Technical Baseline Management									■																							
OCX Block 1 Ready to Transition to Operations (RTO)									■																							
M-Code, L5 and L2C Initial Operational Capability (IOC)													■																			
M-Code PNT IOC																	■															
OCX 3F Operational Acceptance																									■							

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203269SF / GPS III Follow-On (GPS III F)	Project (Number/Name) 653171 / GPS Enterprise Integration

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Support GPS III and GPS III F AFL				
GPS III SV09 Available for Launch	1	2023	1	2023
GPS III SV10 Available for Launch	3	2023	3	2023
GPS III F SV11 Available for Launch	2	2026	2	2026
GPS III F SV12 Available for Launch	3	2026	3	2026
GPS III F SV13 Available for Launch	4	2026	4	2026
GPS III F SV14 Available for Launch	2	2027	2	2027
Enterprise Integration Support				
Mission Integration and Technical Baseline Management	1	2023	4	2027
OCX Block 1 Ready to Transition to Operations (RTO)	1	2023	1	2023
M-Code, L5 and L2C Initial Operational Capability (IOC)	1	2024	1	2024
M-Code PNT IOC	2	2025	2	2025
OCX 3F Operational Acceptance	4	2027	4	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</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	-	35.749	42.008	49.628	0.000	49.628	21.972	37.833	12.373	12.614	0.000	212.177
65A037: <i>Ground Based Optical Sensor</i>	-	35.749	42.008	49.628	0.000	49.628	21.972	37.833	12.373	12.614	0.000	212.177
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Space Domain Awareness (SDA) is one of five core competencies of the Space Force and is the effective identification, characterization, and understanding of any factor, passive or active, associated with the space domain that could affect space operations and thereby impact the security, safety, economy, or environment of our nation. As the foundation for space control, SDA encompasses surveillance of all space objects and activities; detailed surveillance of specific space assets; monitoring space environmental conditions; monitoring cooperative space assets; gathering indications and warning on adversary space operations; and conducting integrated command, control, communications, processing, analysis, dissemination, and archiving activities.

This program element fields, upgrades, operationalizes, operates and maintains Space Force sensors and information integration capabilities within the SDA network while companion program element 1206425SF, Space Situational Awareness Systems, develops new network sensors and improved information integration capabilities across the network. Activities funded in this program element (1203940SF) focus on surveillance of objects in earth orbit to aid tasks including satellite tracking; space object identification; tracking and cataloging; satellite attack warning; notification of satellite flyovers to U.S. forces; space treaty monitoring; and technical intelligence gathering.

The Ground-Based Optical Sensor System (GBOSS) Program is an upgrade to the Ground-based Electro-Optical Deep Space Surveillance (GEODSS) system that enables GEODSS to monitor small, closely-spaced, and advanced threats in low, mid, high, and geostationary orbits. The upgraded system will discover currently undetectable space threats, reduce an adversary's tactical surprise and deliver the data required to support accurate, timely, actionable SDA. This facilitates decision-making within the compressed timelines dictated by the realities of the congested, contested, competitive space domain. The program delivers a combination of performance upgrades to existing GEODSS sites, including advanced data exploitation and rapid data dissemination, and will incorporate coalition data, commercial data and/or new GEODSS sites to provide a global capability to positively ID an adversary committing an orbital attack. The program includes updates to the GEODSS image processing and optical subsystems that will enhance the sensitivity and search rate, and fields new multi-spectral advanced technology sensors supporting extended operations, high-fidelity characterization, enhanced indications and warnings (I&W), and attribution.

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, to increase 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 existing capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver GBOSS 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 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	36.897	56.279	0.000	0.000	0.000
Current President's Budget	35.749	42.008	49.628	0.000	49.628
Total Adjustments	-1.148	-14.271	49.628	0.000	49.628
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-14.271			
• 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	-1.148	0.000			
• Other Adjustments	0.000	0.000	49.628	0.000	49.628

Change Summary Explanation

FY 2021: -\$1.148M decrease for SBIR.

FY 2022: -\$14.271M Congressional Directed Reduction

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Ground Based Optical Sensor System (GBOSS)	35.749	42.008	49.628
Description: GBOSS provides a global, ground-based, optical sensor capability for Space Domain Awareness (SDA). The program implements advanced capabilities that may leverage coalition data, commercial data, and sophisticated exploitation algorithms to enhance system response and resiliency to operate in the contested space domain based on aggressive threats by our pacing-competitors, China and Russia. GBOSS improves sensitivity, search rate, tracking of non-cooperative launches, precise tagging of clustered objects, detection of closely spaced dim objects, attribution of orbital attackers and delivers foundational technology to support data exploitation for advanced indications and warnings. This effort includes upgrading existing sensors, dissemination of all data to DoD and IC stakeholders via the Unified Data Library (UDL), and may field GBOSS-			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>enhanced GEODSS capabilities to new locations in accordance with USSF Leadership direction. The program will also acquire new advanced technology sensors to improve persistence and advanced multi-spectral data collection, enabling high-fidelity characterization and rapid attribution. The program will collaborate with Combined Space Operations Center (CSpOC), National Space Defense Center (NSDC), and National Air and Space Intelligence Center (NASIC) efforts to ensure enterprise data fusion and dissemination supporting Enterprise Space Battle Management Command, and Control (ESBMC2).</p> <p>FY 2022 Plans: Complete the software and hardware development for the GEODSS Enhanced Telescope (GET) upgrade and install and test it at the White Sands Missile Range (WSMR) GEODSS site. Install GET hardware and software at the Maui GEODSS site and begin testing. Upgrade infrastructure and start facility build of European site to close the Atlantic Optical Gap to support Initial Operational Capability (IOC) in FY 2024. Begin infrastructure upgrades and facility build of Indo-Pacific site to provide full global coverage by FY 2026.</p> <p>Additionally, FY 2022 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control</p> <p>FY 2023 Plans: Complete the installation and testing of the GET upgrade at the Maui GEODSS site. Incorporate coalition data, commercial data, and/or initiate facility construction of a European GEODSS site to close the Atlantic Optical Gap and support Initial Operational Capability (IOC) in FY 2024. Incorporate coalition data, commercial data and/or initiate facility construction of an Indo-Pacific GEODSS site to provide full global coverage by FY 2026 and Full Operational Capability (FOC) in FY 2027.</p> <p>FY 2023 funding will allow the program office to continue developing and fielding a resilient system necessary to operate in the contested space domain. Activities may include, but are not limited to: integration and test of command and control (C2) and mission partner interfaces, implementation of advanced data exploitation algorithms that may include pattern of life (PoL), advanced indications and warnings (I&W), enhanced defensive cyber operations resiliency measures, space test/combat range events, studies, technical analysis, risk reduction experiments, prototyping and program office support, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased because the program's management services requirements decrease following completion of international agreements.</p>				
Accomplishments/Planned Programs Subtotals		35.749	42.008	49.628

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>
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D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

This program began in FY 2018 to address ground-based optical SDA gaps and shortfalls. The acquisition strategy, approved in March 2018, accelerates the development and fielding of the solution, minimizing the time to address the requirements in light of current and emerging threats. Initial TMRR activities were executed using existing defense, intelligence, and lab contracts. EMD activities are being executed on the Maintenance of Space Situational Awareness Integrated Capabilities (MOSSAIC) contract awarded through full and open competition. The approved acquisition strategy supports fielding Initial Operational Capability (IOC) in the European theater in FY 2024 and Full Operational Capability (FOC) of the global capability in FY 2027.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 65A037 / <i>Ground Based Optical Sensors Operations</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			
GBOSS design, development and life extension	Various	L3Harris : Colorado Springs, CO	-	24.417	Mar 2021	33.769	Nov 2021	33.273	Nov 2022	-		33.273	Continuing	Continuing	-
Test, Training, Other	C/CPIF	Various : Various	-	-		-		7.029	Nov 2022	-		7.029	Continuing	Continuing	-
GBOSS Technical Mission Analysis	RO	Various : Various	-	6.019	Nov 2020	2.819	Nov 2021	4.401	Nov 2022	-		4.401	Continuing	Continuing	-
Subtotal			-	30.436		36.588		44.703		-		44.703	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			
A&AS	Various	Various : Various	-	2.567	May 2021	2.560	Nov 2021	2.800	Nov 2022	-		2.800	Continuing	Continuing	-
FFRDC	Various	Various : Various	-	2.696	Apr 2021	2.080	Nov 2021	2.000	Nov 2022	-		2.000	Continuing	Continuing	-
Other Support	C/CPAF	Various : Various	-	0.050	Nov 2020	0.780	Nov 2021	0.125	Nov 2022	-		0.125	Continuing	Continuing	-
Subtotal			-	5.313		5.420		4.925		-		4.925	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		-	35.749	42.008	49.628	-		49.628	Continuing	Continuing	N/A

Remarks
 The GBOSS program has minimal organic resources. The FY 2023 funding in Management Services enables parallel efforts to implement international agreements in two countries, manage site construction contracts, and simultaneously maintain surveillance and management of the telescope development in the U.S. Additionally, specialized FFRDC knowledge and expertise in optics will support the enhanced telescope upgrade effort.

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 65A037 / <i>Ground Based Optical Sensors Operations</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>GBOSS Development</i>				
GBOSS TMRR	1	2021	4	2021
GBOSS EMD	1	2021	1	2027
CDR	4	2021	1	2022
Operational Acceptance at White Sands Missile Range	3	2022	3	2022
Operational Acceptance at Maui	2	2023	2	2023
Operational Acceptance in Europe	4	2024	4	2024
IOC	4	2024	4	2024
Operational Acceptance in Indo-Pacific	1	2025	1	2025
FOC	3	2026	1	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</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	-	55.592	48.063	21.848	0.000	21.848	36.600	37.050	37.361	38.089	Continuing	Continuing
65A001: <i>Counter Satellite Communications System</i>	-	48.929	33.438	19.745	0.000	19.745	34.455	34.864	35.126	35.810	Continuing	Continuing
65A005: <i>Offensive Counterspace (OCS) C2</i>	-	2.184	2.619	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.803
65A013: <i>BOUNTY HUNTER</i>	-	4.479	12.006	2.103	0.000	2.103	2.145	2.186	2.235	2.279	Continuing	Continuing

A. Mission Description and Budget Item Justification

Acquisition Decision Memorandum (ADM) April 24th 2009, directed all capabilities identified in the October 4th 2006, Counter Communications System (CCS) Block 20, Joint Requirements Oversight Council (JROC) approved Capability Development Document (CDD) shall be accomplished as Pre-planned Product Improvement Program (P3I) upgrades to the CCS Block 10. On April 11th 2016, Air Force Space Command (AFSPC) updated ADM adding additional responsibility for CCS Block 10.3 Meadowlands.

CCS provides expeditionary, deployable, reversible offensive space control (OCS) effects applicable across the full spectrum of conflict. It prevents adversary Satellite Communications (SATCOM) in Area of Responsibility (AOR) including Command & Control (C2), Early Warning and Propaganda, and hosts Rapid Reaction Capabilities in response to Urgent Needs. This program effort includes architecture engineering and studies, system hardware design and development, software design and integration, and testing and demonstration of capabilities to provide disruption of satellite communications signals.

Space acquisition must respond with speed and agility to emerging adversary threats. The Space Systems Command (SSC) has transformed the organization and implementation of space acquisition to an enterprise approach, to increase 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 repurpose existing capabilities.

Bounty Hunter (BH) is a ground-based, deployable, tactical space Electronic Warfare Support system (ES) that provides SATCOM geolocation and interference detection capabilities that support the Defensive Space Control of US systems in a specific AOR. BH provides the capability to monitor, detect, characterize and geolocate friendly and unfriendly electro-magnetic interference (EMI) across multiple radio frequency bands in support of Command, Control, Communications, Computers, and Intelligence (C4I) systems by US Joint forces. Continuing annual agile development is needed to meet new user needs in an ever changing threat environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver Bounty Hunter capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605829S. In FY 2021 0.147M expended, in FY 2022 0.152M expended and, it is estimated for civilian pay expenses in FY 2023 will be 0.155M in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	57.189	38.063	0.000	0.000	0.000
Current President's Budget	55.592	48.063	21.848	0.000	21.848
Total Adjustments	-1.597	10.000	21.848	0.000	21.848
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	10.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.597	0.000			
• Other Adjustments	0.000	0.000	21.848	0.000	21.848

Change Summary Explanation

FY 2023: The Offensive Counterspace C2 project is scheduled to complete by the end of FY 2022. 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.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>				Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>			
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
65A001: <i>Counter Satellite Communications System</i>	-	48.929	33.438	19.745	0.000	19.745	34.455	34.864	35.126	35.810	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Acquisition Decision Memorandum (ADM) April 24th 2009, directed all capabilities identified in the Oct 4th 2006 CCS Block 20, Joint Requirements Oversight Council (JROC) approved Capability Development Document (CDD) shall be accomplished as Pre-planned Product Improvement Program (P3I) upgrades to the Counter Communications System (CCS) Block 10. On April 11th 2016, Air Force Space Command (AFSPC) signed and updated ADM adding additional responsibility for CCS Block 10.3 Meadowlands.

CCS provides expeditionary, deployable, reversible offensive space control (OCS) effects applicable across the full spectrum of conflict. It prevents adversary Satellite Communications (SATCOM) in Area of Responsibility (AOR) including Command & Control (C2), Early Warning and Propaganda, and hosts Rapid Reaction Capabilities in response to Urgent Operational Needs. This program effort includes architecture engineering and studies, system hardware design and development, software design and integration, and testing and demonstration of capabilities to provide disruption of satellite communications signals.

Space acquisition must respond with speed and agility to emerging adversary threats. The Space Systems Command (SSC) has transformed the organization and implementation of space acquisition to an enterprise approach, to increase 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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver counterspace 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.

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

	FY 2021	FY 2022	FY 2023
Title: Counter Communications System (CCS) Pre-planned Product Improvement (P3I) Program	48.929	33.438	19.745
Description: Develop, integrate, test and field the CCS P3I program. This is an incremental approach to deliver Block 20 CCS capabilities.			
FY 2022 Plans: Continue P3I development, integration and testing of the Block 10 P3I Meadowlands program. Include additional CCS Block 20 capabilities in CCS Block 10.3 Meadowlands, design forward garrison systems, mission specific emulators, training environment			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>

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

	FY 2021	FY 2022	FY 2023
and multi-range integration. Begin delivery of the Meadowlands development systems following the successful completion of developmental and operational testing. Continue development of new mission techniques to meet advancing threat and integrate techniques into the CCS program of record. Continue implementation of Agile development approach for development of weapon system software.			
Additionally, FY 2022 funding will allow the program to rapidly respond and implement system resiliency and situational awareness necessary to operate in the contested space domain. RDT&E funding is required to support this transformation and enable Space Superiority end-to-end integration activities such as, but not limited to program office support, studies, technical analysis, experimentation, prototyping, architectural development, systems engineering, demonstrations, testing, command and control integration, mission partner integration, and space test/combat range events.			
FY 2023 Plans: Continue P3I development, integration and testing of the Block 10 P3I Meadowlands program. Include additional CCS Block 20 capabilities in CCS Block 10.3 Meadowlands, design forward garrison systems, mission specific emulators, training environment and multi-range integration. Continue development of new mission techniques to meet advancing threat and integrate techniques into the CCS program of record. Continue Agile development approach for development of weapon system software and mission techniques. Prepare for concentrated stand-alone testing of CCS warfighting techniques and integration of the next counter Electronic Warfare (EW) system.			
Further, FY 2023 funding will further the program's development to rapidly respond and implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc. Rapidly respond and implement system resiliency and situational awareness necessary to operate in the contested space domain.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to FY 2022 due to the ramp down of CCS Meadowlands development and testing activities.			
Accomplishments/Planned Programs Subtotals	48.929	33.438	19.745

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 CTRSPC: <i>Counterspace Systems</i>	44.167	59.793	55.269	-	55.269	61.908	1.968	2.008	2.048	0.000	227.161

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

D. Acquisition Strategy

All contracts in this program element will be awarded using competitive procedures to the maximum extent possible, to upgrade existing capabilities as well as to acquire next generation capabilities through incremental acquisitions.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</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			
Block 10 P3I Development	Various	Various : El Segundo, CA	-	38.195	Feb 2021	24.937	Feb 2022	11.384	Feb 2023	-		11.384	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	0.912	Oct 2020	0.726	Oct 2021	0.727	Oct 2022	-		0.727	Continuing	Continuing	-
Enterprise Systems Engineering and Integration	C/FFP	Various : Various, CA	-	1.002	May 2021	0.198	May 2022	0.197	May 2023	-		0.197	Continuing	Continuing	-
Counterspace Architecture Development	C/CPFF	NGMS : Redondo Beach, CA	-	0.966	Jan 2021	0.908	Jan 2022	0.927	Jan 2023	-		0.927	Continuing	Continuing	-
Subtotal			-	41.075		26.769		13.235		-		13.235	Continuing	Continuing	N/A

Support (\$ 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			
Security	C/CPAF	Mantech : El Segundo, CA	-	2.278	Nov 2020	2.304	Nov 2021	2.307	Nov 2022	-		2.307	Continuing	Continuing	-
Subtotal			-	2.278		2.304		2.307		-		2.307	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			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	1.163	Oct 2020	0.786	Oct 2021	0.800	Oct 2022	-		0.800	Continuing	Continuing	-
A&AS	Various	Various : El Segundo, CA	-	4.373	May 2021	3.481	May 2022	3.307	May 2023	-		3.307	Continuing	Continuing	-
Other Support	Various	Various : El Segundo, CA	-	0.040	Oct 2020	0.098	Oct 2021	0.096	Oct 2022	-		0.096	Continuing	Continuing	-
Subtotal			-	5.576		4.365		4.203		-		4.203	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027					
	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		
CCS B10.3																														
10.3 Development																														
Technique development (2x per year)																														
10.3 Development Test/Operational Test																														
10.3 System Deliveries #1-4																														

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CCS B10.3				
10.3 Development	1	2021	2	2022
Technique development (2x per year)	3	2021	1	2026
10.3 Development Test/Operational Test	2	2022	4	2022
10.3 System Deliveries #1-4	3	2023	1	2024

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

Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206421SF / Counterspace Systems				Project (Number/Name) 65A005 / Offensive Counterspace (OCS) C2			
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
65A005: <i>Offensive Counterspace (OCS) C2</i>	-	2.184	2.619	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.803
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This effort supports the evolution of command and control (C2) and mission planning capabilities in support of the fielding and employment of Counterspace Systems. It provides for the integration and upgrade of collaborative tools to link deployable counterspace systems with Joint Warfighting C2 systems and to enable integrated planning and execution of the counterspace mission. Upgraded capabilities will be integrated into current and future command and control systems. This program will leverage the Joint Execution and Tasking System for Space (JETSS) effort in C2 for future space control and counterspace mission capabilities. Requirements for this program are derived from Space Force Headquarters prioritized requirements, in accordance with AFSPC 63-104.

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

	FY 2021	FY 2022	FY 2023
Title: Joint Execution and Tasking System for Space (JETSS)	2.184	2.619	0.000
Description: Evolve with upgrades the counterspace mission planning and C2 capability to support counterspace systems space control warfighter activities.			
FY 2022 Plans: Accelerate the completion of integration into BMC2, upgrading Space Electronic Warfare C2 capabilities at multiple classification levels for CSpOC and tactical units. Additionally, FY 2022 funding will allow the program 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.			
FY 2023 Plans: N/A			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to the completion of Project 65A005: Offensive Counterspace (OCS) C2.			
Accomplishments/Planned Programs Subtotals	2.184	2.619	0.000

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

N/A

Remarks

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
3620F / 5	PE 1206421SF / <i>Counterspace Systems</i>	65A005 / <i>Offensive Counterspace (OCS) C2</i>

D. Acquisition Strategy

All contracts will be awarded using competitive procedures to the maximum extent possible to acquire next generation capabilities through incremental acquisitions. The Offensive Counterspace (OCS) C2 project will complete by end of FY 2022, and any future efforts will be considered for inclusion as an incremental delivery of the Space C2 program.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A005 / <i>Offensive Counterspace (OCS) C2</i>
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

JETSS	
C2 Product Line Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A005 / <i>Offensive Counterspace (OCS) C2</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
JETSS				
C2 Product Line Development	1	2021	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>				Project (Number/Name) 65A013 / <i>BOUNTY HUNTER</i>			
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
65A013: <i>BOUNTY HUNTER</i>	-	4.479	12.006	2.103	0.000	2.103	2.145	2.186	2.235	2.279	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Bounty Hunter (BH) is a ground-based, deployable, tactical space Electronic Warfare Support system (ES) that provides SATCOM geolocation and interference detection capabilities that support the Defensive Space Control of US systems in a specific AOR. BH provides the capability to monitor, detect, characterize and geolocate friendly and unfriendly electro-magnetic interference (EMI) across multiple radio frequency bands in support of Command, Control, Communications, Computers, and Intelligence (C4I) systems by US Joint forces. Continuing annual agile development is needed to meet new user needs in an ever changing threat environment.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Bounty Hunter capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605829F. In PY 2021 \$0.134M was expended for civilian pay expenses in this program element, and in CY 2022 \$0.152M will be expended for civilian pay expenses in this program element.

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

	FY 2021	FY 2022	FY 2023
Title: Bounty Hunter	4.479	12.006	2.103
Description: Develop new capabilities for the Bounty Hunter program to meet and maintain pace with the operational threat environment. Specific accomplishments are classified.			
FY 2022 Plans: Continue to resolve any new technical obsolescence hardware (HW) and software (SW) challenges with new system component purchases for additional new system delivery as directed by the US Space Force. Finalize execution of the program RDT&E plan for system upgrade to BH 3.0 and beyond to allow for system component consolidation and completion of remote operations in specific CCMD AOR's. Reach and maintain pace with the threat environment and 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, experimentation, prototyping, etc.			
FY 2023 Plans: Continue to resolve any new technical obsolescence HW and SW challenges with new system developmental research to facilitate component purchases for new system delivery as directed by the U.S. Space Force. Finalize execution of the program RDT&E plan for system upgrade to BH 3.0 and beyond to allow for system component consolidation and completion of remote operations in specific Combatant Command (CCMD) Areas of Responsibility (AOR's). Reach and maintain pace with the threat environment and 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, experimentation, prototyping, etc.			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A013 / <i>BOUNTY HUNTER</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Further, FY 2023 development will focus on automation of BH capabilities in an effort to reduce the operational manning of the deployed systems.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY2023 decreased compared to FY2022 by \$9.902M. Justification for this decrease is the completion of UON 003-21-001.			
Accomplishments/Planned Programs Subtotals	4.479	12.006	2.103

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• SPAF 01 CTRSPC: <i>Counterspace Systems</i>	4.988	5.030	5.099	-	5.099	-	-	-	-	0.000	15.117

Remarks
BH was established in FY16 as a JCTD project in response to a JUON in 2010. BH was established as a Program of Record (PoR) in March 2019.

D. Acquisition Strategy
Contracts funded for this program shall be awarded to MITRE, a Federally Funded Research and Development Center (FFRDC), and the commercial vendor COLSA Corporation.

**2026 Continuous Delivery (SW & HW updates) Start 2nd qtr 2026 - End 1st qtr 2027

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A013 / <i>BOUNTY HUNTER</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
Bounty Hunter																												
Bounty Hunter Incremental Development																												
Bounty Hunter Ops System #1																												
Bounty Hunter Ops System #2																												
Bounty Hunter Ops System #3 Production																												
Bounty Hunter Ops System #3 Operations																												
Bounty Hunter Ops System #4 Production																												
Bounty Hunter Ops System #4 Operations																												
Bounty Hunter Ops System #5 Production																												
Bounty Hunter Ops System #5 Operations																												
Bounty Hunter Trainer #1																												
Bounty Hunter Trainer #2 Production																												
Bounty Hunter Trainer #2 Operations																												
Bounty Hunter Trainer #3 Production																												
Bounty Hunter Trainer #3 Operations																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206421SF / <i>Counterspace Systems</i>	Project (Number/Name) 65A013 / <i>BOUNTY HUNTER</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Bounty Hunter</i>				
Bounty Hunter Incremental Development	1	2021	4	2027
Bounty Hunter Ops System #1	1	2021	4	2027
Bounty Hunter Ops System #2	1	2021	4	2027
Bounty Hunter Ops System #3 Production	1	2021	4	2022
Bounty Hunter Ops System #3 Operations	1	2023	4	2027
Bounty Hunter Ops System #4 Production	1	2021	3	2022
Bounty Hunter Ops System #4 Operations	4	2022	4	2027
Bounty Hunter Ops System #5 Production	1	2022	3	2023
Bounty Hunter Ops System #5 Operations	4	2023	4	2027
Bounty Hunter Trainer #1	1	2021	4	2027
Bounty Hunter Trainer #2 Production	1	2021	3	2021
Bounty Hunter Trainer #2 Operations	4	2021	4	2027
Bounty Hunter Trainer #3 Production	4	2022	3	2024
Bounty Hunter Trainer #3 Operations	4	2024	4	2027

Note

**2026 Continuous Delivery (SW & HW updates) Start 2 qtr 2026 - End 1st qtr 2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</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	-	2.440	1.438	48.870	0.000	48.870	69.333	23.362	23.881	24.346	Continuing	Continuing
65A038: <i>SSA Environmental Monitoring</i>	-	2.440	1.438	1.438	0.000	1.438	0.000	0.000	0.000	0.000	Continuing	Continuing
65A039: <i>WSF-M</i>	-	0.000	0.000	47.432	0.000	47.432	69.333	23.362	23.881	24.346	0.000	188.354

A. Mission Description and Budget Item Justification

SSAEM Project 65A038 is a non-ACAT, Class D technology demonstration project to support the international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). COSMIC-2 launched six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft in FY 2019. The sensor types are Tri-Global Navigation Satellite System (Tri-GNSS) Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap #4 (Ionospheric Density), Gap #7 (Equatorial Ionospheric Scintillation) and Gap #12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.

In FY 2023, PE 1206422SF, Weather System Follow-On, Project 644289, Weather Satellite Follow-On, R-1 Line #8 efforts were transferred to PE 1206422SF, Weather System Follow-On, Project 65A039, Weather System Follow-on - Microwave (WSF-M), R-1 Line #20 reflecting the successful completion of Milestone B on 15 May 2020. Residual budget in FY24-25 funds will be transferred from BA04 to BA05 in future budget cycle.

Weather System Follow-on program 1206422SF consists of Space Situational Awareness Environmental Monitoring (SSAEM) Project 65A038 and WSF-M Project 65A039.

The Weather Satellite Follow-on - Microwave (WSF-M) Project 65A039 includes funds for the WSF-M system, the Compact Ocean Wind Vector Radiometer (COWVR) technology demonstration, and the Energetic Charged Particle (ECP) sensor development.

Weather System Follow-on (WSF) is a Low-Earth Orbit (LEO) microwave imaging system developed and delivered by the United States Space Force's Space Systems Command (SSC). WSF is the next generation of space-based passive microwave sensing technology. It will provide U.S. and Allied warfighters with essential weather data, including the measurement of ocean surface wind speed and direction, ice thickness, snow depth, soil moisture, and local spacecraft energetic charged particle environment. The ocean surface wind speed measurement enables tropical cyclone intensity determination by the Joint Typhoon Warning Center. The data gathered by WSF will be provided to meteorologists in support of the generation of a wide variety of weather products necessary to conduct mission planning and operations globally.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	
<p>WSF is an Acquisition Category IB program comprised of two Space Vehicles (SV) and their associated command, control, and data dissemination network. Global environmental monitoring data is gathered, stored, and down-linked through the Satellite Control Network (SCN) and disseminated to Air Force and Navy weather centers. Additionally, data is broadcast real time by the satellite for utilization by heritage Direct Readout Terminals that use the data for local weather forecasting.</p> <p>WSF is a Major Defense Acquisition Program (MDAP) with the Space Force as the lead component. Founded on the Space-Based Environmental Monitoring (SBEM) Analysis of Alternatives (AoA) results, the WSF will be to enable:</p> <ol style="list-style-type: none">1) Timely weather collection over broad oceans in support of maneuvering forces;2) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere. <p>Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.</p> <p>COWVR is an on-orbit demonstration project of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI).</p> <p>ECP supports the SBEM Weather Gap #11, Low Earth Orbit Energetic Charged Particle Characterization. To support this requirement, the ECP sensor will be integrated on the WSF-M satellites.</p> <p>Space acquisition must respond with speed and agility to emerging adversary threats. 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 repurpose capabilities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF for 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. In FY 2021 \$0.00 was expended for civilian pay expenses in this program element, and in FY 2022 \$0.00 is forecasted for civilian pay expenses in this program element.</p> <p>This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>
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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	2.526	1.438	0.000	0.000	0.000
Current President's Budget	2.440	1.438	48.870	0.000	48.870
Total Adjustments	-0.086	0.000	48.870	0.000	48.870
• 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	-0.086	0.000			
• Other Adjustments	0.000	0.000	48.870	0.000	48.870

Change Summary Explanation

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</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
65A038: <i>SSA Environmental Monitoring</i>	-	2.440	1.438	1.438	0.000	1.438	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Space Situational Awareness Environmental Monitoring (SSAEM) program is a non-ACAT, Class D technology demonstration project to support the international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). COSMIC-2 launched six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft in FY 2019. The sensor types are Tri-Global Navigation Satellite System (Tri-GNSS) Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap #4 (Ionospheric Density), Gap #7 (Equatorial Ionospheric Scintillation) and Gap #12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SSAEM for 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. In FY 2021 \$0.00 was expended for civilian pay expenses in this program element, and in FY 2022 \$0.00 is forecasted for civilian pay expenses in this program element.

The RFB ground stations will be transferred to AFRL after Calibration and Validation is complete in 2nd Quarter FY 2022. Design life has extended through FY28 due to system performance exceeding expectations.

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

	FY 2021	FY 2022	FY 2023
Title: Space Situational Awareness Environment Monitoring (SSAEM)	2.440	1.438	1.438
Description: The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO).			
FY 2022 Plans:			
Continue Radio Frequency Beacon receivers (RFB) fielding activities at operational Ionospheric Scintillation and Total Electron Content Observer (ISTO) sites. Continue on-orbit support of SSAEM sensors onboard COSMIC-2 as well as provide remote sensing of space weather coverage until the satellites reach their design mission End of Life. Continue program office and other related support activities that may include,			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
but are not limited to studies, technical analysis, prototyping, etc.			
<i>FY 2023 Plans:</i> Continue development and improvement of operationalized products for USSF/Navy models. Adapt existing data readings based on emerging user needs. Improve terrestrial and space weather data capture in terms of quality and latency in cooperation with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO) Taiwan. Complete fielding and transition of RFB to AFRL. Evaluate and adapt to emerging solar maximum environment to ensure constellation health and longevity as the program is transitioned to sustainment after FY 2024. 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, experimentation, prototyping, etc.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	2.440	1.438	1.438

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

N/A

Remarks

D. Acquisition Strategy

SSAEM post-launch and cal/val support contract is the sole-source contract to University Corporation Atmospheric Research due to their expertise in radio occultation and space weather monitoring for SSAEM sensors. The Justification & Approval (J&A) was approved in June 2018 and the Request for Proposal was released on August 1st, 2018. The contract was awarded in July 2019 for 5-years of post-launch cal/val and on-orbit support.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</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			
UCAR Sensor R&D	SS/CPFF	UCAR : TBD	-	0.893	Nov 2020	0.759	Nov 2021	0.589	Nov 2022	-		0.589	Continuing	Continuing	-
On-Orbit Support (UCAR/JPL)	MIPR	UCAR/JPL : Boulder, CO	-	0.845	Nov 2020	0.440	Nov 2021	0.395	Nov 2022	-		0.395	Continuing	Continuing	-
Ground Support	Various	Various : TBD	-	0.698	Nov 2020	-		0.153	Nov 2022	-		0.153	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	-		0.115	Nov 2021	0.144	Nov 2022	-		0.144	Continuing	Continuing	-
Subtotal			-	2.436		1.314		1.281		-		1.281	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			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	0.000	Nov 2020	0.115	Nov 2021	0.096	Nov 2022	-		0.096	Continuing	Continuing	-
A&AS	Various	Various : Various	-	-		-		0.056	May 2023	-		0.056	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.004	Aug 2021	0.009		0.005	Nov 2022	-		0.005	Continuing	Continuing	-
Subtotal			-	0.004		0.124		0.157		-		0.157	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
-	2.440	1.438	1.438	-	1.438	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</i>
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Space Situational Awareness</i>	
<i>Environmental Monitoring</i>	
SSAEM Sensor Cal/Val	
On Orbit Activities	
RFBrcyberhardening & Fielding Activities	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Situational Awareness Environmental Monitoring</i>				
SSAEM Sensor Cal/Val	1	2021	3	2022
On Orbit Activities	4	2021	4	2024
RFBBr Cyberhardening & Fielding Activities	1	2021	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>				Project (Number/Name) 65A039 / <i>WSF-M</i>			
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
65A039: <i>WSF-M</i>	-	0.000	0.000	47.432	0.000	47.432	69.333	23.362	23.881	24.346	0.000	188.354
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This is not a new start. In FY 2023, PE 1206422SF, Weather System Follow-On, Project 644289, Weather Satellite Follow-On, R-1 Line #8 efforts were transferred to PE 1206422SF, Weather System Follow-On, Project 65A039, Weather System Follow-on - Microwave (WSF-M), R-1 Line #20 reflecting the successful completion of Milestone B on 15 May 2020. Residual budget in FY24-25 funds will be transferred from BA04 to BA05 in future budget cycle.

Weather System Follow-on program 1206422SF consists of Space Situational Awareness Environmental Monitoring (SSAEM) Project 65A038 and WSF-M Project 65A039.

The Weather Satellite Follow-on - Microwave (WSF-M) Project 65A039 includes funds for the WSF-M system, the Compact Ocean Wind Vector Radiometer (COWVR) technology demonstration, and the Energetic Charged Particle (ECP) sensor development.

Weather System Follow-on (WSF) is a Low-Earth Orbit (LEO) microwave imaging system developed and delivered by the United States Space Force's Space Systems Command (SSC). WSF is the next generation of space-based passive microwave sensing technology. It will provide U.S. and Allied warfighters with essential weather data, including the measurement of ocean surface wind speed and direction, ice thickness, snow depth, soil moisture, and local spacecraft energetic charged particle environment. The ocean surface wind speed measurement enables tropical cyclone intensity determination by the Joint Typhoon Warning Center. The data gathered by WSF will be provided to meteorologists in support of the generation of a wide variety of weather products necessary to conduct mission planning and operations globally.

WSF is an Acquisition Category IB program comprised of two Space Vehicles (SV) and their associated command, control, and data dissemination network. Global environmental monitoring data is gathered, stored, and down-linked through the Satellite Control Network (SCN) and disseminated to Air Force and Navy weather centers. Additionally, data is broadcast real time by the satellite for utilization by heritage Direct Readout Terminals that use the data for local weather forecasting.

WSF is a Major Defense Acquisition Program (MDAP) with the Space Force as the lead component. Founded on the Space-Based Environmental Monitoring (SBEM) Analysis of Alternatives (AoA) results, the WSF will be to enable:

- 1) Timely weather collection over broad oceans in support of maneuvering forces;
- 2) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

COWVR is an on-orbit demonstration project of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI).

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A039 / <i>WSF-M</i>
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ECP supports the SBEM Weather Gap #11, Low Earth Orbit Energetic Charged Particle Characterization. To support this requirement, the ECP sensor will be integrated on the WSF-M satellites.

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

	FY 2021	FY 2022	FY 2023
<p>Title: WSF Microwave Satellite (SV1-2)</p> <p>Description: This is not a new start. Develop, build, integrate, and test the WSF Microwave (WSF-M) satellites, including bus, payloads, and ground upgrades to satisfy JROC-directed SBEM Capability gaps.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Complete WSF-M Ground Segment Integration & Test. Complete SV-1 I&T, to include, but not limited to Day-In-The-Life testing. Conduct SV-1 pre-ship review ahead of shipment of SV-1 to payload processing facility for launch processing. Execute pre-priced contract to manufacture and build of SV-2 to include payload and spacecraft unit and subsystems production, integration and test. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: The FY 2023 funding increased due to the transfer of funding from PE 1206422SF BA04, Weather System Follow-On, Project 644289 to PE 1206442SF BA05, Weather System Follow-On, Project 65A039. The transfer of funding recognizes the \$8.1M in FY22 funds under the former BA04 removed through congressional mark for product development excess to need.</p>	0.000	0.000	47.097
<p>Title: COWVR Tech Demo</p> <p>Description: This is not a new start. The Compact Ocean Wind Vector Radiometer (COWVR) launch objective supports Category A Weather Requirements, as codified in JROC Memo 092-014, providing on-orbit technology demonstration of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI). This will be a cooperative mission with NASA for integrating the sensor onto the International Space Station (ISS) as a weather technology demonstration project. The new mission designation for the COWVR launch will be Space Test Program Houston Mission #8 (STP-H8). Demonstrating COWVR technology in the space environment remains an important milestone for the microwave data weather mission in lieu of the ORS-6 cancellation. Unlike ORS-6, COVWR will fly on the ISS and the residual operational capability is not guaranteed as a result.</p> <p>FY 2022 Plans:</p>	0.000	0.000	0.030

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A039 / <i>WSF-M</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
N/A			
<p>FY 2023 Plans: Continue operating the sensor and gathering data for potential inclusion into current weather models. This funding includes but is not limited to payload commanding, data interpretation and dissemination, and other ground operational support.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased due to the transfer of funding from PE 1206422SF BA04, Weather System Follow-On, Project 644289 to PE 1206442SF, BA05, Weather System Follow-On, Project 65A039</p>			
<p>Title: ECP</p> <p>Description: This is not a new start. Energetic Charged Particles (ECP) will support the SBEM Weather Gap 11 and address the Secretary of the Air Force (SECAF) policy which directed each Space Force Satellite Office to plan for ECP sensors on all pre-Milestone B satellite acquisitions. To support this requirement, the ECP sensor will be integrated on the WSF-M satellites.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Continue support for system integration activities. Complete WSF-M ECP sensor data processing software and pre-launch efforts.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased due to the transfer of funding from PE 1206422SF BA04, Weather System Follow-On, Project 644289 to PE 1206442SF, BA05, Weather System Follow-On, Project 65A039</p>	0.000	0.000	0.305
Accomplishments/Planned Programs Subtotals	0.000	0.000	47.432

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
E. Acquisition Strategy
The acquisition strategy for WSF is based on validated SBEM AoA results from FY 2014 and subsequent acquisition strategy development activities that were conducted in FY 2015. The WSF acquisition strategy focuses on streamlined acquisition processes for providing materiel solutions to OSVW, TCI & LEO ECP, as validated by the JROC; deliver microwave sensing solution to address DoD needs for OSVW and TCI capabilities and deliver space environment sensing solution to address LEO ECP capabilities for on-orbit attributions and support of anomaly resolutions.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force Date: April 2022

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
3620F / 5	PE 1206422SF / <i>Weather System Follow-on</i>	65A039 / <i>WSF-M</i>

The Space Force is conducting a technology demonstration of the Compact Ocean Wind Vector Radiometer (COWVR) sensor on the International Space Station (ISS), utilizing its unique technology demonstration capabilities for on-orbit demonstration of COWVR technology. The Space Systems Command (SSC) Space Test Program Office is the lead Space Force organization spearheading the NASA partnership, with the SSC Development Corps responsible for the COWVR sensor and providing programmatic support to enable COWVR sensor to ISS integration/technology demonstration.

The program awarded a contract for WSF-M with up to two satellites through a full and open competition. The WSF-M first satellite (SV-1) Initial Launch Capability is 1st quarter FY 2024. The pre-priced WSF-M SV-2 option must be exercised by Nov 2022 or be subject to renegotiation. WSF-M SV-2 ILC is 4th quarter FY 2027. The WSF SV-2 will be functionally equivalent to SV-1. The Naval Research Lab Blossom Point Tracking Facility (BPTF) will be the Satellite Operations Center (SOC) for WSF-M.

The WSF ECP sensor is developed by AFRL and will be integrated onto the WSF-M satellites.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A039 / <i>WSF-M</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			
WSF COWVR Technology Demonstration	Various	Various : TBD	-	-		-		0.030	Apr 2023	-		0.030	0.000	0.030	-
WSF Microwave System (SV1-2)	C/CPFF	Ball Aerospace, : Boulder, CO	-	-		-		25.638	Nov 2022	-		25.638	0.000	25.638	499.147
WSF ECP	C/Various	Various : Various	-	-		-		0.305	Jan 2023	-		0.305	0.000	0.305	-
WSF Enterprise Systems Engineering & Integration	C/CPAF	Engility Corp : Andover, MA	-	-		-		3.267	Nov 2022	-		3.267	0.000	3.267	-
WSF Technical Mission Analysis	RO	Aerospace Corp. : El Segundo, CA	-	-		-		6.414	Nov 2022	-		6.414	0.000	6.414	-
WSF Blossom Point Naval Research Laboratory	MIPR	NRL : Welcome, MD	-	-		-		4.174	Dec 2022	-		4.174	0.000	4.174	-
Subtotal			-	-		-		39.828		-		39.828	0.000	39.828	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			
WSF FFRDC	RO	Aerospace Corp : El Segundo, CA	-	-		-		3.019	Nov 2022	-		3.019	0.000	3.019	-
WSF A&AS	Various	Various : El Segundo, CA	-	-		-		4.377	Feb 2023	-		4.377	0.000	4.377	-
WSF Other Support	Various	Various : El Sefunto, CA	-	-		-		0.208	Nov 2022	-		0.208	0.000	0.208	-
Subtotal			-	-		-		7.604		-		7.604	0.000	7.604	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		-	-	-		47.432	-	47.432	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A039 / <i>WSF-M</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

<i>Weather System Follow-On</i>																																
WSF SV-1 Production/Integration and Test																																
WSF SV-1 Initial Launch Capability																																
WSF SV-1 Initial Operational Capability																																
WSF SV-1 Full Operational Capability																																
WSF ECP Development & Delivery to Prime Contractor for SV-2																																
WSF SV-2 Production/Integration and Test																																
WSF SV-2 Initial Launch Capability																																
COWVR Technology Demonstration On-Orbit Operations																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206422SF / <i>Weather System Follow-on</i>	Project (Number/Name) 65A039 / <i>WSF-M</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Weather System Follow-On</i>				
WSF SV-1 Production/Integration and Test	1	2023	4	2023
WSF SV-1 Initial Launch Capability	1	2024	1	2024
WSF SV-1 Initial Operational Capability	4	2024	4	2024
WSF SV-1 Full Operational Capability	2	2025	2	2025
WSF ECP Development & Delivery to Prime Contractor for SV-2	4	2024	4	2024
WSF SV-2 Production/Integration and Test	1	2023	3	2027
WSF SV-2 Initial Launch Capability	4	2027	4	2027
COWVR Technology Demonstration On-Orbit Operations	1	2023	3	2024

Note

FY 2021 and FY 2022 scheduled activities are captured within the budget justification exhibit for program 1206422SF, Weather System Follow-On, Project 644289, Weather Satellite Follow-On, R-1 Line #6.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</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	-	165.008	127.026	105.140	0.000	105.140	115.879	165.311	156.446	159.492	Continuing	Continuing
65A006: <i>Space Based Space Surveillance</i>	-	165.008	127.026	105.140	0.000	105.140	115.879	165.311	156.446	159.492	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Space Domain Awareness (SDA) is one of five core competencies of the Space Force and is the effective identification, characterization, and understanding of any factor, passive or active, associated with the space domain that could affect space operations and thereby impact the security, safety, economy, or environment of our nation. As the foundation for space control, SDA encompasses surveillance of all space objects and activities; detailed surveillance of specific space assets; monitoring space environmental conditions; monitoring cooperative space assets; gathering indications and warning on adversary space operations; and conducting integrated command, control, communications, processing, analysis, dissemination, and archiving activities.

This program element develops new network sensors and improved information integration capabilities across the space surveillance network (SSN) while companion program element 1203940SF fields, upgrades, operationalizes, operates, and maintains Space Force sensors and information integration capabilities within the SSN. Activities funded in this program element (1206425SF) also support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, modernization initiatives, systems engineering, system development, and test & evaluation, and may include prototyping and technology demonstration.

The Space-Based Space Surveillance (SBSS) Block 10 satellite was launched September 2010 with a design life through 2017 and an extended operational capability now expected through 2028. The SBSS Follow-On (SBSS FO) program will develop and deliver a system to continue providing space object surveillance from space beyond SBSS Block 10 End-of-Life. The United States Space Force (USSF) and National Reconnaissance Office (NRO) have signed a Memorandum of Agreement partnering SBSS FO with an NRO program based on overlapping requirements. The new partner program is called SILENTBARKER. SILENTBARKER enables timely detection and custody of on orbit threats in order to protect US High Value Assets in space in support of the National Defense Strategy.

SILENTBARKER requirements are based on a Statement of Capabilities and upon the current Space Domain Awareness (SDA) Initial Capabilities Document architectural requirements focused on protecting High Value Assets. SILENTBARKER will provide the capability to search, detect, and track objects from a space-based sensor for timely custody and event detection. Surveillance from space augments and overcomes existing ground sensor limitations with timely 24-hour above-the-weather collection of satellite metric data only possible with a space-based sensor. This data is communicated to operators at the Combined Space Operations Center (CSpOC), National Space Defense Center (NSDC), and other classified users. This program element includes efforts related to SILENTBARKER, its integration into the broader space superiority architecture, and analysis and experimentation to ensure space-based space surveillance capabilities against the evolving threat.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>
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This program also evaluates affordable Space-Based SDA replenishment options to provide system resiliency and situational awareness necessary to operate in the contested space domain studies through technical analysis, risk reduction experiments, affordable prototyping, and partnership with Air Force Research Laboratory (AFRL). In addition, this program leverages opportunities for space-based commercial, international partnerships, and hosted payloads to support the SDA mission.

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, to increase 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 repurpose existing capabilities.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver SILENTBARKER for emergent or unanticipated 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. In FY 2021 0.206M was expended for civilian pay expenses in this program element, and in FY 2022 0.220M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	173.074	127.026	0.000	0.000	0.000
Current President's Budget	165.008	127.026	105.140	0.000	105.140
Total Adjustments	-8.066	0.000	105.140	0.000	105.140
• 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	-2.491	0.000			
• SBIR/STTR Transfer	-5.575	0.000			
• Other Adjustments	0.000	0.000	105.140	0.000	105.140

Change Summary Explanation

FY 2021: \$-2.491 decrease for reprogramming to higher Space Force priorities and -\$5.575 decrease for SBIR.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: Space-Based Space Domain Awareness (SDA)	165.008	127.026	105.140
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Description: Effort title changed from "SBSS Follow-On (SBSS FO) Design & Development" to "Space-Based Space Domain Awareness (SDA)" due to current Space Force terminology for SDA that includes effective identification, characterization, and understanding of any factor, passive or active, associated with the space domain.
This is not a new start.

Performs space-based SDA analysis, research, and development for the SILENTBARKER system in partnership with the NRO.

FY 2022 Plans:

Continue development of SILENTBARKER expansion assets to increase coverage for deep-space SDA. Continue implementation of ground mission data processing and data dissemination efforts in support of SILENTBARKER ground requirements. Establish requirements and technology enhancements to ensure space-based space surveillance capabilities against the evolving threat for future upgrades, extensions, and augmentations through analysis, prototyping, and experimentation.

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, prototyping, etc.

FY 2023 Plans:

Prepare for and conduct Pre-Ship Review (PSR) in preparation for launch of the first increment. SILENTBARKER launch of the first increment in addition to on-orbit support to prepare for Initial Operational Capability (IOC). Continue development of SILENTBARKER expansion assets to increase coverage for deep-space SDA. Conduct Critical Design Review (CDR) for expansion effort. Continue implementation and operationalize ground mission data processing and data dissemination efforts in support of Space-Based SDA ground requirements. Continue technology enhancements to ensure space-based space surveillance capabilities against the evolving threat for future upgrades, extensions, and augmentations through analysis, prototyping, and experimentation.

Additionally, FY 2023 funding will continue planning for Space-Based SDA hosted payloads and affordable replenishment activities and allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. In addition will leverage opportunities for SDA space-based commercial, international partnerships, and AFRL partnerships. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and affordable prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/ combat range events, and office support, etc.

FY 2022 to FY 2023 Increase/Decrease Statement:

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 funding decreased because the annually allocated amounts fluctuate per the 50/50 cost sharing USSF-NRO Interagency Agreement.			
Accomplishments/Planned Programs Subtotals	165.008	127.026	105.140

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

N/A

Remarks

E. Acquisition Strategy

The Acquisition Strategy was approved to minimize the space-based SDA gap post-SBSS Block 10. SILENTBARKER anticipates Initial Launch Capability in FY 2023. The SBSS FO Materiel Development Decision was approved by the Milestone Decision Authority (MDA) on April 5, 2016. The Acquisition Strategy Panel was completed with the MDA on August 29, 2016. To satisfy the SDA architecture needs, the SBSS FO program requirements combined with an NRO program and were updated in the December 2017 SILENTBARKER Statement of Capabilities. The SBSS FO program remains a Space Force program, but will leverage NRO processes to fulfill SBSS FO space segment and telemetry, tracking, and commanding (TT&C) program segments in order to further National Security Space objectives. Mutual investment for the non-recurring engineering (NRE) cost enables the potential for a larger initial constellation buy and lower unit costs. SILENTBARKER expansion contract awarded 25 Jun 21 to extend capabilities past Phase I.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 65A006 / <i>Space Based Space Surveillance</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			
SBSS Follow On Prime Development	MIPR	Various : Various	-	139.540	Nov 2020	104.713	Dec 2021	89.182	Dec 2022	-		89.182	Continuing	Continuing	-
SBSS Technical Mission Analysis	Various	Various : Various, CA	-	1.965	Jan 2021	0.900	Nov 2021	0.831	Nov 2022	-		0.831	Continuing	Continuing	-
SBSS Enterprise SE&I	Various	Various : Various	-	1.699	Dec 2020	1.600	Nov 2021	0.900	Nov 2022	-		0.900	Continuing	Continuing	-
Subtotal			-	143.204		107.213		90.913		-		90.913	Continuing	Continuing	N/A

Support (\$ 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			
Civilian Reimbursable Budget Authority	RO	SSC : El Segundo, CA	-	0.206	Dec 2020	0.220	Dec 2021	0.225	Dec 2022	-		0.225	Continuing	Continuing	-
Subtotal			-	0.206		0.220		0.225		-		0.225	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			
FFRDC	RO	Aerospace Corp : Los Angeles, CA	-	0.887	Dec 2020	0.900	Nov 2021	0.831	Nov 2022	-		0.831	Continuing	Continuing	-
A&AS	Various	Various : CA	-	20.587	Jan 2021	18.373	Jan 2022	12.831	Jan 2023	-		12.831	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.124	Mar 2021	0.320	Mar 2022	0.340	Mar 2023	-		0.340	Continuing	Continuing	-
Subtotal			-	21.598		19.593		14.002		-		14.002	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			-	165.008	127.026	105.140	-	105.140	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force							Date: April 2022			
Appropriation/Budget Activity 3620F / 5			R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>			Project (Number/Name) 65A006 / <i>Space Based Space Surveillance</i>				
	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks
 The SBSS FO project has very minimal organic Space Force resources. The FY 2023 Management Services includes support to parallel efforts for both the SBSS FO and SBSS FO Expansion, including Space Force contributions for prepare for SILENTBARKER launch, check out, and on-orbit support as well as design reviews for SBSS FO Expansion. Additionally, non-recurring engineering investments require increased assistance and advisory services to enable integration of data products between intelligence community and Space Force infrastructure until integration is mature and stable.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force											Date: April 2022				
Appropriation/Budget Activity 3620F / 5						R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>					Project (Number/Name) 65A006 / <i>Space Based Space Surveillance Systems</i>				

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027							
	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				
AFRL Tech Demo/Prototyping D2S2																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206425SF / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 65A006 / <i>Space Based Space Surveillance</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
SBSS Follow On				
Technology Development, Engineering and Manufacturing Development, Production	1	2021	2	2023
Test Readiness Review (TRR)	3	2022	3	2022
Pre-Ship Review	1	2023	2	2023
Available for Launch	3	2023	3	2023
On-orbit Support	3	2023	4	2027
SBSS Follow On Expanded Coverage				
MS-C and Contract Award	2	2021	3	2021
Technology Development, Engineering and Manufacturing Development, Production	3	2021	2	2026
System Requirements Review (SRR)	1	2022	1	2022
Critical Design Review (CDR)	1	2023	1	2023
Available for Launch	3	2026	3	2026
On-orbit Support	1	2024	4	2027
Space Domain Awareness (SDA) Hosted Payload (HP) Prototyping				
Contract Award	1	2022	1	2022
Phase 3 Demo	2	2023	2	2023
HP Launch on ROOSTER-4	4	2024	4	2024
Prototyping Super-Synchronous Small Satellite Space Surveillance System (S6)/ Defense Deep Space Sentinel (D2S2)				
Air Force Research Laboratory (AFRL) Tech Demo/Prototyping S6	4	2023	4	2023
AFRL Tech Demo/Prototyping D2S2	1	2024	1	2024

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</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	-	86.918	26.942	11.701	0.000	11.701	4.077	1.020	1.022	1.043	0.000	132.723
657104: <i>MILSATCOM Space Modernization Initiative (SMI)</i>	-	86.918	26.942	11.701	0.000	11.701	4.077	1.020	1.022	1.043	0.000	132.723
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Space Modernization Initiative (SMI) evolves current and future SATCOM systems to develop a more affordable and resilient integrated enterprise capable of meeting near-term and emerging requirements. Under this construct, SMI includes the Capabilities Insertion Program (CIP) to enhance the current Advanced Extremely High Frequency (AEHF) constellation and Protected Communications performance to improve system operational resiliency. Additionally, SMI will demonstrate technologies and Concepts of Operations (CONOPS) that lead to a Protected Anti-Jam Tactical SATCOM (PATS) capability that provides tactical-level military SATCOM (MILSATCOM) users protected, anti-jam SATCOM while operating in a contested environment. Global Broadcast Service (GBS) functionality will be added to the PATS modems. GBS implements a worldwide high-capacity satellite broadcast information system to provide a continuous, one-way, high-speed, high-volume flow of classified and unclassified intelligence products (full motion video, imagery, data) to garrisoned, deployed or moving forces.

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, to increase 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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AEHF and SMI 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 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</i>
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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	90.045	28.218	0.000	0.000	0.000
Current President's Budget	86.918	26.942	11.701	0.000	11.701
Total Adjustments	-3.127	-1.276	11.701	0.000	11.701
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-1.276			
• 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	-3.127	0.000			
• Other Adjustments	0.000	0.000	11.701	0.000	11.701

Change Summary Explanation

FY 2023: +11.701M; 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 FY 2023 cannot be made in a relevant manner.

FY 2021: -\$3.127M; SBIR

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: Capabilities Insertion Program (CIP)	53.298	14.050	0.000
Description: Develop software that will increase the current AEHF constellation and Protected Communications capabilities, broaden overall user base, and accommodate a larger user population through improved resource utilization efficiencies. Develop modifications that will improve the Protected mission operational resiliency. Develop software to increase current AEHF terminal data rates with adaptive coding algorithms. Invest in technology demonstrations that improve the operational mission resiliency and effectiveness for all protected capabilities, which include, but are not limited to, Operational Resiliency Phase 2 (OR 2/2B), Mission Planning Element (MPE) 8.4, and Cyber Defense-in-depth.			
FY 2022 Plans: Complete OR 2/2B Phase 2 ground software updates. Complete MPE 8.4 capability improvements to the AEHF system functionality and crypto design. Complete W/V Frequency utility assessments and demonstrations. Additionally, FY 2022 funding will allow the program to implement system resiliency necessary to operate in the contested space domain. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.			
FY 2023 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
N/A				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to the Capabilities Insertion Program (CIP) AEHF Ground efforts completing in FY 2022.				
Title: Protected Tactical Testbed		9.539	0.000	0.000
Description: Protected Tactical Testbed provides a government gold standard of reference for risk reduction and experimentation on critical technology elements for the space payload, terminals, and networking segments of the PATS system. Supports the hardware development of the hub component for the PTES ground system and any necessary test capabilities to support either the over-the-air (OTA) or laboratory demonstrations for the Protected Tactical Service Field Demonstration (PTSFD). Enables system integration capabilities with industry and FFRDC partners for interoperability testing and conducting experiments to mature the PATS operations with a focus on the Protected Tactical Waveform (PTW). This effort moved to PE 1206761SF, Protected Tactical Service (PTS) in FY 2022.				
FY 2022 Plans: N/A				
FY 2023 Plans: N/A				
FY 2022 to FY 2023 Increase/Decrease Statement: N/A				
Title: Air Force - Army Anti-Jam Modem (A3M)		24.081	12.892	0.000
Description: The A3M will develop PTW modems that meet all environmental, integration, and mission requirements for the Satellite Transportable Terminal (STT), Ground Multi-band Terminal (GMT), and other Combat Communications tactical users. A3M development includes integration and testing of production evaluation (pre-production) modems, development of operator training materials, fielding, and sustainment planning. A3M is dependent on the PTES development and delivery of a production representative ground hub to connect to and perform an Operational Assessment (OA) of the pre-production modems to inform the Milestone C production decision. A3M pre-production modems are 100% production-ready and support PTES Minimum Viable Product (MVP) goals. A3M OA testing reduces risk for the PTES Multi-service Operational Test and Evaluation (MOT&E) for initial operating capability (IOC).				
FY 2022 Plans: Complete critical design review, integration and testing of production evaluation units. Test in an operationally-representative environment during the OA. The OA will inform the production decision for Milestone C. Complete PATS Risk Reduction				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
Demonstrations (RRD) and Integration Events (IE). Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. FY 2023 Plans: N/A FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to A3M Block I Development efforts completing in FY 2022.				
Title: Global Broadcast Service (GBS) Description: GBS continues A3M efforts towards meeting integration and mission requirements for Combat Communications users. This includes completing A3M software/firmware updates and integrating the modem into the GBS receive suites, which will allow the modem to be compatible with the GBS legacy broadcast. This ensures the 2,000+ worldwide GBS users continue to have access to continuous, one-way, high-speed, high-volume flow of classified and unclassified intelligence products (full motion video, imagery, data, weather, etc.) during the 5-year fielding timeline. Upon fielding completion, GBS users will transition to a PATS broadcast. This will fulfill the GBS TRANSEC requirement in the GBS JORD-III (2005) and Committee on National Security Systems (CNSS) Policy No. 12/CNSS Instruction No.1200. This solution also supports the CSO SATCOM Vision for improved resiliency and agility. FY 2022 Plans: N/A FY 2023 Plans: Begin A3M software/firmware updates through one of the current A3M Block I Development vendors to add GBS legacy broadcast compatibility. Funding will also integrate A3M with GBS receive suites (physical integration, technical order updates, training package updates, software updates, etc.). Start Satellite Broadcast Manager (SBM) architecture updates for PATS compatibility. Perform initial test activities to include planning and acquisition of test assets. Rapidly respond to implement system resiliency necessary to operate in the contested space domain. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funds increased to support integrating A3M modems and PTW capabilities into GBS receive suites.		-	0.000	11.701
Accomplishments/Planned Programs Subtotals		86.918	26.942	11.701

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPSF 01 ADV555: <i>Advanced EHF</i>	7.823	-	-	-	-	-	-	-	-	0.000	7.823
• SPSF 01 MILSAT: <i>MILSATCOM</i>	4.518	13.927	16.722	-	16.722	23.148	21.635	4.534	4.625	0.000	89.109

Remarks

The FY21-26 MILSAT SPSF above funds the production of the A3M. A3M is a joint effort between the SSC and the Program Manager (PM) Tactical Networks (TN), Aberdeen Proving Ground (APG), to develop a common modem for the AF GMT and Army STT. Leveraging similar mission and environmental requirements enables selection of the high water mark requirements to meet both mission parameters with greater efficiency while reducing risk and lifecycle cost.

E. Acquisition Strategy

A3M is an ACAT III program. A3M leverages the PTSFD technology maturation resulting in a low-risk development effort delivering pre-production modems with 100% production-ready components. This will include certified End Cryptographic Units (ECUs) for full-scope operational and cyber testing, operator and maintainer training materials, and all required intellectual property rights and provisioning documentation to enable swift terminal modification for operational use and sustainment. The development phase will deliver pre-production PTW-capable modems ready for "build-to-print" production. Blended developmental and operational testing is expected to include full environmental, blue, and red team testing prior to the production decision.

The Space Force will utilize existing contracts for all updates necessary. Those contracts are: A3M Block I Development contracts for software/firmware updates; GBS receive suite contracts for terminal integration; GBS architecture sustaining engineering contract for SBM updates; and an existing service level agreement with the 520th Software Engineering Squadron (SWES) for receive suite and SBM software updates.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</i>	Project (Number/Name) 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</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			
Capabilities Insertion Program (CIP)	SS/CPFF	Lockheed Martin : Sunnyvale, CA	-	42.579	Feb 2021	1.625	Nov 2021	-		-		-	0.000	44.204	-
W/V Frequency utilization demonstration	MIPR	AFRL : Various	-	8.554	Mar 2021	8.554	Jan 2022	-		-		-	0.000	17.108	-
Protected Tactical Testbed	Various	MIT/LL : Hanscom AFB, MA	-	9.539	Feb 2021	-		-		-		-	0.000	9.539	-
A3M PTW Modem Development	C/CPAF	Various : Various	-	19.908	Feb 2021	12.542	Nov 2021	-		-		-	0.000	32.450	-
GBS-A3M Software/ Firmware design changes	C/CPFF	TBD : TBD	-	-		-		8.701	Nov 2022	-		8.701	Continuing	Continuing	-
GBS Receive Suite Integration	C/TBD	Not specified. : TBD	-	-		-		0.673	Apr 2023	-		0.673	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace : El Segundo, CA	-	3.165	Feb 2021	2.320	Nov 2021	-		-		-	0.000	5.485	-
Enterprise SE&I	C/CPAF	Linqest : Los Angeles, CA	-	3.073	Feb 2021	0.650	Nov 2021	0.600	Nov 2022	-		0.600	0.000	4.323	-
Subtotal			-	86.818		25.691		9.974		-		9.974	Continuing	Continuing	N/A

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			
GBS DT/IT/OT Resources	Various	Peterson / Schriever SFB : CO Springs, CO	-	-		-		1.500	Jan 2023	-		1.500	Continuing	Continuing	-
Subtotal			-	-		-		1.500		-		1.500	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</i>	Project (Number/Name) 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

MILSATCOM Space Modernization Initiative	
CIP: MPE 8.4	[Redacted]
CIP: Operational Resiliency - Phase 2	[Redacted]
W/V Frequency Utilization Demonstration	[Redacted]
Cyber Defense-in-depth	[Redacted]
Protected Tactical Testbed	[Redacted]
A3M PTW Modem PDR	[Redacted]
A3M PTW Modem CDR	[Redacted]
A3M PTW Modem Block I Development	[Redacted]
GBS-A3M Block I SW/FW design changes	[Redacted]
GBS Test Planning and DT/IT/OT	[Redacted]
GBS SBM and TGRS Integration (Receive Suite Integration)	[Redacted]
GBS PRS Integration	[Redacted]
GBS DR Resolution	[Redacted]

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206431SF / <i>Advanced EHF MILSATCOM (SPACE)</i>	Project (Number/Name) 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MILSATCOM Space Modernization Initiative</i>				
CIP: MPE 8.4	1	2021	2	2022
CIP: Operational Resiliency - Phase 2	2	2021	2	2022
W/V Frequency Utilization Demonstration	1	2021	4	2022
Cyber Defense-in-depth	1	2021	4	2022
Protected Tactical Testbed	1	2021	4	2021
A3M PTW Modem PDR	2	2021	2	2021
A3M PTW Modem CDR	2	2022	2	2022
A3M PTW Modem Block I Development	4	2021	4	2022
GBS-A3M Block I SW/FW design changes	1	2023	4	2023
GBS Test Planning and DT/IT/OT	2	2023	3	2025
GBS SBM and TGRS Integration (Receive Suite Integration)	3	2023	3	2024
GBS PRS Integration	1	2024	3	2024
GBS DR Resolution	3	2025	2	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206432SF / <i>Polar MILSATCOM (SPACE)</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	0.000	123.519	112.170	67.465	0.000	67.465	26.522	10.301	0.000	0.000	0.000	339.977
654215: <i>EPS Recap</i>	0.000	123.519	112.170	67.465	0.000	67.465	26.522	10.301	0.000	0.000	0.000	339.977
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 121

A. Mission Description and Budget Item Justification

This program element acquires the Polar Military Satellite Communications (MILSATCOM) system that provides protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region.

In FY 2006, the Department of Defense (DoD) began funding Enhanced Polar System (EPS). The host spacecraft and the polar communications packages took advantage of the Advanced Extremely High Frequency (AEHF) technology including the extended Data Rate (XDR) waveform. The EPS Capability Development Document (CDD), approved by the Joint Requirements Oversight Council in September 2006, is based on a two-package, hosted XDR program with operational availability in CY 2015 and CY 2017. EPS is comprised of four segments: Payload, Ground Control, Gateway, and Terminal (acquired by each Service's Terminal Program Office). Milestone B review was completed April 2, 2014.

In FY 2019, the United States Air Force (USAF) and Norwegian Ministry of Defense signed the Arctic Memorandum of Agreement (MOA), which enforces the international collaboration with Norway to host two EPS-Recapitalization (EPS-R) payloads on Space Norway-procured spacecraft. EPS-R continues to develop and acquire two Extremely High Frequency (EHF) payloads hosted on Space Norway-procured spacecraft and continues to upgrade/modify the existing EPS Ground Control and Gateway.

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 repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Polar MILSATCOM 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 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206432SF / <i>Polar MILSATCOM (SPACE)</i>
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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	190.235	127.870	0.000	0.000	0.000
Current President's Budget	123.519	112.170	67.465	0.000	67.465
Total Adjustments	-66.716	-15.700	67.465	0.000	67.465
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-15.700			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-60.399	0.000			
• SBIR/STTR Transfer	-6.317	0.000			
• Other Adjustments	0.000	0.000	67.465	0.000	67.465

Change Summary Explanation

FY 2021: -66.716M: -60.399M reprogrammed for higher Space Force priorities. -6.317M SBIR transfer.

FY 2022: -15.700M Congressional directed reduction for prior year carryover.

FY 2023: +67.465M; 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Space Segment	67.982	51.689	33.366
Description: Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.			
FY 2022 Plans: Continue development, fabrication, and testing of the second EPS-R payload that was initiated in FY 2018. Ship first and second payload to space vehicle (SV) vendor for integration onto the SV. Finalize interface documentation and integration plans with international partner. Fund FY 2022 Department of the Air Force (DAF) share of Arctic MOA collaboration costs for hosting of the EPS-R payloads. Facilitate coordination between Space Norway, space vehicle vendor, and payload contractor. Provide representation, technical expertise, and assistance as necessary at Space Norway and/or space vehicle vendor facilities to support activities including payload integration and testing. Support segment and system level testing. Continue cyber certification efforts. Support development and integration for the EPS-R system strategic requirements.			
FY 2023 Plans: Continue testing of both EPS-R payloads that were initiated in FY 2018 to include on-orbit testing starting in FY 2023. Fund FY 2023 DAF share of Arctic MOA collaboration costs for hosting of the EPS-R payloads. Facilitate coordination between Space Norway, space vehicle vendor, and payload contractor. Provide representation, technical expertise, and assistance as necessary			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206432SF / <i>Polar MILSATCOM (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>at Space Norway and/or space vehicle vendor facilities to support activities including payload integration, testing, and deficiency resolution as needed. Support segment and system level testing. Continue cyber certification efforts. Support development and integration for the EPS-R system strategic requirements.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to a shift from testing and integrating the payloads with the Satellite Vehicle to launch checkout of the payloads and on-orbit testing.</p>				
<p>Title: Ground Updates</p> <p>Description: Modify and upgrade the existing EPS Control and Planning Segment (CAPS) to provide command and control and XDR mission planning capability for the two new payloads.</p> <p>FY 2022 Plans: Continue CAPS upgrade to support EPS-R and EPS legacy. Deliver Software Item Qualification Test (SIQT) build and develop/deliver additional software builds as appropriate. Complete all in-band and out-of-band Space Operations Center (SOC) hardware integration. Conduct Functional Configuration Audit and On-Orbit Activation Rehearsal. Support segment and system level testing, to include regression testing with EPS legacy payloads. Acquire Defense Information Systems Network (DISN) lines and associated equipment at various EPS-R and DISA ground nodes as appropriate to support Space Norway SOC out-of-band connectivity to the EPS-R payload as well as in-band connectivity between the various EPS-R ground nodes. Continue development, upgrades, and integration for the EPS-R system strategic requirements. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: Continue testing EPS CAPS to include on-orbit testing starting in FY 2023. Continue efforts with DISA on ground nodes to provide out-of-band connectivity to the EPS-R payload as well as in-band connectivity between EPS-R ground nodes. Provide representation, technical expertise, and assistance as necessary at Space Norway and/or space vehicle vendor facilities to support activities including payload integration and ground to payload testing. Support segment and system level testing. Continue cyber certification and Authority To Operate (ATO) efforts. Provide updates, fixes, and retests to ground software deficiencies found in Factory Acceptance Testing, Site Acceptance Testing, and On-orbit Testing. Support development and integration for the EPS-R system strategic requirements. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>		35.405	54.166	27.815

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206432SF / <i>Polar MILSATCOM (SPACE)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 funding decreased due to a shift from testing, payload integration with the satellite vehicles and terminal installation to on-orbit testing and transition to sustainment.			
<p>Title: Gateway Updates</p> <p>Description: Modify and upgrade the existing EPS Gateway to support the two new payloads.</p> <p>FY 2022 Plans: Continue EPS Gateway upgrades, segment and system integration testing. Continue installation efforts and testing for a second telemetry and control terminal as well as a fourth Navy Multiband Terminal (NMT) to support dual EPS/EPS-R operations to the extent EPS legacy remains operational. Upgrade additional telemetry and control terminals as necessary to support EPS-R. Support risk reduction/development, upgrades, and integration for the EPS-R system strategic requirements including required Family of Advanced Beyond-Line-Of-Sight Terminals (FAB-T) software modifications.</p> <p>FY 2023 Plans: Continue EPS Gateway upgrades, segment, and system integration testing. Complete terminals installation efforts and continue testing for a second telemetry and control terminal as well as a fourth NMT to support dual EPS/EPS-R operations to the extent EPS legacy remains operational. Prepare for two FAB-T terminals to replace two aging Telemetry & Control Terminals (T&C-T). Continue to support risk reduction, development upgrades, and integration for the EPS-R system strategic requirements to include any modification required for the FAB-T software as needed.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to early installation of NMT and T&C-T as well as a phased contracting approach for FAB-T modifications, updates, and testing.</p>	20.132	6.315	6.284
Accomplishments/Planned Programs Subtotals	123.519	112.170	67.465

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

Remarks

E. Acquisition Strategy
Awarded payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiated fabrication of two EPS functional-equivalent payloads in FY 2018. In FY 2019, the USAF and Norwegian Ministry of Defence signed the Arctic Memorandum of Agreement, which enforces the international collaboration with Norway to host the two EPS-Recapitalization (EPS-R) payloads on the Space Norway-procured spacecraft. Conducted market research to identify industry capabilities and acquisition concepts. Awarded CAPS contract for EPS ground upgrade. Gateway updates will be accomplished by Naval Information Warfare Center Pacific, the EPS Gateway Segment developer. The program office initiates the procurement of a replacement terminal for the Telemetry and Command Terminal. This acquisition strategy updates

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206432SF / <i>Polar MILSATCOM (SPACE)</i>
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the EPS Ground Segment to accommodate the EPS functional equivalent payloads and extend operations and sustainment beyond 2028. The U.S. Government will retain the system integrator role, as it was for EPS program of record.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206432SF / Polar MILSATCOM (SPA CE)	Project (Number/Name) 654215 / EPS Recap
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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			
EPS-R Tactical Payloads 1-2	SS/CPIF	NGAS : Redondo Beach, CA	0.000	53.184	Nov 2020	40.925	Nov 2021	25.354	Nov 2022	-		25.354	0.000	119.463	487.309
Control and Planning Segment Upgrades	SS/CPIF	NGMS : Redondo Beach, CA	0.000	27.698	Nov 2020	42.887	Nov 2021	21.136	Nov 2022	-		21.136	21.477	113.198	88.377
Gateway Upgrades	Various	Various : Various, CA	0.000	15.750	Nov 2020	5.000	Nov 2021	4.775	Nov 2022	-		4.775	6.500	32.025	68.895
Technical Mission Analysis	RO	Aerospace : El Segundo, CA	0.000	5.880	Nov 2020	5.900	Nov 2021	5.940	Nov 2022	-		5.940	1.500	19.220	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	18.027	Nov 2020	13.558	Nov 2021	7.050	Nov 2022	-		7.050	3.211	41.846	-
Subtotal			0.000	120.539		108.270		64.255		-		64.255	32.688	325.752	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			
FFRDC	RO	Aerospace : El Segundo, CA	0.000	0.755	Oct 2020	0.606	Oct 2021	0.630	Nov 2022	-		0.630	0.600	2.591	-
A&AS	Various	Various : Various	0.000	2.075	Oct 2020	3.144	Oct 2021	2.480	Oct 2022	-		2.480	3.435	11.134	-
Other Support	Various	Various : Various	0.000	0.150	Oct 2020	0.150	Oct 2021	0.100	Oct 2022	-		0.100	0.100	0.500	-
Subtotal			0.000	2.980		3.900		3.210		-		3.210	4.135	14.225	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	0.000	123.519	112.170	67.465	-	67.465	36.823	339.977	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206432SF / <i>Polar MILSATCOM (SPA CE)</i>	Project (Number/Name) 654215 / <i>EPS Recap</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Space Segment	
Payload Design/Build	
International Collaboration w/ Norway	
Space Vehicle Integration/Test	
Payloads Ready to Ship	
Ground and Gateway Upgrades/ Modifications	
Risk Reduction Activities/Studies	
Acquire Telemetry and Control Terminals	
Upgrades/Modifications	
System Level Integration and Test	
Control Terminal Installation	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206432SF / <i>Polar MILSATCOM (SPA CE)</i>	Project (Number/Name) 654215 / <i>EPS Recap</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Space Segment				
Payload Design/Build	1	2021	1	2022
International Collaboration w/ Norway	1	2021	3	2024
Space Vehicle Integration/Test	1	2022	1	2024
Payloads Ready to Ship	1	2022	2	2022
Ground and Gateway Upgrades/Modifications				
Risk Reduction Activities/Studies	1	2021	2	2024
Acquire Telemetry and Control Terminals	1	2021	2	2023
Upgrades/Modifications	1	2021	4	2024
System Level Integration and Test	2	2021	4	2025
Control Terminal Installation	1	2024	4	2025

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206433SF / <i>Wideband Global SATCOM (SPACE)</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	-	0.000	0.000	48.438	0.000	48.438	49.549	0.000	0.000	0.000	Continuing	Continuing
657107: <i>WGS Space Systems Resiliency Upgrade</i>	-	0.000	0.000	48.438	0.000	48.438	49.549	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 5, PE 1206433SF, project 657107, WGS 11+ Beam Optimization & Operational Management (BOOM), is a new start.

A. Mission Description and Budget Item Justification

The Wideband Global SATCOM (WGS) System provides the DoD with high data rate military satellite communication (MILSATCOM) services in accordance with the Joint Space Management Board-approved MILSATCOM architecture (August 1996), the Joint Requirements Oversight Council (JROC)-approved MILSATCOM Capstone Requirements Document (October 1997), and JROC-approved WGS Operational Requirements Document (May 2000). This program was originally conceived to augment the near-term "bandwidth gap" in warfighter communications needs. Dual-frequency WGS satellites augment, then replace the DoD's Defense Satellite Communications System X-band service and augment one-way Global Broadcast Service Ka-band capabilities. In addition, WGS provides a high capacity two-way Ka-band Service.

WGS Block I consists of satellites 1-3, Block II consists of satellites 4-6 and Block II Follow-on (B2FO) includes satellites 7-10 and WGS 11+. WGS satellites 1-10 have been funded, procured and launched in previous budget cycles.

In the Consolidated Appropriations Act, FY 2018, Congress added \$600.0M SPAF in FY 2018 for "full funding for WGS 11 and 12." A sole source Request for Proposal was released to Boeing in June 2018. A final decision was made to procure a single satellite (WGS 11+) with twice the operational capacity of WGS 10 as the best approach to delivering the directed additional WGS capacity in a cost effective manner. Total WGS 11+ 3021/3022 funds are \$670.859M.

International Partners (IPs) receive constellation-wide WGS resources commensurate with their financial contributions to the WGS system. Investment from IPs to cooperatively enhance the system started in November 2007 through a bilateral Memorandum of Understanding (MOU) with Australia to fund WGS space vehicle (SV)-6, launch and launch services. Five countries (Canada, Denmark, Netherlands, Luxembourg, New Zealand) signed a new multilateral WGS MOU in 2012 and funded the procurement of WGS SV-9. In 2017, Amendment One to the WGS MOU leveraged additional funding for resiliency enhancements from two new IPs (Czech Republic and Norway). There is an International Agreement via the State Department regarding IP collaboration with WGS 11+. In Amendment Two to the multilateral MOU (adds Belgium and United Kingdom, but does not include Australia), IPs agree to cover necessary ground upgrades and launch costs for WGS 11+ not covered by the 2018 Congressional add, with Space Systems Command (SSC) providing program management, integration, and engineering expertise through FY 2026.

The DoD has procured a more advanced single WGS 11+ satellite enhancing support to the US military, DoD, and allied nations with more flexibility to support dispersed users than previous WGS spacecraft. WGS 11+ produces more beams (over 1500) than the entire existing WGS constellation and will provide twice the mission

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206433SF / <i>Wideband Global SATCOM (SPACE)</i>
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capability. The new capabilities allow operators to create unique coverage anywhere within the satellite's field of view and custom designed for the mission at hand. The objective of this effort is for the development, integration, and test of advanced beam management to enhance legacy beam management tools in support of rapid planning and control. This effort will develop and deploy capabilities across the WGS enterprise to provide WGS 11+ management and control (M&C) ground enhancements with responsive end-to-end mission planning, protection, and terminal synchronized capabilities. Funding the engineering and development for enhanced element M&C will provide greater routing complexity and mission planning flexibility to support 80 times more X and Ka-band spot beams on WGS 11+ than on WGS 1-10 spacecraft. This funding will be used to develop and integrate WGS-11+ advanced beam management capabilities facilitating contested and mobile operations on tactically relevant timescales. Definition and deployment of machine-to-machine interfaces between resource request and planning software facilitates rapid beam management and reduces planning and operations timelines. Updated WGS 11+ M&C interfaces will improve planning data responsiveness through access to automated equipment configuration registries and enable WGS 11+ integration into the broader DoD SATCOM Enterprise. External WGS-11+ interfaces may be leveraged to support planning, situational awareness, power control, and real time equipment orchestration.

Space acquisition must respond with speed and agility to emerging adversary threats. The 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 repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WGS 11+ for 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 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	48.438	0.000	48.438
Total Adjustments	0.000	0.000	48.438	0.000	48.438
• 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	48.438	0.000	48.438

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206433SF / <i>Wideband Global SATCOM (SPACE)</i>
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Change Summary Explanation

FY 2023: +\$48.438M; Funds New Start WGS 11+ primary planning and control interfaces to utilize beam optimization, to include ground architecture, site surveys, and terminal development.

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

	FY 2021	FY 2022	FY 2023
<p>Title: WGS 11+ Beam Optimization & Operational Management (BOOM)</p> <p>Description: Develop and integrate WGS 11+ advanced beam management capabilities driving improved warfighter ability to rapidly re-plan WGS 11+ expanded coverage.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: In FY 2023, WGS 11+ BOOM is a New Start. FY 2023 funding commences development and initial integration of advanced beam management facilitating contested and mobile operations in tactically relevant timelines, updates to architecture models, and identifies software functions required to update WGS 11+ ground and terminal components. Mission planning and development focus is on defining and implementing software specifications to program the configuration of shaped beams supporting MILSATCOM service topologies. Integration focus will be on the publication and deployment of equipment configuration data elements into a Unified Data Library for access by planners and the integration and test of planning beam management products within the DoD SATCOM Enterprise. Efforts will also include using external platforms for integration and test. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased compared to FY 2022 due to the program being a New Start in FY 2023. Initiates activities to update WGS legacy ground terminal to enhance legacy beam management tools.</p>	-	0.000	48.438
Accomplishments/Planned Programs Subtotals	-	0.000	48.438

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

N/A

Remarks

E. Acquisition Strategy

Leverage existing contracts and government relationships (to include but not limited to USSF, Army, and DISA) to provide WGS enterprise enhancements. Contracts may be competitively awarded, utilizing a to-be-determined contract type.

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206433SF / <i>Wideband Global SATC OM (SPACE)</i>	Project (Number/Name) 657107 / <i>WGS Space Systems Resiliency Upgrade</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>WGS 11+ Beam Optimization & Operational Management</i>				
Beam Planning Development	2	2023	3	2025
Integration and Test	4	2023	4	2025

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206440SF / <i>Next-Gen OPIR -- Ground</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	-	0.000	542.477	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
657106: <i>Next-Gen OPIR-Ground</i>	-	0.000	542.477	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In accordance with Congressional direction in the FY22 enacted budget, funds in Program Element 1206442SF, Project 657106, Next-Gen OPIR Ground, have been transferred to 1206440SF.

A. Mission Description and Budget Item Justification

Next-Gen OPIR Ground (Project 657106): Next-Gen OPIR Ground, also known as Future Operationally Resilient Ground Evolution (FORGE), consists of Command and Control (C2) migration to US Space Force (USSF) Enterprise Ground Services (EGS), modernization of Mission Data Processing (MDP) to implement an open framework and develop mission applications, and required development and/or upgrades to Relay Ground Stations (RGS) to meet USSF current and future space domain demands. FORGE and EGS efforts combined will provide the flexibility and scalability to integrate new satellites, sensors and capabilities more rapidly and efficiently in order to meet evolving threats and warfighter needs. Identify shared/common platform, infrastructure, and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. The Next-Gen OPIR ground efforts enable cyber enhancements for both space and ground systems. EGS will introduce common ground services such as Telemetry, Tracking, and Commanding (TT&C); mission management; and automation. To support initial Next-Gen OPIR Space satellite launches without driving risk into the FORGE development schedule, the program has established a risk reduction ground Next-Gen OPIR Interim Operations (NIO) capability based on a limited Space Based Infrared System (SBIRS) Block 20 solution.

The total cost of the FORGE Rapid Prototyping Middle Tier of Acquisition effort is 2,849.44 million, including RDT&E and procurement of prototype units. The FORGE Rapid Prototyping is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206440SF / Next-Gen OPIR -- Ground
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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	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	542.477	0.000	0.000	0.000
Total Adjustments	0.000	542.477	0.000	0.000	0.000
• 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	542.477			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

In accordance with Congressional direction in the FY22 enacted budget, funds in Program Element 1206442SF, Project 657106, Next-Gen OPIR Ground, have been transferred to 1206440SF.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: FORGE - C2	-	64.253	0.000
Description: The Space Force is transitioning to Enterprise Ground Services, a Government-owned ground architecture that focuses on Mission Management (MM), TT&C, and Ground Control (GC) utilizing common services. FORGE C2 creates Mission Unique Software (MUS) and provides sensor/spacecraft specific C2 capabilities to plug into the EGS suite of services. C2 of the legacy SBIRS constellation assets will be transitioned using the FORGE C2 portion of EGS.			
FY 2022 Plans: GEO Non-Integrated Threat Warning/Attack Assessment (ITW/AA) Ops Migration to EGS (GNOME): Continue development and integration of C2 MUS and core applications for a GEO space vehicle onto EGS. Conduct live testing of developed MUS and integrated system at all applicable test locations. Work with Naval Research Laboratory (NRL) to refine software required to operate MUS with core applications on the EGS framework (e.g., Neptune & Virtual Mission Operations Center (VMOC)) and support deficiency burn-down from test events. SBIRS Constellation Cutover (C2X): Continue development of MUS and integration activities to support migration of all HEOs and GEO assets to EGS/FORGE framework. Continue to develop or refine NRL software required to operate core applications, and conduct preliminary testing.			
FY 2023 Plans:			

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206440SF / <i>Next-Gen OPIR -- Ground</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY23 Budget Year Plans are captured in Program Element 1206442SF. They will be captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill in the next budget cycle.				
FY 2022 to FY 2023 Increase/Decrease Statement: The FY 2023 funding amount in PE 1206442SF increased compared to the FY 2022 funding amount in this PE by 8.05M as SBIRS C2 constellation cutover activities ramp-up.				
Title: FORGE - Mission Data Processing (MDP)		-	296.157	0.000
Description: The FORGE MDP effort creates a replacement for the existing legacy SBIRS Ground mission processing applications which have cyber security and scalability limitations. MDP is creating a cyber-resilient, flexible, and scalable open framework capable of meeting current and future threats. MDP will plan OPIR and other mission data resource utilization to meet warfighter requirements. MDP provides the ability to ingest and publish varying levels of processed data for enhanced processing, perform efficient and systematic upgrades, and orchestrate real-time wide-band processing for ITW/AA and non-ITW/AA mission areas. The MDP system provides modular mission applications to meet the future challenges of Missile Warning (MW), Missile Defense (MD), Battlespace Awareness (BA), Technical Intelligence (TI). MDP is critical to making cyber-secure, effective use of the increased amounts of data that will be collected by Next-Gen OPIR.				
FY 2022 Plans: Continue development of follow-on Mission Data Processing Framework Provider (MDPAF) effort. Award follow-on Mission Data Processing Applications Provider (MDPAP) effort. Establish MDP capability in the OPIR Battlespace Awareness Center (OBAC) and Mission Control Station (MCS) enclaves. Begin creating and processing approved plans for ITW/AA, Theater Event System, and Missile Defense certification. Start SBIRS Legacy and Next Gen Polar sensor specific processing software. Additionally, FY 2022 funding will allow the program 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.				
FY 2023 Plans: FY23 Budget Year Plans are captured in Program Element 1206442SF. They will be captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill in the next budget cycle.				
FY 2022 to FY 2023 Increase/Decrease Statement: The FY 2023 funding amount in PE 1206442SF decreased compared to the FY 2022 funding amount in this PE by \$6.658M as GNOME activities begin to ramp down.				
Title: FORGE - Next Gen Transition		-	159.067	0.000

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206440SF / <i>Next-Gen OPIR -- Ground</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Description: The title of this major thrust has changed from "Next Gen Interim Operations (NIO)" to "FORGE-Next Gen Transition" to better encompass and describe all of the associated activities. Next Gen is the development to transition future OPIR space systems to using FORGE and EGS for mission processing and C2.</p> <p>Included in this effort is the development of an interim system (NIO) to ensure the most critical ground processing is ready in time for the first Next-Gen OPIR satellite launch. NIO will create mono tracks and publish those mono tracks to the existing SBIRS Block 20 ground system for fusion and dissemination to the warfighter.</p> <p>FY 2022 Plans: Continue development of the risk reduction system, and conduct early integration and testing events. Continue development of FORGE C2 and start integration with EGS. Start install of hardware at the Consolidated and Continental United States (CONUS) Relay ground sites. Start integration of mission data processing applications into the framework to support NGG. Continue to execute NGG contract.</p> <p>FY 2023 Plans: FY23 Budget Year Plans are captured in Program Element 1206442SF. They will be captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill in the next budget cycle.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: The FY 2023 funding amount in PE 1206442SF increased compared to the FY 2022 funding amount in this PE by \$10.107M as initial integration and testing events begin.</p>				
<p>Title: FORGE - Relay Ground Stations (RGSs)</p> <p>Description: OPIR data collected in space must be relayed to ground entry points and routed to provide warfighters with timely information. The legacy SBIRS ground architecture requires RGS upgrades and new RGSs to receive OPIR data from legacy and future Next-Gen OPIR assets. This effort expands the set of RGSs with up to three additional RGSs that will use common hardware capable of supporting all Next Gen OPIR space assets. This effort will provide data to the MCS for processing and dissemination to warfighters and National Command Authorities. The RGS modernization effort will include the ability to operate antennas, process data, and support older Defense Support Program (DSP) assets.</p> <p>FY 2022 Plans: Relay Ground Station (RGS): Start build-out of RGS-A site facility which is an integral part of RGS development. Start antenna/infrastructure design. Perform site surveys and planning for the next RGS site.</p> <p>FY 2023 Plans:</p>		-	23.000	0.000

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206440SF / <i>Next-Gen OPIR -- Ground</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY23 Budget Year Plans are captured in Program Element 1206442SF. They will be captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill in the next budget cycle.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> The FY 2023 funding amount in PE 1206442SF increased compared to the FY 2022 funding amount in this PE by \$54.000M due to hardware/antenna purchases and continuing effort to install, integrate and test first site while initiating planning and design efforts on the second site.			
Accomplishments/Planned Programs Subtotals	-	542.477	0.000

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

Remarks

E. Acquisition Strategy
The Next Gen OPIR Ground program is executing an acquisition strategy using Middle Tier of Acquisition (MTA) authority for Rapid Prototyping approved via Acquisition Decision Memorandum on 5 Dec 19.

To support this acquisition strategy, the program will follow an agile approach to develop capabilities and a robust DevSecOps (Development/Security/Operations) solution to deliver the capabilities. The FORGE program is pursuing a rapid prototyping approach founded primarily on software and infrastructure reuse, partnerships with other programs, limited scope, use of existing contracts where necessary, and maximizing competition where possible. For the MDP thrust, the FORGE program will competitively use Other Transaction (OT) authorities to develop the framework and the applications. For the C2 thrust, the program team will use existing Space Systems Command (SSC) contracts with an emphasis to on-ramp to Enterprise Ground Services as soon as practical. For the Next Gen Transition effort, the program is using the Next Gen GEO contract with the prime contractor. The program is executing the MDP, C2, and NIO thrusts within the scope of its Middle Tier of Acquisition authorities. The program is executing the RGS thrust using traditional acquisition authorities.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206440SF / Next-Gen OPIR -- Ground	Project (Number/Name) 657106 / Next-Gen OPIR-Ground
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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			
FORGE - C2	Various	Various : TBD	-	-		64.253	Jan 2022	-		-		-	Continuing	Continuing	-
FORGE - MDP	Various	Various : TBD	-	-		245.025	Nov 2021	-		-		-	Continuing	Continuing	-
FORGE - Next Gen Transition	Various	Various : TBD	-	-		159.067	Nov 2021	-		-		-	Continuing	Continuing	-
FORGE - RGS-A	Various	Various : TBD	-	-		23.000	Nov 2021	-		-		-	Continuing	Continuing	-
FORGE - RGS Second Site	TBD	Various : TBD	-	-		0.000		-		-		-	Continuing	Continuing	-
SE&I	TBD	TBD : TBD	-	-		13.118	Dec 2021	-		-		-	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	-		2.125	Jan 2022	-		-		-	Continuing	Continuing	-
Subtotal			-	-		506.588		-		-		-	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			
FFRDC	RO	Aerospace Corporation : El Segundo, CA	-	-		4.688		-		-		-	Continuing	Continuing	-
A&AS	Various	Various : TBD	-	-		30.851		-		-		-	Continuing	Continuing	-
Other Support	Various	Various : TBD	-	-		0.350		-		-		-	Continuing	Continuing	-
Subtotal			-	-		35.889		-		-		-	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	-	-	542.477	-	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206440SF / Next-Gen OPIR -- Ground	Project (Number/Name) 657106 / Next-Gen OPIR-Ground
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

FORGE - C2	
GNOME	
SBIRS Constellation C2 Transition	
FORGE - MDP	
Competitive Prototype Applications Provider	
Follow-On Prototype Framework Development	
Follow-On Prototype Applications Provider Development	
Sensor Specific Processing	
FORGE - Next Gen Transition	
Next Gen GEO Development	
Next Gen Polar Development	
FORGE - RGS	
RGS-A Development	
Second Site Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206440SF / <i>Next-Gen OPIR -- Ground</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR-Ground</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>FORGE - C2</i>				
GNOME	1	2021	1	2024
SBIRS Constellation C2 Transition	3	2021	4	2024
<i>FORGE - MDP</i>				
Competitive Prototype Applications Provider	1	2021	4	2021
Follow-On Prototype Framework Development	1	2021	4	2025
Follow-On Prototype Applications Provider Development	2	2022	4	2027
Sensor Specific Processing	1	2021	4	2025
<i>FORGE - Next Gen Transition</i>				
Next Gen GEO Development	1	2021	4	2027
Next Gen Polar Development	1	2021	4	2027
<i>FORGE - RGS</i>				
RGS-A Development	1	2021	4	2025
Second Site Development	2	2023	4	2027

UNCLASSIFIED

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</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	-	2,318.864	125.853	3,479.459	0.000	3,479.459	2,951.422	2,439.846	1,598.985	1,436.199	Continuing	Continuing
657009: <i>Space Mod Initiative</i>	-	194.662	97.978	224.084	0.000	224.084	341.045	320.831	273.532	218.582	Continuing	Continuing
657106: <i>Next-Gen OPIR Ground</i>	-	384.289	0.000	612.529	0.000	612.529	662.760	557.800	371.924	286.841	Continuing	Continuing
657120: <i>Next-Gen OPIR Space, Block 0 GEO</i>	-	1,402.900	0.000	1,713.933	0.000	1,713.933	907.577	636.663	452.039	462.547	Continuing	Continuing
657121: <i>Next-Gen OPIR Space, Block 0 Polar</i>	-	337.013	0.000	899.196	0.000	899.196	1,008.941	892.331	470.765	436.905	Continuing	Continuing
657123: <i>Integration</i>	-	0.000	27.875	29.717	0.000	29.717	31.099	32.221	30.725	31.324	Continuing	Continuing

Note

In accordance with Congressional direction in the FY22 enacted budget, funds in Project 657120, Next Gen OPIR Block 0 GEO will be distributed to newly created program element 1206443SF, Next Gen OPIR - GEO. Budget will be submitted in the new PE for the next budget cycle.

In accordance with Congressional direction in the FY22 enacted budget, funds in Project 657121, Next Gen OPIR Block 0 Polar will be distributed to newly created program element 1206444SF, Next Gen OPIR - Polar. Budget will be submitted in the new PE for the next budget cycle.

In accordance with Congressional direction in the FY22 enacted budget, funds in Project 657106, Next Gen OPIR Ground (FORGE) will be distributed to newly created program element 1206440SF, Next Gen OPIR - FORGE. Budget will be submitted in the new PE for the next budget cycle.

A. Mission Description and Budget Item Justification

The Next Generation Overhead Persistent Infrared (Next-Gen OPIR) program will succeed the current Space Based Infrared System (SBIRS) and will provide improved missile warning, missile defense, battlespace awareness, and technical intelligence collection capabilities that are more survivable against emerging adversary threats. The program will deliver satellites in a diverse set of orbits to meet mission coverage needs; a modular, extensible, and cyber-hardened ground system to operate and process mission data downlinked from on-orbit assets; an on-ramp to demonstrate novel infrared technologies; and an integration effort will identify, plan, manage and execute integration activities at the enterprise level. The program is comprised of five projects, summarized below:

1. Next-Gen OPIR Space Modernization Initiative (SMI) (Project 657009/Program Element 1206442SF): To better enable response to emerging global missile threats, SMI advances capabilities and reduces risk through three major thrust areas: Demonstrations/Prototypes, Technology Maturation, and Data Exploitation. Demonstrations mature technologies by delivering ground and on-orbit prototypes. Demonstrations advance OPIR capabilities for missile warning and tracking ensuring a low risk, smooth transition of advanced technology to future operational systems. Technology Maturation focuses investments on high pay-off critical components to reduce production risks and development costs. Technology Maturation focuses development on advanced IR sensing optics and electronics; resiliency hardware and software; and on-board processing algorithms and on-board computers. Data Exploitation enables access to OPIR data sources to expand technical intelligence

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	
<p>and battlespace awareness processing and data dissemination tools to support warfighters and other data users. SMI supports Next-Gen OPIR by maturing new technologies to enable detection of new and challenging missile threats. SMI funds engineering activities to reduce both production and future system costs through manufacturing and producibility enhancements, and technology insertion. SMI generally includes studies and risk reduction activities to evolve the current Program of Record (PoR) constellation and/or simultaneously mature breakthrough technologies to create a leap in capability for follow-on systems.</p> <p>2. Next-Gen OPIR Ground (Project 657106/Program Element 1206440SF): Next-Gen OPIR Ground, also known as Future Operationally Resilient Ground Evolution (FORGE), consists of Command and Control (C2) migration to the Space Force's Enterprise Ground Services (EGS), modernization of Mission Data Processing (MDP) to implement an open framework, and required development and/or upgrades to Relay Ground Stations (RGS) to meet United States Space Command guidance on the current and future space domain demands. FORGE and EGS efforts combined will provide the flexibility and scalability to integrate new satellites, sensors, and capabilities more rapidly and efficiently in order to meet evolving threats and warfighter needs. Identify shared/common platform, infrastructure, and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. The Next-Gen OPIR ground efforts enable cyber enhancements for both space and ground systems. EGS will introduce common ground services such as Telemetry, Tracking, and Commanding (TT&C); mission management; and automation. To support initial Next-Gen OPIR Space satellite launches without driving risks into the FORGE development schedule, the program will establish a risk reduction ground Next-Gen OPIR Interim Operations (NIO) capability based on a limited Space Based Infrared System (SBIRS) Block 20 solution that can be utilized if FORGE is delayed.</p> <p>3. Next-Gen OPIR Space, Block 0 GEO (NGG) (Project 657120/Program Element 1206443SF): Joint Requirements Oversight Council Memorandum (JROCM) 130-17, dated 21 December 2017, directs the development of the next generation of strategically survivable space-based missile warning OPIR platforms in both GEO and Polar orbits. The Program Office is acquiring the NGG capability in two contract actions. Phase 1, awarded in August 2018, encompasses requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR). Phase 2 was awarded in FY 2021 for the manufacturing, assembly, system integration and test, launch, and early on-orbit test, through operational acceptance of NGG satellites 1-3. The first GEO satellite is required no later than FY 2025.</p> <p>4. Next-Gen OPIR Space, Block 0 Polar (NGP) (Project 657121/Program Element 1206444SF): The Program Office is acquiring the NGP capability through three contract phases. Phase 0, awarded in June 2018, encompassed system requirements analysis and risk reduction efforts, which led to a March 2020 System Requirements Review (SRR). Phase 1, awarded May 2020, encompasses design and development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR. Phase 2 will be awarded prior to System CDR for the manufacturing, assembly, integration and test, and early on orbit test, through operational acceptance of NGP satellites 1 and 2. The first Polar satellite is required in FY 2028.</p> <p>5. Integration (Project 657123/Program Element 1206442SF): The Next Generation OPIR Integration project includes the direct Enterprise Systems Engineering and Integration (SE&I) efforts associated with the Government's primary role in, and tasks necessary to accomplish, the critical lead system integration function with the Next Gen OPIR enterprise material segments (Next Gen GEO, Next Gen Polar, Next Gen Ground, and the Resilient Missile Warning/Missile Tracking architecture). The focus of the Integration project is on system-level integration requirements between segments such as Space to Ground. This differs from integration within each segment which refers to subsystem-level integration between subsystems such as a spacecraft bus to the mission payload. The Government Integrator directs the Next Gen OPIR current enterprise architecture and system definition, controls and validates interfaces, ensures compatibility of Next Gen systems, and develops/manages plans</p>		

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	
<p>for execution and fielding of the Next Gen OPIR Enterprise. Further, the Integrator executes unique Model Based System Engineering and integration requirements of each segment by providing modeling, simulation, and technical analyses of Government-directed enterprise level trades among the Next Gen OPIR segments. These trades lead to definition, management, maintenance, and evolution of the Next Gen OPIR Enterprise requirements and interface technical documents to ensure the integrity of the enterprise technical baseline.</p> <p>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 repurpose existing capabilities.</p> <p>The total cost of the FORGE Rapid Prototyping Middle Tier of Acquisition effort is 2,849.44 million, including RDT&E and procurement of prototype units. FORGE Rapid Prototyping is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways. The FORGE RP MTA effort only represents a portion of the entire FORGE program.</p> <p>The total cost of the Next Gen OPIR Space (GEO and Polar) Middle Tier of Acquisition effort is 8,074.5 million, including RDT&E and procurement of prototype units. Next Gen OPIR is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways. The NG OPIR Space (GEO and Polar) effort only represents a portion of the entire GEO and Polar programs.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver Next-Gen OPIR weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206389SF.</p> <p>This program is in Budget Activity 5, System Development and Demonstration (SDD) because the majority of Projects under PE 1206442SF have been declared Section 804 Rapid Prototype efforts conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>
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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	2,318.864	2,451.256	0.000	0.000	0.000
Current President's Budget	2,318.864	125.853	3,479.459	0.000	3,479.459
Total Adjustments	0.000	-2,325.403	3,479.459	0.000	3,479.459
• 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	-2,325.403			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	3,479.459	0.000	3,479.459

Change Summary Explanation

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>				Project (Number/Name) 657009 / <i>Space Mod Initiative</i>			
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
657009: <i>Space Mod Initiative</i>	-	194.662	97.978	224.084	0.000	224.084	341.045	320.831	273.532	218.582	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Next-Gen OPIR Space Modernization Initiative (SMI) (Project 657009): To better enable response to emerging global missile threat, SMI advances capabilities and reduces risk through three major thrust areas: Demonstrations/Prototypes, Technology Maturation, and Data Exploitation. Demonstrations mature technologies by delivering ground and on-orbit prototypes. Demonstrations advance OPIR capabilities for missile warning and tracking ensuring a low risk, smooth transition of advanced technology to future operational systems. Technology Maturation focuses investments on high pay-off critical components to reduce production risks and development costs. Technology Maturation focuses development on advanced IR sensing optics and electronics; resiliency hardware and software; and on-board processing algorithms and on-board computers. Data Exploitation enables access to OPIR data sources to expand technical intelligence and battlespace awareness processing and data dissemination tools to support warfighters and other data users. SMI supports Next-Gen OPIR by maturing new technologies to enable detection of new and challenging missile threats. SMI funds engineering activities to reduce both production and future system costs through manufacturing and producibility enhancements, and technology insertion. SMI includes studies and risk reduction activities to evolve the current Program of Record (PoR) constellation and simultaneously mature breakthrough technologies to create a leap in capability for follow-on systems.

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

	FY 2021	FY 2022	FY 2023
Title: Demonstrations/Prototypes	133.139	37.381	135.758
<p>Description: Demonstrations and prototypes mature and prove viability of OPIR technologies, missions, and performance with ground and on-orbit prototypes. They enable transition of improved capabilities to full scale architectures and inform critical decisions for future fielding as well as support maturation of Mission Data Processing (MDP) algorithms for tactical and strategic applications by providing additional sensors and algorithms to advance detection and tracking.</p> <p>The Missile Track Custody Demo leverages the Missile Track Custody Digital Engineering Risk Reduction effort, to support a digital engineering demonstration and prototype development that will prove the capability to track emerging missile threats outlined in the Missile Warning (MW) Missile Defense (MD) Capability Development Document (CDD). The effort assesses the feasibility of missile tracking from Medium Earth Orbit (MEO) with ground based hardware in-the-loop simulations and on-orbit satellites. The primary mission of the digital engineering effort is to show the feasibility of providing track custody data from post-boost to burn-out of dim upper stage missiles. The Missile Track Custody Digital Engineering Risk Reduction effort will fill noted knowledge gaps identified by the Integrated OPIR Missile Warning & Missile Defense Interagency Team by developing digital models and engineering development units. Space Systems Command's Missile Track Custody Demonstrations, combined with Space Development Agency and Missile Defense Agency (MDA) OPIR system data, are critical to the future combined missile warning and defense architecture. The effort will carry two mission payload vendor designs through Mission Payload Critical Design Review (CDR) in FY 2022 and has contract options to build, test, integrate and launch up to six Space Vehicles (SV) into</p>			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2021	FY 2022	FY 2023
<p>MEO followed by on-orbit experimentation and support. The effort will deliver CDR level designs and digital models to the USSF and OSD for detailed architecture analysis.</p> <p>The Wide Field Of View (WFOV) demonstration matures WFOV technology and validates multi-mission capabilities including the potential for a single sensor to simultaneously perform strategic and tactical missions. WFOV is ready for launch in FY 2022. Collection of on-orbit WFOV data is critical to develop algorithms to process large data set generated by emerging large format focal planes and reduce risk for future architectures. The WFOV payload and bus are separate development efforts. The WFOV testbed program provides a bus capable of demonstrating on-orbit mission performance and mitigating the development risks for employing WFOV sensors. The testbed program will integrate, test, and launch a prototype WFOV payload with a government owned free flyer spacecraft. The WFOV testbed will host the WFOV payload. As an integrated SV, the WFOV system will prove on-orbit mission performance of WFOV sensors. The WFOV payload will provide the critical on-orbit data required to develop and validate WFOV algorithms, as well as on-board MDP throughput requirements for strategic missile warning.</p> <p>A OSD/CAPE Missile Warning and Missile Tracking Analysis of Alternatives concluded in FY 2021 and recommended a MEO warning and tracking layer solution. The Missile Track Custody Demonstration and prototype provides the fastest and most efficient MEO solution by leveraging on-going risk reduction efforts and expanding into a full flight demonstration.</p> <p>FY 2022 Plans: WFOV Demonstrations: Continue to mature ground integration plan to ensure ground mission data processing and Space Vehicle Command and Control after launch. Continue development of launch and early orbit test plan to ensure Space Vehicle deployment and mission payload calibration. Refine experimentation plan to verify prototype meets requirements; and finalize transition to operations plan.</p> <p>Missile Track Custody Digital Engineering Risk Reduction: Execute Other Transaction Agreement for up to two contractors that culminates in a Mission Payload Critical Design Review (CDR) by end of FY 2022. Continue to develop digital engineering tools to model sensor performance across a variety of orbits and inform future OPIR architecture studies.</p> <p>FY 2023 Plans: Missile Track Custody Demonstrations: Continue to execute up to two Other Transaction Agreements to build and mature digital engineering Model-Based Systems Engineering tools to model performance against the Missile Track Custody Technical Requirements Document (TRD) and the Missile Warning and Missile Defense Capabilities OPIR Development Document. Select up to two vendors to proceed on to perform development culminating in a Space Vehicle Critical Design Review (CDR). Conduct a digital Space Vehicle Preliminary Design Review. Continue spacecraft bus development and purchase long lead parts. Conduct integrated demonstrations of the payload. Develop bus-to-payload interfaces, conduct spacecraft-to-ground requirements analysis and conduct early integration testing. Perform demonstrations to validate system meets space system</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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CDR entrance and exit criteria. Continue to mature Government Reference Digital Engineering Environment and Model-Based Systems Engineering (MBSE) and Performance Models to ensure that, as the designs mature, the Government can continue to manage risk while understanding system level performance or cost trades. Rapidly respond to implement system resiliency and situational awareness necessary to operate in a contested space domain. Activities may include, but are not limited to, program office support, studies, technical analysis, modeling, simulation, experimentation, prototyping, etc.

FY 2022 to FY 2023 Increase/Decrease Statement:

FY 2023 funds increased to support development of the MEO prototype space vehicle and preliminary and critical design review campaigns, including engineering and system-level activities.

Title: Technology Maturation	10.526	4.854	11.952
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Description: Assess technology needs to support resiliency of PoR assets and future architectures that are responsive to the evolving threat environment. Perform trade and design studies to assess obsolescence, affordability, capability design modifications, and CONOPS for the OPIR mission. Mature technologies and manufacturability to reduce cost, schedule, and technical risk for new component and subsystem designs that may be used in the future systems. Mature technologies including algorithms, Focal Plane Arrays (FPA), optical filters, on-board processors, auxiliary resiliency payloads, and other payload components for future missile warning satellites, and reconstitution capabilities. Develop modeling and simulation (M&S) capabilities, and engineering model prototypes for hardware/software integration and testing. These efforts will reduce risk and mature technologies applicable to future systems and architectures. Additionally, develop test beds to validate/verify requirements and ensure technical maturity for next-generation payload technologies as well as threat mitigation components and techniques.

FY 2022 Plans:

Ongoing technology maturation efforts will deliver initial flight grade FPAs in early FY 2022. Accelerate data-processing technologies, including resilient algorithms, delivering standard scenes, and studies to investigate minimum detectable targets and raid scenarios. Begin maturing additional new technologies in support of emerging program of record needs, including resilient FPAs, radiation hardened memory, and reduced cost cryo-coolers. Continue prototyping resilient hardware and maturing critical technologies that include large format FPAs, resilient FPAs, resilient processing algorithms, pointing mirrors, threat sensors, and processors for earliest integration into Next-Gen OPIR or similar programs. Continue to develop technology options to address emerging threats and stressing targets to current and future OPIR systems. Continue to develop and space qualify emerging technologies to reduce risk for Next-Gen OPIR satellites. Continue to develop system resiliency and advanced technology concepts via ground and on-orbit demonstrations to validate performance, develop CONOPS, and prove enhanced system capabilities. Continue to develop test bed components for resiliency, requirements verification/validation, and to enhance technology maturation. Additionally, FY 2022 funding will allow the program to implement system resiliency and situational

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>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 Plans: Evolve ongoing OPIR technology maturation efforts to further accelerate data-processing technologies, including resilient, onboard GEO algorithms, delivering standard scenes, and studies to investigate minimum detectable targets and raid scenarios. Continue to mature additional technologies in support of emerging program of record needs, including resilient, high dynamic range FPAs, resilient onboard MEO algorithms, radiation hardened memory, and reduced cost cryo-coolers. Advance prototyping resilient hardware and maturing critical technologies that include large format FPAs, resilient FPAs, resilient processing algorithms, pointing mirrors, threat sensors, and processors for earliest integration into Next-Gen OPIR or similar programs. Maintain and enhance efforts to develop technology options to address emerging threats and stressing targets to current and future OPIR systems. Progress development and space qualification of emerging technologies to reduce risk for Next-Gen OPIR satellites. Boost development of system resiliency and advanced technology concepts via ground and on-orbit demonstrations to validate performance, develop CONOPS, and prove enhanced system capabilities. Expand the development of test bed components for resiliency, requirements verification/validation, and to enhance technology maturation.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding level is consistent with FY 2022 actuals investments in Tech Maturation due to the FY 2022 OPIR mission priorities.</p>			
<p>Title: Data Exploitation</p> <p>Description: Data exploitation efforts will exploit existing OPIR data sources including Defense Support Program (DSP), SBIRS Highly Elliptical Orbit (HEO), SBIRS GEO Scanner, SBIRS GEO Starer, WFOV demonstrations, prototypes, and other sources. Efforts will exploit data through collection, processing, fusion, data dissemination, algorithm development and testing, network connectivity, and sensor performance assessments. SBIRS and other sensors provide a rich data set for exploitation. SMI data exploitation enables access to raw and processed data for data analysts and application developers to expand capabilities for battlespace awareness and other applications. SMI data exploitation efforts are complementary to, and enhance, the exploitation capabilities delivered by the Program of Record (PoR) and prototypes. SMI will develop tools and algorithms to enable users to apply OPIR data to support their mission needs. Data exploitation efforts also evaluate tools for C2, mission management, and MDP to reduce risk. Data exploitation efforts evolve the PoR ground system to an open architecture that could support PoR and other future satellite alternatives. SMI ground system development activities seek to demonstrate the performance of an evolved ground system architecture capable of supporting multiple satellites, payloads, and missions through management and data processing. These efforts seek to lower operating costs with enhanced net-centric and service-oriented features with a new flexible expansion capability. Data exploitation efforts support demonstration and prototype architecture planning and experimentation.</p>	50.997	55.743	76.374

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p><i>FY 2022 Plans:</i> Innovate wildland fire tracking capabilities and incorporate applications into national fire tracking solution. Begin Data Exploitation efforts on Wide Field of View (WFOV) system as the satellite transitions from on-orbit check-out to its detailed experimentation plan. Incorporate results from WFOV payload calibration into WFOV MDP software. Develop and test WFOV calibration algorithm and execute the WFOV on-orbit calibration. Continue expanding operational capability of the data exploitation lab enabling applications to advance from a prototype state to a near-fully operational capability. Complete expansion of a Battlespace Awareness real-time capability in the OPIR Battlespace Awareness Center (OBAC) that will integrate applications and services matured in the data exploitation government lab. Continue to develop, expand, and manage the common open framework architecture of the data exploitation lab and real-time OBAC capability. Support development of experimental operations and additional uses of the program of record data in the OBAC. Develop prototype processes for managing an open framework architecture. Develop applications for the OBAC that transition to the Future Operationally Resilient Ground Evolution (FORGE). Support experimentation, technology maturity, and evolution of exploitation algorithms and continue to provide enhanced ground segment capability and tools for C2, data collection, mission processing, and data dissemination via the Space Enterprise Consortium contract vehicle. Enhance mission resiliency and data exploitation of SBIRS and other OPIR data. Continue to collaborate with the Intelligence Community (IC) and Missile Defense Agency (MDA) to enhance Joint OPIR Ground (JOG) study initiatives. Develop and demonstrate the performance of a Government owned open and extensible evolved ground system architecture to support multiple satellites, payloads, and missions. Demonstrate data processing for any infrared payload with enhanced net-centric and service-oriented features with a flexible expansion capability.</p> <p><i>FY 2023 Plans:</i> Continue to innovate wildland fire tracking capabilities and incorporate applications into national fire tracking solution. Continue operations and Data Exploitation efforts on Wide Field of View (WFOV) system as the satellite transitions from on-orbit check-out to its detailed experimentation plan. Incorporate results from WFOV payload calibration into WFOV MDP software. Develop and test WFOV calibration algorithm and execute the WFOV on-orbit calibration. Continue expanding operational capability of the data exploitation lab enabling applications to advance from a prototype state to a near-fully operational capability. Continue to support development of experimental operations and additional uses of the program of record data in the OBAC. Develop prototype processes for managing an open framework architecture. Develop applications for the OBAC that transition to the Future Operationally Resilient Ground Evolution (FORGE). Continue to support experimentation, technology maturity, and evolution of exploitation algorithms and continue to provide enhanced ground segment capability and tools for C2, data collection, mission processing, and data dissemination via the Space Enterprise Consortium (SpEC) Other Transaction Agreements (OTAs) and AFRL/RI Broad Agency Announcement (BAA) contract vehicle. Enhance mission resiliency and data exploitation of SBIRS and other OPIR data using BAAs and OTAs. Continue to collaborate with the Intelligence Community (IC) and Missile Defense Agency (MDA) to enhance Joint OPIR Ground (JOG) study initiatives. Continue to develop and demonstrate the performance of a Government owned open and extensible evolved ground system architecture to support multiple satellites, payloads, and</p>			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
missions, as required. Evolve data processing for infrared payload applications with enhanced net-centric and service-oriented features.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased due to the ramp up of WFOV data exploitation activities.			
Accomplishments/Planned Programs Subtotals	194.662	97.978	224.084

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• SPAF 01 MSSBIR: <i>SBIR High (Space)</i>	160.891	156.481	-	-	-	-	0.000	0.000	-	0.000	317.372

Remarks

D. Acquisition Strategy

The program office will use a variety of acquisition approaches to execute various concept studies, technology maturation efforts, testbed/prototype demonstrations, and data exploitation initiatives and projects. The program office will collaborate with appropriate contracting agencies to support each individual effort. Data exploitation efforts in the laboratory and the OPIR Battlespace Awareness Center (OBAC) will leverage existing external contracts, as well as new internal competitive contracts. Activities, such as SBIRS obsolescence and affordability enhancements to the existing satellite design, will leverage existing Program of Record contracts. Technology maturation and component prototyping and/or qualification could leverage existing contracts. Broad Agency Announcements (BAAs) and Other Transaction Authorities (OTA) are planned in collaboration with Air Force Research Lab (AFRL) and other government agencies. Where practical, other efforts are competed. A SSC BAA will be used to acquire and mature high priority technology items. Federally Funded Research and Development Center (FFRDC), University Affiliated Research Centers (UARCs), and Systems Engineering and Technical Assistance (SETA) contractors will also be used to conduct and support studies. New technology, replacement components, and system designs will be acquired with government data rights to the maximum extent, allowing incorporation into future OPIR satellite production or system development. Contracting partnerships with other agencies will also be used to study, develop, demonstrate, and prove emerging capabilities. To accelerate contracting actions and program execution, the Space Enterprise Consortium (SpEC) will be utilized to execute OTAs to conduct data exploitation improvements at the OBAC and Tools, Application, Processing (TAP) Lab. A local SSC contract is being utilized for services at the OBAC and TAP Lab.

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Demonstrations/Prototypes - WFOV Testbed</i>				
Prepare for Launch activity	2	2022	4	2022
<i>Demonstrations/Prototypes - Track Custody Demo (TCD)</i>				
Develop & Test	2	2021	2	2022
Architecture Analysis	3	2022	4	2022
Mission Payload Critical Design Review	4	2022	4	2022
Mission Payload, Bus Build & Test	1	2023	4	2024
TCD Space Vehicle Critical Design Review	4	2023	4	2023
Mission Payload Delivery	1	2025	1	2025
TCD Space Vehicle Integration & Test	1	2025	4	2025
TCD Space Vehicle Delivery	4	2025	4	2025
Launch TCD Space Vehicle	1	2026	1	2026
On-Orbit Experimentation	2	2026	4	2027
<i>Technology Maturation</i>				
Development High Dynamic Range (HDR) FPAs	1	2021	4	2027
Phase II Kickoff	3	2022	3	2022
HDR & Laser Resiliency Test Chips (TRL4)	4	2023	4	2023
Operational HDR (TRL 5-6)	1	2026	1	2026
Resilient Algorithm Development	1	2021	4	2027
Select High Sensitivity Enhancements	1	2023	1	2023
Optimized Algorithm Demo	2	2024	2	2024
Embedded Algorithms Delivery 2	4	2024	4	2024
<i>Data Exploitation</i>				

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Execute BAAs	1	2021	4	2022
SpEC OTAs	3	2022	3	2023
Government Lab & OBAC Support Services	1	2021	4	2027
WFOV Early On-Orbit Calibration and Exploitation	1	2023	2	2026
Conduct OBAC Framework Ops	1	2023	2	2024
High Altitude Dim Event Stalker (HADES) MVP to OBAC	1	2021	2	2023
HADES IOC on FORGE	2	2023	2	2023
HADES FOC on FORGE	3	2024	3	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>				Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>			
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
657106: <i>Next-Gen OPIR Ground</i>	-	384.289	0.000	612.529	0.000	612.529	662.760	557.800	371.924	286.841	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In accordance with Congressional direction in the FY22 enacted budget, funds in Project 657106, Next Gen OPIR Ground (FORGE) will be distributed to newly created program element 1206440SF, Next Gen OPIR Ground. Budget will be submitted in the new PE for the next budget cycle.

A. Mission Description and Budget Item Justification

Next-Gen OPIR Ground (Project 657106/Program Element 1206440SF): Next-Gen OPIR Ground, also known as Future Operationally Resilient Ground Evolution (FORGE), consists of Command and Control (C2) migration to US Space Force (USSF) Enterprise Ground Services (EGS), modernization of Mission Data Processing (MDP) to implement an open framework and develop mission applications, and required development and/or upgrades to Relay Ground Stations (RGS) to meet USSF current and future space domain demands. FORGE and EGS efforts combined will provide the flexibility and scalability to integrate new satellites, sensors and capabilities more rapidly and efficiently in order to meet evolving threats and warfighter needs. Identify shared/common platform, infrastructure, and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. The Next-Gen OPIR ground efforts enable cyber enhancements for both space and ground systems. EGS will introduce common ground services such as Telemetry, Tracking, and Commanding (TT&C); mission management; and automation. To support initial Next-Gen OPIR Space satellite launches without driving risk into the FORGE development schedule, the program has established a risk reduction ground Next-Gen OPIR Interim Operations (NIO) capability based on a limited Space Based Infrared System (SBIRS) Block 20 solution.

FORGE is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways.

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

	FY 2021	FY 2022	FY 2023
Title: FORGE - C2	44.855	0.000	72.301
Description: The Space Force is transitioning to Enterprise Ground Services, a Government-owned ground architecture that focuses on Mission Management (MM), TT&C, and Ground Control (GC) utilizing common services. FORGE C2 creates Mission Unique Software (MUS) and provides sensor/spacecraft specific C2 capabilities to plug into the EGS suite of services. C2 of the legacy SBIRS constellation assets will be transitioned using the FORGE C2 portion of EGS.			
FY 2022 Plans: FY22 Current Year Plans are captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill.			
FY 2023 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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<p>GNOME: Continue development and integration of C2 MUS and core applications for a GEO space vehicle onto EGS. Conduct live testing of developed MUS and integrated system at all applicable test locations. Work with NRL to refine software required to operate MUS with core applications on the EGS framework (e.g., Neptune & VMOC) and support deficiency burn-down from test events.</p>			
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<p>C2X: Continue development of MUS, SBIRS Transport Network and integration activities to support migration of all HEOs and GEO assets to EGS/FORGE framework. Continue to develop or refine NRL software required to operate core applications, and conduct preliminary testing.</p>			
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<p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to the FY 2022 funding amount in PE 1206440SF by \$8.05M as SBIRS C2 constellation cutover activities ramp-up.</p>			
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<p>Title: FORGE - Mission Data Processing (MDP)</p>	198.682	0.000	294.054
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<p>Description: The FORGE MDP effort creates a replacement for the existing legacy SBIRS Ground mission processing applications which have cyber security and scalability limitations. MDP is creating a cyber-resilient, flexible, and scalable open framework capable of meeting current and future threats. MDP will plan OPIR and other mission data resource utilization to meet warfighter requirements. MDP provides the ability to ingest and publish varying levels of processed data for enhanced processing, perform efficient and systematic upgrades, and orchestrate real-time wide-band processing for ITW/AA and non-ITW/AA mission areas. The MDP system provides modular mission applications to meet the future challenges of Missile Warning (MW), Missile Defense (MD), Battlespace Awareness (BA), Technical Intelligence (TI). MDP is critical to making cyber-secure, effective use of the increased amounts of data that will be collected by Next-Gen OPIR.</p>			
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<p>FY 2022 Plans: FY22 Current Year Plans are captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill.</p>			
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<p>FY 2023 Plans: Deliver non-ITW/AA certified framework to MCS and MCS-Backup. Continue development of follow-on MDPAP effort. Continue development of MDPAP effort. Continue development of SBIRS Legacy sensor specific processing software. Continue development for Sensor Specific Processing (SSP) to support migration of all SBIRS HEOs and GEO assets to FORGE framework. Conduct required studies to identify shared platform, infrastructure, and data layer solutions that will inform future concepts and activities in support of enterprise open frameworks and architectures as well as risk reduction activities, technical analysis for common platform, infrastructure and data layers for ground and communication systems to build upon. FY 2023 funding will allow the program to implement system resiliency, cyber security and situational awareness necessary to operate</p>			
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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
in the contested space domain. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, and prototyping.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to the FY 2022 funding amount in PE 1206440SF by \$6.658M as GNOME activities begin to ramp down.				
Title: FORGE - Next Gen Transition		137.704	0.000	169.174
Description: The title of this major thrust has changed from "Next Gen Interim Operations (NIO)" to "FORGE-Next Gen Transition" to better encompass and describe all of the associated activities.				
Next Gen is the development to transition future OPIR space systems to using FORGE and EGS for mission processing and C2. Included in this effort is the development of an interim system (NIO) to ensure the most critical ground processing is ready in time for the first Next-Gen OPIR satellite launch. NIO will create mono tracks and publish those mono tracks to the existing SBIRS Block 20 ground system for fusion and dissemination to the warfighter.				
FY 2022 Plans: FY22 Current Year Plans are captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill.				
FY 2023 Plans: Continue development of the risk reduction system, and conduct early integration and testing events. Continue integration of FORGE C2 and EGS functions. Continue install of hardware at the Consolidated and Continental United States (CONUS) Relay ground sites. Continue integration of mission data processing applications into the framework to support NGG. Continue to execute NGG and NGP contract. Start Space to Ground capability testing with NGG-1.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to the FY 2022 funding amount in PE 1206440SF by \$10.107M as initial integration and testing events begin.				
Title: FORGE - Relay Ground Stations (RGSs)		3.048	0.000	77.000
Description: OPIR data collected in space must be relayed to ground entry points and routed to provide warfighters with timely information. The legacy SBIRS ground architecture requires RGS upgrades and new RGSs to receive OPIR data from legacy and future Next-Gen OPIR assets. This effort expands the set of RGSs with up to three additional RGSs that will use common hardware capable of supporting all Next Gen OPIR space assets. This effort will provide data to the MCS for processing and dissemination to warfighters and National Command Authorities. The RGS modernization effort will include the ability to operate antennas, process data, and support older Defense Support Program (DSP) assets.				

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p><i>FY 2022 Plans:</i> FY22 Current Year Plans are captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill.</p> <p><i>FY 2023 Plans:</i> Relay Ground Station (RGS): Continue build-out of RGS-A site facility which is an integral part of RGS development. Continue antenna/infrastructure installation and prepare for check out. Purchase high-value antenna and associated hardware for RGS-A site ramp up of labor/construction activities. Perform site surveys and planning for the next RGS site.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to the FY 2022 funding amount in PE 1206440SF by \$54.000M due to hardware/antenna purchases and continuing effort to install, integrate and test first site while initiating planning and design efforts on the second site.</p>			
Accomplishments/Planned Programs Subtotals	384.289	0.000	612.529

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

N/A

Remarks

D. Acquisition Strategy

The Next Gen OPIR Ground program is executing an acquisition strategy using Middle Tier of Acquisition (MTA) authority for Rapid Prototyping approved via Acquisition Decision Memorandum on 5 Dec 19.

To support this acquisition strategy, the program will follow an agile approach to develop capabilities and a robust DevSecOps (Development/Security/Operations) solution to deliver the capabilities. The FORGE program is pursuing a rapid prototyping approach founded primarily on software and infrastructure reuse, partnerships with other programs, limited scope, use of existing contracts where necessary, and maximizing competition where possible. For the MDP thrust, the FORGE program will competitively use Other Transaction (OT) authorities to develop the framework and the applications. For the C2 thrust, the program team will use existing Space Systems Command (SSC) contracts with an emphasis to on-ramp to Enterprise Ground Services as soon as practical. For the Next Gen Transition effort, the program is using the Next Gen GEO contract with the prime contractor. The program is executing the MDP, C2, and NIO thrusts within the scope of its Middle Tier of Acquisition authorities. The program is executing the RGS thrust using traditional acquisition authorities.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / Next Generation OPIR	Project (Number/Name) 657106 / Next-Gen OPIR Ground
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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			
FORGE - C2	Various	Various : Various	-	44.850	Nov 2020	-		72.301	Jun 2023	-		72.301	Continuing	Continuing	-
FORGE - MDP	Various	Various : Various	-	154.433	Nov 2020	-		238.367	Nov 2022	-		238.367	Continuing	Continuing	-
FORGE - Next Gen Transition	Various	Various : Various	-	137.704	Nov 2020	-		169.174	Nov 2022	-		169.174	Continuing	Continuing	-
FORGE - RGS-A	Various	Various : Various	-	3.048	Nov 2020	-		67.000	Nov 2022	-		67.000	Continuing	Continuing	-
FORGE - RGS Second Site	TBD	Various : Various	-	-		-		10.000	Mar 2023	-		10.000	Continuing	Continuing	-
SE&I	TBD	TBD : TBD	-	13.891	Nov 2020	-		15.746	Dec 2022	-		15.746	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo/ CA	-	2.130	Nov 2020	-		2.168	Jan 2023	-		2.168	Continuing	Continuing	-
Subtotal			-	356.056		-		574.756		-		574.756	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			
FFRDC	RO	Aerospace Corporation : El Segundo/CA	-	3.838	Jan 2021	-		4.782	Jan 2023	-		4.782	Continuing	Continuing	-
A&AS	Various	Various : Various	-	24.290	Feb 2021	-		32.641	Feb 2023	-		32.641	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.105	Nov 2020	-		0.350	Nov 2022	-		0.350	Continuing	Continuing	-
Subtotal			-	28.233		-		37.773		-		37.773	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		-	384.289	-	612.529	-	612.529	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

FORGE - C2	
GNOME	
SBIRS Constellation C2 Transition	
FORGE - MDP	
Competitive Prototype Applications Provider	
Follow-On Prototype Framework Development	
Follow-On Prototype Applications Provider Development	
Sensor Specific Processing	
FORGE - Next Gen Transition	
Next Gen GEO Development	
Next Gen Polar Development	
FORGE - RGS	
RGS-A Development	
Second Site Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
FORGE - C2				
GNOME	1	2021	4	2023
SBIRS Constellation C2 Transition	3	2021	4	2024
FORGE - MDP				
Competitive Prototype Applications Provider	1	2021	4	2021
Follow-On Prototype Framework Development	1	2021	4	2025
Follow-On Prototype Applications Provider Development	3	2022	4	2027
Sensor Specific Processing	1	2022	4	2027
FORGE - Next Gen Transition				
Next Gen GEO Development	1	2021	4	2027
Next Gen Polar Development	1	2021	4	2027
FORGE - RGS				
RGS-A Development	1	2021	4	2025
Second Site Development	2	2023	4	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>				Project (Number/Name) 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>			
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
657120: <i>Next-Gen OPIR Space, Block 0 GEO</i>	-	1,402.900	0.000	1,713.933	0.000	1,713.933	907.577	636.663	452.039	462.547	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In accordance with Congressional direction in the FY22 enacted budget, funds in Project 657120, Next Gen OPIR Block 0 GEO will be distributed to newly created program element 1206443SF, Next Gen OPIR - GEO. Budget will be submitted in the new PE for the next budget cycle.

A. Mission Description and Budget Item Justification

Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) Space Block 0 Geosynchronous Earth Orbit (GEO) (Project 657120/Program Element 1206443SF): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, deployed forces and allies. The Next-Gen OPIR GEO (NGG) missile warning satellites enhance detection and improve reporting of intercontinental ballistic missile launches, submarine ballistic missile launches, and tactical ballistic missile launches. Development consists of new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands.

The Program Office is acquiring the NGG capability in two contract actions. Phase 1 awarded in August 2018 encompasses requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR). Phase 2 was awarded in Jan 2021 for the manufacturing, assembly, system integration and test, launch, and early on-orbit test through operational acceptance of NGG satellites 1-3.

Next-Gen OPIR GEO is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways.

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

	FY 2021	FY 2022	FY 2023
Title: Next-Gen OPIR Space, Block 0 GEO	1,402.900	0.000	1,713.933
Description: Development of the Next-Gen OPIR GEO missile warning satellites with a proven bus, new hardened sensors, and auxiliary payloads for increased resilience. The space segment for GEO missile warning satellites consist of a resilient architecture providing real time persistent global equatorial infrared coverage. The first GEO satellite is required in FY 2025.			
FY 2022 Plans: FY22 Current Year Plans are captured in Program Element 1206443SF per direction in the FY22 Appropriations Bill.			
FY 2023 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Continue Phase 2 efforts to build and deliver 3 GEO SVs. Continue assembly, integration and test of two competing payloads. Complete testing of at least one flight mission payload for SV #1 and delivery for integration into the SV. Continue efforts to manufacture, build, integrate, and test the GEO SV #1, including the first system-level integrated testing to enable discovery and correction of defects critical to launch. Conduct mission and auxiliary payload integration onto SV #1. Conduct SV #1 acoustic test. Continue critical path flight hardware procurement for SVs #2 & 3. Begin efforts to manufacture, build, integrate, and test the GEO SV #2, including early subsystem integration and testing. Rapidly respond to updated intelligence on threats and implement system resiliency and situational awareness necessary to operate in a contested space domain. Activities include, but are not limited to, program office support, studies, technical analysis, modeling, simulation, experimentation, prototyping, etc.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to the FY 2022 funding amount in PE 1206443SF by \$514.740M due to concurrent engineering, production, integration and test activity supporting all three Next Gen OPIR GEO Space Vehicles and two new-development OPIR mission payloads. Funds are required to preserve FY25 initial launch capability (ILC) for SV #1, place flight hardware material and vendor orders for SV 1-3, and perform space/ground integration activities. Funds required to enable the essential integration, test, and find/fix activity necessary to deliver SV#1 and two competitively produced OPIR mission payloads on the accelerated schedule necessary to maintain FY25 ILC.</p>			
Accomplishments/Planned Programs Subtotals	1,402.900	0.000	1,713.933

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

N/A

Remarks

D. Acquisition Strategy

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of 3 Next-Gen GEO satellites. The Next-Gen OPIR Space program has been designated a Middle Tier Acquisition (MTA) Rapid Prototype effort under Section 804 of the 2016 National Defense Authorization Act (NDAA). The purpose of the MTA is to develop and qualify up to two competitive mission payloads. Upon approval by the SAE to complete MTA activity, the Next Gen OPIR Block 0 program development will transition to Major Capability Acquisition program. The first GEO satellite is required by FY 2025. The program office awarded a sole source contract under the authority of a Justification & Authorization document. The Next-Gen GEO Phase 1 contract was awarded in FY 2018, consisting of requirements development, critical path flight hardware procurement, and risk reduction efforts culminating in a Sept 2021 Critical Design Review (CDR). The Next-Gen GEO Phase 2 modification was awarded in Jan 2021, and includes scope for parts procurement, assembly, integration, test, launch, and checkout of all 3 GEO space vehicles.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / Next Generation OPIR	Project (Number/Name) 657120 / Next-Gen OPIR Space, Block 0 GEO
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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			
Next-Gen OPIR Space, Block 0 GEO (Phase 1 & 2)	Various	Lockheed Martin: Various : Various	-	1,362.660	Oct 2020	-		1,644.859	Oct 2022	-		1,644.859	Continuing	Continuing	-
SE&I	Various	Various : Various	-	4.759	Nov 2020	-		18.441	Dec 2022	-		18.441	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp. : El Segundo, CA	-	10.184	Oct 2020	-		20.555	Oct 2022	-		20.555	Continuing	Continuing	-
Subtotal			-	1,377.603		-		1,683.855		-		1,683.855	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			
FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	10.622	Oct 2020	-		12.621	Oct 2022	-		12.621	Continuing	Continuing	-
A&AS	Various	Various : TBD	-	14.550	Feb 2021	-		17.051	Feb 2023	-		17.051	Continuing	Continuing	-
Other Support	Various	Various : TBD	-	0.125	Oct 2020	-		0.406	Oct 2022	-		0.406	Continuing	Continuing	-
Subtotal			-	25.297		-		30.078		-		30.078	Continuing	Continuing	N/A

Project Cost Totals	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	1,402.900	-	1,713.933	-	1,713.933	Continuing	Continuing	N/A

Remarks
FY22 Cost Categories are captured in Program Element 1206443SF per direction in the FY22 Appropriations Bill.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027					
	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		
<i>Next Gen OPIR Space, Blk 0 GEO Phase 1</i>																														
Bus Development	██████████																													
Payload Development	██████████																													
SV 1 Critical Path Flight Hardware	████████████████████																													
Mission Payload #1 CDR			████																											
Mission Payload #2 CDR			████																											
System CDR			████																											
<i>Next Gen OPIR Space, Blk 0 GEO Phase 2</i>																														
SV 2/3 Critical Flight Hardware Purchases	████████████████████																													
SV 1 Mission Payload Integration & Testing			████████████████████																											
SV 2 Mission Payload Integration & Testing			████████████████████																											
SV 1 Bus Build Integration & Testing			██																											
SV 3 Mission Payload Integration & Testing			██																											
SV 2 Bus Build Integration & Testing			██																											
SV 1 Ready for Launch																														
SV 3 Bus Build Integration & Testing																														

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Next Gen OPIR Space, Blk 0 GEO Phase 1</i>				
Bus Development	1	2021	4	2021
Payload Development	1	2021	4	2021
SV 1 Critical Path Flight Hardware	1	2021	3	2022
Mission Payload #1 CDR	3	2021	3	2021
Mission Payload #2 CDR	4	2021	4	2021
System CDR	1	2022	1	2022
<i>Next Gen OPIR Space, Blk 0 GEO Phase 2</i>				
SV 2/3 Critical Flight Hardware Purchases	2	2021	2	2024
SV 1 Mission Payload Integration & Testing	4	2021	4	2023
SV 2 Mission Payload Integration & Testing	4	2021	4	2023
SV 1 Bus Build Integration & Testing	4	2021	3	2025
SV 3 Mission Payload Integration & Testing	1	2024	3	2026
SV 2 Bus Build Integration & Testing	1	2024	3	2027
SV 1 Ready for Launch	4	2025	4	2025
SV 3 Bus Build Integration & Testing	1	2025	4	2027

Note

Next-Gen OPIR GEO efforts continue past 2027.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206442SF / Next Generation OPIR				Project (Number/Name) 657121 / Next-Gen OPIR Space, Block 0 Polar			
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
657121: Next-Gen OPIR Space, Block 0 Polar	-	337.013	0.000	899.196	0.000	899.196	1,008.941	892.331	470.765	436.905	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In accordance with Congressional direction in the FY22 enacted budget, funds in Project 657121, Next Gen OPIR Block 0 Polar will be distributed to newly created program element 1206444SF, Next Gen OPIR - Polar. Budget will be submitted in the new PE for the next budget cycle.

A. Mission Description and Budget Item Justification

Next-Generation Overhead Persistent Infrared (OPIR) Space, Block 0 Polar (NGP) (Project 657121/Program Element 1206444SF): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, its deployed forces, and its allies. Next-Gen OPIR Space enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. Development consists of the Next-Gen OPIR Polar missile warning satellites with new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands.

The Program Office is acquiring the NGP capability through three contract phases. Phase 0, awarded in June 2018, encompassed system requirements analysis and risk reduction efforts, which led to a March 2020 System Requirements Review (SRR). Phase 1, awarded in May 2020, encompasses design and development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR in FY 2024. Phase 2 will be awarded prior to System CDR for the manufacturing, assembly, integration and test, and early on orbit test, through operational acceptance of NGP satellites 1 and 2.

Next-Gen OPIR Polar is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways.

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

	FY 2021	FY 2022	FY 2023
Title: Next Gen OPIR Space, Block 0 Polar	337.013	0.000	899.196
Description: Development of the Next-Gen OPIR Polar missile warning satellites using a proven bus with modifications, auxiliary payloads for improved resiliency, and new hardened sensors. The Polar space segment will consist of two Next-Gen OPIR Polar satellites in a resilient architecture, providing real time persistent infrared coverage of the northern hemisphere.			
FY 2022 Plans: FY22 Current Year Plans are captured in Program Element 1206444SF per direction in the FY22 Appropriations Act.			
FY 2023 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657121 / <i>Next-Gen OPIR Space, Block 0 Polar</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Continue to execute system engineering and bus maturation activities leading to Preliminary Design Review (PDR). Scheduled activities include Internal Design Reviews (IDR) which flow into Preliminary Design Audits (PDAs); the completion of the IDRs and PDAs are unique to Northrup Grumman for pre-PDR readiness. The activities supporting Space Vehicle development are to continue and mature the bus design and complete unit and sub-system level IDRs. The Communications Payload (CPL) and Cryptographic units will continue engineering, design, and hardware/software risk reduction activities to support System PDR. Many of the early stages of component-level IDRs will complete to solidify CPL preliminary design. The acceleration and execution of the SV, ground cryptographic equipment designs, and hardware prototyping will support timely completion of NGP design integration. This includes design and test plans for space to ground testing, delivery of cybersecurity design documents, and completion of cross-agency design audits to mature the Polar cybersecurity approach. Additionally, the execution of the Cyber Table Top exercises will identify design security risks that can be mitigated pre-PDR; and complete the Cybersecurity Strategy which will inform the decision for Authority to Operate. Assembly, Integration and Test (AI&T) path to PDR includes completion of Producibility & Ground System Engineering (GSE) Requirements: documentation and product development such as AI&T Plan & Procedures; Mechanical Ground System Engineering (MGSE); Electrical Ground System Engineering (EGSE), and significant oversight of factory facilities modernization and test bed development.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to the FY 2022 funding amount in PE 1206444SF by \$427.796M to support ramp-up of engineering activity to plan and execute PDR and critical parts procurement necessary to support FY28 launch.</p>			
Accomplishments/Planned Programs Subtotals	337.013	0.000	899.196

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

N/A

Remarks

D. Acquisition Strategy

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of 3 Next-Gen GEO and 2 Next-Gen Polar satellites. The Next-Gen OPIR Space program has been designated a Middle Tier Acquisition (MTA) Rapid Prototype effort under Section 804 of the 2016 National Defense Authorization Act (NDAA). The purpose of the MTA is to develop and qualify up to two competitive mission payloads. Following completion of the MTA activity, the Next Gen OPIR GEO program developments will transition to Major Capability Acquisition programs. The first GEO satellite is required by FY 2025 and the first Polar satellite is required in FY 2028. The program office awarded two sole source contracts (one to a GEO prime and one to a Polar prime) under the authority of two Justification & Authorization documents. The Next-Gen Polar Phase 0 was awarded in FY 2018, consisting of requirements development and culminated in a March 2020 SRR. Phase 1 was awarded May 2020, encompassing requirements review, design, development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR NLT FY 2024 for Next-Gen Polar Satellite Vehicles (SV) 1 and 2. Phase 2 will be awarded prior to System CDR, encompassing build, integration, test, launch, and transition to operations for Next-Gen Polar SVs 1 and 2.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / Next Generation OPIR	Project (Number/Name) 657121 / Next-Gen OPIR Space, Block 0 Polar
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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			
Next Gen OPIR Space, Block 0 Polar Phase 1	SS/CPAF	Northrop Grumman : Redondo Beach, CA	-	316.362	Oct 2020	-		830.516	Oct 2022	-		830.516	Continuing	Continuing	-
Enterprise Comm and Crypto	Various	Various : Various	-	-		-		34.768	Dec 2022	-		34.768	Continuing	Continuing	-
SE&I	Various	Various : Various	-	3.878	Dec 2020	-		8.192	Dec 2022	-		8.192	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	6.311	Oct 2020	-		8.775	Oct 2022	-		8.775	Continuing	Continuing	-
Subtotal			-	326.551		-		882.251		-		882.251	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			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	4.273	Dec 2020	-		4.251	Dec 2022	-		4.251	Continuing	Continuing	-
A&AS	Various	Various : Various	-	6.129	Feb 2021	-		6.160	Feb 2023	-		6.160	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.060	Oct 2020	-		6.534	Oct 2022	-		6.534	Continuing	Continuing	-
Subtotal			-	10.462		-		16.945		-		16.945	Continuing	Continuing	N/A

Project Cost Totals	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	-	337.013	-	899.196	-	899.196	Continuing	Continuing	N/A

Remarks
FY22 Cost Categories are captured in Program Element 1206444SF per direction in the FY22 Appropriations Act.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / Next Generation OPIR	Project (Number/Name) 657121 / Next-Gen OPIR Space, Block 0 Polar

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027										
	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							
Phase 1																																			
Design and Development, Critical Path Flight Hardware Procurement, & Risk Reduction																																			
Baseline Technical Review (BTR)-6																																			
ModSim Rqmts Review																																			
Mission Payload #1 CDR																																			
Mission Payload #2 CDR																																			
BTR-7																																			
Bus Design Reuse Review																																			
BTR-8																																			
PDR																																			
BTR-9																																			
CDR																																			
Phase 2																																			
Phase 2 ATP																																			
SV-1 Assembly, Integration, & Test																																			
SV-2 Assembly, Integration, & Test																																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657121 / <i>Next-Gen OPIR Space, Block 0 Polar</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Phase 1				
Design and Development, Critical Path Flight Hardware Procurement, & Risk Reduction	1	2021	4	2025
Baseline Technical Review (BTR)-6	4	2021	4	2021
ModSim Rqmts Review	1	2022	1	2022
Mission Payload #1 CDR	3	2021	3	2021
Mission Payload #2 CDR	4	2021	4	2021
BTR-7	2	2022	2	2022
Bus Design Reuse Review	3	2022	3	2022
BTR-8	1	2023	1	2023
PDR	4	2023	4	2023
BTR-9	3	2024	3	2024
CDR	4	2025	4	2025
Phase 2				
Phase 2 ATP	2	2025	2	2025
SV-1 Assembly, Integration, & Test	3	2025	3	2027
SV-2 Assembly, Integration, & Test	3	2026	4	2027

Note

Note: Next-Gen Polar (Project 657121) efforts continue past 2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>				Project (Number/Name) 657123 / <i>Integration</i>			
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
657123: <i>Integration</i>	-	0.000	27.875	29.717	0.000	29.717	31.099	32.221	30.725	31.324	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Government works with the Enterprise SE&I contractor as a team to define the Next Gen OPIR enterprise architecture, control and validate interfaces, ensure compatibility of Next Gen OPIR systems, and develop/manage plans for fielding the Next Gen OPIR segments. Further, the Enterprise SE&I executes system-level integration requirements between segments such as Space to Ground. This differs from integration within each segment; integration within segments refers to subsystem-level integration between subsystems such as a spacecraft bus to the mission payload. The Government Integrator is responsible for defining the Next Gen OPIR enterprise architecture, controls and validates interfaces, ensures compatibility of Next Gen OPIR systems, and develops/manages plans for fielding the Next Gen OPIR Enterprise. Further, the Integrator executes Model Based System Engineering through modeling, simulation, and technical analyses of Government-directed enterprise level trades among the Next Gen OPIR segments. These trades lead to definition, management, maintenance, and evolution of the Next Gen OPIR Enterprise technical requirements and interface documents to ensure the integrity of the enterprise technical baseline.

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

	FY 2021	FY 2022	FY 2023
Title: Next-Gen OPIR Space, Integration	0.000	27.875	29.717
<p>Description: The Integration (Project 657123) project includes the efforts associated with the Government's primary role and tasks necessary to accomplish the critical lead system integration function with the Next Gen OPIR enterprise material segments (Next Gen GEO, Next Gen Polar, Next Gen Ground, and the Resilient Missile Warning/Missile Tracking architecture). The Next Generation OPIR Program Manager is responsible for directing the Next Gen OPIR current Enterprise architecture, system definition, controls and validates interfaces, ensures compatibility of Next Gen systems, and develops/manages plans for execution and fielding of the Next Gen OPIR Enterprise</p> <p>FY 2022 Plans: Continue to execute critical System of Systems planning and execution. Scheduled activities: Space-to-ground System level Critical Design Review completion; NGG space-to-ground interface demonstrations; cyber vulnerability assessments; mission unique ground-based payload processors and software integration into FORGE. Plan for major pre-launch enterprise integration events scheduled in 2023. Activities include, but not limited to, management of the technical baseline; continued definition of space to ground interfaces, Early Integration Demonstration activities, Space to Ground integration and test planning activities, cross-segment engineering trades, and hosted payload integration and test activities. Activities may include, but are not limited to program office support studies, technical analysis experimentation, and prototyping.</p> <p>FY 2023 Plans: Continue to execute critical System of Systems planning and execution. Scheduled activities: NGG space-to-ground compatibility testing. Plan for major pre-launch enterprise integration events including NGG pre-launch readiness testing. Activities include,</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657123 / <i>Integration</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>but not limited to, management of the technical baseline; continued definition of space to ground interfaces, Early Integration Demonstration activities, Space to Ground integration and test planning activities, cross-segment engineering trades, and hosted payload integration and test activities. 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 experimentation, and prototyping.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 funds increased to support increased concurrent activities in the Next Gen programs and accelerate planning to support pivot to Resilient MW/MT requirements development while ensuring continued success of NGG and NGP.</p>			
Accomplishments/Planned Programs Subtotals	0.000	27.875	29.717

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

N/A

Remarks

D. Acquisition Strategy

The Space Force will exercise complete ownership of the architecture, system definition, technical baseline, and integration of NG OPIR space and ground segments. While this complex intersegment integration is traditionally performed by a prime contractor under a systems development contract, for NG OPIR, this approach requires the government to be the integrator. To execute this responsibility, the government leverages systems engineering and integration expertise from the Systems Engineering and Integration (SE&I) contractor. The Program Office intends to contract for this capability through a Systems Engineering and Integration follow-on Contract. There is a contractor finishing the execution of the current SE&I contract in 2021 with options into FY 2022, and the follow-on effort will be a competitive award expected for award in FY 2022. In this effort, the contractor will be tightly integrated with the government team to assist in executing the government lead system integration and validation function.

This contract will encompass two functions: first, it primarily supports the Enterprise SE&I effort captured in this Integration Project. Secondly, the contract includes scope to execute SE&I requirements internal to each segment.

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206442SF / <i>Next Generation OPIR</i>	Project (Number/Name) 657123 / <i>Integration</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Next Gen OPIR GEO to Ground</i>				
System CDR	1	2022	1	2022
Technical Baseline Management	2	2022	4	2027
Space to Ground Compatibility Test	4	2024	4	2024
Pre-Launch Readiness Test	3	2024	4	2024
<i>Next Gen OPIR, Space Polar</i>				
PDR	4	2023	4	2023
CDR	4	2025	4	2025

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206443SF / <i>Next-Gen OPIR -- GEO</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	-	0.000	1,199.193	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
657120: <i>Next-Gen OPIR Block0-GEO</i>	-	0.000	1,199.193	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In accordance with Congressional direction in the FY22 enacted budget, funds in Program Element 1206442SF, Project 657120, Next-Gen OPIR Space, Block 0 GEO, have been transferred to 1206443SF.

A. Mission Description and Budget Item Justification

Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) Space Block 0 Geosynchronous Earth Orbit (GEO) (Project 657120): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, deployed forces and allies. The Next-Gen OPIR GEO (NGG) missile warning satellites enhance detection and improve reporting of intercontinental ballistic missile launches, submarine ballistic missile launches, and tactical ballistic missile launches. Development consists of new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands. The Program Office is acquiring the NGG capability in two contract actions. Phase 1 awarded in August 2018 encompasses requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR). Phase 2 was awarded in Jan 2021 for the manufacturing, assembly, system integration and test, launch, and early on-orbit test through operational acceptance of NGG satellites 1-3.

The total cost of the Next-Gen OPIR Middle Tier of Acquisition effort is 8,074.5 million, including RDT&E and procurement of prototype units. Next-Gen OPIR is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206443SF / Next-Gen OPIR -- GEO
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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	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	1,199.193	0.000	0.000	0.000
Total Adjustments	0.000	1,199.193	0.000	0.000	0.000
• 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	1,199.193			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

In accordance with Congressional direction in the FY22 enacted budget, funds in Program Element 1206442SF, Project 657120, Next-Gen OPIR Space, Block 0 GEO, have been transferred to 1206443SF.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: Next-Gen OPIR Space, Block 0 GEO	-	1,199.193	0.000
Description: Development of the Next-Gen OPIR GEO missile warning satellites with a proven bus, new hardened sensors, and auxiliary payloads for increased resilience. The space segment for GEO missile warning satellites consist of a resilient architecture providing real time persistent global equatorial infrared coverage. The first GEO satellite is required in FY 2025.			
FY 2022 Plans: Complete Phase 1 development on spacecraft bus and up to two competitive flight mission payloads designs. Continue development of ground and spacecraft flight software and mission data processing algorithms. Continue communication system early integration risk reduction demonstrations. Continue component and subsystem integration testing. Complete mission model and simulation development and begin government integration and requirement verification. Complete critical path flight hardware procurement for SV #1. Continue assembly, integration, and test of up to two competitive flight mission payloads for SVs #1 & 2. Continue Phase 2 efforts to manufacture, build, integrate, test, and launch of the GEO SV #1. Continue critical path flight hardware procurement for SVs #2 & 3. Additionally, FY 2022 funding will allow the program 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, and prototyping.			
FY 2023 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206443SF / <i>Next-Gen OPIR -- GEO</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY23 Budget Year Plans are captured in Program Element 1206442SF. They will be captured in Program Element 1206440SF per direction in the FY22 Appropriations Bill in the next budget cycle.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> The FY 2023 funding in PE 1206442SF increased by \$514.74M compared to the FY 2022 funding in this PE due to concurrent engineering, production, integration and test activity supporting all three Next Gen OPIR GEO Space Vehicles and two new-development OPIR mission payloads. Funds are required to preserve FY25 initial launch capability (ILC) for SV #1, place flight hardware material and vendor orders for SV 1-3, and perform space/ground integration activities. Funds required to enable the essential integration, test, and find/fix activity necessary to deliver SV #1 and two competitively produced OPIR mission payloads on the accelerated schedule necessary to maintain FY25 ILC.			
Accomplishments/Planned Programs Subtotals	-	1,199.193	0.000

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

N/A

Remarks

E. Acquisition Strategy

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of 3 Next-Gen GEO satellites. The Next-Gen OPIR Space program has been designated a Middle Tier Acquisition (MTA) Rapid Prototype effort under Section 804 of the 2016 National Defense Authorization Act (NDAA). The purpose of the MTA is to develop and qualify up to two competitive mission payloads. Upon approval by the SAE to complete MTA activity, the Next Gen OPIR Block 0 program development will transition to Major Capability Acquisition program. The first GEO satellite is required by FY 2025. The program office awarded a sole source contract under the authority of a Justification & Authorization document. The Next-Gen GEO Phase 1 contract was awarded in FY 2018, consisting of requirements development, critical path flight hardware procurement, and risk reduction efforts culminating in a Sept 2021 Critical Design Review (CDR). The Next-Gen GEO Phase 2 modification was awarded in Jan 2021, and includes scope for parts procurement, assembly, integration, test, launch, and checkout of all 3 GEO space vehicles.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206443SF / Next-Gen OPIR -- GEO	Project (Number/Name) 657120 / Next-Gen OPIR Block0-GEO
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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			
Next-Gen OPIR Space, Block 0 GEO (Phase 1 & 2)	Various	Lockheed Martin : Various	-	-		1,144.922	Oct 2021	-		-		-	Continuing	Continuing	-
SE&I	Various	Various : TBD	-	-		16.589	Nov 2021	-		-		-	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	-		15.201	Oct 2021	-		-		-	Continuing	Continuing	-
Subtotal			-	-		1,176.712		-		-		-	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			
FFRDC	RO	Aerospace Corporation : El Segundo, CA	-	-		7.756	Oct 2021	-		-		-	Continuing	Continuing	-
A&AS	Various	Various : TBD	-	-		14.266	Feb 2022	-		-		-	Continuing	Continuing	-
Other Support	Various	Various : TBD	-	-		0.459	Oct 2021	-		-		-	Continuing	Continuing	-
Subtotal			-	-		22.481		-		-		-	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			-	-	1,199.193	-	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206443SF / <i>Next-Gen OPIR -- GEO</i>	Project (Number/Name) 657120 / <i>Next-Gen OPIR Block0-GEO</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

<i>Next Gen OPIR Space, Blk 0 GEO Phase 1</i>	
Bus Development	
Payload Development	
SV 1 Critical Path Flight Hardware	
Payload CDR	
System CDR	
<i>Next Gen OPIR Space, Blk 0 GEO Phase 2</i>	
SV 2/3 Critical Flight Hardware Purchases	
SV 1 Mission Payload Integration & Testing	
SV 2 Mission Payload Integration & Testing	
SV 1 Bus Build Integration & Testing	
SV 3 Mission Payload Integration & Testing	
SV 2 Bus Build Integration & Testing	
SV 1 Ready for Launch	
SV 3 Bus Build Integration & Testing	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206443SF / <i>Next-Gen OPIR -- GEO</i>	Project (Number/Name) 657120 / <i>Next-Gen OPIR Block0-GEO</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Next Gen OPIR Space, Blk 0 GEO Phase 1</i>				
Bus Development	1	2021	2	2022
Payload Development	1	2021	2	2022
SV 1 Critical Path Flight Hardware	1	2021	3	2022
Payload CDR	3	2021	3	2021
System CDR	1	2022	1	2022
<i>Next Gen OPIR Space, Blk 0 GEO Phase 2</i>				
SV 2/3 Critical Flight Hardware Purchases	2	2021	2	2024
SV 1 Mission Payload Integration & Testing	4	2021	4	2023
SV 2 Mission Payload Integration & Testing	4	2021	4	2023
SV 1 Bus Build Integration & Testing	4	2021	3	2025
SV 3 Mission Payload Integration & Testing	1	2024	3	2026
SV 2 Bus Build Integration & Testing	1	2024	4	2027
SV 1 Ready for Launch	4	2025	4	2025
SV 3 Bus Build Integration & Testing	1	2025	4	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206444SF / <i>Next-Gen OPIR -- Polar</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	-	0.000	471.398	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
657121: <i>Next-Gen OPIR Space, Block 0 Polar</i>	-	0.000	471.398	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In accordance with Congressional direction in the FY22 enacted budget, funds in Program Element 1206442SF, Project 657121, Next-Gen OPIR Space, Block 0 Polar, have been transferred to 1206444SF

A. Mission Description and Budget Item Justification

Next-Generation Overhead Persistent Infrared (OPIR) Space, Block 0 Polar (NGP) (Project 657121): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, its deployed forces, and its allies. Next-Gen OPIR Space enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. Development consists of the Next-Gen OPIR Polar missile warning satellites with new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands.

The Program Office is acquiring the NGP capability through three contract phases. Phase 0, awarded in June 2018, encompassed system requirements analysis and risk reduction efforts, which led to a March 2020 System Requirements Review (SRR). Phase 1, awarded in May 2020, encompasses design and development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR in FY 2024. Phase 2 will be awarded prior to System CDR for the manufacturing, assembly, integration and test, and early on orbit test, through operational acceptance of NGP satellites 1 and 2.

Next-Gen OPIR Polar is not fully funded across the Future Years Defense Program. The Department of the Air Force is assessing all options to address the funding shortfalls for MTA programs including additional funding in a future budget request, performance trades based on technical maturity, or transition to alternative pathways.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206444SF / Next-Gen OPIR -- Polar
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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	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	471.398	0.000	0.000	0.000
Total Adjustments	0.000	471.398	0.000	0.000	0.000
• 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	471.398			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

In accordance with Congressional direction in the FY22 enacted budget, funds in Program Element 1206442SF, Project 657121, Next-Gen OPIR Space, Block 0 Polar, have been transferred to 1206444SF

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: Next Gen OPIR Space, Block 0 Polar	-	471.398	0.000
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Description: Development of the Next-Gen OPIR Polar missile warning satellites using a proven bus with modifications, auxiliary payloads for improved resiliency, and new hardened sensors. The Polar space segment will consist of two Next-Gen OPIR Polar satellites in a resilient architecture, providing real time persistent infrared coverage of the northern hemisphere.

FY 2022 Plans:

Continue Phase 1 systems engineering design activities to ensure a successful Polar System Preliminary Design Review (PDR) by FY 2023. Support enterprise requirements in the development of the Next Gen OPIR System Requirements Document (SRD), Next Gen OPIR Space Segment Specification, and Polar Space Vehicle (SV) Technical Requirements Document (TRD). Mature satellite design by performing analysis for requirements unique to the Polar bus and payload. Conduct Baseline Technical Reviews (BTR) as well as modeling and simulation reviews to ensure satellite mission performance parameters are met. Develop design reference missions as well as conditions and methods documentation to understand power, pointing, thermal, data-rate, data-volume, environment, and ground interface parameters. Specify design updates to resolve any payload interface requirement disconnects. Perform auxiliary payload subsystem (APS) installation in a virtualized System Integration Laboratory (SIL) environment to conduct flight software testing. Refine initial software design, develop test events and initial test plans. Mature security design by performing an iterative review of security controls and establish implementation plans. Continue risk

FY 2021	FY 2022	FY 2023
-	471.398	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206444SF / <i>Next-Gen OPIR -- Polar</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
reduction efforts, initial procurement of mission critical flight hardware and test equipment to support systems engineering, cyber, resiliency, and security test events. Additionally, FY 2022 funding will allow the program 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, and experimentation, prototyping. FY 2023 Plans: FY23 Budget Year Plans are captured in Program Element 1206442SF. They will be captured in Program Element 1206444SF per direction in the FY22 Appropriations Bill in the next budget cycle. FY 2022 to FY 2023 Increase/Decrease Statement: The FY 2023 funding in PE 1206442SF increased by \$427.798M compared to the FY 2022 funding in this PE to support ramp of engineering activity to support PDR and critical parts procurement necessary to support FY28 launch.			
Accomplishments/Planned Programs Subtotals	-	471.398	0.000

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

N/A

Remarks

E. Acquisition Strategy

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of 3 Next-Gen GEO and 2 Next-Gen Polar satellites. The Next-Gen OPIR Space program has been designated a Middle Tier Acquisition (MTA) Rapid Prototype effort under Section 804 of the 2016 National Defense Authorization Act (NDAA). The purpose of the MTA is to develop and qualify up to two competitive mission payloads. Following completion of the MTA activity, the Next Gen OPIR GEO program developments will transition to Major Capability Acquisition programs. The first GEO satellite is required by FY 2025 and the first Polar satellite is required in FY 2028. The program office awarded two sole source contracts (one to a GEO prime and one to a Polar prime) under the authority of two Justification & Authorization documents. The Next-Gen Polar Phase 0 was awarded in FY 2018, consisting of requirements development and culminated in a March 2020 SRR. Phase 1 was awarded May 2020, encompassing requirements review, design, development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR NLT FY 2024 for Next-Gen Polar Satellite Vehicles (SV) 1 and 2. Phase 2 will be awarded prior to System CDR, encompassing build, integration, test, launch, and transition to operations for Next-Gen Polar SVs 1 and 2.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206444SF / Next-Gen OPIR -- Polar	Project (Number/Name) 657121 / Next-Gen OPIR Space, Block 0 Polar
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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			
Next Gen OPIR Space,Block 0 Polar Phase 1	SS/CPAF	Northrop Grumman : Redondo Beach, CA	-	-		441.192	Oct 2021	-		-		-	Continuing	Continuing	-
Enterprise Comm and Crypto	Various	Various : TBD	-	-		-		-		-		-	Continuing	Continuing	-
SE&I	Various	Various : TBD	-	-		7.898	Dec 2021	-		-		-	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	-		7.400	Oct 2021	-		-		-	Continuing	Continuing	-
Subtotal			-	-		456.490		-		-		-	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			
FFRDC	RO	Aerospace Corporation : El Segundo, CA	-	-		2.301	Dec 2021	-		-		-	Continuing	Continuing	-
A&AS	Various	Various : TBD	-	-		6.105	Feb 2022	-		-		-	Continuing	Continuing	-
Other Support	Various	Various : TBD	-	-		6.502	Oct 2021	-		-		-	Continuing	Continuing	-
Subtotal			-	-		14.908		-		-		-	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	-	-		471.398	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206444SF / Next-Gen OPIR -- Polar	Project (Number/Name) 657121 / Next-Gen OPIR Space, Block 0 Polar

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Phase 1	
Design and Development, Critical Path Flight Hardware Procurement, & RiskReduction	
Baseline Technical Review (BTR)-6	
ModSim Rqmts Review	
Mission Payload SRR	
BTR-7	
Bus Design Reuse Review	
BTR-8	
PDR	
BTR-9	
CDR	
Phase 2	
Phase 2 ATP	
Assembly, Integration, & Test	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206444SF / <i>Next-Gen OPIR -- Polar</i>	Project (Number/Name) 657121 / <i>Next-Gen OPIR Space, Block 0 Polar</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Phase 1				
Design and Development, Critical Path Flight Hardware Procurement, & RiskReduction	1	2021	3	2025
Baseline Technical Review (BTR)-6	4	2021	4	2021
ModSim Rqmts Review	1	2022	1	2022
Mission Payload SRR	1	2022	1	2022
BTR-7	2	2022	2	2022
Bus Design Reuse Review	3	2022	3	2022
BTR-8	1	2023	1	2023
PDR	4	2023	4	2023
BTR-9	3	2024	3	2024
CDR	4	2024	4	2024
Phase 2				
Phase 2 ATP	1	2024	1	2024
Assembly, Integration, & Test	2	2024	4	2026

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (COMSATCOM) Integration</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	-	41.711	23.400	23.513	0.000	23.513	21.380	69.418	72.456	70.667	0.000	322.545
650140: <i>COMSATCOM</i>	-	41.711	0.000	13.668	0.000	13.668	15.909	64.406	72.456	70.667	0.000	278.817
651126: <i>COMSATCOM Infrastructure</i>	-	0.000	23.400	9.845	0.000	9.845	5.471	5.012	0.000	0.000	0.000	43.728

A. Mission Description and Budget Item Justification

Commercial SATCOM Integration develops, prototypes and demonstrates the capabilities required to fully leverage COMSATCOM as part of the Department's SATCOM enterprise. The United States Space Force (USSF) has determined that an enterprise approach to the procurement, delivery and management of its SATCOM capabilities is the best means to create an environment that is responsive to Combatant Commanders and other users across the spectrum of conflict. In addition, an enterprise approach will improve affordability, Department purchasing power and mission assurance. Project 650140, COMSATCOM Enterprise Integration of Fighting SATCOM, will rapidly prototype and deliver Enterprise Management and Control (EM&C) integration tools and mission applications enabling warfighters to operate responsive and resilient SATCOM as a single enterprise. Project 651126, COMSATCOM Infrastructure, will develop and stand up COMSATCOM business and customer management tools, finalizing the Congressionally-directed migration from DISA systems to USSF systems. Development of enhanced COMSATCOM acquisition capabilities leverage enterprise innovation activities focused on transforming how DoD acquires, accesses and deploys COMSATCOM capabilities.

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 repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver COMSATCOM for weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PE 1206445SF.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (COMSATCOM) Integration</i>
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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	43.212	23.400	0.000	0.000	0.000
Current President's Budget	41.711	23.400	23.513	0.000	23.513
Total Adjustments	-1.501	0.000	23.513	0.000	23.513
• 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	-1.501	0.000			
• Other Adjustments	0.000	0.000	23.513	0.000	23.513

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 650140: *COMSATCOM*

Congressional Add: *Enterprise Integration of Fighting SATCOM*

Congressional Add Subtotals for Project: 650140

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	41.711	-
	41.711	-
	41.711	-

Change Summary Explanation

FY 2023: +\$23.513M; Continue COMSATCOM development and integration efforts to deliver the Fighting SATCOM capabilities. 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 FY 2023 cannot be made in a relevant manner.

FY 2021: -\$1.501M; SBIR

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (C OMSATCOM) Integration</i>	Project (Number/Name) 650140 / <i>COMSATCOM</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
650140: <i>COMSATCOM</i>	-	41.711	0.000	13.668	0.000	13.668	15.909	64.406	72.456	70.667	0.000	278.817
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The backbone of Fighting SATCOM is a SATCOM Enterprise Management and Control (EM&C) capability for an Integrated SATCOM Enterprise. This is the foundation for SATCOM integration into an operational level Command and Control (C2) system that enables the end-to-end sensor-to-shooter execution serving the protect and defend, as well as theatre support missions for United States Space Command (USSPACECOM) and the Theater Combatant Commands. SATCOM EM&C applications will provide critical services to our warfighters to facilitate timely, quality driven battlespace decisions for SATCOM allocation and use. The effort leverages a Development Security Operations (DevSecOps) platform to rapidly prototype and deliver EM&C mission applications enabling responsive, resilient SATCOM for the Single Warfighting Commander, National Space Defense Center (NSDC), Combined Space Operations Center (CSpOC), SATCOM Integrated Operations Division (SIOD), Regional SATCOM Support Centers (RSSC), Space and Missile Defense Command (SMDC) Satellite Operations Brigade, and other C2 centers. Enterprise-level architecture, prototyping, test, and experimentation will drive Commander's acceptance of capabilities and enable integrated mission systems with machine-to-machine connections. SATCOM EM&C applications are delivered in capability categories including Situational Awareness / Common Operating Picture, Enterprise SATCOM Planning, and SATCOM Mission Management.

The FY 2023 funding request was reduced by \$6.292M to account for the availability of prior year execution balances.

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

	FY 2021	FY 2022	FY 2023
<p>Title: Enterprise Integration of Fighting SATCOM (1)</p> <p>Description: SSC is developing the EM&C capability to support the Chief of Space Operation's (CSO) Fighting SATCOM Vision. Leveraging the Capability Roadmap Architecture and Situational Awareness/Common Operating Picture previously developed, prototyping efforts focus on improving the user interface/experience, integrating global spectrum usage, providing status of SATCOM systems (ground and space), Electro-Magnetic Interference (EMI) characterization, and development of SATCOM registries.</p> <p>FY 2023 Plans: This effort continues plans initiated in the FY 2021 Congressional add and leverages the FY 2021 prototyping and integration efforts to mature EM&C. FY 2023 funding will be used to continue integration of data sources into the Situational Awareness/Common Operating Picture (SA/COP) capability matured with FY 2021 funding to include MILSATCOM and Commercial systems. Maturing the SA/COP capability includes data visualization providing integrated picture of SATCOM related sensors networks and functionality for defensive space control. In addition, this effort leverages FY 2021 prototyping efforts to continue development of Enterprise Planning capability to reduce human burden in planning efforts and integrate SA/COP capabilities, as well as</p>	-	-	13.668

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (COMSATCOM) Integration</i>	Project (Number/Name) 650140 / <i>COMSATCOM</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>planning efforts for delivery of Mission Management and Analytical Tools capabilities to facilitate operational dynamic roaming by leveraging machine-to-machine interfaces. Invest in tools to support EMI/RF characterization. Integrate with DISA's SATCOM Ordering Management and Situational Awareness Tool (SOMSAT). Continue to leverage a DevSecOps platform and pipeline, and other contract vehicle(s) as required, to rapidly prototype and deliver EM&C mission applications, and fund supporting infrastructure, IT, and cyber efforts to support this platform. Continue to define Flexible Network Interface and Flexible Terminal Interface standards and support implementation to facilitate data exchange between terminals, network operations centers, and EM&C. Fund the development and integration of MILSATCOM (e.g. WGS), commercial (e.g. mPOWER), and international partner (e.g. UK Skynet) systems into the enterprise architecture. Rapidly respond to implement system resiliency 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 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased to build upon FY21 Congressional add to continue EM&C and application development.</p>			
Accomplishments/Planned Programs Subtotals	-	-	13.668

	FY 2021	FY 2022
<p>Congressional Add: Enterprise Integration of Fighting SATCOM</p> <p>FY 2021 Accomplishments: This is not a New Start, as it transitions the effort from Program Element 1206431SF, Advanced EHF MILSATCOM (Space). In FY 2021, six prototype contracts were successfully awarded using the Space Enterprise Consortium (SpEC) contracting vehicle to mature capabilities in the following four areas: 1) Terminal Registry to develop an authoritative source of truth for SATCOM terminals, 2) Integrated Data Manager to aggregate, normalize, and tap disparate data, 3) Health and Status to display the health and status of SATCOM systems, and 4) Radio Frequency/Electromagnetic Interference (EMI) to provide spectral and EMI data and support geolocation. In addition, the EM&C Systems Engineering & Integration (SE&I) contractor continued integrating and maturing the SA/COP capability targeted for the Satellite Integrated Operations Division (SIOD). These are all foundational building blocks to provide data visualization applications and tools, a terminal registry, Unified Data Library (UDL) data calls and definition, integration of EMI and current system status, and a common application interface and operating picture. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p>	41.711	-
Congressional Adds Subtotals	41.711	-

C. Other Program Funding Summary (\$ in Millions)
N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / Commercial SATCOM (C OMSATCOM) Integration	Project (Number/Name) 650140 / COMSATCOM

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

Remarks

D. Acquisition Strategy

Fighting SATCOM Integration utilizes the Middle Tier of Acquisition authorities by leveraging Other Transaction Authority (OTA) agreement awards through the Space Enterprise Consortium to rapidly develop prototype capabilities in operationally relevant blocks. Early risk reduction and delivery of first operational prototypes began in FY 2021. Individual prototype efforts are competitively awarded fixed-price agreements leveraging non-traditional defense contractors. USSF is developing a SATCOM EM&C acquisition strategy and capability roadmap for technology insertion for SATCOM, leveraging various contract vehicle(s) to incrementally deliver capability enhancements while relying on a mix of contractor and SE&I support for integration of these capabilities into a consolidated EM&C system. Prototyping efforts will work in concert with this strategy.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (COMSATCOM) Integration</i>	Project (Number/Name) 650140 / <i>COMSATCOM</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			
DevOPs Platform, Systems Integration, Prototyping	Various	Not specified. : TBD	-	23.257	Aug 2021	-		6.377	Jan 2023	-		6.377	0.000	29.634	-
Technical Mission Analysis	RO	Aerospace : El Segundo, CA	-	2.200	Apr 2021	-		0.440	Jan 2023	-		0.440	0.000	2.640	-
SE&I	C/CPIF	Linquest : El Segundo, CA	-	12.394	Apr 2021	-		5.708	Feb 2023	-		5.708	0.000	18.102	-
Subtotal			-	37.851		-		12.525		-		12.525	0.000	50.376	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			
A&AS	Various	Not specified. : TBD	-	3.810	Apr 2021	-		1.093	Nov 2022	-		1.093	0.000	4.903	-
Other Support	TBD	Not specified. : TBD	-	0.050	Apr 2021	-		0.050	Oct 2022	-		0.050	0.000	0.100	-
Subtotal			-	3.860		-		1.143		-		1.143	0.000	5.003	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			-	41.711	-	13.668	-	13.668	0.000	55.379	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (C OMSATCOM) Integration</i>	Project (Number/Name) 650140 / <i>COMSATCOM</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Prototyping and Integration	
SATCOM SA/COP	
Enterprise Planning	
Mission Management	
Prototype Transition	
Transition to operational environment	
Mission Support	
Maintain SATCOM EM&C application, environment, data sources	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (COMSATCOM) Integration</i>	Project (Number/Name) 650140 / <i>COMSATCOM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Prototyping and Integration</i>				
SATCOM SA/COP	1	2023	4	2027
Enterprise Planning	1	2023	4	2027
Mission Management	1	2023	4	2027
<i>Prototype Transition</i>				
Transition to operational environment	1	2025	4	2027
<i>Mission Support</i>				
Maintain SATCOM EM&C application, environment, data sources	1	2023	4	2027

Note

Project 650140 does not have FY 2022 funding. FY 2021 funding is carrying the program events listed above through FY 2022 and until FY 2023 funding becomes available.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 5					R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (C OMSATCOM) Integration</i>				Project (Number/Name) 651126 / <i>COMSATCOM Infrastructure</i>			
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
651126: <i>COMSATCOM Infrastructure</i>	-	0.000	23.400	9.845	0.000	9.845	5.471	5.012	0.000	0.000	0.000	43.728
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2022, PE 1206445SF, Project 651126, COMSATCOM Infrastructure, is a New Start.

A. Mission Description and Budget Item Justification

IAW the FY18 NDAA 1601(a), as amended, and on behalf of the Chief of Space Operations (CSO) and in consultation with the DoD Chief Information Officer (CIO), the USSF Commercial Satellite Communications Office (CSCO), serves as the sole authority for the procurement of COMSATCOM services for the DoD; this responsibility was previously held by DISA. In order to provide the joint warfighter with modernized access to COMSATCOM services and ensure combat effectiveness across all domains, the CSCO requires a comprehensive COMSATCOM Management & Control (CM&C) Systems of Systems. CM&C implementation is also critical to complete the Congressionally-mandated COMSATCOM mission transition from DISA to USSF. The CM&C Program will have multiple components including: (1) Business Suite & Marketplace designed to automate and streamline requests for work and customer interaction, thereby replacing manual processes for over 100 different contracts valued at \$5B over the FYDP; (2) Financial Management System required to operate a new and cutting-edge Enterprise Space Activity Group (ESAG) under the Defense Working Capital Funds (DWCF); (3) Integration with third party systems and capabilities, including cloud-based hosting and Enterprise Management & Control (EM&C) - the nexus of future USSF space-based SATCOM Command and Control (C2).

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

	FY 2021	FY 2022	FY 2023
Title: COMSATCOM Management and Control (CM&C) System of Systems	0.000	23.400	9.845
Description: The subject Research, Development, Test and Evaluation (RDT&E) funds will be executed by the Space Systems Command (SSC), and will be used to stand up mission-critical COMSATCOM support systems, thereby enabling a transformational change to the acquisition of COMSATCOM, increasing speed to service, improving quality of service, reducing cost, and laying the foundation to incorporate new industry innovations into the future. This activity will transition and enhance the existing COMSATCOM customer-facing tools and background financial management data systems from DISA to the USSF. An enhanced system of tools is required to automate and securely distribute COMSATCOM services and capabilities to stakeholders, in order to improve the ordering, billing, activation, provisioning, and other financial management tasks currently leveraging limited DISA capability.			
FY 2022 Plans: Funding in FY 2022 will develop USSF financial management systems, integrate CM&C systems, and build the applications that populate the CSCO Marketplace. The Financial Management System encompasses the finance and accounting capabilities required to manage and report CSCO working capital fund business such as invoicing, payments and rate tracking. CM&C			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (COMSATCOM) Integration</i>	Project (Number/Name) 651126 / <i>COMSATCOM Infrastructure</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Integration provides the processes and capabilities needed to interconnect all relevant and applicable sub-systems and components, to include those owned and operated by other organizations and commercial providers, to facilitate enterprise connectivity. The CSCO Marketplace will consist of applications required by customers to order and/or activate products and services. The CSCO Marketplace also includes 24/7 customer support. Activities may include, but are not limited to, program office support, studies, non-recurring engineering, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2023 Plans: Funding in FY 2023 will continue FY 2022 integration work for the CSCO Marketplace and Financial Management Systems into third party systems, etc. FY 2023 funding will also provide any necessary enhancements required for optimized user experience at all hierarchal levels for the systems. Finally, FY 2023 funding will ensure establishment or continuation of Authority to Operate and associated risk management and cybersecurity requirements for the applicable systems.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funds decreased due to the main system development occurring in FY 2022. FY 2023 funding is to continue integration, enhancements and on-going modifications.</p>			
Accomplishments/Planned Programs Subtotals	0.000	23.400	9.845

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
The current acquisition strategy is to perform competitive awards to qualified contractors via multiple contracting authorities. Efforts will include required compliance tools and processes supporting existing business models, necessary operational readiness updates to existing equipment, and other services required to implement the transition from DISA to USSF. Contracts may be competitively awarded, utilizing a to-be-determined contract type.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (C OMSATCOM) Integration</i>	Project (Number/Name) 651126 / <i>COMSATCOM Infrastructure</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			
Financial Management System	TBD	TBD : TBD	-	-		7.000	Jul 2022	3.000	Jan 2023	-		3.000	Continuing	Continuing	-
CSCO Marketplace	TBD	TBD : TBD	-	-		10.000	May 2022	5.000	Mar 2023	-		5.000	Continuing	Continuing	-
CM&C Integration	TBD	TBD : TBD	-	-		4.400	May 2022	1.845	Jan 2023	-		1.845	Continuing	Continuing	-
Subtotal			-	-		21.400		9.845		-		9.845	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			
A&AS	Various	National Capital region : TBD	-	-		2.000	May 2022	-		-		-	Continuing	Continuing	-
Subtotal			-	-		2.000		-		-		-	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			-	-	23.400	9.845	-	9.845	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (C OMSATCOM) Integration</i>	Project (Number/Name) 651126 / <i>COMSATCOM Infrastructure</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

CM&C System-of-Systems																												
Financial Management System																												
CSCO Marketplace																												
CM&C Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206445SF / <i>Commercial SATCOM (C OMSATCOM) Integration</i>	Project (Number/Name) 651126 / <i>COMSATCOM Infrastructure</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CM&C System-of-Systems				
Financial Management System	4	2022	4	2024
CSCO Marketplace	3	2022	3	2025
CM&C Integration	3	2022	4	2025

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206446SF I Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)
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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	-	0.000	0.000	499.840	0.000	499.840	723.621	802.313	827.201	863.650	Continuing	Continuing
657LEO: Resilient MW/MT - LEO	-	0.000	0.000	499.840	0.000	499.840	723.621	802.313	827.201	863.650	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This project funds efforts previously funded in FY 2022 under RDT&E, Defense-Wide, program element (PE) 1206410SDA.

A. Mission Description and Budget Item Justification

The Space Development Agency (SDA) is developing and demonstrating next generation space capabilities for the joint warfighter enabled by proliferation of satellites in Low Earth Orbit (LEO) and a new acquisition model utilizing rapid spiral development. SDA is developing capabilities to address a wide range of Department of Defense (DoD) space needs as stated in the National Defense Strategy and DoD Space Vision, including advanced missile tracking and global surveillance enabling beyond-line-of-sight targeting. SDA will orchestrate the rapid development and fielding of the National Defense Space Architecture (NDSA), a resilient military sensing and data transport capability via a proliferated space architecture in LEO. This program element funds the development and demonstration of space technologies to deliver advanced missile tracking, global surveillance and surface moving target custody, and enhanced space domain awareness and deterrence capabilities to U.S. joint warfighting forces in bi-annual tranches, beginning in FY 2022.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	499.840	0.000	499.840
Total Adjustments	0.000	0.000	499.840	0.000	499.840
• 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	499.840	0.000	499.840

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206446SF I Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)
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Change Summary Explanation

The worked performed in this PE is a continuation of efforts that in FY 2022 are funded under RDT&E, Defense-Wide, PE 1206410SDA.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)	0.000	0.000	499.840	0.000	499.840
Description: Rapidly develop, deploy and demonstrate prototype architecture that enables a resilient Missile Warning/Missile Tracking enabled by a proliferated Low Earth Orbit (pLEO) architecture. This effort will define, demonstrate, and deliver the architectures and standards necessary to fully populate a Missile Warning/Missile Tracking LEO layer as part of the NDSA.					
FY 2022 Plans: N/A					
FY 2023 Base Plans: Tranche 1: - Finalize design through Critical Design Review (CDR) for the Tracking Layer Tranche 1 space vehicles. - Begin assembly, integration, and testing (AI&T) of satellite buses. - Begin ground systems Missile Warning/Missile Tracking integration at Tranche 1 Mission Operations Centers and Missile Warning/Missile Tracking enterprise locations. - Continue Missile Warning/Missile Tracking force design analysis.					
Tranche 2: - Leverage lessons learned and accomplishments from Tranches 0 and 1 to inform space vehicle, ground, and interoperability design requirements for Tranche 2. - Assess, design, develop, integrate, test and conduct ground and, modem, crypto, and software defined networking risk reduction experimentation opportunities.					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: The worked performed in this PE continues efforts that were previously funded in FY 2022 under RDT&E, Defense-Wide, PE 1206410SDA.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	499.840	0.000	499.840

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206446SF / <i>Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 1206410SDA: <i>Space Technology Development and Prototyping</i>	-	550.000	-	-	-	-	-	-	-	0.000	0.000

Remarks
The worked performed in this PE continues efforts that were previously funded in FY 2022 under RDT&E, Defense-Wide, PE 1206410SDA.

E. Acquisition Strategy

Partners for these activities may include Missile Defense Agency (MDA), Space Systems Command (SSC), DoD Combatant Commands, DoD research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers. Missile Warning/Missile Tracking is being acquired via Firm Fixed Price contracts conducted in accordance with Other Transaction Authority (OT) for prototyping processes.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206446SF / <i>Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)</i>	Project (Number/Name) 657LEO / <i>Resilient MW/MT - LEO</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)</i>	
Develop Tranche 1 Tracking Satellites	
Develop Tranche 1 Tracking payload data management	
Develop Tranche 1 Tracking Ground Stations	
Integrate into Real-time Transfer Service	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206446SF / <i>Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)</i>	Project (Number/Name) 657LEO / <i>Resilient MW/MT - LEO</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Resilient Missile Warning Missile Tracking - Low Earth Orbit (LEO)</i>				
Develop Tranche 1 Tracking Satellites	4	2022	1	2025
Develop Tranche 1 Tracking payload data management	4	2022	1	2025
Develop Tranche 1 Tracking Ground Stations	4	2022	1	2025
Integrate into Real-time Transfer Service	4	2022	3	2024

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206447SF I Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)
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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	-	0.000	0.000	139.131	0.000	139.131	267.358	258.168	126.255	36.202	Continuing	Continuing
657MEO: Resilient MW/MT - MEO	-	0.000	0.000	139.131	0.000	139.131	267.358	258.168	126.255	36.202	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 This program, BA 5, PE 1206447SF, Budget Program Accounting Code 657???, Missile Warning (MW)/ Missile Tracking (MT) - Medium Earth Orbit (MEO) Space, is a continuation of the prototyping of the MEO Track Custody Demonstration under PE 1206442SF Next Generation OPIR Budget Program Accounting Code 657009: Space Modernization Initiative.

A. Mission Description and Budget Item Justification

In 2021, the Space Warfighting Analysis Center (SWAC) conducted its inaugural USSF Force Design with a key focus area in the Missile Warning and Missile Tracking mission area. The goal of the analysis was to produce a highly resilient government reference design that could maintain custody of emergent dimmer and more maneuverable threats through the boost and post-boost phases of flight. The SWAC concluded that a multi-layered approach was required to meet the stringent performance requirements while maximizing total system resilience. Their recommended government reference design included a combined constellation of 135 LEO and 16 MEO satellites working in concert through an integrated ground solution. On 27 Jan 2022, the Space Acquisition Council concluded that the Space Development Agency would develop the LEO layer of the architecture while Space Systems Command would provide the MEO layer in addition to serving as the total system integrator.

The Resilient Missile Warning/Missile Tracking project executes the architecture transition from a missile warning boost-phase focused constellation to a distributed, multi-orbit, constellation to meet the intent of the 2021 SWAC Force Design recommendation. This architecture pivot performs both missile warning and missile tracking (post-boost phase) anchored on the Missile Warning and Missile Defense OPIR Enterprise OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC), JROCM 042-19, dated 8 May 2019. The inclusion of missile tracking ensures the constellation can maintain custody of evolved dim and maneuvering threats through all phases of flight to provide required missile warning attack characterization. This pivot also marks the transition to a more resilient architecture against kinetic and non-kinetic threats. With space assets distributed in multiple orbits, the overall architecture and mission is more resilient in a contested environment. The Resilient Missile Warning / Missile Tracking MEO investments evolve the architecture beyond Next-Gen OPIR GEO, Polar and the Space Modernization Initiative demonstrations to an operational system that will perform the full missile warning and missile tracking mission. The Space Force will phase and deploy space assets for this effort in collaboration with capabilities delivered by the Space Development Agency (SDA) (PE 1206446SF). Additionally, the Space Force will develop satellite control capabilities and fuse mission data for accurate warning/tracking solutions through the Missile Warning / Missile Tracking MEO Ground segment (PE 1206448SF, 657???) . This ground segment will integrate with the existing global OPIR ground infrastructure as well as SDA's ground to provide a robust, combined ground solution to meet stringent data accuracy and latency needs. Overall, the Department of Defense is united to deliver a multi-faceted OPIR architecture that meets warfighter needs for detection, tracking, and reporting on these challenging evolved missile threats.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206447SF / <i>Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)</i>
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The Department of Defense recently completed an Analysis of Alternatives (AoA) for the future missile warning and missile tracking architecture. The AoA identified several architecture building blocks to further investigate feasibility to meet mission needs while focusing on aggressive cost control. In FY22, the Missile Track Custody Digital Engineering Risk Reduction effort (PE 1206442SF, 657009) iterated on the AoA sensor recommendations, developed digital payload designs, validated system performance against threat models, and performed ground demonstrations of sensor hardware and software. Transitioning development into this program element expands MEO development from a single satellite demonstration into a multiple satellite prototype system that will deliver at least 4 MEO satellites as an Initial Warfighting Capability in coordination with LEO for a minimum viable product combined warning and tracking architecture by FY2028.

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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MWMT 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 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	139.131	0.000	139.131
Total Adjustments	0.000	0.000	139.131	0.000	139.131
• 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	139.131	0.000	139.131

Change Summary Explanation

MW/MT- MEO Space, BA 5, PE 1206447SF, is a continuation of the MEO Track Custody Demonstration under PE 1206442SF Next Generation OPIR Budget Program Accounting Code 657009: Space Modernization Initiative. This PE was established for FY2023 and beyond to transition these ongoing efforts into an operational space architecture.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206447SF / <i>Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Title: Missile Warning (MW)/ Missile Tracking (MT) - Medium Earth Orbit (MEO) Space</p> <p>Description: Transitions the MEO Track Custody Demonstration under PE 1206442SF Next Generation OPIR Budget Program Accounting Code 657009: Space Modernization Initiative from a demonstration to a future program of record. The Space Force recently completed an OSD/CAPE directed Analysis of Alternatives (AoA) update for the future missile warning and missile tracking architecture. The AoA update recommended the Space Force aggressively pursue MEO satellites by using prototyping to control costs and deliver capability incrementally.</p> <p>To responsively deliver capabilities, this BPAC will fund continued development of the MEO prototypes through multiple satellite launches and operations in support of an initial warfighting capability for the combined LEO and MEO architecture. Initial Warfighting Capability is comprised of validating through on-orbit measurements the ability for regional tracking, mission management and control, and coordinated regional warning and access. After performance validation is complete, prototype sensors will feed data directly to operational warning and defense systems. The initial warfighting capability will provide: sensitivity to detect emerging threats; accurate tracking to contain maneuvering targets, and deliver data within the required latency to close the kill-chain solution.</p> <p>FY 2023 Plans: Continues efforts in PE 1206442SF to rapidly transition the track custody demo from a single satellite sensor demonstration to a multiple satellite coordinated prototype effort tied to a cross-linked initial warfighting capability of the future architecture. In coordination with funds in 1206442SF Next Generation OPIR Budget Program Accounting Code 657009, this program element will begin development of SVs 2 and beyond with plans to achieve a multiple orbital plane prototype. FY23 begins long lead purchases of flight parts to take two or more designs from payload critical design review through system critical design review. Additionally, it begins crosslink development, communication system upgrades, and full spacecraft development to expand beyond a single demonstration to a multi-satellite, multi-plane prototype. Finally, Bus integration and test begins after completion of system CDR. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funds increased to establish a new program element and allow for a pivot to an integrated MW/MT architecture.</p>		-	-	139.131
Accomplishments/Planned Programs Subtotals		-	-	139.131
D. Other Program Funding Summary (\$ in Millions)				
N/A				

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206447SF I Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)
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D. Other Program Funding Summary (\$ in Millions)

Remarks

E. Acquisition Strategy

The Space Force will continue development of current demonstration contracts competitively awarded using funds from 1206442SF Next Generation OPIR Budget Program Accounting Code 657009. The program will develop an acquisition strategy for transition from a demonstration to a program of record which will include expanding from a single satellite demonstration to a multiple satellite coordinated prototyping effort that provides mission and operational utility. The initial architecture will be based on the Missile Warning and Missile Defense OPIR Enterprise Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019. The first satellites, to fulfill detection and reporting within regions of interest, are required starting in 2028. A transition is planned in FY2023 to support additional development contract modifications and/or awards.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206447SF / <i>Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)</i>	Project (Number/Name) 657MEO / <i>Resilient MW/MT - MEO</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			
Tech Development	Various	Various : TBD	-	-		-		14.800	Dec 2022	-		14.800	Continuing	Continuing	-
Space Segment Dev	Various	Various : TBD	-	-		-		114.131	Dec 2022	-		114.131	Continuing	Continuing	-
Subtotal			-	-		-		128.931		-		128.931	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			
FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	-		-		4.000	Jan 2023	-		4.000	Continuing	Continuing	-
A&AS	Various	Various: TBD : TBD	-	-		-		6.000	Nov 2022	-		6.000	Continuing	Continuing	-
Other Support	Various	Various: TBD : TBD	-	-		-		0.200	Nov 2022	-		0.200	Continuing	Continuing	-
Subtotal			-	-		-		10.200		-		10.200	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		-	-	-	139.131	-	139.131	Continuing	Continuing	N/A

Remarks
 Funding in FY23 to support necessary government program office activities required to develop the technical requirements, perform market research, solicit, evaluate, award and begin development of the resilient MW/MT architecture.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206447SF / <i>Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)</i>	Project (Number/Name) 657MEO / <i>Resilient MW/MT - MEO</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
<i>Resilient Missile Warning/Missile Tracking</i>																												
Payload Critical Design Review																												
System Critical Design Review																												
Transition/Award of multi-satellite development contracts																												
Design, Production & Build of SV2-X																												
Assembly, Integration & Test of SV2-X																												
Launch of SV2-X																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206447SF / <i>Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)</i>	Project (Number/Name) 657MEO / <i>Resilient MW/MT - MEO</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Resilient Missile Warning/Missile Tracking</i>				
Payload Critical Design Review	1	2023	1	2023
System Critical Design Review	4	2023	4	2024
Transition/Award of multi-satellite development contracts	2	2023	2	2023
Design, Production & Build of SV2-X	4	2023	4	2025
Assembly, Integration & Test of SV2-X	4	2025	4	2027
Launch of SV2-X	1	2027	4	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206448SF / <i>Resilient MW/MT Ground</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	-	0.000	0.000	390.596	0.000	390.596	463.489	508.074	520.542	498.552	Continuing	Continuing
657124: <i>Resilient MW/MT</i>	-	0.000	0.000	390.596	0.000	390.596	463.489	508.074	520.542	498.552	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

MW/MT- Ground, BA 5, PE 1206448SF, is a continuation of the following ongoing efforts: 1) Space Development Agency (SDA) BA4, PE 1206410SDA, and 2) MEO Track Custody Demonstration under PE 1206442SF Next Generation Overhead Persistent Infrared (OPIR) Budget Program Accounting Code 657009: Space Modernization Initiative. This project provides the ground architecture for the MW/MT - LEO project, PE 1206446SF and MW/MT - MEO project, PE 1206447SF.

A. Mission Description and Budget Item Justification

In 2021, the Space Warfighting Analysis Center (SWAC) conducted its inaugural USSF Force Design with a key focus area in the Missile Warning and Missile Tracking mission area. The goal of the analysis was to produce a highly resilient government reference design that could maintain custody of emergent dimmer and more maneuverable threats through the boost and post-boost phases of flight. The SWAC concluded that a multi-layered approach was required to meet the stringent performance requirements while maximizing total system resilience. Their recommended government reference design included a combined constellation of 135 LEO and 16 MEO satellites working in concert through an integrated ground solution. On 27 Jan 2022, the Space Acquisition Council concluded that the Space Development Agency would develop the LEO layer of the architecture while Space Systems Command would provide the MEO layer in addition to serving as the total system integrator.

The Missile Warning/Missile Tracking (MW/MT) Ground project executes the ground segment for the OPIR architecture transition from a missile warning boost-phase focused constellation to a distributed, multi-orbit constellation to meet the intent of the 2021 Force Design recommendation. This architecture pivot performs both missile warning and missile tracking (post-boost phase) anchored on the Missile Warning and Missile Defense OPIR Enterprise OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC), JROCM 042-19, dated 8 May 2019. The inclusion of missile tracking ensures the constellation can maintain custody of evolved dim and maneuvering threats through all phases of flight to provide required missile warning attack characterization. This pivot also marks the transition to a more resilient architecture against kinetic and non-kinetic threats. With space assets distributed in multiple orbits, the overall architecture and mission is more resilient in a contested environment. The Missile Warning / Missile Tracking Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) investments evolve the architecture beyond Next-Gen OPIR GEO, Polar and the Space Modernization Initiative demonstrations to an operational system that will perform the full missile warning and missile tracking mission. The Space Force will phase and deploy space assets for this effort in collaboration with capabilities delivered by the Space Development Agency (SDA).

As part of this PE, the Space Force and SDA will collaboratively develop satellite control capabilities and fuse mission data for accurate warning/tracking solutions. Both the Space Force and SDA will leverage existing global OPIR ground infrastructure within their organizations to perform the layer-specific ground functions. SSC will serve as the System of Systems Integrator to implement this combined ground segment, identifying shared investment strategies to maximize affordability, and

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

Appropriation/Budget Activity R-1 Program Element (Number/Name)
3620F: Research, Development, Test & Evaluation, Space Force I BA 5: PE 1206448SF I Resilient MW/MT Ground
System Development & Demonstration (SDD)

presenting a unified, trusted data source that meet stringent accuracy and latency requirements. Overall, the Department of Defense is united to deliver a multi-faceted OPIR architecture that meets warfighter needs for detection, tracking, and reporting on these challenging evolved missile threats.

To support the LEO Space layer specific ground functions, SDA's ground segment provides constellation management, ground-based data processing, dissemination, and management, space-to-ground verification and ground-based interoperability testing, support operations, and other integration activities for the SDA Tranche 1 (T1) Tracking Layer and integrates with the MW/MT enterprise. The T1 Tracking Layer, awarded in FY 2022, is the minimum viable product proliferated satellite constellation to provide global access for tracking of Hypersonic Glide Vehicles and other advanced missile threats. As a part of the National Defense Space Architecture (NDSA), the LEO MW/MT ground segment leverages the T1 Transport Layer, and T1 Operations and Integration (O&I) Centers to provide MW/MT data to the Warfighter anywhere in the world.

To support the MEO Space layer specific ground functions, the Space Force is transitioning the MEO Track Custody Demonstration (1206442SF, 657009) ground segment to a program of record. It expands the existing MW ground architecture to meet the Command and Control (C2) and Mission Data Processing (MDP) requirements for the new Resilient MW/MT MEO space layer as well as integrates with existing space-based MW capabilities [i.e., Space-Based Infrared System (SBIRS)], planned space-based MW capabilities [i.e., Next-Gen Geosynchronous Earth Orbit (Next-Gen GEO) and Next Gen Polar systems], and interagency MW/MT capabilities [i.e., SDA's Low Earth Orbit (LEO) MW/MT] to ensure that the MW/MT mission is able to meet the detection, tracking, and reporting demands for evolved, dim and maneuvering threats.

The Space Force will perform the systems of systems integration function for both MEO and LEO layers to meet warfighter needs for detection, tracking, and reporting on these challenging missile threats. The Space Force may pursue a competitive award for the lead systems integration to align efforts across MW/MT LEO Space, MEO Space, and MW/MT Ground.

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 repurpose existing capabilities

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MWMT 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 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206448SF / <i>Resilient MW/MT Ground</i>
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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	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	390.596	0.000	390.596
Total Adjustments	0.000	0.000	390.596	0.000	390.596
• 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	390.596	0.000	390.596

Change Summary Explanation

MW/MT- Ground, BA 5, PE 1206448SF, is a continuation of the following ongoing efforts: 1) SDA RDT&E program elements 1206310SDA and 1206410SDA, and 2) MEO Track Custody Demonstration under PE 1206442SF Next Generation OPIR Budget Program Accounting Code 657009: Space Modernization Initiative. This PE was established for FY2023 and beyond to transition these ongoing efforts into an operational ground architecture supporting the MW/MT - LEO project, PE 1206446SF and MW/MT - MEO project, PE 1206447SF.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Missile Warning (MW)/ Missile Tracking (MT) Ground Low Earth Orbit (LEO)	-	0.000	225.797
Description: Expands the existing NDSA architecture to meet the Command and Control (C2), Mission Data Processing (MDP), Enterprise Integration, and Support Operations requirements for the T1 Tracking Layer. The LEO MW/MT ground segment provides constellation management, ground-based data processing, dissemination, and management, space-to-ground verification and ground-based interoperability testing, support operations, and other integration activities for the SDA Tranche 1 (T1) Tracking Layer and integrates with the MW/MT enterprise. This includes the connection of T1 Operation and Integration (O&I) centers with legacy and emerging MW/MT capabilities to disseminate MW/MT data in common message formats for rapid response to advanced missile threat.			
FY 2022 Plans: This effort continues activities started in RDT&E program elements 1206310SDA and 1206410SDA.			
FY 2023 Plans: Rapidly execute the NDSA Tranche 1 programs initiated in FY 2022 to establish the LEO MW/MT ground segment required to support launches starting in FY 2025 and capability demonstration starting in FY 2026. This includes investments in facilities, hardware, network management, Ground Entry Points (GEP), Optical Ground Terminals (OGT), software development, mission			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206448SF / <i>Resilient MW/MT Ground</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>payloads, contract services, and any other integration requirements to support the MW/MT/MD enterprise. Leverage and expand upon existing Mission Data Processing Applications (MDPAPs) and Joint OPIR Ground initiatives to ensure rapid processing and dissemination to global warfighting community. In addition, this effort will support the planning and execution of performance and integration risk mitigation activities associated with C2 challenges, MDP expansion, and interagency integration. Other activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funds increased to establish a new budget program accounting code and allow for a pivot to the Resilient MW/MT architecture.</p>				
<p>Title: Missile Warning (MW)/ Missile Tracking (MT) - Ground - Medium Earth Orbit (MEO)</p> <p>Description: Expands the existing MW ground architecture to meet the Command and Control (C2) and Mission Data Processing (MDP) requirements for the new Resilient MW/MT MEO space layer as well as integrates with existing space-based MW capabilities [i.e., Space-Based Infrared System (SBIRS)], planned space-based MW capabilities [i.e., Next-Gen Geosynchronous Earth Orbit (Next-Gen GEO) and Next Gen Polar systems], and interagency MW/MT capabilities [i.e., SDA's Low Earth Orbit (LEO) MW/MT] to ensure that the MW/MT mission is able to meet the detection, tracking, and reporting demands for evolved, dim and maneuvering threats.</p> <p>FY 2022 Plans: See PE 1206442SF Next Generation OPIR Budget Program Accounting Code 657009: Space Modernization Initiative Demo Thrust MEO Track Custody Risk Reduction.</p> <p>FY 2023 Plans: Continues work in PE 1206442SF to rapidly transition the track custody demo ground segment from a single satellite non-realtime technical pathfinder to a multi-plane, multi-satellite realtime prototype that meets warfighter specified reporting timelines. This program element expands development for Command and Control (C2) and Mission Data Processing (MDP) to meet the initial warfighter capability for sensitivity, accuracy, and latency of the MW/MT MEO space layer. This includes investments in facilities, hardware, ground transport, Ground Entry Points (GEP), contract services, and any other general ground infrastructure required to standup an instantiation of the Future Operationally Resilient Ground Evolution's (FORGE) Mission Data Processing Application Framework (MDPAF) for MDP and establish appropriate C2 solutions. Leverage and expand upon existing Mission Data Processing Applications (MDPAPs) and Joint OPIR Ground initiatives to ensure rapid processing and dissemination to global warfighting community. In addition, this effort will support the planning and execution of performance and integration risk mitigation activities associated with C2 challenges, MDP expansion, and interagency integration. Rapidly respond to implement</p>		-	0.000	164.799

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206448SF / <i>Resilient MW/MT Ground</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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, experimentation, prototyping, etc.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 funds increased to establish a new budget program accounting code and allow for a pivot to the Resilient MW/MT architecture.			
Accomplishments/Planned Programs Subtotals	-	0.000	390.596

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

N/A

Remarks

E. Acquisition Strategy

LEO: The SDA will continue execution of current contracts competitively awarded in FY 2022 using funds from RDT&E program elements 1206310SDA and 1206410SDA. The SDA T1 programs will execute approved acquisition strategies to deliver a LEO proliferated constellation under the Middle Tier of Acquisition prototyping pathway. The T1 Tracking Layer will be the initial capability to support the architecture derived from the Missile Warning and Missile Defense OPIR Enterprise Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019.

The MW/MT - Ground - LEO project will leverage the efforts in the all of the SDA T1 programs to provide low latency MW/MT data to the MW/MT enterprise.

MEO: The Space Force will continue development of current demonstration contracts competitively awarded using funds from 1206442SF Next Generation OPIR Budget Program Accounting Code 657009. The program will develop an acquisition strategy for transition from a demonstration to a program of record which will include expanding from a single satellite demonstration to a multiple satellite coordinated prototyping effort that provides mission and operational utility. The initial architecture will be based on the Missile Warning and Missile Defense OPIR Enterprise Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019. The first satellites, to fulfill detection and reporting within regions of interest, are required starting in 2028. A transition is planned in FY2023 to support additional development contract modifications and/or awards .

Additionally, the MW/MT - Ground - MEO project may pursue a competitive award for the lead systems integration to align efforts across MW/MT LEO, MEO, and Ground.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206448SF / Resilient MW/MT Ground	Project (Number/Name) 657124 / Resilient MW/MT
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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			
LEO: C2, Networks, Interoperability, system design, test, and integration	Various	Various : TBD	-	-		-		122.083		-		122.083	Continuing	Continuing	-
LEO: Data Management	Various	Various : TBD	-	-		-		64.660		-		64.660	Continuing	Continuing	-
LEO: Ground Infrastructure	Various	Various : TBD	-	-		-		33.870		-		33.870	Continuing	Continuing	-
MEO: Ground C2	Various	Various : TBD	-	-		-		36.276	Mar 2023	-		36.276	Continuing	Continuing	-
MEO: Ground MDP	Various	Various : TBD	-	-		-		50.787	Dec 2022	-		50.787	Continuing	Continuing	-
MEO: Ground Infrastructure	Various	Various : TBD	-	-		-		25.912	Mar 2023	-		25.912	Continuing	Continuing	-
MEO: SE&I	Various	Various : TBD	-	-		-		11.194	Dec 2022	-		11.194	Continuing	Continuing	-
MEO: Lead Systems Integrator	Various	Various : TBD	-	-		-		21.766	Dec 2022	-		21.766	Continuing	Continuing	-
MEO: Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	-		-		2.073	Jan 2023	-		2.073	Continuing	Continuing	-
Subtotal			-	-		-		368.621		-		368.621	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			
LEO: FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	-		-		2.105		-		2.105	Continuing	Continuing	-
LEO: Other Support	Various	Various : TBD	-	-		-		3.079		-		3.079	Continuing	Continuing	-
MEO: FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	-		-		6.219	Jan 2023	-		6.219	Continuing	Continuing	-
MEO: A&AS	Various	Various : TBD	-	-		-		10.365	Nov 2022	-		10.365	Continuing	Continuing	-
MEO: Other Support	Various	Various : TBD	-	-		-		0.207	Nov 2022	-		0.207	Continuing	Continuing	-
Subtotal			-	-		-		21.975		-		21.975	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206448SF / <i>Resilient MW/MT Ground</i>	Project (Number/Name) 657124 / <i>Resilient MW/MT</i>
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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
Project Cost Totals	-	-	-	390.596	-	390.596	Continuing	Continuing	N/A

Remarks
 Funding in FY 2023 is to support necessary government program office activities required to develop the technical requirements, perform market research, solicit, evaluate, award and continue development of the MW/MT ground architecture.

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206448SF / <i>Resilient MW/MT Ground</i>	Project (Number/Name) 657124 / <i>Resilient MW/MT</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>LEO: Resilient Missile Warning/Missile Tracking</i>				
Ground infrastructure design, build, integration & trust	1	2023	4	2024
Mission Data Processing design, build, integration & test	1	2023	4	2026
Command & Control design, build, integration & test	1	2023	4	2027
<i>MEO: Resilient Missile Warning/Missile Tracking</i>				
Ground infrastructure design, build, integration & test	1	2023	4	2027
Mission Data Processing design, build, integration & test	1	2023	4	2027
Command & Control design, build, integration & test	1	2023	4	2027

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206853SF / <i>National Security Space Launch Program (SPACE) - EMD</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	-	533.016	201.510	124.103	0.000	124.103	82.361	23.383	55.679	56.764	Continuing	Continuing
650006: <i>Next Generation Launch System Investment</i>	-	533.016	201.510	124.103	0.000	124.103	82.361	23.383	55.679	56.764	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Prior Years Funding \$2,089.431M was executed in PE 1206853F.

A. Mission Description and Budget Item Justification

The National Security Space Launch (NSSL) program provides a space launch service that satisfies the government's National Launch Forecast (NLF) requirements to place National Security Space (NSS) space vehicles on orbit. NSSL is a launch service, not a weapon system, which is primarily funded with production funds.

NSSL Phase 2 development, started late FY 2014, funds research and development activities and related studies, to include, but not limited to, investments in new and/or upgraded launch systems and associated launch facilities to meet NSS launch needs leveraging domestic commercial launch providers. The RDT&E program will also fund continued research and development activities, mission manifest capability development & future studies for emerging NSS launch needs. These efforts will develop technologies for space access, mobility, and logistics (SAML) through multiple public-private partnerships; help sustain the U.S. industrial base; address emergent needs for launch-related space access and lower procurement costs by promoting competition. Examples include, but are not limited to, orbital transfer, on-orbit servicing, digital engineering, and novel on-orbit propulsion technologies.

The Space Force will continue investments in the Launch Service Agreement (LSA) public-private partnership with United Launch Alliance Vulcan Centaur for launch system development. In addition, the Space Force will complete rocket propulsion system (RPS) with Aerojet Rocketdyne for the RL10 upper stage engine development and the associated technical maturation program. Future development to capitalize on new technology and innovations developed by industry may continue to utilize public-private partnerships. The Space Force will also be leveraging opportunities to integrate Department of Defense payloads on to launch services procured commercially or by other Government agencies (e.g. NASA) where excess margin is available.

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, to increase 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 repurpose existing capabilities.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206853SF / <i>National Security Space Launch Program (SPACE) - EMD</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver NSSL system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF. In FY 2021 \$1.649M was expended for civilian pay expenses in this program element, and in FY 2022 \$2.079M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	550.978	221.510	0.000	0.000	0.000
Current President's Budget	533.016	201.510	124.103	0.000	124.103
Total Adjustments	-17.962	-20.000	124.103	0.000	124.103
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-20.000			
• 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	-17.962	0.000			
• Other Adjustments	0.000	0.000	124.103	0.000	124.103

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 650006: *Next Generation Launch System Investment*

Congressional Add: *Next Generation Rocket Engine Testing*

Congressional Add: *Upper Stage Resiliency Enhancements*

Congressional Add Subtotals for Project: 650006

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	15.000	-
	75.000	-
Congressional Add Subtotals for Project: 650006	90.000	-
Congressional Add Totals for all Projects	90.000	-

Change Summary Explanation

FY 2021: -17.962M decrease for SBIR.

FY 2022: -20.000M Congressional directed reduction for Enabling Investments.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206853SF / <i>National Security Space Launch Program (SPACE) - EMD</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Title: NSSL Enabling Investments</p> <p>Description: Enabling Investments are a continuous portfolio of RDT&E projects that will increase U.S. space dominance through the end of the decade and beyond. The portfolio consists of multiple public-private partnerships to develop technologies for space access, mobility, and logistics (SAML). Examples include, but are not limited to, orbital transfer, on-orbit servicing, digital engineering, and novel on-orbit propulsion technologies.</p> <p>FY 2022 Plans: Launch Enterprise will continue its SAML RDT&E agreements awarded in FY 2021, including work on upper stage resiliency enhancements and next generation rocket engine testing. Additional enabling technology agreements will be awarded in FY 2022 within the SAML as the requirements evolve and are defined.</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to no planned FY 2023 funding for SAML. Launch Enterprise will evaluate the technologies from the FY 2022 efforts that warrant additional investments.</p>		0.000	16.871	0.000
<p>Title: Launch Service Agreement</p> <p>Description: Invest in providers of domestic Launch Services. This investment enables the transition from the use of non-Allied space launch engines to commercial launch services that also meet NSS needs. Execute Other Transaction Authority (OTA) agreements to develop various industry solutions utilizing public-private partnerships. Continued the technical maturation and risk reduction activities in support of Launch Service OTAs.</p> <p>FY 2022 Plans: Continue NSSL Phase 2 public-private partnership investment with United Launch Alliance (ULA) for the development of the Vulcan Centaur launch system. This investment includes completion of Initial Operational Capability activities, continued development for the heavy lift variant (Category C) of the Vulcan Centaur, including Critical Design Review, and initiation of West Coast launch complex improvements. Additionally, FY 2022 funding will allow the program 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 Plans: Continue NSSL Phase 2 public-private partnership investment with United Launch Alliance (ULA) for the development of the Vulcan Centaur launch system. This investment includes continued development for the heavy lift (Category C) capability of</p>		434.216	178.303	124.103

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)		R-1 Program Element (Number/Name) PE 1206853SF I National Security Space Launch Program (SPACE) - EMD		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
the Vulcan Centaur, including Design Certification Review, and continued West Coast space launch complex improvements. Additionally, FY 2023 funding will allow the program 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. FY 2022 to FY 2023 Increase/Decrease Statement: FY23 decrease due to the near completion of Vulcan development requiring fewer milestone payments.				
Title: Rocket Propulsion System Development Description: Invest in domestic rocket propulsion systems (RPS) under the Launch Service Agreement Other Transaction Authority (OTA) agreements. This investment enables the transition from the use of non-Allied space launch engines to domestic rocket propulsion systems. Continue to execute a single RPS OTA agreement utilizing a public-private partnership. FY 2022 Plans: Conclude public-private partnership with Aerojet Rocketdyne for upper stage engine development, ensuring an available, domestic, cost-effective solution. This investment includes completion of development engine qualification testing. FY 2023 Plans: N/A FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decrease due to completion of the Rocket Propulsion Development effort.		8.800	6.336	0.000
Accomplishments/Planned Programs Subtotals		443.016	201.510	124.103
		FY 2021	FY 2022	
Congressional Add: Next Generation Rocket Engine Testing FY 2021 Accomplishments: Launch enterprise executed FY 2021 legislation by competitively awarding engine testing prototype projects to potential NSSL phase three providers. As part of the enabling investments portfolio, the Program awarded one Other Transaction Authority Agreements using the Space Enterprise Consortium at the end of FY 2021.		15.000	-	
Congressional Add: Upper Stage Resiliency Enhancements FY 2021 Accomplishments: Launch enterprise executed FY 2021 legislation by competitively awarding upper stage resiliency enhancement projects to potential NSSL phase three providers. As part of the enabling		75.000	-	

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206853SF / <i>National Security Space Launch Program (SPACE) - EMD</i>
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	FY 2021	FY 2022
investments portfolio, the Program awarded three Other Transaction Authority Agreements using the Space Enterprise Consortium at the end of FY 2021.		
Congressional Adds Subtotals	90.000	-

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPSF 01 NSSL00: <i>National Security Space Launch</i>	996.371	1,337.347	1,056.133	-	1,056.133	2,126.485	2,521.314	2,535.711	2,283.073	Continuing	Continuing

Remarks

E. Acquisition Strategy

Launch Enterprise will continue execution of NSSL Phase 2 Public-Private Partnership investments and NSSL Enabling Investments, including those for Next Generation Rocket Engine Testing and Upper Stage Resiliency Enhancements. Phase 2 consists of RDT&E investment in commercial launch system prototypes developed via the Space Force's Launch Service Agreements (LSAs) and Rocket Propulsion System (RPS) Other Transaction Authority (OTA) agreements to ensure two domestic launch service providers are certified to meet all NSS requirements. Phase 2 ends the use of the Russian RD-180 engine and leverages the U.S. launch industry to meet more stressing national security needs. This strategy ensures space launch operations meet requirements for Assured Access to Space (AATS) codified in 10 USC 2273 and Congressional direction to end U.S. reliance on non-allied propulsion systems. Enabling Investments, initiated by FY 2021 Congressional Adds and continued in FY 2022, are developing advanced space access capabilities to sustain competition for launch services starting in FY 2025 per the NSSL Phase 2 acquisition strategy. Enabling Investments foster a robust launch industrial base and leverage launch innovation to maintain American leadership in launch capabilities.

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

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206853SF / <i>National Security Space Launch Program (SPACE) - EMD</i>	Project (Number/Name) 650006 / <i>Next Generation Launch System Investment</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			
RPS OTA	C/Variou	Aerogjet Rocketdyne : Canoga Park, CA	-	8.800	Nov 2020	6.336	Nov 2021	-		-		-	0.000	15.136	-
LSA OTA1	C/Variou	United Launch Alliance : Denver, CO	-	327.405	Nov 2020	132.124	Nov 2021	87.997	Nov 2022	-		87.997	Continuing	Continuing	-
LSA OTA2	C/Variou	Blue Origin : Kent, WA	-	36.000	Nov 2020	-		-		-		-	0.000	36.000	-
LSA OTA3	C/Variou	Northrop Grumman : Chandler	-	40.341	Nov 2020	-		-		-		-	0.000	40.341	-
FFRDC Mission Assurance	RO	Aerospace : El Segundo, CA	-	12.560	Nov 2020	17.495	Dec 2021	10.919	Dec 2022	-		10.919	Continuing	Continuing	-
Launch Enterprise System Engineering and Integration	C/CPFF	Various : various	-	11.443	Mar 2021	13.804	Nov 2021	10.024	Nov 2022	-		10.024	Continuing	Continuing	-
Congressional Add Next Generation Rocket Engine Testing	C/Variou	Space X : El Segundo, CA	-	14.891	Sep 2021	-		-		-		-	0.000	14.891	-
Congressional Add Upper Stage Resiliency Enhancements 1	C/Variou	Rocket Lab : Long Beach, CA	-	24.999	Sep 2021	-		-		-		-	0.000	24.999	-
Congressional Add Upper Stage Resiliency Enhancements 2	C/Variou	United Launch Alliance : Denver, CO	-	24.999	Sep 2021	-		-		-		-	0.000	24.999	-
Congressional Add Upper Stage Resiliency Enhancements 3	C/Variou	Blue Origin : Kent, WA	-	24.999	Sep 2021	-		-		-		-	0.000	24.999	-
NSSL Enabling Investments Orbital Transfer & Maneuver (OTM)	C/Variou	TBD : TBD	-	-		16.871	Jun 2022	-		-		-	0.000	16.871	-
Subtotal			-	526.437		186.630		108.940		-		108.940	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force													Date: April 2022		
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
3620F / 5				PE 1206853SF / National Security Space Launch Program (SPACE) - EMD					650006 / Next Generation Launch System Investment						
Support (\$ 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			
Organic Civilian Support	Reqn	DOD : El Segundo, CA	-	1.649	Oct 2020	2.079	Oct 2021	2.142	Oct 2022	-		2.142	Continuing	Continuing	-
Subtotal			-	1.649		2.079		2.142		-		2.142	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			
FFRDC	RO	Aerospace : El Segundo, CA	-	1.010	Nov 2020	1.229	Dec 2021	0.954	Dec 2022	-		0.954	Continuing	Continuing	-
Advisory and Assistance Services	Various	Various : Various	-	1.103	Dec 2020	5.141	Nov 2021	6.277	Nov 2022	-		6.277	Continuing	Continuing	-
Other Support	Various	Various : Various	-	2.817	Nov 2020	6.431	Nov 2021	5.790	Nov 2022	-		5.790	Continuing	Continuing	-
Subtotal			-	4.930		12.801		13.021		-		13.021	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			-	533.016	201.510		124.103		-		124.103	Continuing	Continuing	N/A	
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206853SF / <i>National Security Space Launch Program (SPACE) - EMD</i>	Project (Number/Name) 650006 / <i>Next Generation Launch System Investment</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Rocket Propulsion System (RPS) Development	
Aerojet Rocketdyne RPS OTA	
Launch Service Agreement (LSA)	
Blue Origin LSA OTA	
Northrop Grumman LSA OTA	
United Launch Alliance (ULA) LSA OTA	
ULA LSA OTA 1st Vulcan Flight	
ULA LSA OTA 1st Cat C Flight	
Congressional Add	
Space X OTA Next Generation Rocket Engine Testing	
Blue Origin OTA Upper Stage Resiliency Enhancements	
ULA OTA Upper Stage Resiliency Enhancements	
Rocket Lab OTA Upper Stage Resiliency Enhancements	
NSSL Enabling Investments	
Orbital Transfer & Maneuver (OTM)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206853SF / <i>National Security Space Launch Program (SPACE) - EMD</i>	Project (Number/Name) 650006 / <i>Next Generation Launch System Investment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Rocket Propulsion System (RPS) Development</i>				
Aerojet Rocketdyne RPS OTA	1	2021	4	2022
<i>Launch Service Agreement (LSA)</i>				
Blue Origin LSA OTA	1	2021	1	2021
Northrop Grumman LSA OTA	1	2021	1	2021
United Launch Alliance (ULA) LSA OTA	1	2021	3	2025
ULA LSA OTA 1st Vulcan Flight	4	2022	4	2022
ULA LSA OTA 1st Cat C Flight	1	2024	1	2024
<i>Congressional Add</i>				
Space X OTA Next Generation Rocket Engine Testing	4	2021	4	2021
Blue Origin OTA Upper Stage Resiliency Enhancements	4	2021	4	2021
ULA OTA Upper Stage Resiliency Enhancements	4	2021	4	2021
Rocket Lab OTA Upper Stage Resiliency Enhancements	4	2021	4	2021
<i>NSSL Enabling Investments</i>				
Orbital Transfer & Maneuver (OTM)	3	2022	4	2022

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1205502SF / <i>Small Business Innovation Research</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	-	256.920	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
663005: <i>Small Business Innovation Research</i>	-	256.920	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) program implements 15 U.S.C Section 638 to maximize the creative, innovative, and entrepreneurial spirit of small businesses to solve technological problems.

In January 2021, the Secretary of the Air Force named the AFWERX Director as the Chief Commercialization Officer and aligned the Department of the Air Force's (DAF) SBIR and STTR Programs to AFWERX. In conjunction with the establishment of the United States Space Force (USSF), AFWERX stood up SpaceWERX to execute SBIR and STTR funds for the space portfolio. SpaceWERX's mission is to identify, acquire, and integrate innovation capabilities into the USSF while cultivating partnership among the nation's Space Guardians and top problem solvers. SpaceWERX will accomplish this mission through (i) connecting diverse, innovative industry, academia, and Government entities; (ii) creating capability options and prototype opportunities for the USSF; (iii) facilitating streamlined acquisition processes; and (iv) fostering a culture of innovation.

Additionally, this Program Element (PE) has a direct tie to PE 0604317F, Technology Transfer, Project 646030, AFWERX, and PE 0604858F, Tech Transition Program, Project 640858, Prime, as this program improves Air Force and Space Force capabilities by connecting innovators, simplifying technology transfer, and accelerating results. This Program is a parallel effort to United States Air Force PE 0605502F, Small Business Innovation Research.

This document reflects actual FY 2021 3620 funds aligned to the SBIR/STTR program in accordance with the legislative authority to direct 3.65% of enacted funds anticipated for extramural awards to the program. Funding is spread across multiple focus areas and change from year to year based on known and emerging technology gaps, warfighting demand signals, and broader assessments of the military industrial base in light of its reliance on foundational commercial industries. Expected proportional execution of SBIR/STTR funds in each fiscal year's focus area, as well as a description of each of these areas, is provided below. Actuals may vary depending on allocation of actual funds received, timeliness of funds availability, or changes to strategic guidance or executive priorities.

Legacy funding accounts for pre-existing topics (i.e., prior to FY 2020) that either have select notices for Phase IIs or would like to release a Request For Proposal for a Phase II award. This budget allocation category will be phased out by FY 2023. Specific topic funding is dedicated for defense-focused technologies that do not have clear non-defense potential in the near term. Open Topics are an opportunity for any qualified small-business offeror to seek product-market fit within the DAF, demonstrate value to early-adopter communities, and scale their solution to meet market demand.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1205502SF / <i>Small Business Innovation Research</i>
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This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	256.920	0.000	0.000	0.000	0.000
Total Adjustments	256.920	0.000	0.000	0.000	0.000
• 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	256.920	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

Increase in FY 2021 in SBIR/STTR Transfer is due to realignment of funds to PE 1205502SF, Small Business Innovation Research, in accordance with the authorities provided in 15 U.S.C. Section 2363.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Small Business Innovation Research & Small Business Technology Transfer	256.920	0.000	0.000
Description: FY 2021 SBIR/STTR funds were allocated in the following manner: 6% Legacy 36% Specific Topic 49% Open Topic 9% SFPP			
In FY 2021, the DAF introduced the SFPP. SFPP expands Strategic Funding Increase (STRATFI) initiative with the Tactical Funding Increase (TACFI) program. The TACFI program supports smaller scale, tactical level requirements (e.g., on-going operations at a Wing or Delta). The TACFI program allows for up to \$1.7 million of SBIR/STTR funds per effort, and may also require individual effort approval from the Small Business Administration. Given smaller amounts of supplemental funding as compared to STRATFI, TACFI requires a lower matched funding ratio at 1:1 (1 Government non-SBIR to 1 SBIR OR 1 Private to 1 SBIR) matching.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1205502SF / <i>Small Business Innovation Research</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2022 SBIR/STTR funds are intended to be allocated as follows: Legacy: 5% Specific Topic: 38% Open Topic: 38% SFPP: 19% FY 2023 SBIR/STTR funds are intended to be allocated as follows: Specific Topic: 40% Open Topic: 40% SFPP: 20% FY 2024 SBIR/STTR funds are intended to be allocated as follows: Specific Topic: 40% Open Topic: 40% SFPP: 20% FY 2022 Plans: Not Applicable FY 2023 Plans: Not Applicable			
Accomplishments/Planned Programs Subtotals	256.920	0.000	0.000

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

Remarks

E. Acquisition Strategy
Not Applicable

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206116SF / <i>Space Test and Training Range Development</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	-	19.724	69.819	21.453	0.000	21.453	21.873	22.295	22.789	23.232	Continuing	Continuing
666156: <i>Space Test and Training Range Development</i>	-	19.724	69.819	21.453	0.000	21.453	21.873	22.295	22.789	23.232	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Due to FY 2022 funds being applied to the incorrect line item in enactment, \$17.5M will be realigned to 0304369F/Cyber Capabilities Support Office from 1206116SF/Space Test & Training Range Development through an internal reprogramming. This change will be recorded in next year's Justification Documentation.

A. Mission Description and Budget Item Justification

Supports the development of Space Test and Training Range (STTR) capabilities critical for developmental and operational test, training, exercises and tactics development for Space Control systems and Joint National Space Architecture. Includes development, demonstration and delivery of test assets, special test equipment, capabilities and systems required to test, validate, and verify performance of integrated space control systems. Provides a safe, secure, controllable and repeatable environment for the testing of space control mission systems and training operators in both realistic and relevant environments. Additionally, using an agile incremental development approach for range capabilities, this program develops test range assets for both the fixed node Space Range Operations Center (SROC) at Schriever Space Force Base and a deployable Signal Monitoring Unit capability to support complex Joint, AF and SF exercises. The virtual range as part of the Family of Systems (FoS), called Advanced Threat Simulation Environment (ATSE) virtual range, is being developed to accomplish the STTR mission. ATSE integrates to a Distributed Mission Architecture, tying into cyber, air, and space ranges for increased realism and complexity required to prepare space operators for real-world threats. This technology will allow for the first-ever use of a realistic signal environment to increase the realism and efficiency of space control squadron training. These risk reduction activities will include on-orbit capabilities, ground components, communication between nodes, and other required infrastructure.

The National Space Test and Training complex is the overarching complex designed to encompass all space test and training range needs to include cyberwarfare. STTR will function as the Electronic Warfare pillar (NSTTC-EW). The cyber warfare pillar will function as NSTTC-C.

Space acquisition must respond with speed and agility to emerging adversary threats. The Space Systems Command (SSC) has transformed the organization and implementation of space acquisition to an enterprise approach, to increase 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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver STTR 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.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206116SF / <i>Space Test and Training Range Development</i>
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This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	20.281	19.319	0.000	0.000	0.000
Current President's Budget	19.724	69.819	21.453	0.000	21.453
Total Adjustments	-0.557	50.500	21.453	0.000	21.453
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	50.500			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.557	0.000			
• Other Adjustments	0.000	0.000	21.453	0.000	21.453

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 666156: *Space Test and Training Range Development*

Congressional Add: *Cyber Training Range and Advanced Threat Simulation Environment*

Congressional Add Subtotals for Project: 666156

Congressional Add Totals for all Projects

	FY 2021	FY 2022
Congressional Add Subtotals for Project: 666156	0.000	50.500
Congressional Add Totals for all Projects	0.000	50.500

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. Congressional rescission of \$2.0M in FY2021.

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

	FY 2021	FY 2022	FY 2023
Title: Range Control	15.600	14.700	17.300
Description: Continue development of virtual range integration with cyber and air ranges hosting network emulators and other environments allowing tactics, techniques, and procedures (TTP) development, realistic operational testing, and enable more realistic exercises integrating joint air, space and cyber effects. Continue overhaul of fixed range capabilities, replacement of obsolete equipment, outdated servers, and performing software upgrades focusing on updating signal monitoring hardware with visualization tools and new monitoring capabilities and cybersecurity automation. Implement system resiliency and situational awareness necessary to operate in the contested space domain. Acquire additional system capability to enable and enhance			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206116SF / <i>Space Test and Training Range Development</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>training against new and emerging adversarial assets, to integrate mission scenarios into one graphic user interface, to develop transportable range operations center to provide flexible range control capability for multiple sites, to reduce size, weight, and power, and to replace software defined radio cards. Integrate joint DoD solutions for counterspace and space superiority effects.</p> <p>FY 2022 Plans: Develop new range future framework capability to integrate into the Joint Space Enterprise Architecture (JSpEA) to replace end-of-life equipment and aged software making up the Space Range Operations Center and signal monitoring units. Expand range mission to increase/enhance capabilities and operations to keep up with current and emerging space threats. Develop range to utilize a common baseline, common user interface (UI), and common tools to operate under a common system architecture. Integrate joint DoD solutions for counterspace and space superiority effects.</p> <p>Consolidate range into a single sustainable baseline for family of systems under the JSpEA. Continue development of virtual range integration with cyber and air ranges hosting network emulators and other environments allowing tactics, techniques, and procedures (TTP) development, realistic operational testing, and enable more realistic exercises combining air, space, and cyber effects. Continue Interim Contractor support (ICS) of virtual range.</p> <p>Additionally, FY 2022 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2023 Plans: Continue development of a new range future framework capability to integrate into the JSpEA, expanding the range mission to increase/enhance capabilities and operations to keep up with current and emerging space threats. Continue range development to utilize a common sustainable baseline, common user interface (UI), and common tools needed to operate under a common system architecture. Continue to integrate joint DoD solutions for counterspace and space superiority effects.</p> <p>Continue risk reduction/mitigation efforts for Space Orbital Engagement Range to analyze, prototype and demonstrate potential range systems to support live testing of new advanced development space systems, space operator orbital engagement maneuvers (OEM) advanced training, and future SPACE FLAG exercises using live systems.</p> <p>Begin development of deployable range (DRange) capability to provide flexible range control in support of operational requirements. DRange capability will include monitoring, control and status, logging, for upgraded Deployable Signal Monitoring</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206116SF / <i>Space Test and Training Range Development</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Units (D-SMU) operations. Development of a DRange prototype to demonstrate range control capabilities from operational locations. Additionally, FY 2023 funding will allow the program to 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: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 due to development of deployable range control capability that can be used across multiple operational locations.			
Title: Management Services Description: A&AS, FFRDC, and other Program Office Support FY 2022 Plans: Management Services FY 2023 Plans: Management Services FY 2022 to FY 2023 Increase/Decrease Statement: Management Services	4.124	4.619	4.153
Accomplishments/Planned Programs Subtotals	19.724	19.319	21.453

	FY 2021	FY 2022
Congressional Add: Cyber Training Range and Advanced Threat Simulation Environment FY 2021 Accomplishments: N/A FY 2022 Plans: Support development of the National Space Test and Training Complex - Electronic Warfare (NSTTC - EW) which will provide a next-gen over-the-air and closed-loop environment to support the future EW systems and integrated warfighter training; Integrating both environments under the Joint Space Enterprise Architecture (JSpEA). Develop realistic threat-informed environments with cyber defense capabilities in partnership with Air Force Cyber Command (AFCYBER) and Defensive Cyber Ops-Space (DCO-Space) to support mission defense teams, cyber aggressors, and cyber test and evaluation units, and enable realistic	0.000	50.500

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206116SF / <i>Space Test and Training Range Development</i>
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	FY 2021	FY 2022
exercises at Space Flag and other events with cyber operators. Seed prototype space test and evaluation lab for cyber resiliency testing of space mission systems.		
Congressional Adds Subtotals	0.000	50.500

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

N/A

Remarks

E. Acquisition Strategy

All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6:</i> <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206392SF / <i>ACQ Workforce - Space & Missile Systems</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	-	193.631	214.051	253.716	0.000	253.716	276.500	281.903	269.884	292.039	Continuing	Continuing
664280: <i>SMC Civilian Pay</i>	-	193.631	214.051	253.716	0.000	253.716	276.500	281.903	269.884	292.039	Continuing	Continuing

A. Mission Description and Budget Item Justification

Space Systems Command (SSC) equips US and allied forces with operational space and missile systems, launch systems, and command and control infrastructure in support of global military and national security operations. SSC operates with over 6,300 people and an annual budget exceeding 6.4B providing joint warfighters navigation, communication, weather, warning, force application, and space control capabilities.

SSC is authorized to employ approximately 1,897 civilian acquisition professionals providing the management, tools, and technical capabilities needed to oversee acquisition programs to include materiel solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel supporting the Los Angeles Garrison at Los Angeles AFB. Funding SSC civilian payroll from the RDT&E appropriation provides program managers the flexibility to hire additional civilian personnel with program dollars versus additional contractors in concert with initiatives in response to the Defense Acquisition Workforce Improvement Act. This program element supports both civilian pay and non-pay support requirements.

In FY 2022 \$214.051M was expended for civilian pay expenses in this program element.

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, to increase 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 repurpose existing capabilities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206392SF / <i>ACQ Workforce - Space & Missile Systems</i>
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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	183.930	214.051	0.000	0.000	0.000
Current President's Budget	193.631	214.051	253.716	0.000	253.716
Total Adjustments	9.701	0.000	253.716	0.000	253.716
• 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	9.701	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	253.716	0.000	253.716

Change Summary Explanation

FY 2021: increase due to 9.701M reprogramming action due to September shortfall to cover FTEs at 1,312.

FY 2023: increase of 35.740 due to 95 encumbered positions transferred from AFLCMC and 20 encumbered positions transferred from NAVY MUOS to SSC MUOS as well as Civ Pay reprice, and AcqDEMO conversions.

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

Appropriation/Budget Activity 3620F / 6	R-1 Program Element (Number/Name) PE 1206392SF / ACQ Workforce - Space & Missile Systems	Project (Number/Name) 664280 / SMC Civilian Pay
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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
664280: SMC Civilian Pay	-	193.631	214.051	253.716	0.000	253.716	276.500	281.903	269.884	292.039	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Space Systems Command (SSC) equips US and allied forces with operational space and missile systems, launch systems, and command and control infrastructure in support of global military and national security operations. SSC operates with over 6,300 people and an annual budget exceeding 6.4B providing joint warfighters navigation, communication, weather, warning, force application, and space control capabilities.

SSC is authorized to employ approximately 1,897 civilian acquisition professionals providing the management, tools, and technical capabilities needed to oversee acquisition programs to include materiel solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel supporting the Los Angeles Garrison at Los Angeles AFB. Funding SSC civilian payroll from the RDT&E appropriation provides program managers the flexibility to hire additional civilian personnel with program dollars versus additional contractors in concert with initiatives in response to the Defense Acquisition Workforce Improvement Act. This program element supports both civilian pay and non-pay support requirements.

In FY 2022 \$214.051M was expended for civilian pay expenses in this program element.

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, to increase 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 repurpose existing capabilities.

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

	FY 2021	FY 2022	FY 2023
Title: SSC Acquisition Workforce	193.631	214.051	253.716
Description: Provide professional government civilian acquisition workforce in support of all Space Systems Command programs. 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, prototyping, etc.			
FY 2022 Plans: Provide professional government civilian acquisition workforce in support of all Space Systems Command programs.			
FY 2023 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 6	R-1 Program Element (Number/Name) PE 1206392SF / ACQ Workforce - Space & Missile Systems	Project (Number/Name) 664280 / SMC Civilian Pay
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Provide professional government civilian acquisition workforce in support of all Space Systems Command programs. 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, prototyping, etc.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to FY 2022 due to transfer of encumbered positions from AFLCMC and Navy to SSC as well as Civ Pay reprise and AcqDEMO conversions.			
Accomplishments/Planned Programs Subtotals	193.631	214.051	253.716

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

N/A

Remarks

D. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206398SF / <i>Space & Missile Systems Center - MHA</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	-	9.765	12.119	13.962	0.000	13.962	15.053	15.348	15.666	15.916	Continuing	Continuing
664280: <i>SMC Civilian Pay</i>	-	9.765	12.119	13.962	0.000	13.962	15.053	15.348	15.666	15.916	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Space Systems Command (SSC) equips US and allied forces with operational space and missile systems, launch systems, and command and control infrastructure in support of global military and national security operations. SSC operates with over 6,300 people and an annual budget exceeding 6.4B providing joint warfighters navigation, communication, weather, warning, force application, and space control capabilities.

Program Element 1206398F, Project: 664281 Space Systems Command - Major Headquarters Activities (MHA) was established to improve overall performance, strengthen business operations, and achieve efficiencies, effectiveness and cost savings that can be transferred to higher priority needs. PE adds approximately 75 acquisition professionals.

In FY 2022 \$12.119M was expended for civilian pay expenses in this program element.

Space acquisition must respond with speed and agility to emerging adversary threats. SSC has transformed the organization and implementation of space acquisition to an enterprise approach, to increase 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 repurpose existing capabilities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206398SF / <i>Space & Missile Systems Center - MHA</i>
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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	9.765	12.119	0.000	0.000	0.000
Current President's Budget	9.765	12.119	13.962	0.000	13.962
Total Adjustments	0.000	0.000	13.962	0.000	13.962
• 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	13.962	0.000	13.962

Change Summary Explanation

FY 2023: increase of 1.083 due to Civ Pay reprise.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: SSC - Major Headquarters Activities	9.765	12.119	13.962
Description: Provide professional government civilian acquisition workforce in support of all Space Systems Command Headquarters Activities. Implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to SSC Staff support, studies, technical analysis, prototyping, etc.			
FY 2022 Plans: Provide professional government civilian acquisition workforce in support of all Space Systems Command Management Headquarters Activities.			
FY 2023 Plans: Provide professional government civilian acquisition workforce in support of all Space Systems Command Management Headquarters Activities.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 due to repricing			
Accomplishments/Planned Programs Subtotals	9.765	12.119	13.962

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

N/A

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

Appropriation/Budget Activity
3620F: *Research, Development, Test & Evaluation, Space Force I BA 6:*
RDT&E Management Support

R-1 Program Element (Number/Name)
PE 1206398SF / *Space & Missile Systems Center - MHA*

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

Remarks

E. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6:</i> <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</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	-	0.000	0.000	2.773	0.000	2.773	2.831	2.890	2.951	2.951	0.000	14.396
C6601Z: <i>Civilian Pay Adjustment</i>	-	0.000	0.000	2.773	0.000	2.773	2.831	2.890	2.951	2.951	0.000	14.396
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
 This program, BA 6, PE 1206616SF, project C6601Z, Civilian Pay Adjustment, is a new start.

A. Mission Description and Budget Item Justification

The Budget Line Item was assigned an incorrect Project code that aligned it in Budget Activity (BA) 06 (RDT&E Management Support). The correct Program Element (PE) is 1206616SF, Space Advanced Technology Development/Demo, Project 634868, Maui Space Surveillance System. This line item will be transferred back to PE 1206616SF under BA 03 in the next cycle.

While a new BA 06 (RDT&E Management Support) Project was created in FY 2023 due to the incorrect Project code assignment, this effort does not contain new work.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	2.773	0.000	2.773
Total Adjustments	0.000	0.000	2.773	0.000	2.773
• 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	2.773	0.000	2.773

C. Accomplishments/Planned Programs (\$ in Millions)	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>
Title: Civilian Pay Adjustment	-	0.000	2.773

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206616SF / <i>Space Advanced Technology Development/Demo</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Description: Funds civilian pay for personnel at the Maui Space Surveillance System. The Budget Line Item was assigned an incorrect Project code that aligned it in Budget Activity 06 (RDT&E Management Support). The correct Program Element (PE) is 1206616SF, Space Advanced Technology Development/Demo, Project 634868, Maui Space Surveillance System. This line item will be transferred back to PE 1206616SF under BA03 in the next cycle.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Funds civilian pay for personnel at the Maui Space Surveillance System.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022 by \$2.773 million because the Budget Line Item was assigned an incorrect Project code that aligned it in Budget Activity 06 (RDT&E Management Support). The correct Program Element (PE) is 1206616SF, Space Advanced Technology Development/Demo, Project 634868, Maui Space Surveillance System. This line item will be transferred back to PE 1206616SF under BA 03 in the next cycle.</p>			
Accomplishments/Planned Programs Subtotals	-	0.000	2.773

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

Remarks

E. Acquisition Strategy
Not Applicable

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206759SF / <i>Major T&E Investment - Space</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	-	0.000	86.503	89.751	0.000	89.751	98.694	105.148	110.679	112.909	Continuing	Continuing
660191: <i>Initial Operational Test and Eval</i>	-	0.000	1.442	1.512	0.000	1.512	1.542	1.572	1.603	1.634	Continuing	Continuing
664597: <i>Air Force Test Investments</i>	-	0.000	85.061	88.239	0.000	88.239	97.152	103.576	109.076	111.275	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program provides funds for the United States Space Force (USSF) Test Enterprise. Funds support enterprise-level, threat-relevant, and fully-integrated developmental and operational Space Test & Evaluation (T&E) activities and capabilities; the development of a professional space T&E workforce; and the organization, acquisitions, and operations of the National Space Test and Training Complex (NSTTC).

Space T&E activities and capabilities include the USSF Integrated Test Force (ITF) structures, USSF Operational Test Agency (OTA) test execution campaigns, and the workforce and activities required to conduct T&E to adequately assess the performance and survivability of DoD space systems, tactics, and technologies in contested environments.

Workforce development refers to the organizations, training, and activities required to develop a professional space T&E workforce including the development and operation of the Space Test Course at the United States Air Force (USAF) Test Pilot School (TPS).

Space T&E infrastructure encompasses the organization, acquisitions, operations, and associated activities as part of the NSTTC to develop, integrate, operate, and sustain the minimum technical capabilities required to test and evaluate the performance and survivability of critical Department of Defense (DoD) space systems in contested environments. The NSTTC delivers realistic test and training environments to support capability development by incorporating a mix of live and virtual capabilities to conduct threat emulation, advanced training, tactics development, and integrated testing.

In FY 2022, Major T&E Investment - Space was a New Start.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support	R-1 Program Element (Number/Name) PE 1206759SF I Major T&E Investment - Space
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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	0.000	71.503	0.000	0.000	0.000
Current President's Budget	0.000	86.503	89.751	0.000	89.751
Total Adjustments	0.000	15.000	89.751	0.000	89.751
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	15.000			
• 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	89.751	0.000	89.751

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 664597: Air Force Test Investments

Congressional Add: Program increase - lab and test range upgrades for space

Congressional Add Subtotals for Project: 664597

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	-	15.000
Congressional Add Subtotals for Project: 664597	-	15.000
Congressional Add Totals for all Projects	-	15.000

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.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 6					R-1 Program Element (Number/Name) PE 1206759SF / Major T&E Investment - S pace				Project (Number/Name) 660191 / Initial Operational Test and Eval			
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
660191: <i>Initial Operational Test and Eval</i>	-	0.000	1.442	1.512	0.000	1.512	1.542	1.572	1.603	1.634	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Space Operational Test and Evaluation refers to Congressionally mandated Space Initial Operational Test and Evaluation (IOT&E) to support major weapon system acquisition decisions beyond Low-Rate Initial Production (LRIP), Milestone C, full rate production, fielding, and declaration of Initial Operational Capability (IOC). For Major Defense Acquisition Programs (MDAP), the law requires IOT&E be completed under realistic operating conditions before proceeding beyond LRIP. IOT&E will be planned to answer all critical operational issues (COI) as thoroughly as possible. IOT&E is conducted to determine the operational effectiveness and suitability and resolve overall mission capability of systems undergoing research and development (R&D) efforts. It is an evaluation of a system's performance when the complete system is tested and evaluated against operational criteria by personnel with the same qualifications as those who will operate, maintain and support the system when deployed. In general, IOT&E is performed on new systems in development, major modifications, and other systems as directed.

This funds the USSF Operational Test Agency's participation in Integrated Test and Evaluation (IT&E). Additionally, it funds the Multiservice Operational Test and Evaluation (MOT&E) and Follow-on Operational Test and Evaluation (FOT&E) when it is the continuation of IOT&E activities past the full rate production decision. FOT&E answers specific questions about unresolved COIs and test issues or completes areas not finished during the IOT&E. This effort also funds related operational test and evaluation (OT&E) activities such as Early Influence, Operational Utility Evaluations (OUE), Early Operational Assessments (EOA), and Operational Assessments (OA) which are independent OT&Es supporting major milestones and decision points, full rate production, fielding, or declaration of IOC for USSF programs. USSF schedules and executes tests according to the forecasted test readiness of the MDAP program offices.

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

	FY 2021	FY 2022	FY 2023
Title: Space Systems Operational Test and Evaluation (OT&E)	0.000	1.442	1.512
Description: Plan, execute and report OT&E for Space Systems			
FY 2022 Plans:			
Advanced Extremely High Frequency Satellite Communications (Advanced EHF): 4 TES will lead tests of suitability, cybersecurity, and AEHF MOT&E liens starting in FY23			
Evolved Strategic SATCOM (ESS): Conduct early influence			
Military GPS User Equipment (GPS MGUE): Conduct OUE 2			
GPS Next Generation Control Segment (GPS OCX): Conduct IOT&E			
Long-Range Discrimination Radar (LRDR): Conduct IOT&E			
Next-Generation Overhead Persistent Infrared (Next-Gen OPIR): Plan OA and Conduct early influence			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 6	R-1 Program Element (Number/Name) PE 1206759SF / Major T&E Investment - S pace	Project (Number/Name) 660191 / Initial Operational Test and Eval		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Protected Tactical Enterprise Service (PTES): Complete MOT&E Protected Tactical SATCOM (PTS): Plan for EOA Space Based Infrared System (SBIRS): Conduct early influence Space C2 (formerly JMS): Complete IOT&E Weather System Follow-On Microwave (WSF-M): Conduct OA Launch and Test Range System (LTRS): Conduct early influence. Conduct other planning and operational testing for new space system programs as the requirement becomes known to USSF.</p> <p>FY 2023 Plans: Continue FY22 activities namely: Advanced Extremely High Frequency Satellite Communications (Advanced EHF): Conduct early influence Evolved Strategic SATCOM (ESS): Conduct early influence Military GPS User Equipment (GPS MGUE): Conduct OUE 2 GPS Next Generation Control Segment (GPS OCX): Plan for MOT&E Long-Range Discrimination Radar (LRDR): Conduct IOT&E Next-Generation Overhead Persistent Infrared (Next-Gen OPIR): Conduct OA Protected Tactical Enterprise Service (PTES): Complete MOT&E Protected Tactical SATCOM (PTS): Plan for EOA Space Based Infrared System (SBIRS): Conduct early influence Space C2 (formerly JMS): Complete IOT&E Weather System Follow-On Microwave (WSF-M): Conduct OA Conduct other planning and operational testing for new space system programs as the requirement becomes known to USSF.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Increase from 2022 to 2023 due to inflation factor.</p>				
Accomplishments/Planned Programs Subtotals		0.000	1.442	1.512
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
This project title will be renamed in a future cycle to reflect current scope and direction of the project.				
D. Acquisition Strategy				
N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 6					R-1 Program Element (Number/Name) PE 1206759SF / Major T&E Investment - S pace				Project (Number/Name) 664597 / Air Force Test Investments			
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
664597: Air Force Test Investments	-	0.000	85.061	88.239	0.000	88.239	97.152	103.576	109.076	111.275	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Space Force Test Investments refers to the space T&E activities, workforce development, and space T&E infrastructure required for the development, operation, and sustainment of the USSF Test Enterprise required to conduct T&E to adequately assess the performance and survivability of DoD space systems, tactics, and technologies in contested environments.

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

	FY 2021	FY 2022	FY 2023
Title: Space Force Test Investments	0.000	70.061	88.239
Description: Develop, operate, and sustain the USSF Test Enterprise.			
FY 2022 Plans: Establish the Space Test Course at the USAF TPS and graduate the first classes of space test professionals. Develop a foundational and scalable software baseline for an enduring on-orbit test capability that utilizes terrestrial and on-orbit sensors to provide near real-time and safety of flight, time, space, position information (TSPI) for Space T&E campaigns. Complete acquisition of a dedicated space Command and Control (C2) antennae to support Space T&E campaigns. Prototype a Model Based Systems Engineering (MBSE) baseline for future digital Space T&E campaigns informed by live, virtual, and constructive testing.			
FY 2023 Plans: Invest in previously identified technical capabilities to include survivability infrastructure, on-orbit range development, physics-based modeling, data infrastructure, facility upgrades and contractor support. Continue previous USSF Test Enterprise efforts under this PE including development and operation of the NSTTC. Develop digital NSTTC and Space T&E capabilities based on an MBSE baseline. Continue software development for NSTTC on-orbit capabilities and begin development and acquisition of terrestrial and on-orbit sensor capabilities. Begin to fund the Space Force Foreign Materiel Program in accordance with the prioritized Space Force Foreign Materiel List. Progress the technical baseline for the NSTTC's on-orbit, digital, electromagnetic spectrum, and cyber infrastructure and develop more robust test and training capabilities. Continue to develop and conduct the Space Test Course at the USAF TPS.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 6	R-1 Program Element (Number/Name) PE 1206759SF / Major T&E Investment - S pace	Project (Number/Name) 664597 / Air Force Test Investments

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
The FY23 funds increase is for investments in foundational infrastructure for the core digital elements of the NSTTC as well as the standup of new developmental and operational T&E capabilities within Space Training and Readiness Command (STARCOM). The increase also includes an inflation adjustment			
Accomplishments/Planned Programs Subtotals	0.000	70.061	88.239

	FY 2021	FY 2022
Congressional Add: Program increase - lab and test range upgrades for space	-	15.000
FY 2022 Plans: The FY22 funding increase of \$15 million will accelerate development activities and acquisitions of the NSTTC's On-Orbit, Digital, and Cyber T&E infrastructure.		
Congressional Adds Subtotals	-	15.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2021	FY 2022	FY 2023	FY 2023	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTE 06 0604759F: <i>Major T&E Investment</i>	208.680	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	208.680
• RDTE 06 0605712F: <i>Initial Operational Test & Evaluation</i>	13.557	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.557

Remarks

D. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206860SF / <i>Rocket Systems Launch Program (SPACE)</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	-	17.710	17.769	17.922	0.000	17.922	20.076	20.127	20.120	20.512	Continuing	Continuing
661023: <i>Rocket System Launch Program (RSLP)</i>	-	17.710	17.769	17.922	0.000	17.922	20.076	20.127	20.120	20.512	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Rocket Systems Launch Program (RSLP) provides responsive space and Research, Development, Test and Evaluation (RDT&E) launch vehicle support to DoD and other government agencies using commercial launch systems and excess ballistic missile assets. The RSLP mission was established by the Secretary of Defense in 1972. The small launch program complements the National Security Space Launch (NSSL) program with multiple options to acquire dedicated spacelift and rideshare services for developmental, demonstration, and small operational space vehicles. It provides mission planning, payload integration, vehicle acquisition, processing, launch operations, booster storage and disposition, aging surveillance, maintenance and logistics support for selected DoD responsive space and RDT&E launches. Costs directly attributable to a specific launch or program (e.g., reliability of flight testing, maintenance of launch vehicle processing infrastructure) are paid by the user (Space Force, Navy, Army, Missile Defense Agency (MDA), Defense Advanced Research Project Agency (DARPA), National Reconnaissance Office (NRO), etc.). RSLP maintains exclusive control of decommissioned Minuteman and Peacekeeper assets used in testing to include refurbishment, transportation and handling, storage, aging surveillance, and launch services. RSLP also funds general research, development, prototyping, integration, and supplemental reliability of flight testing efforts for launch to enhance the reliability of the Minotaur and other fleet vehicles (e.g., updates to the Modular Mechanical Ordnance Destruct System).

Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Command (SSC) is transforming the organization and implementation of space acquisition to an enterprise approach, to increase 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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Rocket Systems Launch 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.

The FY 2023 funding request was reduced by \$1.079M to account for the availability of prior year execution balances.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206860SF / <i>Rocket Systems Launch Program (SPACE)</i>
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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	17.993	17.769	0.000	0.000	0.000
Current President's Budget	17.710	17.769	17.922	0.000	17.922
Total Adjustments	-0.283	0.000	17.922	0.000	17.922
• 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	-0.283	0.000			
• Other Adjustments	0.000	0.000	17.922	0.000	17.922

Change Summary Explanation

FY 2023: 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 positions for FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Storage/Refurbishment/Flight Readiness/Demil	14.768	14.827	14.980
Description: Storage, refurbishment, inventory control, and demil/disposal of decommissioned Minuteman, Peacekeeper and other missile flight test assets			
FY 2022 Plans: Continue storage, refurbishment, inventory control, and demil/disposal of decommissioned Minuteman, Peacekeeper and other missile flight test assets and perform research and development support operations as required. Investigate and develop shipping throughput capacity to maximize opportunity for motor disposal. Continue support activities to include but not limited to sustainment replacement and refurbishment of support equipment, mission support, special studies etc.			
FY 2023 Plans: Continue storage, refurbishment, inventory control, and demil/disposal of decommissioned Minuteman, Peacekeeper and other missile flight test assets and perform research and development support operations as required. Investigate and develop shipping throughput capacity to maximize opportunity for motor disposal. Continue support activities to include but not limited to sustainment replacement and refurbishment of support equipment, mission support, special studies etc.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 1206860SF / <i>Rocket Systems Launch Program (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY 2023 increased due to inflation adjustments.				
<p>Title: Aging Surveillance</p> <p>Description: Perform aging surveillance-related activities on stored motors</p> <p>FY 2022 Plans: Continue performing aging surveillance-related activities on stored motors; continue performing analysis/studies to identify and evaluate potential safety-related issues affecting stored motors; continue program office support and related support activities such as, but not limited to mission support, special studies, etc.</p> <p>FY 2023 Plans: Continue performing aging surveillance-related activities on stored motors; continue performing analysis/studies to identify and evaluate potential safety-related issues affecting stored motors; continue program office support and related support activities such as, but not limited to mission support, special studies, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: N/A</p>		2.142	2.142	2.142
<p>Title: Other Launch Support Services</p> <p>Description: Perform Launch Services Activities</p> <p>FY 2022 Plans: Continue launch vehicle acquisition, processing, launch services support, mission assurance, reliability of flight and operations to launch RDT&E payloads.</p> <p>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, prototyping, etc.</p> <p>FY 2023 Plans: Continue launch vehicle acquisition, processing, launch services support including responsive launch, mission assurance, reliability of flight and operations to launch RDT&E payloads.</p> <p>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, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>		0.800	0.800	0.800

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206860SF / <i>Rocket Systems Launch Program (SPACE)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
N/A			
Accomplishments/Planned Programs Subtotals	17.710	17.769	17.922

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

N/A

Remarks

E. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6:</i> <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206862SF / <i>Tactically Responsive Launch</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	-	14.549	50.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	64.549
664235: <i>Tactically Responsive Launch</i>	-	14.549	50.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	64.549
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Tactically Responsive Launch will demonstrate space operations that will enable the DoD space domain and strategic deterrence objectives. It will fund proof-of-concept tactically responsive space launch demonstrations including, but not limited to, satellites, control systems, and concept of operations using emerging and extant commercial launch and satellite providers with the goal to place or replace military capability on orbit within 24 hours.

Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Command (SSC) is transforming the organization and implementation of space acquisition to an enterprise approach, to increase 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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactically Responsive Launch 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 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206862SF / <i>Tactically Responsive Launch</i>
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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	15.000	0.000	0.000	0.000	0.000
Current President's Budget	14.549	50.000	0.000	0.000	0.000
Total Adjustments	-0.451	50.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	50.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.451	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 664235: *Tactically Responsive Launch*

Congressional Add: *Tactically Responsive Launch*

Congressional Add: *Tactically Responsive Space*

Congressional Add Subtotals for Project: 664235

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	14.549	-
	-	50.000
Congressional Add Subtotals for Project: 664235	14.549	50.000
Congressional Add Totals for all Projects	14.549	50.000

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

	FY 2021	FY 2022
Congressional Add: Tactically Responsive Launch	14.549	-
FY 2021 Accomplishments: Demonstrated proof-of-concept tactically responsive space launch capabilities using emerging and extant launch providers. Activities included concept design, studies of commercial capabilities and operations, technical analysis, launch service acquisition, prototyping, rideshare service acquisition, processing, launch services support, mission assurance, operations; and tactics, techniques, and procedures, program office support, etc. for demonstration of responsive launch.		
Congressional Add: Tactically Responsive Space	-	50.000
FY 2022 Plans: Continue to demonstrate proof-of-concept tactically responsive space capabilities, including satellites, launch vehicles, control systems, and concept of operations using emerging and extant launch providers. Activities included concept design, studies of commercial capabilities and operations, technical		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206862SF / <i>Tactically Responsive Launch</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022
analysis, launch service acquisition, prototyping, rideshare service acquisition, processing, launch services support, mission assurance, operations; and tactics, techniques, and procedures, program office support, etc. for demonstration of responsive space and launch.		
Congressional Adds Subtotals	14.549	50.000

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

N/A

Remarks

E. Acquisition Strategy

Utilizing new and existing open competitive launch service contracts, Small Business Innovative Research contracts, and Other Transaction Authority (OTA) Agreements to take advantage of evolving commercial capabilities.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6:</i> <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206864SF / <i>Space Test Program (STP)</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	-	25.666	20.881	25.366	0.000	25.366	30.256	30.267	29.827	30.408	Continuing	Continuing
662617: <i>C6601Z</i>	-	25.666	20.881	25.366	0.000	25.366	30.256	30.267	29.827	30.408	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Space Test Program (STP) executes the annual DoD Space Experiments Review Board (SERB) process and consolidates requirements from Science and Technology (S&T) community in order to optimize space system missions and achieve maximum benefit of available resources. STP designs and executes missions to maximize launch mass to orbit, combines multiple flight experiments on suitable spacecraft, multiple spacecraft on available launch vehicles, and facilitates launch packages for government, commercial, and international partnerships. STP provides a cost-effective way to evaluate militarily relevant space flight experiments that:

- Demonstrate on orbit performance of new technologies to increase technology readiness level and validate research hypotheses for the S&T community
- Develop and mature future operational capabilities
- Advance operational tactics, techniques and procedures for future space and test capabilities
- Enable on-orbit experiments to support S&T
- Leverage national (e.g. DoD, commercial, and NASA) and international launch opportunities to increase space access for S&T efforts.

STP supports the Space Force efforts to define future system architectures that address emerging threats, enable resilient space capabilities, and employ tactical space operations to ensure freedom of operations in the space domain.

STP adheres to Executive Orders 10521 and 13185, and the requirement from the Office of the Under Secretary of Defense Research and Engineering (OUSD R&E) to support research per DoD Instruction 3210.1, Administration and Support of Basic Research. In addition, the Deputy Secretary of Defense Space Test Program Management & Funding Policy, issued in July 2002, reaffirmed STP as the primary provider of spaceflight for the DoD space research community. The July 2002 policy statement also reaffirmed STP's role as the single manager for all DoD payloads on the International Space Station (ISS).

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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver STP 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.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206864SF / <i>Space Test Program (STP)</i>
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This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	26.541	20.881	0.000	0.000	0.000
Current President's Budget	25.666	20.881	25.366	0.000	25.366
Total Adjustments	-0.875	0.000	25.366	0.000	25.366
• 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	-0.875	0.000			
• Other Adjustments	0.000	0.000	25.366	0.000	25.366

Change Summary Explanation

FY 2021: -0.875M due to SBIR. 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.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Payload Integration	20.729	15.889	19.059
Description: Integrate payloads onto spaceflight missions on the full spectrum of DoD on-orbit R&D (e.g. space vehicle, free-flyer payloads, hosted payloads, etc.). Includes acquisition of associated spacecraft and integration hardware.			
FY 2022 Plans: Complete STP-H7 launch integration and installation on the ISS. Continue payload integration of HE-1, and STP-H9, and begin design for STP-H10. Continue satellite integration and test, technical analysis, and interface verifications for STPSat-7. Initiate studies and planning for STPSat-8 acquisition. Collaborate on technical analysis and payload integration rideshare efforts. Additionally, FY 2022 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.			
FY 2023 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 1206864SF / <i>Space Test Program (STP)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Begin STP-5 planning, integration and design activities. Begin design for STPSat-8 acquisition (STEP 2.0 (Space Test Experiment Platform)). Conduct payload integration of STP-H9, STP-H10, STP-S27AD3, STP-S27VPC, STP-S28C, STP-28AR1, STP-Sat7 and Queen's Jubilee. Begin design for future ISS missions. Conduct satellite acquisition and integration of STPSat-7 and its ground systems. Begin STP-H11 integration and design activities. Conduct STP-S29 technical analysis and payload integration rideshare. Initiate STP Small Launch STP-S30 (every 2 yrs) Mission Unique and Integration Costs. Collaborate on technical analysis and other future missions as required. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to initiating several activities. Program accomplishments transition from payload integration to launch to on-orbit ops. Each year, these requirements expand and contract within the overall budget as a function of the lifecycle of the programs.</p>				
<p>Title: Launch Vehicle and Launch Services</p> <p>Description: Purchase launch services, launch vehicles, and launch vehicle support for the full spectrum of DoD on-orbit R&D (e.g. space vehicle, free-flyer payloads, hosted payloads, etc.), enabling spaceflight worthiness and "Do No Harm" certification for Space Systems Command (SSC) and US Space Force (USSF) HQ.</p> <p>FY 2022 Plans: Continue to support spaceflight worthiness and "Do No Harm" certification for launch readiness. Execute S-28A & B small launch initiatives and initiate the S-29 small launch planning and technical analysis. Plan and complete technical analysis for commercial rideshare launch of DoD SERB experiments and International Space Access Review Board (ISARB) approved experiments not manifested onto S-28 or planned for manifest onto S-29.</p> <p>FY 2023 Plans: Continue to Support spaceflight worthiness and "Do No Harm" Certification. Execute STP-S28C, STP-28AR1, STP-H9, STP-S27AD3, STP-S27VPC and Queen's Jubilee small launch initiatives. Execute STP-5 medium launch initiative. Plan and complete technical analysis for commercial rideshare launch of DoD SERB experiments and International Space Access Review Board (ISARB) approved experiments. Continue STPSat-7 launch integration activities and conduct other launch integration activities as required.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>		3.933	4.395	5.138

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 1206864SF / <i>Space Test Program (STP)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY 2023 increased due to executing several initiatives. Program accomplishments transition from payload integration to launch to on-orbit ops. Each year, these requirements expand and contract within the overall budget as a function of the lifecycle of the programs.				
Title: On Orbit Satellite Operations		1.004	0.597	1.169
Description: Execute first-year operations and operations support for STP-sponsored missions.				
FY 2022 Plans: Begin on-orbit operations for H7 and continue on-going operations for ISS payloads and DoD SERB payloads as requested.				
FY 2023 Plans: Continue on-orbit operations for STP-H7, GARI (Gadolinium Aluminum Gallium Garnet Radiation Instrument), and SPIRRAL (Space Power InfraRed Regulation and Analysis of Lifetime). Continue on-going operations for ISS payloads and DoD SERB payloads as requested. Complete Mission Complete Mission Operations for STP-S28A, STP-S28B, STPSat-6, STP-H7, STP-H8, STP-27AD2 (RECURVE, XVI, and Epic Athena payloads). Prepare on-orbit operations for STP-H9, STP-S28C, STP-28AR1, STP-S27AD3, STP-S27VPC and Queen's Jubilee.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased slightly to support on-orbit missions. Program accomplishments transition from payload integration to launch to on-orbit ops. Each year, these requirements expand and contract within the overall budget as a function of the lifecycle of the programs.				
Accomplishments/Planned Programs Subtotals		25.666	20.881	25.366
D. Other Program Funding Summary (\$ in Millions) N/A				
Remarks				
E. Acquisition Strategy N/A				

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1201017SF I Global Sensor Integrated on Network (GSIN)
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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	-	5.411	4.731	5.321	0.000	5.321	7.545	7.275	6.873	7.007	Continuing	Continuing
675368: GSIN (Global Integrated Sensor Network)	-	5.411	4.731	5.321	0.000	5.321	7.545	7.275	6.873	7.007	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The missions of US Space Command (USSPACECOM) and US Strategic Command (USSTRATCOM) include establishing and providing full-spectrum, global strike, coordinated space and information operations capabilities to meet both deterrent and decisive national security objectives and to provide operational space support, integrated missile defense, Global Command Control, Communications, and Computers Intelligence Surveillance and Reconnaissance (C4ISR), nuclear enterprise, and specialized planning expertise.

The Nation's strategic Command and Control (C2) sensors and mission planning programs cannot rapidly exchange information across multiple missions, creating ambiguity that delays time critical national C2 decision making processes. Global Sensor Integrated on Network (GSIN) developed and established a unified schema that integrates disparate Missile Warning (MW), Missile Defense (MD), Technical Intelligence (TI), Measurement and signature intelligence (MASINT), and a variety of non-traditional data into a single, exposed data set, providing resilient and unambiguous MW/MD data to national leadership. GSIN also enables existing radars and sensors to provide data in net-centric formats consumable by other authorized systems and mission areas, thus reducing the need to acquire more systems. Activities also include studies and analysis to support current program planning, execution, and future program planning.

Global Data Integration (GDI) is the new project name previously known as Global Sensor Integration on Networks (GSIN). GDI supports the DoD Data Strategy, by exposing, transporting, and fusing previously stove-piped data and making it available, exploitable, and able to be analyzed for a variety of mission perspectives, agnostic of the Information Technology (IT) platform. GDI directly supports USSPACECOM, USSTRATCOM and other Combatant Commands and Major Commands, and Nuclear Enterprise Center (NEC) mission sets.

As a leading Data as a Service (DaaS) and Analytics as a Service (AaaS) provider, GDI provides access to over 1,300+ diverse data sources; meshing selected systems and sensors, from tactical to strategic, including the nation's most modern and capable assets, improved algorithms, mobility, and forward deployment to provide earlier cross-cueing and expanded decision space when every second counts. GDI enables creation of a User-Defined Operating Picture (UDOP) to provide a single, unambiguous missile event picture allowing real-time collaboration for nuclear C2 and improved senior leader situational awareness (SA) for effective decision-making.

GDI also improves Space Domain Awareness (SDA) by accessing additional sensor capability and provides this data for the larger space order of battle capabilities. GDI dramatically improves the ingestion of non-traditional, but readily available, non-US government and commercial data to the Space Force satellite catalog. GDI addresses US Northern Command (USNORTHCOM) and USSTRATCOM's signed Joint Emergent Operational Need (JEON) ST-0010 request for uninterrupted

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: <i>Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1201017SF / <i>Global Sensor Integrated on Network (GSIN)</i>
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traditional and non-traditional sensor data integration, and is an enabling capability supporting the Global Threat Characterization Assessment (GTCA) Operational Planning Team report. GDI provides critical and unique data to USSPACECOM SDA data repositories to facilitate the large Space Battle Management Command and Control (BMC2) suite of capabilities/programs. Finally, GDI provides Cross Domain Solution (CDS) access, machine learning, data analysis and correlation/fusion functions to optimize SA in the field.

The GDI Program includes two major thrusts: GDI Development; and Radar, Sensor, Technical Intelligence (TI), and Allied Systems data integration.

The GDI Development effort includes four sub-efforts: 1) DATABAHN; 2) Fusion Engine for All-Source Tracking (FEAST), 3) Analytical Collaborative Environment - Multi Intelligence (ACE-M), and 4) Data Integrity (DI) efforts.

- DATABAHN includes developing and fielding dedicated CDS Concepts of operation (CONOPS), including geographically-separated, redundant nodes, to provide greater operational resiliency.

- FEAST fuses and correlates Radio Assisted Detection and Ranging (RADAR), Overhead Persistent Infrared (OPIR) and Electronic Signals Intelligence (ELINT) data at the SECRET level, and provides high-fidelity source geolocation in support of multiple DoD and Intelligence Community (IC) organizations. This capability is being replicated on Joint Worldwide Intelligence Communications System (JWICS), greatly increasing the functionality and value to the warfighter.

- ACE-M is a cloud-based, multi enclave (Secure Internet Protocol Router (SIPR)/JWICS), battlespace awareness and tactical decision aid capability which provides agile access to authoritative and dynamic intelligence data feeds, analytics, and geospatial information layers in a single visualization environment.

-DI develops plans to use artificial intelligence (AI) and block chain technology in support of data governance, provenance and discoverability.

The Radar, Sensor, Technical Intelligence (TI), and Allied Systems data integration effort designs, develops, exposes and integrates data from radar, sensors and technical intelligence systems in regions of the world where potential GDI users currently do not have coverage.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver GDI capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826SF, 605827SF, 0605828SF, 0605829SF, 0605830SF, 0605831SF, 0605832SF, and 0605898SF.

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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1201017SF I Global Sensor Integrated on Network (GSIN)
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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	5.597	4.731	0.000	0.000	0.000
Current President's Budget	5.411	4.731	5.321	0.000	5.321
Total Adjustments	-0.186	0.000	5.321	0.000	5.321
• 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	-0.186	0.000			
• Other Adjustments	0.000	0.000	5.321	0.000	5.321

Change Summary Explanation

FY 2021: -\$0.186 decrease for SBIR.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Title: Global Data Integration (GDI) Development</p> <p>Description: Effort title changed from "Global Data Integration (GDI)" to "Global Data Integration (GDI) Development" to differentiate major thrust from new project title. This is not a new start.</p> <p>Develop common Extensible Markup Language (XML) net-enabled data schemas and configuration management processes and procedures for Missile Warning, Missile Defense, Space, MASINT/Technical Intelligence, and Sensor data to manage the XML schema and associated XML messaging and services. Develop technical outreach for potential new GDI data consumers and providers who require GDI sensor data. Upgrade GDI capabilities as Defense Information Systems Agency (DISA) Enterprise Services evolve. Continue modifications to data services. Support integration of GDI sensor data into appropriate registries/catalogs. Continue development of GDI data services to enable visualization in a common operating picture. Conduct studies and demonstrations of SSA capabilities, data correlation, and assessment services for risk reduction evaluations.</p> <p>FY 2022 Plans: - DATABAHN: Continue accreditation and certification of Mountain Pass site one and begin replication of Mountain Pass to site two; continue integration efforts with ACE-M</p>	4.911	4.231	4.821

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1201017SF / <i>Global Sensor Integrated on Network (GSIN)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>- FEAST: Finalize integration and testing of TS/SCI data sources</p> <p>- Data Integrity: In conjunction with MIT/LL, continue to develop methodologies to implement block-chain technology to further ensure the integrity GDI-exposed data sources</p> <p>- Additionally, FY 2022 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2023 Plans:</p> <p>-DATABAHN: Continue pursuing accreditation. Develop and field a dedicated CDS and Cloud presence, including geographically-separated, redundant nodes, providing greater operational resiliency. Provide capability to include new data consumers and providers who require GDI sensor data. Support integration of GDI sensor data into appropriate registries and catalogs. Continue development of GDI data services to enable visualization in a common operating picture.</p> <p>-FEAST: Develop a test bed for block-chain efforts and finalize replication of Secret Internet Protocol Routed Network (SIPRNET)-level FEAST capability on Joint Worldwide Intelligence Communications System (JWICS). Integrate additional Top Secret/Special Compartmentalized Information (TS/SCI) data sources and algorithms.</p> <p>-ACE-M: Develop data fusion plans and capabilities, such as visual display of situational awareness data, analytic tools and algorithms, and historical playback of events, for new and existing GDI users</p> <p>-DI: Develop plans to incorporate new capabilities in AI and block-chain technology. Test and evaluate all GDI segments in support of data governance, provenance and discovery.</p> <p>Additionally, FY 2023 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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 1201017SF / <i>Global Sensor Integrated on Network (GSIN)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY 2023 funding increased due to additional effort to field a dedicated CDS and Cloud presence and initiating ACE-M data fusion efforts.				
Title: Radar, Sensor, Technical Intelligence (TI), and Allied Systems		0.500	0.500	0.500
Description: Radar, sensor, technical intelligence and Allied Systems: Designs, develops, exposes and integrates data from radar, sensors and technical intelligence systems in regions of the world where potential GDI users currently do not have coverage. Provide real time data from systems that previously reported in hours or days after critical events. Conduct studies/surveys/meetings as necessary to continually identify systems meeting GDI user data exposure needs. Designs, develops, tests, exposes, and integrates SDA data from previously untapped systems into space production systems and the Global Information Grid (GIG). Develop implementation plans to mature data exposure capabilities.				
FY 2022 Plans:				
<ul style="list-style-type: none"> - Continue Integration and Testing of Radar 1 - Start Design/Development & Production/Fielding of Radar 2 - Rapidly implement system resiliency and situational awareness changes required to operate in the contested space domain 				
FY 2023 Plans:				
<ul style="list-style-type: none"> - Complete Integration and Testing of Radar 1 and support Initial Operational Capability (IOC) - Continue Production/Fielding of Radar 2 - Rapidly implement system resiliency and situational awareness changes required to operate in the contested space domain 				
FY 2022 to FY 2023 Increase/Decrease Statement:				
N/A				
Accomplishments/Planned Programs Subtotals		5.411	4.731	5.321
D. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
E. Acquisition Strategy				
GDI uses existing government contract vehicles whenever available, from agencies such as Missile Defense Agency (MDA) or Air Force Life Cycle Management Center (AFLCMC) to develop and modernize the combined SDA/MW/MD/MASINT/TI data exposure architecture and solution. When appropriate contracts do not exist or not available to GDI, USSTRATCOM awards new contracts in support of responsive and consistent GDI goals. The contracts are managed by the relevant organization's contracting office.				

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

Appropriation/Budget Activity
3620F: *Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development*

R-1 Program Element (Number/Name)
PE 1201017SF / *Global Sensor Integrated on Network (GSIN)*

Massachusetts Institute of Technology/Lincoln Labs (MIT/LL) will provide the Data Integrity effort based upon ongoing research as an FFRDC.

All contracts are competed whenever possible.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force			Date: April 2022		
Appropriation/Budget Activity 3620F / 7		R-1 Program Element (Number/Name) PE 1201017SF / <i>Global Sensor Integrated on Network (GSIN)</i>		Project (Number/Name) 675368 / <i>GSIN (Global Integrated Sensor Network)</i>	

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				
	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	
DATABAHN																													
Production/Fielding																													
Initial Operational Capability																													
Integration and Testing																													
Full Operational Capability																													
FEAST																													
Development, Integration, and Testing																													
ACE-M																													
Common Operating Picture (COP) in a Cross Domain Solution (CDS) Environment																													
DATABAHN Ingestion into COP																													
Resiliency Testing of GDI's Three Pillars																													
DI																													
R&D Proof of Concept																													
Radar, Sensor, Technical Intelligence (TI) and Allied Systems																													
(RADAR 1) Integration and Testing																													
(RADAR 1) Initial Operational Capability																													
(RADAR 2) Design/Develop																													
(RADAR 2) Production/Fielding																													
(RADAR 2) Integration and Testing																													
(RADAR 2) Initial Operational Capability																													
(RADAR 3) Design/Develop																													
(RADAR 3) Production/Fielding																													
(RADAR 3) Integration and Testing																													

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force							Date: April 2022						
Appropriation/Budget Activity 3620F / 7				R-1 Program Element (Number/Name) PE 1201017SF / <i>Global Sensor Integrated on Network (GSIN)</i>				Project (Number/Name) 675368 / <i>GSIN (Global Integrated Sensor Network)</i>					

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027							
	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				
(RADAR 3) Initial Operational Capability																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1201017SF / <i>Global Sensor Integrated on Network (GSIN)</i>	Project (Number/Name) 675368 / <i>GSIN (Global Integrated Sensor Network)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>DATABAHN</i>				
Production/Fielding	3	2021	3	2023
Initial Operational Capability	4	2023	4	2023
Integration and Testing	4	2023	1	2024
Full Operational Capability	2	2024	2	2024
<i>FEAST</i>				
Development, Integration, and Testing	1	2021	3	2023
<i>ACE-M</i>				
Common Operating Picture (COP) in a Cross Domain Solution (CDS) Environment	2	2021	4	2023
DATABAHN Ingestion into COP	3	2021	4	2024
Resiliency Testing of GDI's Three Pillars	3	2023	2	2027
<i>DI</i>				
R&D Proof of Concept	1	2021	4	2027
<i>Radar, Sensor, Technical Intelligence (TI) and Allied Systems</i>				
(RADAR 1) Integration and Testing	3	2022	1	2023
(RADAR 1) Initial Operational Capability	2	2023	2	2023
(RADAR 2) Design/Develop	2	2023	4	2023
(RADAR 2) Production/Fielding	4	2023	4	2025
(RADAR 2) Integration and Testing	4	2025	3	2027
(RADAR 2) Initial Operational Capability	4	2027	4	2027
(RADAR 3) Design/Develop	4	2023	4	2023
(RADAR 3) Production/Fielding	1	2024	1	2026

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1201017SF / <i>Global Sensor Integrated on Network (GSIN)</i>	Project (Number/Name) 675368 / <i>GSIN (Global Integrated Sensor Network)</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
(RADAR 3) Integration and Testing	1	2026	3	2027
(RADAR 3) Initial Operational Capability	4	2027	4	2027

Note
All RADAR timelines are notional, pending FMS actions.

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1203001SF I Family of Advanced BLoS Terminals (FAB-T)
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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	-	224.242	156.788	128.243	0.000	128.243	80.750	1.989	0.304	0.310	0.000	592.626
672490: Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)	-	18.294	14.817	2.850	0.000	2.850	0.000	0.000	0.000	0.000	0.000	35.961
673035: Presidential and National Voice Conferencing	-	57.199	42.992	34.972	0.000	34.972	35.161	1.989	0.304	0.310	0.000	172.927
673040: Force Element Terminal	-	148.749	98.979	90.421	0.000	90.421	45.589	0.000	0.000	0.000	0.000	383.738

A. Mission Description and Budget Item Justification

The Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) - Command Post Terminal (CPT), Force Element Terminal (FET), and Presidential and National Voice Conferencing (PNVC) Integrator programs - transitioned from AFPEO/SP to AFPEO/NC3 effective December 2018.

The FAB-T CPT project replaces legacy Milstar terminals and will provide Extremely High Frequency (EHF), protected high data rate communication for nuclear and conventional forces to include PNVC. FAB-T will provide this new, highly secure, state-of-the-art capability for Department of Defense (DoD) platforms to include strategic platforms and airborne/ground command posts via Milstar and Advanced EHF (AEHF) satellites. FAB-T CPTs will also support the critical command and control (C2) of the Milstar and AEHF satellite constellations. In FY 2023, Project FAB-T CPT will be completed.

The FAB-T FET project replaces the legacy Ultra High Frequency (UHF) Milstar system and provides secure, protected, and survivable communications for the strategic warfighter through airborne-based Military Satellite Communication (MILSATCOM) terminals. The FAB-T FET will provide the B-52 aircraft with worldwide nuclear and non-nuclear, survivable, anti-jam Low Probability of Detect (LPD)/ Low Probability of Intercept (LPI) data and voice communications. The FAB-T FET will be interoperable with AEHF, Enhanced Polar Systems - Recapitalization (EPS-R), and Evolved Strategic SATCOM (ESS) satellite constellations utilizing Extended Data Rate (XDR) waveforms. FAB-T FET was designated as a Middle Tier of Acquisition (MTA) in Feb 2019.

The total cost of the FAB-T FET Middle Tier of Acquisition effort is 496.4M, including RDT&E and procurement of prototype units. The program is fully funded across the Future Years Defense Program. Risk Reduction efforts accomplished in 2019 are not included in the MTA cost, and result in a total investment of \$527.2M.

The PNVC Integrator project is a critical element of the Nuclear Command, Control, and Communications (NC3) System. PNVC is the Survivable Emergency Conferencing Network (SECN) replacement capability, which provides anti-jam, anti-scintillation, survivable, and enduring voice communications through the AEHF satellite system for national and strategic users. There are several components being developed and procured by other organizations that must be synchronized to expeditiously field the capability. The PNVC Integrator is responsible for end-to-end integration of these components, to include requirements traceability, end-to-end system testing, configuration and checkout activities, training and technical manuals, network transition support, identification of deficiencies in overall PNVC system capability, enterprise, and life cycle support for PNVC components. The AFPEO/SP approved entry into the acquisition lifecycle as a post MS-A Acquisition Category

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203001SF / <i>Family of Advanced BLoS Terminals (FAB-T)</i>
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(ACAT) III Program of Record in January 2016. Starting in December 2018, PNVC Integrator became responsible for the funding requests of all program elements related to the Defense Information Systems and Agency (DISA) components of the PNVC System in accordance with FY 2018 National Defense Authorization Act, Sec. 1661. In February 2019, the AFPEO/NC3 declared the PNVC Integrator an ACAT II Program based on the inclusion of DISA funding in the program budget.

The FY 2023 funding request was reduced by 4.096M to account for the availability of prior year execution balances.

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 PY 0.723M was expended for civilian pay expenses in this program element, and in CY 0.735M is forecasted for civilian pay expenses in this program element

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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	232.229	156.788	0.000	0.000	0.000
Current President's Budget	224.242	156.788	128.243	0.000	128.243
Total Adjustments	-7.987	0.000	128.243	0.000	128.243
• 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	-7.987	0.000			
• Other Adjustments	0.000	0.000	128.243	0.000	128.243

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 FY 2023 cannot be made in a relevant manner.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 7					R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)				Project (Number/Name) 672490 / Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)			
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
672490: Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)	-	18.294	14.817	2.850	0.000	2.850	0.000	0.000	0.000	0.000	0.000	35.961
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The FAB-T Command Post Terminal (CPT) project replaces legacy Milstar terminals and will provide Extremely High Frequency (EHF), protected high data rate communication for nuclear and conventional forces to include Presidential and National Voice Conferencing (PNVC). FAB-T CPT will provide this new, highly secure, state-of-the-art capability for Department of Defense (DoD) platforms to include strategic platforms and airborne/ground command posts via Milstar and Advanced EHF (AEHF) satellites. FAB-T CPTs will also support the critical command and control (C2) of the Milstar and AEHF satellite constellations. The Department of the Air Force (DAF) will continue development of the FAB-T CPT, performing systems engineering, architecture studies, development and operational test efforts, terminal interoperability with the full AEHF satellite constellation activities, and other program activities to meet current and future emerging SATCOM requirements. In FY 2023, Project FAB-T CPT will be completed.

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

	FY 2021	FY 2022	FY 2023
Title: FAB-T CPT Development	18.294	14.817	2.850
Description: The FAB-T CPT program will provide EHF voice and data Military Satellite Communication (MILSATCOM) for nuclear and conventional forces as well as airborne and ground command posts with connectivity to Milstar and AEHF satellites.			
FY 2022 Plans: The FAB-T CPT program continues to provide EHF voice and data MILSATCOM for nuclear and conventional forces as well as airborne and ground command posts with connectivity to Milstar and AEHF satellites. FAB-T CPT continues development of efforts required for National Security Agency (NSA) AEHF terminal certification, specifically an update to the software encryption station.			
Activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.			
The Nuclear Command, Control, and Communication (NC3) system of systems provides connectivity from the President or Secretary of Defense through the National Military Command System (NMCS) to nuclear execution forces worldwide. To enhance and maintain NC3 mission success, the AF formalized AF NC3 elements as a specified AF Weapon System (WS), AN/USQ-225.			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	Project (Number/Name) 672490 / Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Activities funded in this Program pay for its integration into multiple legacy systems, other ongoing NC3 acquisition programs, and future capabilities for the overall AF NC3 WS.</p> <p>FY 2023 Plans: The FAB-T CPT program will continue to provide EHF voice and data MILSATCOM for nuclear and conventional forces as well as airborne and ground command posts with connectivity to Milstar and AEHF satellites. FAB-T CPT is scheduled to complete development of efforts required for NSA AEHF terminal certification, specifically an update to the software encryption station.</p> <p>Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>Activities funded in this program continue to pay for AN/USQ-225 integration into multiple legacy systems, other ongoing NC3 acquisition programs, and future capabilities for the overall AF NC3 WS.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: The reduction in resource requirements stems from a shift from design and development to testing of efforts in support of NSA AEHF terminal certification. FAB-T CPT Development will complete in FY 2023.</p>			
Accomplishments/Planned Programs Subtotals	18.294	14.817	2.850

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• SPAF 01 FBLOST FAB-T: FAB-T	55.950	30.745	19.078	-	19.078	21.607	15.457	14.289	5.011	Continuing	Continuing
• SPAF 01 FBLOST PNVC: FAB-T	5.240	5.799	7.316	-	7.316	3.286	1.661	1.695	1.739	Continuing	Continuing
• SPAF 01 SPAF FET: FAB-T	0.000	0.000	0.000	-	0.000	120.837	232.655	210.737	23.241	Continuing	Continuing
• RDTE 07 FET: FAB-T	148.749	98.979	90.421	-	90.421	45.589	0.000	0.000	0.000	0.000	383.738
• RDTE 07 PNVC: FAB-T	57.199	42.992	34.972	-	34.972	35.161	1.989	0.304	0.310	Continuing	Continuing

Remarks

D. Acquisition Strategy

FAB-T CPT Acquisition Strategy: In FY 2012, the government restructured the FAB-T CPT development program to introduce competition into the acquisition strategy in order to reduce risk in delivering this capability as well as to drive down production costs. To ensure the best value to the government, the DAF awarded production contracts in September 2013 to both contractors (Boeing and Raytheon). The production contracts began with production planning for both contractors. In June 2014, the DAF down-selected to Raytheon. Development and production of FAB-T CPTs continued with Raytheon. The first Production contract options to produce FAB-T CPTs were exercised after a successful Milestone C decision was approved September 1, 2015.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	Project (Number/Name) 672490 / Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)
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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			
FAB-T CPT Prime Contract	Various	Raytheon : Marlboro, MA	-	17.346	Jan 2021	13.862	Nov 2021	1.996	Dec 2022	-		1.996	Continuing	Continuing	-
FAB-T CPT Technical Mission Analysis	Various	Various : Various	-	0.000	Oct 2020	0.397	Dec 2021	0.390	Dec 2022	-		0.390	Continuing	Continuing	-
FAB-T CPT GFE	Various	Various : Various	-	0.002	Feb 2021	-		-		-		-	Continuing	Continuing	-
Subtotal			-	17.348		14.259		2.386		-		2.386	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			
FAB-T CPT Other Support	Various	Various : Various	-	0.946	Dec 2020	0.142	Oct 2021	0.064	Nov 2022	-		0.064	Continuing	Continuing	-
FAB-T CPT A&AS	Various	Various : Various	-	-		0.416	Feb 2022	0.400	Jan 2023	-		0.400	Continuing	Continuing	-
Subtotal			-	0.946		0.558		0.464		-		0.464	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			-	18.294	14.817	2.850	-	2.850	Continuing	Continuing	N/A

Remarks
 Prior Years funding, FY 2016/FY 2017 \$95.229M was executed in Program Element (PE) 0303001F. Prior to FY 2016, \$180.602M was executed in PE 0303601F.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force			Date: April 2022				
Appropriation/Budget Activity 3620F / 7		R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)			Project (Number/Name) 672490 / Family of Advanced Beyond Line- of-Sight Terminals (FAB-T)		

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

FAB-T	
FAB-T CPT AEHF Terminal Certification	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / <i>Family of Advanced BLoS Terminals (FAB-T)</i>	Project (Number/Name) 672490 / <i>Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>FAB-T</i>				
FAB-T CPT AEHF Terminal Certification	1	2021	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 7					R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)				Project (Number/Name) 673035 / Presidential and National Voice Conferencing			
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
673035: Presidential and National Voice Conferencing	-	57.199	42.992	34.972	0.000	34.972	35.161	1.989	0.304	0.310	0.000	172.927
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The PNVC project is a critical element of the Nuclear Command, Control, and Communications (NC3) System. PNVC is the Survivable Emergency Conferencing Network (SECN) replacement capability which provides anti-jam, anti-scintillation, survivable, and endurable voice communications through the Advanced Extremely High Frequency (AEHF) satellite system for national and strategic users. There are several components being developed and procured by other organizations that must be synchronized to expeditiously field this capability. The PNVC Integrator is responsible for end-to-end integration of these components, to include requirements traceability, end-to-end system testing, configuration and checkout activities, training and technical manuals, network transition support, identification of deficiencies in overall PNVC system capability, enterprise, and life cycle support for PNVC components. The AFPEO/SP approved entry into the acquisition lifecycle as a post MS-A Acquisition Category (ACAT) III Program of Record in January 2016. In February 2019 the AFPEO/NC3 declared the PNVC Integrator an ACAT II Program based on updated approved budget request.

Starting in December 2018 PNVC Integrator became responsible for the funding requests of all program elements related to the Defense Information Systems and Agency (DISA) components of the PNVC System in accordance with FY 2018 National Defense Authorization Act, Sec. 1661.

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

	FY 2021	FY 2022	FY 2023
Title: PNVC Integrator	57.199	42.992	34.972
Description: PNVC is the SECN replacement capability which provides anti-jam, anti-scintillation, survivable, and endurable voice communications through the AEHF satellite system for national and strategic users. The PNVC capability consists of constituent programs being developed and produced by other organizations. This program will integrate, test, and support configuration of hardware from these other programs. PNVC components will be installed at ground fixed and mobile command locations as well as three aircraft platforms.			
FY 2022 Plans: PNVC Integrator team conducts Multi-Service Operational Test and Evaluation (MOT&E), led by the Air Force Operational Test and Evaluation Center (AFOTEC), and overseen by the Director, Operational Test & Evaluation (DOT&E). This end-to-end system test will assess all node types in the PNVC system in its operational environment to determine PNVC's overall capability to support mission accomplishment, as determined by effectiveness, suitability, and other applicable operational considerations such as survivability.			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / <i>Family of Advanced BLoS Terminals (FAB-T)</i>	Project (Number/Name) 673035 / <i>Presidential and National Voice Conferencing</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>The PNVC Integrator also conducts integration and checkout activities and training at remaining operational sites world-wide, conducts cyber-security testing, and continues to work closely with the applicable sustainment organizations, as they make their preparations for becoming responsible for PNVC sustainment, engineering, and maintenance.</p> <p>PNVC Integrator activities include, but are not limited to program office support, prototyping, test planning and execution, deficiency resolution, logistics and sustainment support planning, component product support, risk reduction activities, technical analysis and studies, platform integration and support, and integration of laboratory support.</p> <p>The Nuclear Command, Control, and Communication (NC3) system of systems provides connectivity from the President or Secretary of Defense through the National Military Command System (NMCS) to nuclear execution forces worldwide. To enhance and maintain NC3 mission success, the AF formalized AF NC3 elements as a specified AF Weapon System (WS), AN/USQ-225. Activities funded in this Program pay for its integration into multiple legacy systems, other ongoing NC3 acquisition programs, and future capabilities for the overall AF NC3 WS.</p> <p>FY 2023 Plans: The PNVC Integrator will continue to conduct integration, checkout activities, and training at remaining operational sites world-wide, conduct cyber-security testing, and continue to work closely with the applicable sustainment organizations as responsibilities for PNVC sustainment, engineering, and maintenance are realized.</p> <p>PNVC Integrator activities will include, but are not limited, to program office support, prototyping, test planning and execution, deficiency resolution, logistics and sustainment support planning, component product support, risk reduction activities, technical analysis and studies, platform integration and support, and integration of laboratory support. PNVC will continue to support component fielding, conduct site integration and checkout, and prepare for and execute integrated developmental test activities.</p> <p>Activities funded in this program continue to pay for AN/USQ-225 integration into multiple legacy systems, other ongoing NC3 acquisition programs, and future capabilities for the overall AF NC3 WS.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: As the PNVC system nears its operational capability, the government's role as the integrator is decreasing, and the associated requirements for support from the contractor will likewise decline. Testing will be concluded in FY 2023 and deficiencies will be corrected.</p>				
Accomplishments/Planned Programs Subtotals		57.199	42.992	34.972

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	Project (Number/Name) 673035 / Presidential and National Voice Conferencing
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2021	FY 2022	FY 2023	FY 2023	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Cost To	
			Base	OCO	Total					Complete	Total Cost
• SPAF 01 FBLOST FAB-T: FAB-T	55.950	30.745	19.078	-	19.078	21.607	15.457	14.289	5.011	Continuing	Continuing
• SPAF 01 FBLOST PNVC: FAB-T	5.240	5.799	7.316	-	7.316	3.286	1.661	1.695	1.739	Continuing	Continuing
• SPAF 01 SPAF FET: FAB-T	0.000	0.000	0.000	-	0.000	120.837	232.655	210.737	23.241	Continuing	Continuing
• RDTE 07 FET: FAB-T	148.749	98.979	90.421	-	90.421	45.589	0.000	0.000	0.000	0.000	383.738
• RDTE 07 FAB-T CPT: FAB-T	18.294	14.817	2.850	-	2.850	0.000	0.000	0.000	0.000	0.000	35.961

Remarks

D. Acquisition Strategy

PNVC Acquisition Strategy: On May 15, 2015 the Deputy Secretary of Defense assigned the PNVC End-to-End Integration responsibility to the DAF; effective May 16, 2015, SAF/AQ designated the AFPEO/SP. In February 2019 the AFPEO/NC3 declared the PNVC Integrator an ACAT II Program based on updated approved budget request. The PNVC End-to-End Integrator program is responsible for requirements traceability, End-to-End system testing, site configuration activities, training and technical manuals, network transition support, identifying deficiencies in the PNVC capability, and enterprise and life cycle support for all PNVC components. Starting in December 2018 PNVC Integration is responsible for all program elements' requests for funding related to the Defense Information Systems and Agency (DISA) components of the PNVC System in accordance with FY 2018 National Defense Authorization Act, Sec. 1661.

PNVC will continue to support component fielding, conduct site integration and checkout, and prepare for and execute integrated developmental test activities in advance of the PNVC system Initial Operating Capability.

Beginning in FY2020, all PNVC funds were transferred from DISA to Project 673035, for execution.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	Project (Number/Name) 673035 / Presidential and National Voice Conferencing
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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			
PNVC Prime Contract	Various	Raytheon : Largo, FL	-	36.811	Oct 2020	28.480	Oct 2021	20.672	Oct 2022	-		20.672	Continuing	Continuing	-
PNVC Technical Mission Analysis	Various	Various : Various	-	3.462	Oct 2020	3.089	Oct 2021	3.075	Oct 2022	-		3.075	Continuing	Continuing	-
PNVC Enterprise SE&I	Various	Various : Various	-	4.125	Oct 2020	3.305	Oct 2021	3.205	Oct 2022	-		3.205	Continuing	Continuing	-
Subtotal			-	44.398		34.874		26.952		-		26.952	Continuing	Continuing	N/A

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			
PNVC Government Test and LDTO Support	Various	Various : Various	-	2.756	Oct 2020	0.687	Oct 2021	0.605	Oct 2022	-		0.605	Continuing	Continuing	-
Subtotal			-	2.756		0.687		0.605		-		0.605	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			
PNVC FFRDC	Various	Various : Various	-	3.964	Oct 2020	3.680	Oct 2021	3.675	Nov 2022	-		3.675	Continuing	Continuing	-
PNVC A&AS	Various	Various : Various	-	2.191	Oct 2020	2.162	Nov 2021	2.160	Nov 2022	-		2.160	Continuing	Continuing	-
PNVC Other Support	Various	Various : Various	-	3.890	Oct 2020	1.589	Oct 2021	1.580	Nov 2022	-		1.580	Continuing	Continuing	-
Subtotal			-	10.045		7.431		7.415		-		7.415	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			-	57.199	42.992	34.972	-	34.972	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force			Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	Project (Number/Name) 673035 / Presidential and National Voice Conferencing	

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

<i>PNVC Integrator</i>																												
Phase II Dry-Runs & Development Test 2																												
Multi-Service Operational Test & Evaluation																												
Training/Installation and Checkout																												
Software Maturation																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / <i>Family of Advanced BLoS Terminals (FAB-T)</i>	Project (Number/Name) 673035 / <i>Presidential and National Voice Conferencing</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>PNVC Integrator</i>				
Phase II Dry-Runs & Development Test 2	3	2021	4	2021
Multi-Service Operational Test & Evaluation	2	2023	3	2023
Training/Installation and Checkout	1	2021	1	2027
Software Maturation	1	2021	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 7					R-1 Program Element (Number/Name) PE 1203001SF / <i>Family of Advanced BLoS Terminals (FAB-T)</i>				Project (Number/Name) 673040 / <i>Force Element Terminal</i>			
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
673040: <i>Force Element Terminal</i>	-	148.749	98.979	90.421	0.000	90.421	45.589	0.000	0.000	0.000	0.000	383.738
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Family of Advanced Beyond Line-of-Sight Terminals (FAB-T) FET project replaces the Ultra High Frequency (UHF) Milstar system and provides secure, protected, and survivable communications for the strategic warfighter through airborne-based Military Satellite Communication (MILSATCOM) terminals. The FAB-T FET will provide the B-52 aircraft with worldwide nuclear and non-nuclear, survivable, anti-jam Low Probability of Detect (LPD)/ Low Probability of Intercept (LPI) data and voice communications. The FAB-T FET will be interoperable with Advanced Extremely High Frequency (AEHF), Enhanced Polar Systems - Recapitalization (EPS-R), and Evolved Strategic SATCOM (ESS) satellite constellations utilizing Extended Data Rate (XDR) waveforms. FAB-T FET was designated as a Middle Tier of Acquisition (MTA) in Feb 2019.

The total cost of the FAB-T FET Middle Tier of Acquisition effort is 496.4M, including RDT&E and procurement of prototype units. The program is fully funded across the Future Years Defense Program. Risk Reduction efforts accomplished in 2019 are not included in the MTA cost, and result in a total investment of 527.2M.

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

	FY 2021	FY 2022	FY 2023
Title: FAB-T FET	148.749	98.979	90.421
Description: Continue development of FETs. Development activities include, but are not limited to, FAB-T FET design, development, and qualification testing.			
FY 2022 Plans: Funding is for the continued development of Force Element Terminals. FAB-T FET integration and testing activities include reliability growth testing and fabrication of test assets; prototypes will support terminal environmental and functional testing, to include flight testing, and to support early integration efforts.			
Planning and support activities include continued qualification test planning, logistics support planning, risk reduction activities, technical analysis and studies, platform integration support, and program office support.			
The Nuclear Command, Control, and Communication (NC3) system of systems provides connectivity from the President or Secretary of Defense through the National Military Command System (NMCS) to nuclear execution forces worldwide. To enhance and maintain NC3 mission success, the AF formalized AF NC3 elements as a specified AF Weapon System (WS), AN/USQ-225.			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	Project (Number/Name) 673040 / Force Element Terminal

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Activities funded in this Program pay for its integration into multiple legacy systems, other ongoing NC3 acquisition programs, and future capabilities for the overall AF NC3 WS.</p> <p>FY 2023 Plans: Funding is for the continued development of FETs. FAB-T FET integration and testing activities will include reliability growth testing and fabrication of test assets; prototypes will support terminal environmental and functional testing to include flight testing, and early integration efforts.</p> <p>Planning and support activities will continue qualification test planning, logistics support planning, risk reduction activities for development and follow-on production, technical analysis and studies, platform integration support, program office support, and mitigations for Diminishing Manufacturing Sources and Material Shortages in preparation for terminal production decision.</p> <p>Activities funded in this program continue to pay for AN/USQ-225 integration into multiple legacy systems, other ongoing NC3 acquisition programs, and future capabilities for the overall AF NC3 WS.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: The reduction in resource requirements stems from the FAB-T FET development transition from design planning and prototype development to integration and testing of the prototypes and test assets.</p>			
Accomplishments/Planned Programs Subtotals	148.749	98.979	90.421

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• SPAF 01 FBLOST FAB-T: FAB-T	55.950	30.745	19.078	-	19.078	21.607	15.457	14.289	5.011	Continuing	Continuing
• SPAF 01 FBLOST PNVC: FAB-T	5.240	5.799	7.316	-	7.316	3.286	1.661	1.695	1.739	Continuing	Continuing
• SPAF 01 SPAF FET: FAB-T	0.000	0.000	0.000	-	0.000	120.837	232.655	210.737	23.241	Continuing	Continuing
• RDTE 07 PNVC: FAB-T	57.199	42.992	34.972	-	34.972	35.161	1.989	0.304	0.310	Continuing	Continuing
• RDTE 07 FAB-T CPT: FAB-T	18.294	14.817	2.850	-	2.850	0.000	0.000	0.000	0.000	0.000	35.961

Remarks

D. Acquisition Strategy
FAB-T FET Acquisition Strategy: Per the Acquisition Strategy Panel briefed to SAF/AQ on February 7, 2019, FAB-T FET pursued a Rapid Prototyping development Middle Tier Acquisition approach of the National Defense Authorization Act for FY 2016 (Public Law 114-92). This Rapid Prototyping program enabled FAB-T FET to accelerate the nominal program development timeline in support of the accelerated USSTRATCOM-requested Initial Operating Capability. FAB-T FET awarded a

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force Date: April 2022

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
3620F / 7	PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	673040 / Force Element Terminal

development effort on January 16, 2020 leading to a production decision in FY 2024. The rapid Prototyping effort enabled FAB-T FET to develop, install, and obtain operationally-representative test data from early B-52 FAB-T FET prototypes which will also have residual operations capability. The overall development effort includes system design and build of sufficient test assets to allow for expeditious development, testing, qualification and integration support of the FAB-T FET capability. FAB-T FET will meet B-52 platform requirements to support USSTRATCOM's Strategic Nuclear Command Control and Communication (NC3) mission.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)	Project (Number/Name) 673040 / Force Element Terminal
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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			
FAB-T FET Development Contracts	Various	Raytheon : Marlborough, MA	-	124.051	Oct 2020	73.911	Nov 2021	66.507	Dec 2022	-		66.507	Continuing	Continuing	-
FAB-T FET Technical Mission Analysis	Various	Various : Various	-	2.482	Oct 2020	1.625	Nov 2021	1.615	Dec 2022	-		1.615	Continuing	Continuing	-
FAB-T FET Enterprise SE&I	Various	Various : Various	-	0.357	Mar 2021	0.200	Mar 2022	0.150	Mar 2023	-		0.150	Continuing	Continuing	-
Subtotal			-	126.890		75.736		68.272		-		68.272	Continuing	Continuing	N/A

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			
FAB-T FET Test & Evaluation and Assets	Various	Various : Various	-	6.643	Dec 2020	6.882	Nov 2021	6.800	Dec 2022	-		6.800	Continuing	Continuing	-
Subtotal			-	6.643		6.882		6.800		-		6.800	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			
FAB-T FET FFRDC	Various	Various : Various	-	4.801	Dec 2020	6.005	Nov 2021	6.000	Dec 2022	-		6.000	Continuing	Continuing	-
FAB-T FET Other Support	Various	Various : Various	-	6.394	Nov 2020	7.324	Nov 2021	6.199	Dec 2022	-		6.199	Continuing	Continuing	-
FAB-T FET A&AS	Various	Various : Various	-	4.021	Dec 2020	3.032	Dec 2021	3.150	Jan 2023	-		3.150	Continuing	Continuing	-
Subtotal			-	15.216		16.361		15.349		-		15.349	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			-	148.749	98.979	90.421	-	90.421	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force			Date: April 2022				
Appropriation/Budget Activity 3620F / 7		R-1 Program Element (Number/Name) PE 1203001SF / Family of Advanced BLoS Terminals (FAB-T)			Project (Number/Name) 673040 / Force Element Terminal		

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

FET	
FAB-T Force Element Terminal Development	[REDACTED]
FAB-T FET Design, Fabrication and Development of Prototypes and Test Assets	[REDACTED]
FAB-T FET Qualification Testing	[REDACTED]
FAB-T Force Element Terminal Production	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203001SF / <i>Family of Advanced BLoS Terminals (FAB-T)</i>	Project (Number/Name) 673040 / <i>Force Element Terminal</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>FET</i>				
FAB-T Force Element Terminal Development	1	2021	3	2024
FAB-T FET Design, Fabrication and Development of Prototypes and Test Assets	1	2021	2	2023
FAB-T FET Qualification Testing	1	2022	2	2024
FAB-T Force Element Terminal Production	3	2024	4	2027

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

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 1203040SF / DCO-Space
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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	-	0.000	2.150	28.162	0.000	28.162	28.249	13.808	13.878	13.912	Continuing	Continuing
673070: <i>Defensive Cyber Ops - Space</i>	-	0.000	2.150	28.162	0.000	28.162	28.249	13.808	13.878	13.912	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2022, PE 1203040SF, Defense Cyber Operations - Space efforts were transferred from PE 1203110SF Satellite Control Network (SPACE), Budget Activity 07 due to the creation of a new Appropriation for Space Force and Program Element for Defense Cyber Operations - Space. This is not a new start.

Defensive Cyberspace Operations (DCO-S) provides defensive cyber capabilities that protect the network enclaves of USSF mission systems, to include their associated computer systems, software applications and sensitive operational information against unauthorized intrusion, corruption, and/or destruction. The emphasis of the program is directed toward defensive cyberspace capabilities, computer and network systems security, damage assessment and recovery, cyber threat recognition, attribution, and mitigation, and active response methodologies in response to evolving threats and changes to cyber environment. These areas of emphasis are realized through research and development, test and acquisition in the areas of proactive defense, defensive counter cyberspace, cyberspace intelligence, surveillance and reconnaissance, command and control situational awareness, persistent network operations, as well as decision support, recovery, and digital forensics.

These efforts implement a combined Development/Security/Operations (DEVSECOPS) framework, which incorporates methodologies, technologies, and tools to deeply embed security best practices into the modern development workflow and tool-chain. This effort institutes two product lines: Manticore (Detect & Identify) and Kraken (Protect & Respond). It will endeavor to identify shared/common platform, infrastructure, and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. The DCO-S capabilities are developed, produced and deployed as an agile program, leveraging a DEVSECOPS framework to facilitate rapid and timely fielding to operations.

These developments deploy both out-of-band (Manticore) and in-band (Kraken) cyber defense tool suites to Space Delta 6 (Cyber Ops) protecting the following mission sets: Protected Communications, Missile Warning, Military Strategic Communications (MILSATCOM), Position Navigation and Timing (PNT), Ballistic Missile Command and Control, Space Domain Awareness (SDA), Nuclear Command Control and Communications (NC3), and Command and Control Satellite Operations (C2 Sat Ops).

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, to increase 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 existing capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203040SF / DCO-Space
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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 FY 2021 0.000M was expended for civilian pay expenses in this program element, and in FY 2022 0.000M is forecasted for civilian pay expenses in this program element.

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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	2.150	0.000	0.000	0.000
Current President's Budget	0.000	2.150	28.162	0.000	28.162
Total Adjustments	0.000	0.000	28.162	0.000	28.162
• 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	28.162	0.000	28.162

Change Summary Explanation

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Defensive Cyberspace Operations - Space (DCO-S)	0.000	2.150	28.162
Description: Funding supports cyber hardening and Defensive Cyberspace Operations for Space (DCO-S) activities for the space enterprise. Provides space enterprise defensive cyber solutions to counter advanced persistence cyber threats, through rapid fielding of operational prototypes using agile development methods.			
FY 2022 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203040SF / DCO-Space
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Extended Manticore (Identify & Detect) and Kraken (Protect & Respond) product lines by purchasing hardware devices and renewed software licensing, which allowed external monitoring of mission system networks for purposes of protecting sensitive operational information against unauthorized intrusion, corruption, and/or destruction.</p> <p>FY 2023 Plans: Develop and integrate Manticore (Identify & Detect) and Kraken (Protect & Respond) DCO-S capabilities to new mission areas; build, test and deliver new features to keep pace with growing threat demands. Deploy both out-of-band (Manticore) and in-band (Kraken) cyber defense tool suites to Space Delta 6 (Cyber Ops). Additional DCO-S mission systems will be on-boarded to protect the following mission sets: Protected Communications, Missile Warning, Military Strategic Communications (MILSATCOM), Position Navigation and Timing (PNT), Ballistic Missile Command and Control, Space Domain Awareness (SDA), Nuclear Command Control and Communications (NC3), and Command and Control Satellite Operations (C2 Sat Ops).</p> <p>Increase systems engineering and accreditation support to develop cyber technology risk reduction, test and accreditation plans and perform modeling and analysis for common platform, infrastructure and data layers that ground and communication systems can build upon. Perform Security Test and Evaluation (ST&E) and issue fact-based risk assessments for developed DCO-S capabilities to promote the fielding of interoperable systems with optimum security features, countermeasures and safeguards in place. Explore using existing state-of-the-art commercial defensive applications to inform and drive improvements to military cyber defense capabilities that will protect infused sensor and artificially intelligent systems, as part of the Joint All Domain Command Control initiative.</p> <p>Employ modern testing methodologies based on industry best practices; embed the 47th Test Squadron into the Continuous Integration / Continuous Deployment framework and provide persistent cybersecurity test support and cybersecurity assessments of applications and environments. FFRDC and other management services provide mission assurance oversight to ensure capabilities meet operational need.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to Strategic Cybersecurity Program (SCP) guidance for significant expansion of DCO-S, technology insertion, development, analysis, test and deployment to include four additional mission areas.</p>			
Accomplishments/Planned Programs Subtotals	0.000	2.150	28.162

D. Other Program Funding Summary (\$ in Millions) N/A	
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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force Date: April 2022

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 1203040SF / <i>DCO-Space</i>
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D. Other Program Funding Summary (\$ in Millions)

Remarks
Program funding increased from 2.150M appropriated in FY 2022 to 28.162M in FY 2023 and similar in FY 2024 per SCP guidance to fund four additional space mission systems and associated development.

E. Acquisition Strategy

Currently, DCO-S is being acquired as an enterprise architecture prototype. The latest DCO-S acquisition strategy, committed to using a modular contracting strategy for fast, agile and adaptable approaches in order to successfully develop defensive cyber applications and deploy them to the space enterprise and next generation systems. These efforts implement a combined Development/Security/Operations (DEVSECOPS) framework which incorporates methodologies, technologies, and tools to deeply embed security best practices into the modern development workflow and tool-chain. We plan to leverage new prototyping techniques, previous Government investments in Federally Funded Research and Development Center (FFRDC) and efforts from Government labs as part of those development activities. This meets the highly dynamic cyber domain, with rapidly adapting adversaries and shifting priorities, in which the PMO operates. DCO-S is determined to equip the space enterprise with cyber services that increase mission system cyber resiliency, agility, and defense in support of the mission and warfighters. Defensive Cyber Operations is an immediate need to negate the realized threat on space systems today.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203040SF / DCO-Space	Project (Number/Name) 673070 / Defensive Cyber Ops - Space
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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			
DCO-S Suite Development	TBD	TBD : TBD	-	-		-		8.997	Nov 2022	-		8.997	Continuing	Continuing	-
Product Line Integration	TBD	TBD : TBD	-	-		2.150	May 2022	8.379	Nov 2022	-		8.379	Continuing	Continuing	-
Systems Engineering/ Accreditation	TBD	TBD : TBD	-	-		-		3.375	Nov 2022	-		3.375	Continuing	Continuing	-
Technical Mission Analysis	RO	Various : TBD	-	-		-		1.751	Jan 2023	-		1.751	Continuing	Continuing	-
SE&I	TBD	TBD : TBD	-	-		-		1.824	Nov 2022	-		1.824	Continuing	Continuing	-
Subtotal			-	-		2.150		24.326		-		24.326	Continuing	Continuing	N/A

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			
Developmental Test	TBD	TBD : TBD	-	-		0.000		0.478	Dec 2022	-		0.478	Continuing	Continuing	-
Subtotal			-	-		0.000		0.478		-		0.478	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			
FFRDC	RO	Various : TBD	-	-		-		2.000	Nov 2022	-		2.000	Continuing	Continuing	-
A&AS	C/Various	Various : TBD	-	-		-		1.077	Nov 2022	-		1.077	Continuing	Continuing	-
Other	Various	Various : TBD	-	-		-		0.281	Oct 2022	-		0.281	Continuing	Continuing	-
Subtotal			-	-		-		3.358		-		3.358	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			-	-	2.150	28.162	-	28.162	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203040SF / DCO-Space	Project (Number/Name) 673070 / Defensive Cyber Ops - Space
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

DCO-S	
DCO-S Product Line Development and Integration	
DCO-S Deployment to additional sites SBIRS and RGS	
DCO-Deployments to additional sites AEHF and GPS sites	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203040SF / <i>DCO-Space</i>	Project (Number/Name) 673070 / <i>Defensive Cyber Ops - Space</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>DCO-S</i>				
DCO-S Product Line Development and Integration	1	2022	4	2027
DCO-S Deployment to additional sites SBIRS and RGS	1	2023	4	2024
DCO-Deployments to additional sites AEHF and GPS sites	1	2023	4	2024

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

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 1203109SF / <i>Narrowband Satellite Communications</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	0.000	0.000	110.012	165.892	0.000	165.892	277.713	521.579	671.276	587.324	1,405.633	3,739.429
673109: <i>SATCOM MUOS</i>	0.000	0.000	110.012	165.892	0.000	165.892	277.713	521.579	671.276	587.324	1,405.633	3,739.429
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 345

Note

In FY 2022, Program Element (PE) 1203109N, Satellite Communications (SPACE), efforts were transferred to PE 1203109SF, Narrowband Satellite Communications, in order to meet the intent of Space Policy Directive-4 and to align with Office of the Under Secretary of Defense (OUSD) direction to transfer the Mobile User Objective System (MUOS) from the Department of the Navy to the United States Space Force (USSF).

A. Mission Description and Budget Item Justification

Mobile User Objective System (MUOS) provides a worldwide, multi-service population of mobile and fixed-site terminal users with Ultra High Frequency (UHF) Narrowband, beyond line of sight satellite communications (SATCOM). MUOS significantly increases performance and capacity in support of critical Combatant Command SATCOM priorities. MUOS is the replacement system for the UHF Follow-on (UFO) system, which is currently beyond its design life.

MUOS is comprised of Space, Ground, and User Entry Segments. The Space Segment consists of five geosynchronous satellites, which includes an on-orbit spare. Each satellite provides both a legacy UHF payload backward compatible with UFO and a Wideband Code Division Multiple Access (WCDMA) payload, which provides 3G cellular-like capability. MUOS reached full operational capability in October 2019.

The Ground Segment consists of four world-wide Radio Access Facilities (RAFs) and two satellite control facilities. Each RAF includes three 60 ft. antennas and numerous equipment racks. The RAFs in Hawaii and Virginia each include a Switching Facility (SF), and the RAF in Hawaii includes a Network Management Facility (NMF). The User Entry Segment consists of the MUOS waveform that is ultimately integrated into MUOS-capable terminals which are fielded by the services. In addition to providing UHF SATCOM for the Department of Defense, the USSF has the overall responsibility to deliver the End-to-End (E2E) MUOS capability to the warfighter. This responsibility involves systems engineering, integration, and test management of all MUOS system-of-system activities.

In accordance with a Department of Defense Chief of Information Office assessment, anticipated narrowband satellite communication losses led to the recommendation by Office of Under Secretary of Defense (OUSD) Acquisitions & Sustainment and OUSD Cost Assessment and Program Evaluation (CAPE) direction for Navy to initiate MUOS Service Life Extension (SLE) to acquire and launch two additional MUOS satellites (without legacy payloads). The SLE is projected to extend the 70% constellation availability for the WCDMA capability to at least 2034 and extend the ground segment service life to support satellites to at least 2039.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203109SF / <i>Narrowband Satellite Communications</i>
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This PE funds systems optimization and modernization to address the dynamic, worldwide electromagnetic and cybersecurity environment in which MUOS operates. Efforts also include Service Life Extension early design and risk reduction for MUOS 6 and 7, as well as MUOS ground modernization. The PE includes a MUOS Baseline effort, a Service Life Extension effort, and an Analysis of Alternatives effort led by USSF in FY22-23.

The US Space Force will continue the narrowband analysis of alternatives as required to determine the narrowband solution beyond the MUOS system.

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 repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the MUOS 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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	112.012	0.000	0.000	0.000
Current President's Budget	0.000	110.012	165.892	0.000	165.892
Total Adjustments	0.000	-2.000	165.892	0.000	165.892
• Congressional General Reductions	0.000	-5.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	3.000			
• 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	165.892	0.000	165.892

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 673109: *SATCOM MUOS*

Congressional Add: *L-Band Communications*

	FY 2021	FY 2022
	0.000	3.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203109SF / <i>Narrowband Satellite Communications</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Congressional Add Subtotals for Project: 673109	0.000	3.000
Congressional Add Totals for all Projects	0.000	3.000

Change Summary Explanation

FY 2023: +\$165.892M; 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Title: Mobile User Objective System (MUOS) Baseline Upgrade</p> <p>Description: System optimization and modernization to address the dynamic, worldwide electromagnetic and cybersecurity environment in which MUOS operates.</p> <p>FY 2022 Plans: Continue migration of MUOS ground infrastructure to Advanced Cryptographic Capability (ACC) from Enhanced FireFly Communications Security (COMSEC) which includes changes to MUOS waveform software and artifacts, software updates to existing KG-175 devices, and updates to MIL-STD-188-187A and associated terminal certification program. Continue system optimization and electro-magnetic interference mitigation efforts to ensure capacity is available to the end user. Continue E2E MUOS Usability Enhancements and improvements to over-the-air provisioning and profile portability. Pending a successful JCTD demonstration and military utility assessment in CY 2021, implement an operationally relevant and viable UHF Legacy Extension (ULX) system to mitigate Legacy UHF communications shortfalls.</p> <p>FY 2023 Plans: Complete migration of MUOS ground infrastructure from Enhanced Firefly COMSEC to ACC, which includes changes to MUOS waveform software and artifacts, software updates to existing KG-175 devices, and updates to MIL-STD-188-187A and associated terminal certification program. Continue system optimization and electro-magnetic interference mitigation efforts to ensure capacity is available to the end user. Continue E2E MUOS Usability Enhancements. Continue to investigate alternatives to mitigate Legacy UHF communications shortfalls. 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 studies, technical analysis, experimentation, and interoperability and integration efforts with other DoD systems (e.g., Integrated Broadcast Service (IBS), Combat Survivor Evader Locator (CSEL), etc.).</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to completion and delivery of MUOS ground and waveform changes to support ACC in early FY 2023.</p>	0.000	70.133	44.980
Title: Mobile User Objective System (MUOS) Service Life Extension (SLE)	0.000	29.879	120.912

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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 1203109SF / <i>Narrowband Satellite Communications</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Description: MUOS Service Life Extension (SLE) to acquire and launch two additional MUOS satellites (without legacy payloads) and extend the ground segment service life.</p> <p>FY 2022 Plans: Initiate Risk Reduction Design studies for MUOS 6 and 7 Service Life Extension (SLE) satellites. Address emerging cybersecurity requirements to ensure continued system security and availability. Perform ground life extension studies and initiate migration efforts to a digital processing ground system that is more resilient and responsive to mitigating emerging threats.</p> <p>FY 2023 Plans: FY 2023 is the second year of a ramp-up in SLE effort across the MUOS Space and Ground segments. Continue ramp-up in SLE effort across the MUOS Space and Ground segments. Funding request required to award two fixed-price satellite early design and risk reduction contracts. Conduct system requirements review, prototyping, modelling, and simulation. Conduct ground SLE studies and further migration efforts to a digital processing that is more resilient and responsive to mitigating emerging threats. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to initiation of early design activities and studies, ground modernization, and ramp-up of systems engineering and program management necessary to support MUOS Service Life Extension (SLE) effort.</p>				
<p>Title: Narrowband Analysis of Alternatives</p> <p>Description: Conduct analysis of alternatives for narrowband communications beyond MUOS.</p> <p>FY 2022 Plans: Begin studies bounding the expected solutions regarding requirements definition and technology maturity. Conduct analysis of alternatives to provide narrowband SATCOM capabilities to the joint warfighter beyond the MUOS system.</p> <p>FY 2023 Plans: Narrowband AoA is a FY 2022-funded activity expected to extend into FY 2023</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to utilization of FY 2022 funds to complete the Narrowband Analysis of Alternatives study.</p>		0.000	7.000	0.000
Accomplishments/Planned Programs Subtotals		0.000	107.012	165.892
		FY 2021	FY 2022	
Congressional Add: L-Band Communications		0.000	3.000	

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

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 1203109SF / <i>Narrowband Satellite Communications</i>
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	FY 2021	FY 2022
FY 2021 Accomplishments: N/A		
FY 2022 Plans: Complete directed L-band communications study or work.		
Congressional Adds Subtotals	0.000	3.000

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPSF 01 BA01 MUOS00: <i>Mobile User Objective System</i>	-	45.371	46.833	-	46.833	47.169	49.266	50.238	51.547	728.615	1,019.039

Remarks

E. Acquisition Strategy

The program awarded the Ground and User Entry Segment contracts. The Space Force will use existing requirements in order to develop two operationally-similar SLE satellites. The program awarded competitive risk reduction and system engineering contracts in FY 2022 to determine required non-recurring engineering design changes. Up to two vendors will be awarded competitive contracts in FY 2023 to conduct early design activities for MUOS 6 and 7. One contractor will be selected in FY 2025 for the final design and build contract.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203109SF / <i>Narrowband Satellite Com munications</i>	Project (Number/Name) 673109 / <i>SATCOM MUOS</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			
MUOS SLE Ground Engineering Contract	SS/ Various	General Dynamics : Scottsdale, AZ	0.000	-		7.842	Nov 2021	2.886	Nov 2022	-		2.886	673.165	683.893	-
MUOS SLE Risk Reduction Design Studies	C/FFP	TBD : TBD	0.000	-		13.273	Oct 2021	-		-		-	0.000	13.273	-
MUOS SLE Early Design Activities	C/FFP	TBD : TBD	0.000	-		-		104.458	Jan 2023	-		104.458	56.411	160.869	-
MUOS SLE Crypto Replacement Plans and Interfaces	MIPR	NSA : Fort Meade, MD	0.000	-		0.553	Nov 2021	-		-		-	0.000	0.553	-
MUOS SLE TMA	RO	Aerospace : El Segundo, CA	0.000	-		-		1.433	Oct 2022	-		1.433	21.654	23.087	-
MUOS SLE Final Design and Production	C/CPAF	TBD : TBD	0.000	-		-		-		-		-	2,436.977	2,436.977	-
MUOS Baseline Ground Engineering Contracts	SS/ Various	Various : Various	0.000	-		64.174	Nov 2021	41.915	Nov 2022	-		41.915	40.790	146.879	-
MUOS Baseline Space Engineering Contract	SS/ Various	Lockheed Martin : Sunnyvale, CA	0.000	-		-		1.431	Nov 2022	-		1.431	0.000	1.431	-
MUOS Baseline Electromagnetic Interference	SS/CPFF	Adaptive Dynamics Inc : San Diego, CA	0.000	-		4.284	Nov 2021	0.861	Nov 2022	-		0.861	0.000	5.145	-
L-Band Communications	TBD	Various : Various	0.000	-		3.000	Apr 2022	-		-		-	0.000	3.000	-
MUOS Narrowband Analysis of Alternatives (AoA)	TBD	Various : Various	0.000	-		7.000	Feb 2022	-		-		-	0.000	7.000	-
Subtotal			0.000	-		100.126		152.984		-		152.984	3,228.997	3,482.107	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			
MUOS SLE FFRDC	RO	Aerospace : El Segundo, CA	0.000	-		3.252	Oct 2021	2.865	Oct 2022	-		2.865	42.395	48.512	-

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203109SF / <i>Narrowband Satellite Com munications</i>	Project (Number/Name) 673109 / <i>SATCOM MUOS</i>
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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			
MUOS SLE A&AS	C/CPFF	Various : Various	0.000	-		4.207	Jan 2022	4.599	Mar 2023	-		4.599	110.040	118.846	-
MUOS SLE Other Support	Various	Various : Various	0.000	-		0.752	Oct 2021	4.671	Oct 2022	-		4.671	82.093	87.516	-
MUOS Baseline A&AS	C/CPFF	Various : Various	0.000	-		0.693	Jan 2022	0.250	Mar 2023	-		0.250	0.000	0.943	-
MUOS Baseline Other Support	Various	Not specified. : TBD	0.000	-		0.982	Oct 2021	0.523	Oct 2022	-		0.523	0.000	1.505	-
Subtotal			0.000	-		9.886		12.908		-		12.908	234.528	257.322	N/A

Remarks
Increase from FY22 to FY23 is due to the ramp up of staff necessary to support MUOS SLE efforts.

	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	0.000	-	110.012	165.892	-	165.892	3,463.525	3,739.429	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203109SF / <i>Narrowband Satellite Com munications</i>	Project (Number/Name) 673109 / <i>SATCOM MUOS</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Baseline Upgrade	
Ground System Cybersecurity Updates / Agile Software Delivery	
Waveform Enhancements (ACC)	
Systems Engineering	
Terminal(s) Integration, Certification & Test Responsibility	
Service Life Extension (MUOS 6&7 and Ground Modernization)	
Ground System Cybersecurity Updates / Agile Software Delivery	
Systems Engineering	
Terminal(s) Integration, Certification & Test Responsibility	
Satellite Technical and Trade Studies	
Satellite Risk Reduction and Early Design Activities	
Satellite Final Design, Production, Assembly, Integration and Test Activities	
Ground System Studies	
Ground System Modernization	
Narrowband Analysis of Alternatives	
Analysis of Alternatives	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203109SF / <i>Narrowband Satellite Communications</i>	Project (Number/Name) 673109 / <i>SATCOM MUOS</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Baseline Upgrade				
Ground System Cybersecurity Updates / Agile Software Delivery	1	2022	4	2024
Waveform Enhancements (ACC)	1	2022	1	2023
Systems Engineering	1	2022	4	2024
Terminal(s) Integration, Certification & Test Responsibility	1	2022	4	2024
Service Life Extension (MUOS 6&7 and Ground Modernization)				
Ground System Cybersecurity Updates / Agile Software Delivery	1	2025	4	2027
Systems Engineering	1	2025	4	2027
Terminal(s) Integration, Certification & Test Responsibility	1	2025	4	2027
Satellite Technical and Trade Studies	3	2022	4	2023
Satellite Risk Reduction and Early Design Activities	4	2023	1	2026
Satellite Final Design, Production, Assembly, Integration and Test Activities	3	2025	4	2027
Ground System Studies	3	2022	4	2023
Ground System Modernization	4	2023	4	2027
Narrowband Analysis of Alternatives				
Analysis of Alternatives	3	2022	2	2023

Note

Narrowband AoA is a FY 2022-funded activity expected to extend into FY 2023.

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1203110SF I Satellite Control Network (SPACE)
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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	-	58.509	36.810	42.199	0.000	42.199	49.499	46.224	44.508	38.436	Continuing	Continuing
673276: Satellite Control Network	-	58.509	36.810	42.199	0.000	42.199	49.499	46.224	44.508	38.436	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2022, PE 1203040SF, Defense Cyber Operations - Space efforts were transferred from PE 1203110SF Satellite Control Network (SPACE), Budget Activity 07 due to the creation of a new Program Element for Defense Cyber Operations - Space.

The Satellite Control Network (SCN), formerly known as the Air Force Satellite Control Network (AFSCN), is a satellite ground terminal network comprised of two communication nodes (Schriever SFB & Vandenberg SFB) and 15 antenna systems. The antennas are distributed around the globe at seven locations -- Vandenberg Tracking Station (VTS), Diego Garcia Station (DGS), Guam Tracking Station (GTS), Hawaii Tracking Station (HTS), New Hampshire Tracking Station (NHS), Thule Tracking Station (TTS) and Telemetry and Commanding Station (TCS) at RAF Oakhanger, England -- to ensure global coverage for over 170 satellites in various orbits operating in a congested and contested environment. The SCN conducts an average of 450+ satellite contacts per day supporting Positioning, Navigation and Timing (PNT), Intelligence, Surveillance and Reconnaissance (ISR), Missile Warning and Missile Defense, Communications, Weather, Launch Vehicle Support, and Research and Development (R&D) for Department of Defense (DoD), Intelligence Community (IC), and National Aeronautics and Space Administration (NASA) operations. While most of the 450+ daily satellite contacts are routine command and control (C2) activities, the SCN is also used during satellite emergencies (e.g. a tumbling satellite) because its high-power antennas are often the only terrestrial assets that can re-establish contact with a non-responsive satellite. During each Fiscal Year, the SCN typically supports multiple space vehicle emergencies, resulting in the preservation of over 4B worth of satellites. In addition to routine and emergency satellite operations C2, the SCN provides support to launch and early orbit operations, ensuring worldwide telemetry during launch vehicle ascent, staging, and orbital insertion, and data transmit and receive for new satellites completing early orbit checkout. During each Fiscal Year, the SCN supports multiple launches delivering an average of 14B worth of satellites to their operational orbits. Finally, the SCN provides Factory Compatibility Testing (FCT) to ensure satellites and launch vehicles can communicate via the SCN before the satellite is launched.

These funds are utilized to meet evolving future space demands for Ground Enterprise Next (GEN), to include transmit, receive and data transport to ensure capabilities are available to support DoD, IC, and civil users. This includes efforts to provide more capable ground-based antennas, augment the existing SCN with Federal and commercial antennas to both diversify space-ground link resources and increase capacity for spacecraft communication, modernize satellite scheduling, and develop infrastructure network solutions for long-haul terrestrial communications compatible with Air Force and Space Force missions. Other activities include identifying shared/common platform, infrastructure and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. Funds are also used for requirements management, system planning, enterprise analysis and architecture support, Systems Engineering and Integration (SE&I), cyber security, test, system enhancement and deficiency resolution, and system resiliency.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203110SF / <i>Satellite Control Network (SPACE)</i>
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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 to increase 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 existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SCN 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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	60.480	36.810	0.000	0.000	0.000
Current President's Budget	58.509	36.810	42.199	0.000	42.199
Total Adjustments	-1.971	0.000	42.199	0.000	42.199
• 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	-1.971	0.000			
• Other Adjustments	0.000	0.000	42.199	0.000	42.199

Change Summary Explanation

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: SCN Enhancements and Deficiency Resolution	2.416	2.586	4.634
Description: Provides system enhancements, deficiency resolution, test, cyber security, requirements management, and system architecture support to the SCN utilizing enterprise developed technologies or capabilities, when applicable. Additionally, the SCN is investigating multiple cyber defense tools for integration onto the SCN baseline.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203110SF / <i>Satellite Control Network (SPACE)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>FY 2022 Plans: Refine architecture design and planning to utilize automated scheduling and ground resource management capabilities. Start initial automated scheduling implementation and infrastructure upgrade activities and changes. 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, experimentation, prototyping, etc.</p> <p>FY 2023 Plans: Continue to deliver enhancements and deficiency resolution in fielded SCN systems. Address user priorities to support mission needs. Facilitate automation, efficiency and resiliency improvements for SCN and related ground resources. Activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to a increase in scope of work with Air Force SCN Scheduling Tool (AST) deployment and Enterprise Resource Management (ERM) development.</p>			
<p>Title: Satellite Operations Transmit and Receive</p> <p>Description: Provides enterprise transmit, receive and resource management solutions to enable continuous satellite operations (SATOPS) from benign to contested, degraded and operationally-denied environments as part of GEN efforts. Provides updates to SCN legacy system capability shortfalls. These updates include modernization of current scheduling, resource management, and development execution for future integrated and automated resource management and scheduling services. Additionally, the SCN will integrate with multiple enterprise cyber defense tools for as part of the baseline.</p> <p>FY 2022 Plans: Release Enterprise Resource Management (ERM), initially called Advanced Planning and Scheduling System (APSS), request for prototype proposal. Continue AFSCN Scheduling Tool (AST) phased deployments. Continue 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, experimentation, prototyping, etc.</p> <p>FY 2023 Plans: Continue the phased modernization of capabilities supporting data transmit, receive and transport for both the current and evolving future demand. Adaptably address user priorities to responsively support mission needs. Award initial Enterprise Resource Management (ERM) contract and begin development of ERM ground resource integration, management, and automation capabilities. Complete AST phased deployments and finish transitioning SCN Scheduling onto AST. Implement necessary studies to identify shared platform, infrastructure, and data layer solutions that will inform future concepts and activities in support of enterprise open frameworks and architectures as well as risk reduction activities, technical analysis for common</p>	17.709	7.933	18.303

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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 1203110SF / <i>Satellite Control Network (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
platform, infrastructure and data layers for ground and communication systems to build upon. Activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to planned start of ERM.				
Title: Satellite C2 Augmentation Services		26.848	21.644	13.481
Description: Provides both Federal and commercial satellite C2 services to augment SCN capabilities. Augmented services are planned to be deployed in a phased approach to address early integration and security concerns while providing increased C2 diversity and capacity to reduce the risk of congestion on the SCN.				
FY 2022 Plans: Continue Federal Augmentation and Commercial Augmentation Services (CAS) development activities. Start development work for Federal Augmentation integration into SCN. Continue 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, experimentation, prototyping, etc.				
FY 2023 Plans: Continue Federal Augmentation and Commercial Augmentation Services activities. Implement Operational Test and Operational Acceptance for initial Federal missions. Continue on-boarding and support to missions utilizing CAS. Continue development work for integration of augmentation services into ERM. Continue 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, experimentation, prototyping, etc.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to reduction in planned development and integration work pending USSF policy updates regarding which satellite systems will use CAS.				
Title: Defensive Cyberspace Operations - Space (DCO-S)		5.516	0.000	0.000
Description: Funding supports cyber hardening and Defensive Cyberspace Operations for Space (DCO-S) activities for the space enterprise. Provides space enterprise defensive cyber solutions to counter advanced persistence cyber threats, through rapid fielding of operational prototypes using agile development methods.				
This effort implements a combined Development/Security/Operations (DevSecOps) framework which incorporates methodologies, technologies, and tools to deeply embed security best practices into the modern software development workflow and tool-chain. This effort will institute four product lines: Manticore (detect), Pegasus (protect), Chimera (identify), and Kraken (respond). The				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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 1203110SF / <i>Satellite Control Network (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
DCO-S capabilities are developed and deployed as an agile program, leveraging a DevSecOps framework to facilitate rapid and timely fielding to operations.				
FY 2022 Plans: N/A				
FY 2023 Plans: N/A				
FY 2022 to FY 2023 Increase/Decrease Statement: N/A				
Title: Enterprise Systems Engineering and Integration (SE&I)		6.020	4.647	5.781
Description: SE&I manages the government controlled system and subsystem level baseline requirements including analysis of future changes to the fielded baseline. SE&I provides "government as the integrator" engineering support to ensure multiple separate modernizations and the sustainment baselines are synchronized. SE&I will develop and recommend investment strategies to keep the SCN operating well beyond the Future Years Defense Plan.				
FY 2022 Plans: Continue Program Office support and independent SE&I efforts as required to integrate development and modernization across the SCN. Provide systems and subsystem level definition, baseline, architecture, integration planning and support for the SCN and augmented services. Additionally, SE&I provides support to SSC initiatives supporting Ground Enterprise Next (GEN) activities. Continue to support implementation of 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, experimentation, prototyping, etc.				
FY 2023 Plans: Continue Program Office support and SE&I efforts as required to integrate development and modernization across the SCN. Provide systems and subsystem level definition, baseline, architecture, integration planning, test, and support for the SCN and augmentation services. Additionally, SE&I will provide support to SSC initiatives supporting GEN activities. Continue to support implementation of 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, experimentation, prototyping, etc.				
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to an increase in anticipated requirements.				
Accomplishments/Planned Programs Subtotals		58.509	36.810	42.199

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

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 1203110SF / <i>Satellite Control Network (SPACE)</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 1203110F: <i>Satellite Control Network (SPACE)</i>	53.326	43.655	51.414	-	51.414	52.079	52.912	53.957	55.364	Continuing	Continuing

Remarks

N/A

E. Acquisition Strategy

DT&E efforts focus on completing upgrades as well as future architectures and studies to ensure the best use of investment funding.

SCN acquisition strategy is evolving from completing obsolescence, resiliency, and cyber security upgrades for existing satellite C2 network assets to future planning for the evolution of the SCN, Ground Enterprise Next (GEN), and data transmit, receive and transport architectures to increase efficiency and resiliency of SATOPS operations. This evolution will integrate the commercial and federal augmentation services with the SCN to create a comprehensive system for Advanced Planning and Scheduling System (APSS), now known as Enterprise Resource Management (ERM). ERM request for prototype proposal (RPP) planned for release in FY22.

The SE&I contractor maintains the DoD Architecture Framework (DoDAF) architecture and requirements baseline for Government approval and may perform studies to determine Government options. Limited RDT&E will be applied to the Consolidated SCN Modifications, Maintenance, and Operations (CAMMO) contract when sustaining engineering expertise is needed to finalize Government-approved architectures. Federally Funded Research and Development Corporation technical depth and breadth will be leveraged to ensure SCN modernization efforts are compatible with mission rules and do not pose a risk to safe and cost-effective satellite contacts.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203110SF / <i>Satellite Control Network (SPACE)</i>	Project (Number/Name) 673276 / <i>Satellite Control Network</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			
Satellite Ops Transmit and Receive - Scheduling	Various	Stottler-Henke : Colorado Springs, CO : TBD	-	4.162	Jan 2021	2.444	Jan 2022	4.709	Jan 2023	-		4.709	Continuing	Continuing	-
SCN Enhancements and Deficiency Resolution	Various	Various : Colorado Springs, CO : TBD	-	2.416	May 2021	2.586	May 2022	4.634	May 2023	-		4.634	Continuing	Continuing	-
Satellite Ops Transmit and Receive - Enterprise Resource Management	C/TBD	TBD; TBD : TBD	-	-		-		5.400	Jan 2023	-		5.400	Continuing	Continuing	-
C2 Augmentation (CAS)	Various	TBD; TBD : TBD	-	26.848	Oct 2020	21.644	Mar 2022	13.481	Oct 2022	-		13.481	Continuing	Continuing	-
Defensive Cyberspace Operations for Space (DCO-S)	Various	Various : Colorado Springs, CO : TBD	-	5.516	Dec 2020	-		-		-		-	Continuing	Continuing	-
Enterprise Systems Engineering and Integration (SE&I)	SS/CPIF	ENSCO : Colorado Springs, CO : TBD	-	6.020	Nov 2020	4.647	Nov 2021	5.781	Nov 2022	-		5.781	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA : TBD	-	6.960	Apr 2021	1.504	Jan 2022	2.331	Jan 2023	-		2.331	Continuing	Continuing	-
Subtotal			-	51.922		32.825		36.336		-		36.336	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			
FFRDC	Various	Aerospace Corp, : El Segundo, CA : TBD	-	0.903	Apr 2021	0.930	Jan 2022	0.947	Jan 2023	-		0.947	Continuing	Continuing	-
A&AS	Various	TBD:TBD : TBD	-	5.684	Apr 2021	3.055	Jan 2022	4.916	Jan 2023	-		4.916	Continuing	Continuing	-
Subtotal			-	6.587		3.985		5.863		-		5.863	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		-	58.509	36.810	42.199	-	42.199	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203110SF / <i>Satellite Control Network (SPACE)</i>	Project (Number/Name) 673276 / <i>Satellite Control Network</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>SCN Enhancements and Deficiency Resolution</i>	
SCN Enhancements and Deficiency Resolution	
<i>Satellite Operations Transmit and Receive</i>	
Satellite Operations Transmits and Receive	
<i>Defensive Cyber Ops - Space</i>	
Defensive Cyberspace Operations for Space (DCO-S)	
<i>Satellite C2 Augmentation Services</i>	
Satellite C2 Augmentation Services	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203110SF / <i>Satellite Control Network (SPACE)</i>	Project (Number/Name) 673276 / <i>Satellite Control Network</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>SCN Enhancements and Deficiency Resolution</i>				
SCN Enhancements and Deficiency Resolution	1	2021	4	2027
<i>Satellite Operations Transmit and Receive</i>				
Satellite Operations Transmits and Receive	1	2021	4	2027
<i>Defensive Cyber Ops - Space</i>				
Defensive Cyberspace Operations for Space (DCO-S)	1	2021	4	2021
<i>Satellite C2 Augmentation Services</i>				
Satellite C2 Augmentation Services	1	2021	4	2027

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1203165SF / NAVSTAR Global Positioning System (Space and Control Segments)
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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	-	1.643	1.966	2.062	0.000	2.062	0.000	0.000	0.000	0.000	0.000	5.671
67A025: GPS Enterprise Integrator	-	1.643	1.966	2.062	0.000	2.062	0.000	0.000	0.000	0.000	0.000	5.671
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Detailed information on this effort remains classified and will be provided on a need-to-know basis. Effort to end in FY 2023.

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 repurpose existing capabilities.

This program may include necessary civilian pay expenses required to manage, execute, and deliver NAVSTAR 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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	1.984	1.966	0.000	0.000	0.000
Current President's Budget	1.643	1.966	2.062	0.000	2.062
Total Adjustments	-0.341	0.000	2.062	0.000	2.062
• 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	-0.341	0.000			
• Other Adjustments	0.000	0.000	2.062	0.000	2.062

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203165SF / NAVSTAR <i>Global Positioning System (Space and Control Segments)</i>
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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.

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

	FY 2021	FY 2022	FY 2023
Title: Classified Effort	1.643	1.966	2.062
Description: Implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.			
FY 2022 Plans: Classified effort.			
FY 2023 Plans: Classified effort. Effort ends in FY 2023.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2022 to FY 2023 funding increased as described above.			
Accomplishments/Planned Programs Subtotals	1.643	1.966	2.062

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

N/A

Remarks

E. Acquisition Strategy

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203165SF / NAVSTAR Global Positioning System (Space and Control Segments)	Project (Number/Name) 67A025 / GPS Enterprise Integrator

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

NAVSTAR Global Positioning System (Space and Control Segments)	
Classified Effort	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203165SF / NAVSTAR Global Positioning System (Space and Control Segments)	Project (Number/Name) 67A025 / GPS Enterprise Integrator

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
NAVSTAR Global Positioning System (Space and Control Segments)				
Classified Effort	1	2021	4	2023

Note
Classified effort; details will be provided on a need-to-know basis.

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

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>
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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	-	4.273	1.699	4.157	0.000	4.157	4.237	4.320	4.417	4.502	Continuing	Continuing
67A014: <i>R&D Space & Missile Operations</i>	-	4.273	1.699	4.157	0.000	4.157	4.237	4.320	4.417	4.502	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 Innovation and Prototyping Directorate at Kirtland Air Force Base (KAFB), NM, conducts Space Vehicle and Ground Test and Evaluation (T&E) and Initial Operational Test and Evaluation (IOT&E) to support 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) which provides a deployable system supporting launch and early orbit (LE&O) efforts for a variety of customers. 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) and employs fixed/deployable telemetry, tracking, and commanding (TT&C) antenna systems in support of USSF, Department of Defense, 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.

The objective of the RDSMO Program is to develop and integrate technology to rapidly support prototype and operational space systems. Specifically, the MMSOC ground system is leveraged to expedite the acquisition, integration, and operations cycle and to enable a Satellite Control Authority (SCA) transition to SSFB. The RDSMO program provides beneficial ground and space vehicle technology directly to the warfighting organizations per the RDSMO Charter, for continued experimentation or operations. MMSOC uses a combination of standard hardware and software to:

- (1) perform satellite C2 in support of launch requirements;
- (2) develop tactics, techniques, and procedures to conduct satellite operations;
- (3) provide a satellite C2 incremental block evolution resource for RDT&E of new satellite and C2 systems and concepts; and
- (4) deliver operational flexibility for new and legacy satellite missions designed to outpace adversary on-orbit systems.

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 repurpose capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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>
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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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	4.397	1.699	0.000	0.000	0.000
Current President's Budget	4.273	1.699	4.157	0.000	4.157
Total Adjustments	-0.124	0.000	4.157	0.000	4.157
• 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	-0.124	0.000			
• Other Adjustments	0.000	0.000	4.157	0.000	4.157

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.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: MMSOC Development	4.273	1.699	4.157
Description: Evolution of the Ground Services Architecture (GSA) through the 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, cloud computing, multi-security level operations, and enhanced ground entry points for geosynchronous prototype-operations.			
FY 2022 Plans: Continue providing capability to USSF for reduced cost of operations and maintenance (O&M) through evolution of MMSOC C2 architecture and automated processes and integrate the Enterprise Ground System (EGS) backwards functionality into MMSOC C2.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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<p>Continue capabilities studies such as Cloud Computing, combining antennas, and containerization of services to reduce O&M costs. Optimize the multi-mission operations floor. Continue the experimental campaign and/or transition the residual use of the Long Duration Propulsive Evolved Expendable Launch Vehicle (LDPE)-1 & 2.. Continue to ensure RDSMO resources are available for the successful mission accomplishment of the USSF-12 Payload, Navigation Technology Satellite-3 (NTS-3) and Tetra prototyping projects. Host mission operations of Space Rapid Capability Office (SpRCO) and the Quasi-Zenith Satellite System (QZSS) hosted payload. Continue 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 Plans: Develop MMSOC XPro full cybersecurity-compliance (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 cyber-secure 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 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 Enterprise Ground System (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 2022 to FY 2023 Increase/Decrease Statement:</p>			
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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force **Date:** April 2022

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>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 funds increased to reflect increased activity and is representative of historical RDSMO annual funding levels necessary to continue the required RDSMO development, integration, and test efforts.			
Accomplishments/Planned Programs Subtotals	4.273	1.699	4.157

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

Line Item	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
• SPSF 01 GNRLIT: <i>General Information Tech - Space</i>	1.926	1.938	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

E. Acquisition Strategy
 Modernize ground system capabilities and leverage MMSOC sustainment as a test bed for new ground service development, integration testing, and operations. In FY 2020, RDSMO competitively awarded the Engineering, Development, Integration, and Sustainment (EDIS) contract to support MMSOC, MRF, and EGS activities. RDSMO plans to competitively award a Prototype Operations (POPS)-1 Contract in FY 2022. Additionally, RDSMO uses an Advisory & Assistance Support (A&AS) contract. These contracts are all managed by Space Systems Command (SSC).

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203173SF / <i>Space and Missile Test and Evaluation Center</i>	Project (Number/Name) 67A014 / <i>R&D Space & Missile Operations</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			
Ground Services R&D Engineering, Development, Integration, and Test	C/CPAF	SAIC : Albuquerque, NM	-	2.268	Oct 2020	0.797	Apr 2022	2.012	Nov 2022	-		2.012	Continuing	Continuing	-
Naval Research Lab (NRL)	C/CPAF	Not specified. : TBD	-	-		0.300	Apr 2022	-		-		-	Continuing	Continuing	-
Subtotal			-	2.268		1.097		2.012		-		2.012	Continuing	Continuing	N/A

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			
Space Test and Engineering Contract (STEC) (MMSOC)	C/CPFF	Linquest : Kirtland AFB, NM	-	1.488	Oct 2020	0.381	Dec 2021	-		-		-	Continuing	Continuing	-
Prototype Operations-1 (POPS-1)	C/CPFF	Not specified. : TBD	-	0.000		0.187	May 2022	1.453	Oct 2022	-		1.453	Continuing	Continuing	-
Subtotal			-	1.488		0.568		1.453		-		1.453	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			
A&AS- STS-III	C/FFP	MEI : Los Angeles, CA	-	0.000	Feb 2021	0.034	Apr 2022	0.692	Nov 2022	-		0.692	Continuing	Continuing	-
A&AS- METIS	C/FFP	Linquest : Los Angeles, CA	-	0.217	Feb 2021	0.000	Feb 2022	0.000	Feb 2023	-		0.000	Continuing	Continuing	-
FFRDC- Aerospace	SS/FP	Aerospace : Los Angeles, CA	-	0.300	Oct 2020	0.000	Oct 2021	0.000	Oct 2022	-		0.000	Continuing	Continuing	-
Subtotal			-	0.517		0.034		0.692		-		0.692	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force								Date: April 2022			
Appropriation/Budget Activity 3620F / 7				R-1 Program Element (Number/Name) PE 1203173SF / <i>Space and Missile Test and Evaluation Center</i>				Project (Number/Name) 67A014 / <i>R&D Space & Missile Operations</i>			
	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	-	4.273	1.699		4.157	-	4.157	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203173SF / <i>Space and Missile Test and Evaluation Center</i>	Project (Number/Name) 67A014 / <i>R&D Space & Missile Operations</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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																												
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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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203173SF / <i>Space and Missile Test and Evaluation Center</i>	Project (Number/Name) 67A014 / <i>R&D Space & Missile Operations</i>
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
Quasi-Zenith Satellite System (Customer Funded)																												
Rooster-4 (Customer Funded)																												
Tetra-2 (Customer Funded)																												
Tetra-4 (Customer Funded)																												
Damocles (Customer Funded)																												
Space Rapid Capabilities Office Mission Support																												
Hosted Payload Fleet																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203173SF / <i>Space and Missile Test and Evaluation Center</i>	Project (Number/Name) 67A014 / <i>R&D Space & Missile Operations</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MMSOC Development</i>				
Ground Services Architecture (GSA) Evolution	1	2021	4	2027
CloudSat (Customer Funded)	1	2021	3	2023
Space Test Program Satellite-2 (STPSat-2) (Customer Funded)	1	2021	1	2024
Space Test Program Satellite-3 (STPSat-3) (Customer Funded)	1	2021	1	2025
Operationally Responsive Space (ORS-5) (Customer Funded)	1	2021	4	2027
Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) Augmented Geostationary Laboratory Experiment (EAGLE) Support (Customer Funded)	1	2021	1	2025
Mycroft Support (Customer Funded)	1	2021	3	2022
Jaguar (Customer Funded)	1	2021	4	2027
Long Duration Propulsive ESPA-1 (LDPE-1) (Customer Funded)	1	2021	2	2025
USSF-12 (Customer Funded)	1	2021	2	2025
Long Duration Propulsive ESPA -2 (LDPE-2) (Customer Funded)	1	2021	2	2025
Tetra-1 (Customer Funded)	1	2021	2	2025
LDPE-3A (Customer Funded)	1	2021	4	2025
Tetra-3 (Customer Funded)	1	2021	4	2025
Navigation Technology Satellite NTS-3 (Customer Funded)	1	2021	1	2026
Quasi-Zenith Satellite System (Customer Funded)	1	2021	4	2027
Rooster-4 (Customer Funded)	1	2021	4	2027
Tetra-2 (Customer Funded)	3	2023	4	2025
Tetra-4 (Customer Funded)	3	2023	4	2027
Damocles (Customer Funded)	1	2021	4	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203173SF / <i>Space and Missile Test and Evaluation Center</i>	Project (Number/Name) 67A014 / <i>R&D Space & Missile Operations</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Space Rapid Capabilities Office Mission Support	2	2021	4	2026
Hosted Payload Fleet	1	2024	4	2027

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

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 1203174SF / <i>Space Innovation, Integration and Rapid Technology Development</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	-	35.824	18.054	38.103	0.000	38.103	49.222	48.812	40.241	41.030	Continuing	Continuing
67A011: <i>Space Analysis and Application Development</i>	-	35.824	18.054	38.103	0.000	38.103	49.222	48.812	40.241	41.030	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Located at Peterson SFB, Colorado, the Space Innovation, Integration and Rapid Technology Development (SIIRTD) program develops and modifies modeling and simulation tools that USSF/Space Operations Command's Space Analysis Center uses for operations research, military utility analyses, tradeoff studies, and other evaluations of space mission areas to guide planning, programming, requirements generation, analyses of alternatives, and other activities. Development activities incorporate changes in fielded and projected space operational capabilities, as well as technical improvements, into the group's software tools to ensure their data and technology remain current. The Space Training Simulators team develops and upgrades space training emulators such as the Standard Space Trainer (SST) to meet Space Mission Force (SMF) threat-based, advanced training requirements. Finally, its innovation, education, and training activities foster solutions to operational deficiencies and enhance the integration of space systems into Space Force operations, thereby enabling service and joint warfighters to realize the full potential of existing and planned space capabilities.

Programs and projects in the space warfighting enterprise are evaluating ways to increase innovation and resiliency to known and emerging threats. Space enterprise efforts aim to execute technology risk reduction efforts, integrate new capabilities or repurpose existing capabilities, implement enterprise decision-making tools/ experimentation/rapid prototyping and fielding via all appropriate acquisition authorities and contract mechanisms.

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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203174SF / <i>Space Innovation, Integration and Rapid Technology Development</i>
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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	38.746	18.054	0.000	0.000	0.000
Current President's Budget	35.824	18.054	38.103	0.000	38.103
Total Adjustments	-2.922	0.000	38.103	0.000	38.103
• 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	-2.922	0.000	38.103	0.000	38.103

Change Summary Explanation

FY21: -\$1.608M reprogramming for higher space force priorities; -\$1.314M SBIR adjustment

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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Title: Model/Tool Development and Capability Upgrades</p> <p>Description: Develops, verifies, and validates models for space mission areas and modifies existing models to portray new capabilities that meet senior leader intent. Advancing Modeling & Simulation (M&S) tools to provide space linkages and impacts to the warfighter as constellations are degraded in a contested environment and incorporate space effects at the campaign, mission and engagement levels with the goal of enhancing decision support, visualization, exercise and wargaming. Rapidly meet downward-directed guidance implementing the system resiliency and situational awareness necessary to win in a contested space domain. Activities may include, but are not limited to, acquisition, program office support, studies, technical analysis, prototyping, etc. The space M&S is used for military utility analyses, trade studies, and other space program evaluations supporting OSD, Joint Staff, Headquarters Air Force, Headquarters United States Space Force, and the USSF Field Commands.</p> <p>FY 2022 Plans: Continue to produce technically sound and responsive space analyses models/tools, analyzing warfighter operations in a highly-contested environment in support of national and military needs. Focus will be on Space campaign model development by incorporating space effects in the AF campaign model, Synthetic Theater Operations Research Model (STORM), and increasing space effects in feeder models. Model verification and validation will also be conducted throughout the development process.</p>	9.605	5.829	9.581

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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 1203174SF / <i>Space Innovation, Integration and Rapid Technology Development</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>M&S activities support the entire space enterprise of fielded & projected space operations capabilities, enable threat-based advanced training events, and continuous TTP improvement to prepare space forces to operate in a contested, degraded, operations (CDO) environment against changing threats.</p> <p>FY 2023 Plans: Continue supporting the SpOC field command to develop assessment strategies to assist with deliberate and contingency planning analyzing force structure for the USSF. Also, the funds will support space capability development and space systems delivery as well as strengthen the commander's "fight tonight" strategy with quick-turn senior leader ops assessment. Provides senior leaders with strategic and operational level analysis - converting data into decision quality information. Specifically, funds support for:</p> <ul style="list-style-type: none"> • Support Commander (CC) management (mgt) Headquarters (HQ) and Space Forces Forward (SFFOR) (Operation Order (OPORD direction)) missions; force status to COMSPACEFOR and CDR USSPACECOM • Identifies Space Force "fight tonight" risk in multi-domain warfight using specific scenarios and campaign plans • Developing SpOC and delta metrics as inputs to ops assessments • Campaign modeling initiative response to VCSO "go do"; ensure DoD accurately representing space <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY23 funding increase represents new modifications of numerous campaign and mission plans/models to accurately model all warfighting domains by including space effects. Examples include the DoD endorsed STORM - Synthetic Theater Operations Research Model--campaign model and SEAS - System Effectiveness Analysis Simulation - mission model.</p>				
<p>Title: Standard Space Trainer Development</p> <p>Description: Develop/upgrade Standard Space Trainer (SST) simulators to meet Space Mission Force (SMF) threat-based, Advanced Training (AT) requirements as well as build connectivity to Distributed Mission Operations (DMO) training networks with integration of M&S tools for exercise support. Follows direction set out in USAF Operational Training Infrastructure (OTI) Flight Plan, as well as meets STRATCOM Integrated Priority List (IPL) priorities.</p> <p>FY 2022 Plans: Accelerate completion of SST development for the Upgraded Early Warning Radar (UEWR) mission and MILSATCOM AT capabilities. Continue development of SST functionality for Bounty Hunter, Orbital Warfare, and Perimeter Acquisition Radar Attack Characterization System (PARCS) missions, SST Architecture modernization, and Space-Based Infrared System (SBIRS) AT capabilities. Begin SST development of Space Command & Control (C2) and Eglin Radar missions. Continue ongoing</p>		26.219	12.225	28.522

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203174SF / <i>Space Innovation, Integration and Rapid Technology Development</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>enterprise mission training and DMO for Space (DMO-S) M&S development for Blue/White/Red consoles based on evolving mission requirements, and threat analyses.</p> <p>FY 2023 Plans: Accelerate completion of SST development for Bounty Hunter SST, PARCS SST development, and SBIRS AT capabilities. Continue development of SST functionality for Space C2, IROC SSTs at Eglin AFB, Space Domain Awareness (SDA) and Orbital Warfare (OW) missions as well as SST Architecture modernization. Begin development of AT capabilities across the USSF portfolio as well as MILSATCOM SSTs to support new Delta 8 units. Continue ongoing enterprise M&S development for Blue/White/Red consoles and begin transition from the DMO-S to the Virtual Space Range (VSR).</p> <p>Continue developing SST into an advanced/warfighter training capability. Incorporating SSTs into VSR M&S toolset and developing additional products to support USSF and Mission Partner AT events across distributed networks including Red Console (Threat M&S), Event Visualization, and Exercise Control. VSR projects will also include upgrades to integrate M&S tools into a cloud-based training environment. Without these improvements, interoperability with Joint/Coalition partners and AT capabilities (i.e. Threat M&S) within a virtual training environment will not be possible, limiting the SST's training capability to basic (peacetime) weapon system operation and prohibit mission readiness objectives to "Train as You Fight" in a Contested, Degraded, and Operationally-limited (CDO) space domain.</p> <p>Implement system resiliency and situational awareness necessary to operate in a CDO environment. Activities may include, but are not limited to, program office support, studies, technical analyses, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY2023 increase is due to new development of an SST for both the GPS OCX ground station, and the Upgraded Early Warning Radars (UEWR) portfolio including radars. In addition, it supports a new SST for classified programs in the Space Domain Awareness (SDA) and Orbital Warfare (OW) major warfighting functions. In FY23, integration of capabilities from other SSTs into the DMO-S environment is also being accelerated.</p>			
Accomplishments/Planned Programs Subtotals	35.824	18.054	38.103

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 GNRLIT: <i>General Information Tech - Space</i>	-	-	-	-	-	-	-	-	-	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203174SF / <i>Space Innovation, Integration and Rapid Technology Development</i>
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D. Other Program Funding Summary (\$ in Millions)

Line Item	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
• SPSF 01 GNRLIT: <i>General Information Tech - Space</i>	1.373	1.378	0.412	-	0.412	0.420	0.427	0.436	0.000	Continuing	Continuing

Remarks
Funding and content procures equipment for the SIIRTD USSF Virtual Analysis Capability system. Supports space and cyber modeling & analysis using a variety of Linux and Windows based hardware and software suites. Also procures Information Technology (IT) hardware and software infrastructure for the Distributed Communications Architecture for HQ ACC.

E. Acquisition Strategy

Any new project funded in this program will be awarded using competitive procedures to the maximum extent possible.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203174SF / <i>Space Innovation, Integration and Rapid Technology Development</i>	Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

SIIRTD	
Model Development/Modification, verification & validation	
Space Training Simulators	
DMO-S - Development and Integration	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203174SF / <i>Space Innovation, Integration and Rapid Technology Development</i>	Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
SIIRTD				
Model Development/Modification, verification & validation	1	2021	4	2027
Space Training Simulators	1	2021	4	2027
DMO-S - Development and Integration	1	2021	4	2027

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

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 1203182SF / <i>Spacelift Range System (SPACE)</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	-	20.358	31.115	11.658	0.000	11.658	11.199	10.812	11.052	11.268	Continuing	Continuing
674137: <i>Launch and Test Range System (LTRS) Modernization</i>	-	20.358	31.115	11.658	0.000	11.658	11.199	10.812	11.052	11.268	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Spacelift Range System (SLRS), also known as the Launch and Test Range System (LTRS), provides public safety and assured access to space. LTRS operates at the Eastern Range (ER) at Patrick SFB/Cape Canaveral AFS, FL and the Western Range (WR) at Vandenberg SFB, CA. LTRS provides tracking, telemetry, communications, flight safety, and other capabilities to support launch of national security space (NSS), civil and commercial space payloads, Intercontinental and Sea Launched ballistic missile and missile defense evaluations, and aeronautical and guided weapon tests. LTRS enables national security, civil, and commercial spacelift operations to be conducted safely; together with national security space launch capability, LTRS provides assured access to space for the nation. The ER and WR are designated as Department of Defense Major Range and Test Facility Bases (MRTFB).

LTRS is comprised of twelve subsystems that together provide this capability to the ranges. The Range Safety and Command Destruct subsystems provide the capability to destroy an errant rocket, if necessary to protect public safety. These subsystems rely on the Telemetry, Radar, and Optics subsystems to provide tracking data. The Weather and Surveillance subsystems allow range operators and customers to determine if conditions are safe for launch. The Communications, Data Handling, and Timing & Sequencing subsystems ensure critical data is expeditiously routed from remote sensors (e.g. radars, optics) to range operators and customers. Finally, the Planning and Scheduling subsystem ensures all assets are available when needed for a launch or test operation.

The Space Force requires RDT&E funds to conduct digital data processing and transport prototype projects supporting Range of the Future (ROTF) launch operations. Funds will: provide engineering and analysis to develop promising technology; develop Cloud infrastructure and software development factory and services to prototype and deliver software solutions; validate LTRS architecture capability to meet the accelerating national launch requirement; and introduce advanced data transport formats. These efforts include demonstration of virtualized and remote data processing as well as dispersed and disaggregated flight tracking. Funds will allow for development of Eastern Range (ER)/Western Range (WR) Data Handling Application prototypes for ROTF integration.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver LTRS 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.

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

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 1203182SF / <i>Spacelift Range System (SPACE)</i>
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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose existing capabilities.

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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	21.020	11.115	0.000	0.000	0.000
Current President's Budget	20.358	31.115	11.658	0.000	11.658
Total Adjustments	-0.662	20.000	11.658	0.000	11.658
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	20.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.662	0.000			
• Other Adjustments	0.000	0.000	11.658	0.000	11.658

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 674137: *Launch and Test Range System (LTRS) Modernization*

Congressional Add: *Space Launch and Services Capability*

Congressional Add Subtotals for Project: 674137

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	10.000	20.000
	10.000	20.000
	10.000	20.000

Change Summary Explanation

FY 2023: +\$31.312M; 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 FY 2023 cannot be made in a relevant manner.

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

	FY 2021	FY 2022	FY 2023
Title: Enterprise Systems Engineering and Integration to Support Government-Controlled Baseline	5.746	2.080	2.290
Description: SE&I manages the government controlled system and subsystem level baseline requirements including analysis of future changes to the fielded baseline. SE&I provides "government as the integrator" engineering support to ensure multiple			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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 1203182SF / <i>Spacelift Range System (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>separate modernizations and the sustainment baseline are synchronized. SE&I will develop and recommend investment strategies to keep the Eastern and Western Ranges operating well beyond the FYDP.</p> <p>FY 2022 Plans: Increase system resiliency and agility to meet National launch capacity and cadence requirements per Chief of Space Operations' ROTF agility to meet National launch requirements. Sustain MRTFB activity capability. Additionally, FY 2022 funding will allow the program 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 Plans: Continue to increase system resiliency and agility to meet National launch capacity and cadence requirements per Chief of Space Operations' ROTF agility to meet National launch requirements. Invest in Cloud infrastructure and software development to deliver prototype Range operations concepts focused on increasing space launch capability and sustainment of MRTFB capability. Implement system resiliency and situational awareness necessary to operate in the contested space domain. Continuing activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022. FY 2023 funding was increased due to inflation.</p>				
<p>Title: LTRS Range Technology Integration</p> <p>Description: Provides Advisory and Assistance Services (A&AS) support of the operational baseline (all twelve subsystems) to include configuration management of all range assets, requirements analyses, and special studies. Provides support for Systems Program Office operations, Systems Engineering and Technical Assistance (SETA), and Federally Funded Research and Development Centers (FFRDC). Strategically executes experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.</p> <p>FY 2022 Plans: Analyze, engineer and prototype ROTF concepts to increase LTRS authorization, data transport and data processing. Prototype data-driven applications to provide agile flight vehicle situational awareness as well as automation of LTRS equipment to facilitate rapid range reconfiguration and enable conduct of simultaneous launch operations. Additionally, FY 2022 funding will allow the program 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 Plans: Continue efforts to analyze, engineer and prototype ROTF concepts to include Cloud infrastructure and software factory prototypes. Development services will prototype data-driven applications to provide agile flight vehicle situational awareness</p>		4.612	9.035	9.368

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1203182SF / Spacelift Range System (SPACE)
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
as well as automation of LTRS equipment to facilitate rapid range reconfiguration and enable conduct of simultaneous launch operations. Implement system resiliency and situational awareness necessary to operate in the contested space domain by deploying a Dev/Sec/Ops capability and supporting software Minimum Viable Product (MVP) via a continuous integration/continuous delivery strategy. Activities include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022. FY 2023 funding was increased to account for capability development requirements and support MVP acceleration.			
Accomplishments/Planned Programs Subtotals	10.358	11.115	11.658

	FY 2021	FY 2022
Congressional Add: Space Launch and Services Capability FY 2021 Accomplishments: Congressional Add Funding was used to improve commercial spaceport capability to provide mid-to-low inclination orbits or polar-to-high inclination orbits in support of the national security space at Pacific Spaceport Complex, AK and Mid-Atlantic Regional Spaceport, Wallops Island, VA. FY 2022 Plans: Congressional Add Funding will improve commercial spaceport capability to provide mid-to-low inclination orbits or polar-to-high inclination orbits in support of the national security space at Pacific Spaceport Complex, AK and Mid-Atlantic Regional Spaceport, Wallops Island, VA.	10.000	20.000
Congressional Adds Subtotals	10.000	20.000

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	FY 2021	FY 2022	FY 2023 <u>Base</u>	FY 2023 <u>OCO</u>	FY 2023 <u>Total</u>	FY 2024	FY 2025	FY 2026	FY 2027	<u>Cost To Complete</u>	<u>Total Cost</u>
• SPSF 01 1203182SF: <i>Spacelift Range System (Space)</i>	90.492	93.774	71.712	-	71.712	115.429	109.487	109.267	112.116	Continuing	Continuing

Remarks

E. Acquisition Strategy
 ROTF ensures LTRS Architecture is not a constraint to the accelerating National launch cadence executing on the ER and WR. Innovative utilization of Cloud infrastructure, software factory, and development services to facilitate data-driven Range activities and digital processing and distribution capability is targeted as enabling the ROTF. Promising prototypes and technology will be leveraged into LTRS architecture investments delivering increased operational capacity and state-of-art data formatting and transport to launch operations. The competitively-selected SE&I contractor manages government-controlled requirements and processes as well

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development</i>	PE 1203182SF / <i>Spacelift Range System (SPACE)</i>

as provide support to the "government as the integrator" between LTRS Integrated Support Contract (LISC) and separately competed modernization projects. FFRDC provides mission assurance oversight to ensure capabilities meet operational need.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203182SF / <i>Spacelift Range System (SPACE)</i>	Project (Number/Name) 674137 / <i>Launch and Test Range System (LTRS) Modernization</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			
Enterprise Systems Engineering and Integration	C/FPIF	ENSCO INC : Falls Church, VA	-	5.746	Oct 2020	2.080	Oct 2021	2.290	Oct 2022	-		2.290	Continuing	Continuing	-
LTRS Range of the Future (ROTF) Technology Integration	C/Various	TBD : TBD	-	4.061	May 2021	6.798	May 2022	7.090	May 2023	-		7.090	Continuing	Continuing	-
Subtotal			-	9.807		8.878		9.380		-		9.380	Continuing	Continuing	N/A

Support (\$ 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			
AK Spaceport Infrastructure Support	SS/FFP	Alaska Aerospace Corp : Anchorage, AK	-	5.000	May 2021	10.000	Jul 2022	-		-		-	Continuing	Continuing	-
VA Spaceport Infrastructure Support	SS/FFP	VA Comm Space Flt Auth : Norfolk, VA	-	5.000	May 2021	10.000	Jul 2022	-		-		-	Continuing	Continuing	-
Subtotal			-	10.000		20.000		-		-		-	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			
FFRDC	RO	Aerospace : El Segundo, CA	-	-		0.647	Nov 2021	0.659	Nov 2022	-		0.659	Continuing	Continuing	-
OTHER SUPPORT	PO	Various : El Segundo, CA	-	0.551	Nov 2020	1.590	Nov 2021	1.619	Nov 2022	-		1.619	Continuing	Continuing	-
Subtotal			-	0.551		2.237		2.278		-		2.278	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203182SF / <i>Spacelift Range System (SPACE)</i>	Project (Number/Name) 674137 / <i>Launch and Test Range System (LTRS) Modernization</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

LTRS	
Range Technology Integration	
Enterprise SE&I	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203182SF / <i>Spacelift Range System (SPACE)</i>	Project (Number/Name) 674137 / <i>Launch and Test Range System (LTRS) Modernization</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
LTRS				
Range Technology Integration	1	2021	4	2027
Enterprise SE&I	1	2021	4	2027

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

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 1203265SF / <i>GPS III Space Segment</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	0.000	10.398	7.207	1.626	0.000	1.626	0.000	0.000	0.000	0.000	0.000	19.231
67A019: <i>GPS III</i>	0.000	10.398	7.207	1.626	0.000	1.626	0.000	0.000	0.000	0.000	0.000	19.231
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 292

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space-based navigation system that fills validated Joint Service requirements for worldwide, accurate, common grid three dimensional positioning/navigation for military aircraft, ships, and ground personnel. The consistent accuracy, unaffected by location or weather and available in real time, significantly improves effectiveness of reconnaissance, weapons delivery, mine countermeasures and rapid deployment for all services. GPS must comply with Title 10 United States Code (USC) Sec. 2281, which requires that the Secretary of Defense ensures the continued sustainment and operation of GPS for military and civilian purposes, and 51 USC Sec. 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

The system is composed of three programs: User Equipment (funded under Program Element (PE) 1203164F, 1203164SF), Space (funded under PE 1203165F, 1203265F, 1203265SF, 1203269F, and 1203269SF), and a Control Network (funded under PE 1206423F, 1206423SF and 1203165F). The satellites broadcast high accuracy data using precisely synchronized signals that are received and processed by user equipment installed in military platforms. The user equipment computes the platform position and velocity and provides steering vectors to target locations or navigation waypoints. The control segment provides daily updates to the navigation messages broadcast from the satellites to maintain system precision in three dimensions to 16 meters (spherical error probable) worldwide. Additionally, GPS supports the United States Nuclear Detonation Detection System mission and provides strategic and tactical support to the following Department of Defense missions: Joint Operations by providing capabilities for Positioning, Navigation, and Timing (PNT); Command, Control, Communications, and Intelligence; Special Operations; Military Operations in Urban Terrain; Defense-Wide Mission Support; Air Mobility; and Space Launch Orbital Support.

GPS III is the next generation Space Vehicles (SV) supporting the GPS constellation and is funded in PE 1203265SF. GPS III SVs deliver significant enhancements over legacy satellites, including a new international civil (L1C) Galileo-compatible signal, and enhanced anti-jam power. GPS III SVs 06-10 are in the Production and Deployment Phase.

The GPS III program funds and supports RDT&E of GPS III SVs 01-02 and risk-reducing simulators through a systems engineering approach that matures and delivers SVs for launch. This program includes SVs 01-02 engineering studies and analyses, trade studies, system development, test and evaluation efforts, integrated logistics support products, on-orbit support, and mission operations support for civil and military applications that protect U.S. military and allied use of GPS. The program also includes Contingency Operations as a bridge capability to fly GPS III SVs until the delivery of the Next Generation Operational Control System (OCX) program.

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

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 1203265SF / <i>GPS III Space Segment</i>
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Mission Readiness Campaign activities include launch preparation, planning, mission readiness testing to validate space-ground-user interfaces, mission crew exercises and rehearsals, launch vehicle integration, and On-Orbit Checkout activities to validate performance prior to launch and post launch. Newly certified launch vehicles must be incorporated into the GPS III launch baseline. Integration requires the development of plans and procedures and procurement of special support equipment.

GPS supports the early deployment of Global Military-Code (M-Code) to meet a Congressional mandate limiting user equipment purchases to M-Code capable receivers starting in FY 2017. The funds will cover the M-Code Early Use (MCEU) program and support development costs associated with the GPS control segment software to provide core M-Code capabilities to the warfighter, as well as the ability to command and control, process, and monitor the M-Code signal. MCEU mitigates delays with GPS OCX, supports Military GPS User Equipment (MGUE) testing, and allows for early M-Code operations. M-Code provides greater security to protect navigation and timing in electronically contested environments.

Impacts of the M-Code deployment include:

- Compliance with U.S. Space Command Commander's mandate to provide global monitoring necessary for early M-Code operational use and verification of navigation warfare effects.
- Improved resiliency of the GPS capability.
- Confirmation that PNT Enterprise modernization efforts are integrated and properly deployed.
- Testing and verification of M-Code capability on MGUE/GPS III solution and early M-Code use tied to MGUE fielding.

The feasibility studies and preliminary engineering analyses that are funded by this budget item will determine whether an initiative to host GPS M-Code augmentation payloads on other satellite systems is practical and beneficial. The primary goal is to provide additional mission assurance through redundant systems not directly connected with the current U.S. GPS satellite constellation.

This program encompasses GPS III (SVs 01-10) and MCEU.

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 repurpose capabilities.

This program may include necessary civilian pay expenses required to manage, execute, and deliver GPS III 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.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203265SF / <i>GPS III Space Segment</i>
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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	10.777	7.207	0.000	0.000	0.000
Current President's Budget	10.398	7.207	1.626	0.000	1.626
Total Adjustments	-0.379	0.000	1.626	0.000	1.626
• 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	-0.379	0.000			
• Other Adjustments	0.000	0.000	1.626	0.000	1.626

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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: GPS III SVs 01-02	7.093	7.207	1.626
Description: Development, test, and evaluation of GPS III SVs 01-02 and associated simulators, on-orbit engineering, engineering studies and analyses, trade studies, system development, test and evaluation efforts, and integrated logistics support products.			
FY 2022 Plans: Continue support activities that include product development through life testing, technical mission analysis, information assurance, technical support, system engineering, mission operations, support of test assets, maintenance of network equipment and mission planning tools, and contract closeout activities. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.			
FY 2023 Plans: Finish SV01/02 On-Orbit Engineering and Performance Validation. Complete final development, test and contract closeout activities. Additionally, FY 2023 funding will allow the program to 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, experimentation, prototyping, etc.			
FY 2022 to FY 2023 Increase/Decrease Statement:			

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

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 1203265SF / <i>GPS III Space Segment</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 decreased due to the ramping down of activities associated with final development, test, and initiation of contract close out.			
Title: Architecture Evolution Plan (AEP) M-Code Monitoring	3.305	0.000	0.000
Description: The MCEU program initiative covers the development costs associated with updating the legacy control segment software, AEP, with additional capabilities needed to provide M-Code operations. MCEU provides the Combined Space Operations Center with command and control, processing, and integrity monitoring for the M-Code signal. The development also includes the integration of modernized Monitor Station Technology Improvement Capability (MSTIC) receivers, which are being procured separately using Operations and Maintenance (O&M) funding as a Form- Fit- Functional replacement for the legacy Monitor Station Receiver Element Y-Code receivers. MCEU adds a software upgrade to MSTIC receivers to allow it to process M-Code signals. Prime contract was awarded to start software development and test activities; includes insertion of Legacy Hot Start, Demilitarized Zone, and Receiver Protection Profile requirements into the MCEU baseline.			
FY 2022 Plans: N/A			
FY 2023 Plans: N/A			
FY 2022 to FY 2023 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	10.398	7.207	1.626

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPSF 01 GPSIII: <i>GPS III Space Segment</i>	24.146	84.452	103.340	-	103.340	122.753	76.037	50.443	2.831	0.000	464.002

Remarks

E. Acquisition Strategy
The GPS III next generation space segment (SVs 01-10) rapidly and affordably responds to warfighter capability requirements. The acquisition approach utilizes a disciplined systems engineering approach which focuses on mitigating cost and schedule risk through a lower-risk incremental delivery of mature technologies. This approach focuses on mission success and on-time delivery. The GPS III SVs will have GPS IIF capabilities plus up to a 3x-8x increase in anti-jam signal power, 3x

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022
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 1203265SF / <i>GPS III Space Segment</i>	
<p>improved accuracy, 3+ year increased design life, a new international civil (L1C) signal compatible with the European Galileo system, and a satellite bus capable of supporting future SV capability additions.</p> <p>On January 21, 2017, PEO Space approved the Acquisition Strategy for the MCEU program. The MCEU acquisition strategy enables the GPS Enterprise to provide core M-Code capabilities to the warfighter prior to GPS OCX delivery. MCEU supports the scheduled operational testing of MGUE. MCEU updated the GPS control segment software, AEP, to allow for command and control, processing, and integrity monitoring of the M-Code signal. MCEU acquires this capability by using the existing GPS III prime contract vehicle to modify the operational AEP software. The Air Force approved reinstatement of a previously deferred Key Support Area (KSA) on February 10, 2016. The MSTIC receivers currently under development will get a software upgrade to process M-Code data. This \$7.96M project to procure the M-Code MSTIC receivers was funded through both O&M and SPAF funds in FY 2016-FY 2018. Performance monitoring, integration, and test will be conducted by the MCEU program and sustained under the Global Positioning Operations Support and Sustainment Division contract with Lockheed Martin.</p>		

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203265SF / GPS III Space Segment	Project (Number/Name) 67A019 / GPS III
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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			
GPS III Development	C/CPIF	Lockheed Martin : Denver, CO	0.000	1.245	Dec 2020	0.504	Apr 2022	0.832	Dec 2022	-		0.832	0.000	2.581	-
GPS III SV01-02 On Orbit Incentive Fee	C/CPIF	Lockheed Martin : Denver, CO	0.000	0.547	Apr 2021	-		-		-		-	0.000	0.547	-
GPS III Technical Mission Analysis	Various	Various : Various	0.000	0.756	Mar 2021	0.898	Apr 2022	0.518		-		0.518	0.000	2.172	-
GPS III Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	0.000	0.927	May 2021	0.444	Mar 2023	0.182	Oct 2022	-		0.182	0.000	1.553	-
GPS III Launch Support	RO	45th : Cape Canaveral, FL	0.000	1.475	May 2021	3.765	Apr 2022	-		-		-	0.000	5.240	-
MCEU Development	C/CPIF	Lockheed Martin : Denver, CO	0.000	3.305	Jun 2021	-		-		-		-	0.000	3.305	-
Subtotal			0.000	8.255		5.611		1.532		-		1.532	0.000	15.398	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			
GPS III FFRDC	RO	Aerospace : El Segundo, CA	0.000	1.044	Mar 2021	0.735	Apr 2022	-		-		-	0.000	1.779	-
GPS III A&AS	Various	Various : Various	0.000	1.099	Aug 2021	0.861	Jan 2022	0.094	Dec 2022	-		0.094	0.000	2.054	-
GPS III Other Support	Various	Various : Various	0.000	0.000	Oct 2020	0.000	Oct 2021	-		-		-	0.000	0.000	-
Subtotal			0.000	2.143		1.596		0.094		-		0.094	0.000	3.833	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		0.000	10.398	7.207	1.626	-	1.626	0.000	19.231	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203265SF / <i>GPS III Space Segment</i>	Project (Number/Name) 67A019 / <i>GPS III</i>
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

GPS III	
GPS III SV01/02 On-Orbit Engineering Support/Performance Validation	
MCEU	
MCEU Operational Test Readiness Certification	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203265SF / <i>GPS III Space Segment</i>	Project (Number/Name) 67A019 / <i>GPS III</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>GPS III</i>				
GPS III SV01/02 On-Orbit Engineering Support/Performance Validation	1	2021	4	2023
<i>MCEU</i>				
MCEU Operational Test Readiness Certification	1	2021	1	2021

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

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 1203330SF / <i>Space Superiority ISR</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	-	16.810	18.109	29.128	0.000	29.128	28.601	28.616	24.464	21.879	Continuing	Continuing
67A051: <i>Space Superiority - Advanced Intelligence Systems</i>	-	16.810	18.109	29.128	0.000	29.128	28.601	28.616	24.464	21.879	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Space Superiority Intelligence, Surveillance and Reconnaissance (ISR) (SSI) program provides ISR and Electronic Support (ES) for key find, fix, track, target, engage, and assess (F2T2EA) requirements supporting Space Superiority activities meeting Combatant Command (CCMD) needs. SSI funds developmental intelligence activities to support new space superiority capability acquisition and development. Funds associated developmental ISR Planning and direction, Collection, Processing and exploitation, Analysis and production, Dissemination and integration (PCPAD) capabilities providing Battlespace Awareness and Space Domain Awareness (SDA) in support of Space Superiority and Space Control. This includes funding for fixed and transportable intelligence collection; Processing, Exploitation and Dissemination (PED); analysis and production capabilities that are modular (plug-and-play); meet Risk Management Framework Accreditation requirements and can keep pace with technological advances and emerging threats. It provides intelligence support systems for SDA activities that provide the requisite current and predictive knowledge of space events and threat conditions and intelligence support to the Space Security and Defense Program (SSDP) by providing architectural survivability analysis of critical mission assets for mission assurance, as well as network analysis. It also supports specialized/tailored, phased threat system analysis and studies (A&S), test support, lab equipment, and Material Acquisition and Exploitation (MAE) for system development, vulnerability, susceptibility assessments to support tactics, techniques and procedures (TTP) development, and future threat technology studies necessary for mission area success, achievement of space superiority, and to preserve the US space advantage across all domains.

Space acquisition must respond with speed and agility to the proliferation of emerging space adversary threats and new technologies. In support of these nascent, cutting edge space acquisition capabilities, Space Superiority ISR provides exquisite, crucial cryptologic and ISR through transformational collection and production activities through the rapid development and fielding of fixed and transportable intelligence architectures capable of front-end collection and analysis of new technologies in near real time. Space Superiority and Space Control is only realized through Space Superiority ISR support on the front end of space acquisition, allowing increased innovation and resiliency in support of changing program/project priorities to respond and to operate in the contested space domain, as well as supporting lifecycle experimentation, prototyping, and risk reduction.

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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203330SF / <i>Space Superiority ISR</i>
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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	16.810	18.109	0.000	0.000	0.000
Current President's Budget	16.810	18.109	29.128	0.000	29.128
Total Adjustments	0.000	0.000	29.128	0.000	29.128
• 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	29.128	0.000	29.128

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 FY 2023 cannot be made in a relevant manner.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Advanced Intelligence Systems for Space Superiority	16.810	18.109	29.128	0.000	29.128
Description: Develops transportable and fixed PCPAD capabilities.					
FY 2022 Plans:					
Continues Space Superiority RDT&E through transformation of collection and production activities by developing and fielding fixed and transportable intelligence architectures capable of front-end collection and analysis of new technologies in near realtime. This capability will be expanded across the Special Missions Enterprise (SME) to allow access to sensitive information from each point of presence providing production analysts the ability to rapidly exploit known vulnerabilities and develop new capabilities to counter adversary technological advances. ISR capabilities will be further developed and fielded to replace legacy systems, enhance automation, and respond more quickly to ISR for Space needs. Implements 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, prototyping, etc.					
FY 2023 Base Plans:					
Continues Space Superiority RDT&E through transformation of antiquated collection and production capabilities within the Special Mission Enterprise (SME). Begins mission management enhancements. Provides multiple					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203330SF / <i>Space Superiority ISR</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>antenna systems to 73 ISRS Overseas Continental United States (OCONUS) locations; includes delivery, site integration, and testing for systems. Provides ISR capabilities to 72 ISRS, Peterson SFB, CO in support of Continental United States (CONUS)-based deployable Tactical ISR Operations Cells (TISROCs)/Deployable ISR Support Cells (DISCs) to meet USSF Service-retained and CCMD ISR requirements. Enhances Long Haul Communications Infrastructure to speed dissemination of collected intelligence to analytic elements within the SME. Funds enhancements to analytic exploitation, vulnerability and susceptibility tools. In addition to replacing legacy systems, enhancing automation, and enabling the SME to more quickly respond to ISR for Space needs, FY 2023 funding implements system resiliency and situational awareness necessary to operate in the contested space domain. Funding also supports ISR Cell that develops and fields Data Management System to archive mission data, exploitation tool suite, and cross-domain data dissemination to CCMDs, IC and National Agencies.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: The \$11.019M increase in FY 2023 funding over FY 2022 includes multiple on-going upgrades to the Space ISR enterprise; replaces decades old legacy capabilities; and stands up a new ISR squadron to provide dedicated, deployable support to meet Space Warfighting CONOPS mission requirements. Equips multiple Continental United States (CONUS)-based deployable TISROCs/DISCs to meet USSF Service-retained and CCMD ISR requirements. ISR Cell will develop and field a Data Management System to archive mission data, an exploitation tool suite, and a cross-domain data dissemination to CCMDs, IC, and National Agencies.</p>					
Accomplishments/Planned Programs Subtotals	16.810	18.109	29.128	0.000	29.128

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

Remarks

E. Acquisition Strategy
All contracts funded in this program will be awarded using competitive procedures to the maximum extent possible.

Space Superiority and R&D Intelligence Development: Single Delivery, Cost-Plus-Fixed-Fee (CPFF), advisory and assistance contractor supporting development efforts. Prime contractor is Alion Science & Technology.

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development</i>	PE 1203330SF / <i>Space Superiority ISR</i>

Architecture upgrades to SDA, SSDP, and Space Superiority: Multiple Delivery, CPFF integration contract. Prime contractor is BITSYSTEMS Data Analysis.

Data Analysis, Production Development, Test Support for R&D: Multiple Delivery, CPFF production contract supporting vulnerabilities analysis. Prime Contractor is Booz-Allen Hamilton

ISR Cell for Data Management Archiving, Exploitation and Dissemination: TBD Multiple Delivery, CPFF integration contract providing Data Management System, Exploitation Tool Suites and Cross-Domain Data Dissemination Solution new capability development. Prime contractor is TBD in FY23.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203330SF / <i>Space Superiority ISR</i>	Project (Number/Name) 67A051 / <i>Space Superiority - Advanced Intelligence Systems</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			
Space Superiority and R&D Intelligence Development	C/CPFF	Various: TBD : TBD	-	1.817	Apr 2021	1.856	Nov 2021	1.500	Nov 2022	-		1.500	Continuing	Continuing	-
Architecture Upgrades to SDA, SSDP, and Space Superiority	C/CPFF	Various: TBD : TBD	-	9.586	Jun 2021	10.736	Jun 2022	18.359	Dec 2022	-		18.359	Continuing	Continuing	-
Data Analysis, Product Development & Test Support for R&D	C/CPFF	Various: TBD : TBD	-	5.193	Nov 2021	5.298	Nov 2021	4.601	Nov 2022	-		4.601	Continuing	Continuing	-
ISR Cell for Data Management Archiving, Exploitation and Dissemination	C/CPAF	Various: TBD : TBD	-	-		-		4.444	Jan 2023	-		4.444	Continuing	Continuing	-
Subtotal			-	16.596		17.890		28.904		-		28.904	Continuing	Continuing	N/A

Support (\$ 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			
Mission Support	C/Various	TBD : TBD	-	0.214	Oct 2020	0.219	Oct 2021	0.224	Oct 2022	-		0.224	Continuing	Continuing	-
Subtotal			-	0.214		0.219		0.224		-		0.224	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			-	16.810	18.109	29.128	-	29.128	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203330SF / <i>Space Superiority ISR</i>	Project (Number/Name) 67A051 / <i>Space Superiority - Advanced Intelligence Systems</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
Space Superiority ISR																												
Space Superiority and R&D Intelligence Development																												
Architecture Upgrades to SDA, SSDP, and Space Superiority																												
Data Analysis, Production Development and Test Support for R&D																												
ISR Cell for Data Management Archiving, Exploitation and Dissemination																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203330SF / <i>Space Superiority ISR</i>	Project (Number/Name) 67A051 / <i>Space Superiority - Advanced Intelligence Systems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Superiority ISR</i>				
Space Superiority and R&D Intelligence Development	1	2021	4	2027
Architecture Upgrades to SDA, SSDP, and Space Superiority	1	2021	4	2027
Data Analysis, Production Development and Test Support for R&D	1	2021	4	2027
ISR Cell for Data Management Archiving, Exploitation and Dissemination	2	2023	4	2027

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force											Date: April 2022	
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 1203620SF / <i>National Space Defense Center</i>							
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	-	2.590	1.280	2.856	0.000	2.856	0.000	0.000	0.000	0.000	0.000	6.726
670004: <i>OTHER STRATCOM ACTIVITIES</i>	-	2.590	1.280	2.856	0.000	2.856	0.000	0.000	0.000	0.000	0.000	6.726
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program develops and integrates Battle Management and Command and Control (BMC2) applications for the Joint Task Force - Space Defense (JTF-SD). JTF-SD is one of two subordinate commands to USSPACECOM and has the responsibility to protect and defend space assets from both terrestrial and space-based threats. The JTF-SD executes its mission through its operations center, the National Space Defense Center (NSDC) which was previously referred to as the Joint Interagency Combined Space Operations Center. NSDC efforts include integrating hardware and software prototypes to support various networks developed by mission partners and integrating applications developed by the Space C2 program to ensure relevant and accurate situational awareness to mission partners. NSDC also conducts early prototyping efforts to inform JTF-SD's ability to generate informed BMC2 and space superiority requirements for the acquisition community. The JTF-SD (and NSDC) allows the national security space community to effectively respond to space threat events and will have the capability to develop, test, and integrate new space system tactics, techniques and procedures (TTPs) in support of both DoD and Intelligence Community operations.

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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	2.687	1.280	0.000	0.000	0.000
Current President's Budget	2.590	1.280	2.856	0.000	2.856
Total Adjustments	-0.097	0.000	2.856	0.000	2.856
• 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	-0.097	0.000			
• Other Adjustments	0.000	0.000	2.856	0.000	2.856

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203620SF / <i>National Space Defense Center</i>
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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 FY 2023 cannot be made in a relevant manner.

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

	FY 2021	FY 2022	FY 2023
Title: Application Development	2.590	1.280	2.856
Description: Develop and field Space Battle Management Command and Control capabilities.			
FY 2022 Plans: FY 2022 Plans: Continue to analyze, assess, and provide operations center support for mission partner and Intelligence Community networks and achieve authorization to connect to JTF-SD infrastructure. Partner with test agency to perform developmental and operational test activities and shadow operations for agile DevOps environment. Increase integration efforts for Space C2 applications. Implement system resiliency and situational awareness capability necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, and prototyping.			
FY 2023 Plans: FY 2023 Plans: Continue to analyze, assess, and provide operations center support for mission partner and Intelligence Community networks. Partner with test agency to perform developmental and operational test activities and shadow operations for agile DevOps environment. Increase integration efforts for Space C2 applications. Implement system resiliency and situational awareness capability necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, and prototyping.			
FY 2022 to FY 2023 Increase/Decrease Statement: +\$1.491M increase compared to FY22. FY22 funding was reduced by the Department to account for prior year balances; FY23 funding level is necessary to continue required development, integration and testing efforts.			
Accomplishments/Planned Programs Subtotals	2.590	1.280	2.856

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

N/A

Remarks

E. Acquisition Strategy

NSDC provides funds to Department of the Air Force, DoD, and other partner organizations to execute on their contracts in support of NSDC requirements. Additionally, NSDC funding secures contract support to develop and document the technical baseline and support major test and transition activities during each fiscal year.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203620SF / National Space Defense Center	Project (Number/Name) 670004 / OTHER STRATCOM ACTIVITIES
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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			
SHADOW OPERATIONS CENTER DEVELOPMENT	Various	Various : Colorado Springs, CO	-	0.180	Jan 2021	-		-		-		-	0.000	0.180	-
BMC2 APPLICATION DEVELOPMENT AND INTEGRATION	Various	Various: : Colorado Springs, CO	-	1.006	Jan 2021	0.600	Mar 2022	1.356	Jan 2023	-		1.356	Continuing	Continuing	-
SYSTEM ENGINEERING	Various	Various: : Colorado Springs, CO	-	-		0.330	May 2022	0.500	Dec 2022	-		0.500	0.000	0.830	-
Subtotal			-	1.186		0.930		1.856		-		1.856	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			
A&AS	Various	Various: : Colorado Springs, CO	-	0.502	Jan 2021	0.250	Apr 2022	0.600	Jan 2023	-		0.600	Continuing	Continuing	-
FFRDC	Various	Various: : Colorado Springs, CO	-	0.902	Dec 2020	0.100	Mar 2022	0.400	Jan 2023	-		0.400	Continuing	Continuing	-
Subtotal			-	1.404		0.350		1.000		-		1.000	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		-	2.590	1.280	2.856	-	2.856	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203620SF / <i>National Space Defense Center</i>	Project (Number/Name) 670004 / <i>OTHER STRATCOM ACTIVITIES</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>NSDC INFRASTRUCTURE</i>				
SUSTAINMENT/SUPPORT	1	2021	4	2023
<i>BMC2 APPLICATION DEVELOPMENT AND INTEGRATION</i>				
APPLICATION DEVELOPMENT	1	2021	4	2023
<i>SHADOW OPS CENTER</i>				
DEVELOPMENT	1	2021	4	2021

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

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 1203873SF / <i>Ballistic Missile Defense Radars</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	-	21.817	12.292	18.615	0.000	18.615	13.781	9.077	1.470	0.000	0.000	77.052
674820: <i>Sensor Development</i>	-	21.817	12.292	18.615	0.000	18.615	13.781	9.077	1.470	0.000	0.000	77.052
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

COBRA DANE (CD) is a 40+ year old radar located on Eareckson AS, AK (Shemya Island, AK). CD is the most powerful, sensitive, and accurate Ground-based Midcourse Defense (GMD) radar and the premier Ballistic Missile Defense (BMD) radar. At the same time, it is the most accurate and capable phased array available to the Space Surveillance Network (SSN) for cataloging hazardous and difficult-to-track satellites and space debris objects that clutter the near-earth orbital regime that cannot be detected by most other SSN tracking assets. CD has two primary missions. One is to support US Strategic Command's (USSTRATCOM) BMD mission by providing midcourse coverage for the Ballistic Missile Defense System (BMDS). CD detects Intercontinental Ballistic Missiles (ICBMs) and Sea-Launched Ballistic Missiles (SLBMs), classifies reentry vehicles (RVs) and other missile objects, provides real-time information to the GMD Fire Control (GFC), and provides tracking of threat ballistic missiles with sufficient accuracy to commit the launch of interceptors and to update the target tracks to the interceptor while the interceptor is in flight. CD's other primary mission is to support US Space Command's (USSPACECOM) Space Domain Awareness (SDA) mission by detecting, tracking, correlating, and characterizing man-made resident space objects, primarily in the Low-Earth Orbit (LEO) regime, including space debris and early observation of New Foreign Launches (NFLs). It operates as part of the larger SSN and provides metric observation data to its command and control nodes: the Combined Space Operations Center (CSpOC) and the Distributed Space Command and Control - Dahlgren (DSC2-D). CD also supports USSPACECOM's Space Object Identification (SOI) mission by providing narrowband radar data of man-made resident space objects in the LEO regime. SOI information is used to ascertain the mission and operational status of various payloads and aids in forecasting maneuvers or deorbits.

CD will acquire a modern architecture through design, development, integration, and test. This architecture enhances mission capability, providing warfighter and stakeholder customers direct operational benefit. CD utilizes Federally Funded Research and Development Centers (FFRDC), Systems Engineering and Integration (SE&I), University Affiliated Research Center (UARC), and Assistance and Advisory Services (A&AS) contractors to support programmatic and technical activities. Activities include studies and analysis to support both current program planning and execution and future program planning. Specifically, the Automated Data Processing Equipment (ADPE) Rehost program upgrades the CD system's radar back-end mission data processing, radar management and control, and signal processing capabilities to a modern architecture that facilitates long-term mission resiliency, cyber security, system viability, high operational availability, and rapid hardware and software development and deployment capability. RDT&E funds were provided to the Missile Defense Agency (MDA) to accelerate the joint Department of the Air Force and MDA modernization program of the CD radar. In addition to funds being used to modernize this back-end of the radar, these funds will also be used for out-year planning of front-end component modernization including enhancement of communication elements.

Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Command (SSC) is transforming the organization and implementation of space acquisition to an enterprise approach, to increase 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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203873SF / <i>Ballistic Missile Defense Radars</i>
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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Cobra Dane for 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. In FY 2021 \$0.00 was expended for civilian pay expenses in this program element, and in FY 2022 \$0.00 is forecasted for civilian pay expenses in this program element.

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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	28.179	12.292	0.000	0.000	0.000
Current President's Budget	21.817	12.292	18.615	0.000	18.615
Total Adjustments	-6.362	0.000	18.615	0.000	18.615
• 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	-5.454	0.000			
• SBIR/STTR Transfer	-0.908	0.000			
• Other Adjustments	0.000	0.000	18.615	0.000	18.615

Change Summary Explanation

FY 2021: -5.454M reprogramming reduction to support higher SF priorities and -0.908M decrease for SBIR.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: ADPE Rehost Upgrade, Phase II	21.817	12.292	18.615
Description: The Automated Data Processing Equipment (ADPE) Rehost (ADPE-R) Phase II Signal Processor, Radar Controller and Receiver modernization. Mission Computer replacement will also be accomplished as soon as resources allow. The approach will modernize these systems with an innovative hardware and software-based open architecture solution supported by switching solutions and modernized development environments.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203873SF / <i>Ballistic Missile Defense Radars</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p><i>FY 2022 Plans:</i> Planned projects include completion of demonstration activities, execution of the Mission Computer replacement hardware and software development, system integration, developmental testing, and initial deployment to site. In addition, completion of the Signal Processor, Radar Controller, and Receiver requirements definition activities, and start of design, system hardware and software development. This program element may include necessary civilian pay expenses required to manage, execute, and deliver CD's weapon system capability. Continue program office and other related support and integration activities such as, but not limited to, studies, technical analysis, experimentation, prototyping, architectural development, systems engineering, demonstrations, testing, command and control integration, mission partner integration, and space test/combat range events.</p> <p><i>FY 2023 Plans:</i> Continue effort to upgrade the Signal Processor, Radar Controller, Receiver-Exciter (SPARC/REX) Replacement system hardware and software development. Continue Mission Computer replacement hardware and software development as resources are available. Replaces the transmitter system and associated systems, and the automated data processing equipment. This program element may include necessary civilian pay expenses required to manage, execute, and deliver CD's weapon system capability. 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, experimentation, prototyping, etc.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased due to additional effort to modernize the back-end of the radar and plan front-end system modernization including enhancement of communication elements.</p>			
Accomplishments/Planned Programs Subtotals	21.817	12.292	18.615

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

Remarks

E. Acquisition Strategy
The ADPE Rehost acquisition strategy has transitioned to traditional acquisition delivery orders under a University Affiliated Research Center (UARC), sole-source, cost-plus fixed fee contract. This approach will provide a phased extension of system service life to ensure warfighter capability through at least 2030. This evolutionary migration to a modernized open system approach provides the foundation for adaptable system sustainment and addition of future capabilities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force												Date: April 2022				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)						
3620F / 7				PE 1203873SF / Ballistic Missile Defense Radars						674820 / Sensor Development						
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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	
ADPE Phase II, Mission Computer Replacement	SS/CPAF	Various : Colorado Springs, CO	-	8.834	Dec 2021	3.146	Feb 2022	7.053	Feb 2023	-		7.053	Continuing	Continuing	-	
Signal Processor, Radar Controller, Receiver-Exciter Replacement	SS/CPAF	Various : Colorado Springs, CO	-	8.292	Aug 2021	6.584	Feb 2022	8.809	Feb 2023	-		8.809	Continuing	Continuing	-	
Subtotal			-	17.126		9.730		15.862		-		15.862	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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	
ADPE Integration	Various	Riverside Res Institute : Colorado Springs, CO	-	0.406	Jul 2021	0.700	Dec 2021	0.700	Dec 2022	-		0.700	Continuing	Continuing	-	
Subtotal			-	0.406		0.700		0.700		-		0.700	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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	
Test and Evaluation	Various	Space Readiness Delta : Colorado Springs, CO	-	2.000	Aug 2021	0.411	Feb 2022	0.410	Feb 2023	-		0.410	Continuing	Continuing	-	
Subtotal			-	2.000		0.411		0.410		-		0.410	Continuing	Continuing	N/A	
Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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	
A&AS	Various	Various : Colorado Springs, CO	-	2.285	Jun 2021	1.205	Jun 2022	0.650	Jun 2023	-		0.650	Continuing	Continuing	-	

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203873SF / <i>Ballistic Missile Defense Radars</i>	Project (Number/Name) 674820 / <i>Sensor Development</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

ADPE Rehost Phase II, Part I	
Prototype Phase 2 Requirements, Infrastructure & Early Development	█
ADPE Rehost Phase II, Part II SPARC/REX Replacement	
Phase II, Part II Requirements Development	██████████
Phase II, Part II Hardware/Software Development	██████████████████████████████
Phase II, Part II Systems Integration & Test	██████████████████████████
Phase II, Part II Operational Assessment	██████████
ADPE Rehost Phase II, Part II Mission Computer Replacement	
Phase II, Part II Requirements Development & Design	██████████
Phase II, Part II Hardware/Software Development	██████████████████████████████████████
Phase II, Part II Systems Integration & Test	██████████████████████████
Phase II, Part II Operational Assessment	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203873SF / <i>Ballistic Missile Defense Radars</i>	Project (Number/Name) 674820 / <i>Sensor Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>ADPE Rehost Phase II, Part I</i>				
Prototype Phase 2 Requirements, Infrastructure & Early Development	1	2021	1	2021
<i>ADPE Rehost Phase II, Part II SPARC/REX Replacement</i>				
Phase II, Part II Requirements Development	1	2022	3	2022
Phase II, Part II Hardware/Software Development	3	2022	1	2024
Phase II, Part II Systems Integration & Test	1	2024	4	2024
Phase II, Part II Operational Assessment	4	2024	1	2025
<i>ADPE Rehost Phase II, Part II Mission Computer Replacement</i>				
Phase II, Part II Requirements Development & Design	3	2022	4	2022
Phase II, Part II Hardware/Software Development	4	2022	2	2025
Phase II, Part II Systems Integration & Test	2	2025	4	2025
Phase II, Part II Operational Assessment	1	2026	2	2026

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

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 1203906SF / NCMC - ITW/AA System
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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	-	6.752	9.858	7.274	0.000	7.274	13.520	13.562	14.675	13.680	0.000	79.321
67A051: <i>Space Superiority - Advanced Intelligence Systems</i>	-	6.752	9.858	7.274	0.000	7.274	13.520	13.562	14.675	13.680	0.000	79.321
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program element supports development activities for the North American Aerospace Defense Command (NORAD) Cheyenne Mountain Complex (NCMC) - Integrated Tactical Warning Attack Assessment (ITW/AA) system that provides timely, unambiguous, and continuous warning and attack assessment of air, missile and space threats to North America, and geographical theaters. This system integrates and correlates missile launch and air surveillance information from certified sources to assess the nature of an enemy launch/attack and issue warnings to the President of the United States, Canadian National Leadership, United States Secretary of Defense, National Military Command Center and war-fighting Combatant Commanders. NCMC-ITW/AA and Legacy Space Command and Control (C2) systems provide NORAD/US Northern Command (USNORTHCOM), US Strategic Command (USSTRATCOM), and US Space Command (USSPACECOM) command structures with the information management, decision aids, and connectivity required to monitor, assess, plan, and execute assigned strategic, space operations, and missile defense missions. It provides Nuclear C2 and detonation detection.

The Combatant Commanders Integrated Command and Control System (CCIC2S) is a unique, integrated C2 "system of systems," providing data communication between external sensors and end users, mission processing for air and missile warning mission, and system operations functions. The system supports national strategic objectives with ITW/AA and provides missile and air warning, cueing, and engagement information to theater combatant commanders. The system consists of terrestrial and space-based sensor outputs, C2 nodes, and communications and dissemination links, connecting the US and Canadian defense information networks.

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, to increase 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 existing capabilities to meet emerging threats with our Nuclear C2 assets by ingesting and integrating non-traditional source data in a structured fashion so as to continue to meet strategic requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NCMC-ITW/AA's 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.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1203906SF / NCMC - ITW/AA System
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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	6.990	9.858	0.000	0.000	0.000
Current President's Budget	6.752	9.858	7.274	0.000	7.274
Total Adjustments	-0.238	0.000	7.274	0.000	7.274
• 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	-0.238	0.000			
• Other Adjustments	0.000	0.000	7.274	0.000	7.274

Change Summary Explanation

FY 2021: - 0.238M decrease for SBIR.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: ITW/AA C2 Integration of C2BMC Feeds	6.752	9.858	7.274
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Description: Obtain and assess non-ITW/AA (Global Data Integration) and non-traditional data sources (Command and Control, Battle Management, and Communications (C2BMC) and theater) for integration into CCIC2S and Processing and Display System Migration (PDSM) to display a more complete event picture. Improve source data accuracy for missile warning mission and translate for integration into CCIC2S that will enhance mission displays and improve impact prediction. Create multiple display options for the operator and reduce ambiguity between missile defense and missile warning displays. Provide program office support and other related support activities, including but not limited to technical analysis, prototyping, user evaluations, and independent certification testing.

FY 2022 Plans:

Continue integration, processing, and display of high fidelity data from non-ITW/AA and non-traditional sensors sources, ambiguity resolution, and prediction accuracy improvement to increase the National Command Authorities' time-critical nuclear response decision space. Continue to address emergent missile threats and other capability gaps identified in the Global Threat Characterization Assessment recommendations. Continue missile defense and missile warning information integration to support a common operating picture.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203906SF / NCMC - ITW/AA System
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Continue harmonization of displays between Strategic Missile Warning, Theater Missile Warning, and Missile Defense, and non-traditional source data integration to provide a seamless event-tracking and common operating picture.			
Continue to leverage/integrate new data sources that come online and correlate with missile defense and missile warning display changes to meet emerging adversary threats.			
Continue program office support and other related support activities, including but not limited to technical analysis, prototyping, user evaluations, and independent certification testing.			
FY 2023 Plans: Continue upgrades to add additional non-ITW/AA data for emerging threats.			
Complete C2BMC connectivity effort.			
Continue harmonization of displays between Strategic Missile Warning, Theater Missile Warning, and Missile Defense, and non-traditional source data integration to provide a seamless event-tracking and common operating picture.			
Continue to leverage/integrate new data sources that come online and correlate with missile defense and missile warning display changes to meet emerging adversary threats.			
Implement changes/enhancements to Missile Warning (MW) systems based on PDM plus-up. Further details classified.			
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, experimentation, prototyping, etc.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to completion of first non-traditional data source ingestion.			
Accomplishments/Planned Programs Subtotals	6.752	9.858	7.274

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

Remarks

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

Appropriation/Budget Activity
3620F: *Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development*

R-1 Program Element (Number/Name)
PE 1203906SF / *NCMC - ITW/AA System*

E. Acquisition Strategy

The initial effort was competitively awarded from an existing software services Indefinite Delivery/Indefinite Quantity (IDIQ) contract in Q4 FY 2021. This effort will provide incremental deliveries to the ITW/AA sustainment provider for incorporation into the operational system. The use of experimentation, prototyping, risk reduction, and other efforts to develop new or re-purpose existing capabilities will be accomplished through multi-source acquisitions. In FY 2023, these efforts will continue from a previously awarded contract modification to an existing software services Indefinite Delivery/Indefinite Quantity (IDIQ) Contract.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203906SF / NCMC - ITW/AA System	Project (Number/Name) 67A051 / Space Superiority - Advanced Intelligence Systems

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

C2 Integration of C2BMC Feeds	
C2 Integration Prime Contract	[REDACTED]
- Ingest GDI data into CCIC2S in TDF and CMAFS w/ user evaluation	[REDACTED]
- C2BMC Connectivity	[REDACTED]
- C2BMC Use and Display Data	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203906SF / NCMC - ITW/AA System	Project (Number/Name) 67A051 / Space Superiority - Advanced Intelligence Systems

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
C2 Integration of C2BMC Feeds				
C2 Integration Prime Contract	4	2021	4	2027
- Ingest GDI data into CCIC2S in TDF and CMAFS w/ user evaluation	4	2021	4	2023
- C2BMC Connectivity	1	2022	1	2024
- C2BMC Use and Display Data	1	2022	4	2027

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1203913SF I NUDET Detection System (SPACE)
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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	-	29.157	45.887	80.429	0.000	80.429	93.588	86.600	76.954	78.453	Continuing	Continuing
672808: Nuc Detonation Det Sys (sensors)	-	29.157	45.887	80.429	0.000	80.429	93.588	86.600	76.954	78.453	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The United States Nuclear Detonation (NUDET) Detection System (USNDS) provides a near real-time worldwide, highly survivable/endurable capability to detect, locate, and report any nuclear detonations in the earth's atmosphere or in near space. USNDS supports NUDET detection requirements across five mission areas: Integrated Tactical Warning and Attack Assessment (ITW/AA), Nuclear Force Management (NFM), Space Control, Treaty Monitoring, and a classified mission.

The USNDS program is jointly sponsored and funded by the Department of Defense (DoD), through the Space Force, and the Department of Energy (DOE), through the National Nuclear Security Administration (NNSA) and its Nuclear Detonation Detection (NA-22) office, respectively. NNSA/NA-22 supplies USNDS space sensors as Government Furnished Equipment to the Space Force's USNDS Program Office, which is responsible for all acquisition and Systems Engineering, Integration and Test activities on Space Vehicles (SVs), to include Global Positioning System (GPS) and additional hosts, and their supporting ground control segments. The AF directly funds the development of the USNDS ground segment (described below).

DoD funds their contribution to the USNDS program 1203913SF, Research, Development, Test and Evaluation, Space Force (RDT&E, SF), Procurement, Space Force, and Operations and Maintenance.

USNDS consists of space sensors and complex ground segments. The space segment sensors, funded by DOE, consists of three nuclear detection sensor payloads: the Radiation Detection Capability (RADEC) payload for Defense Support Program (DSP) satellites, the Global Burst Detection (GBD) payload for Medium Earth Orbit platforms (GPS satellites), and the Space Atmospheric Burst Reporting System (SABRS) payload for Geosynchronous Earth Orbit (GEO) platforms (classified GEO host), and Space Test Platform 3. Together, these sensors and associated communications capability provided by the host satellites comprise the global NUDET space segment detection capability for the USNDS. Space sensors communicate NUDET indications to the fixed ground segment, the RADEC Data Processor, and the Integrated Correlation and Display System (ICADS), the five deployable mobile ground segment survivable Ground Nuclear Detonation Detection System Terminals (GNTs), and the survivable/endurable Universal Ground NDS Terminals (UGNTs), when operationally accepted in 4th Quarter of FY 2023. The ground segment provides ground receiving analysis and reporting capabilities to national authorities, commands, and forward users as well as Department of State for the Treaty Monitoring and Verification mission. The ground control segment is being modernized and continuously improved through an incremental, evolutionary acquisition approach.

The upgrades to the GNTs are the survivable/endurable UGNT which are funded with RDT&E in this program. The UGNT provides NUDET Detection Reports to end users through survivable/endurable USNDS communications via MilStar/Future Communication Systems (FCS)/Advanced Extremely High Frequency (AEHF) circuits.

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 1203913SF / NUDET Detection System (SPACE)
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The GNT supports ITW/AA and NFM missions. The UGNT program modifies the baseline of the GNT subsystem and deploys as an integral part of the Space Based Infrared System Survivable (SBIRS) / Endurable Evolution (S2E2) Mobile Ground System (MGS) (SMGS) units also in support of ITW/AA and NFM. The UGNT, when integrated with the SMGS, will perform NUDET event processing with fused NDS data from GPS and DSP. SMGS capability refers to the result of the S2E2 upgrade program for the MGS mission processing capability, including the integration of UGNT. The intended end state of UGNT integration is delivery of enhanced NUDET detection capabilities which meet survivable/endurable attack assessment requirements directed by the President, Secretary of Defense, Joint Staff, USSPACECOM, and USSTRATCOM, delivering long-term, cost effective, multi-role, multi-mission space effects to warfighters across the range of military operations.

ICADS 7 was a new start in FY 2022. ICADS 7 upgrades the ICADS 6 baseline necessary to process future GPS IIIF satellites GBD USNDS messages, address technology obsolescence, and meet updated cybersecurity requirements for system resiliency.

This budget line includes systems engineering, research and development, on-orbit and field testing and end-to-end verification of USNDS space sensors, ground analysis and reporting systems in support of the five USNDS mission areas. Sensor integration for GPS III and GPS III Follow-on (IIIF) are funded in their respective programs.

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 repurpose capabilities.

This program may include necessary civilian pay expenses required to manage, execute, and deliver NUDET Detection System (SPACE) weapon system capability. The use of such program funds is in addition to the civilian pay expenses budgeted in programs 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.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203913SF / <i>NUDET Detection System (SPACE)</i>
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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	29.157	45.887	0.000	0.000	0.000
Current President's Budget	29.157	45.887	80.429	0.000	80.429
Total Adjustments	0.000	0.000	80.429	0.000	80.429
• 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	80.429	0.000	80.429

Change Summary Explanation

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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Title: Integration with SBIRS S2E2 Mobile Ground Terminals (SMGTs)	14.157	6.600	3.800
Description: Support the Integration and test activities between UGNTs and the SMGTs, which together provide NUDET Detection Reports and missile warning data to end users through survivable/endurable USNDS communications via MilStar/FCS/AEHF circuits. The UGNTs deploy as an integral part of the SMGS units also in support of ITW/AA and NFM. Support program scope analyzation for USNDS receiver and NUDET Decryption Unit (NDU) components. Additional support costs includes such activities as; receiver system engineering support, conceptual hardware and software design, check-out/support, testing, and system engineering.			
FY 2022 Plans: Continue to support S2E2 integration and testing activities due to UGNT Concept of Operations (CONOPS) change. Funds are required to support additional integration activities between the UGNT and developing SMGT. The additional integration activities will mitigate technical and schedule inefficiencies due to a shift in the S2E2 CONOPS. Important activities include execution for UGNT dry runs, run for record, operational test and evaluation, and software updates for maintaining an accredited cybersecurity posture. Funds will also provide extended Interim Contract Support (ICS) as a direct result of the new CONOPS shift for the survivable and endurable mission.			
FY 2023 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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 1203913SF / <i>NUDET Detection System (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Complete UGNT integration and testing for the survivable and endurable mission necessary for S2E2/SMGT Operational Acceptance planned for 4th Quarter FY 2023. Provide Technical Order support, UGNT shelter maintenance, shipment of UGNT systems to operational locations, Installation and Checkout, and system testing at Continental United States (CONUS) and Outside CONUS locations.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to planned completion of UGNT integration with S2E2 Mobile Ground Terminals.</p>				
<p>Title: GEO Payload Integration</p> <p>Description: Classified Integration efforts of the GEO payload. This effort is not a new start. It changed title from SABRS Integration to GEO Payload Integration to accurately describe the effort.</p> <p>FY 2022 Plans: Classified</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to completion of GEO payload integration effort in FY 2022.</p>		15.000	3.000	0.000
<p>Title: ICADS 7</p> <p>Description: ICADS 7 consists of satellite ground data processing systems that accommodate the new NDS payload on GPS IIIF SVs and is an upgrade to the current ICADS 6 system. ICADS 7 includes new software, hardware and cybersecurity capabilities and NDS Analysis Package Ground Station (NAPGS) ground systems. The effort includes, but not limited to, the upgrade of two new ICADS 7 test beds, the replacement of the NDU, Enhanced Receiver Subsystems (ERS), and Automated Data Processors (ADP). A non-recurring Engineering effort is required to design the replacements for the NDUs, ERSs and ADPs currently on USNDS tests beds and fielded systems. The ICADS upgrade includes data processing changes to support the new USNDS optical sensor, known as Spectral Imaging Geolocation Hyper-Temporal Sensor (SIGHTS), that will be hosted on the GPS IIIF SVs.</p> <p>FY 2022 Plans: Begin ICADS 7 development including, but not limited to initial design, development of the NDU and ERS, new algorithms, and upgrade software and hardware to support the USNDS payload on GPS IIIF SVs. ICADS 7 activities also include systems engineering, program support, initial test planning, and finalizing requirements. ICADS ground system updates to command and control USNDS payloads, data acquisition, telemetry extraction, mission data processing, and data distribution for USNDS</p>		0.000	36.287	76.629

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1203913SF / <i>NUDET Detection System (SPACE)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>sensor payloads. ICADS 7 development includes GPS IIIIF Mission Readiness Campaign (MRC) space segment test support, GPS IIIIF Early Integration, on-orbit sensor integration, Functional Configuration Audit/Physical Configuration Audit (FCA/PCA) and Development, Testing and Evaluation requirements. Continue program office and other related support activities that may include, but not limited to, studies, technical analysis, prototyping, etc. ICADS 7 will complete System Requirements Review (SRR) in the 3rd quarter of 2022.</p> <p>FY 2023 Plans: Continue to ramp up ICADS 7 development post SRR/Integrated Baseline Review including NDU, ERS, and software and hardware to support the USNDS payloads on GPS IIIIF SVs. Continue systems engineering and test planning for GPS IIIIF MRC, GPS IIIIF Early Integration to include signal verification/data processing, on-orbit USNDS sensor integration, and FCA/PCA. Support next generation USNDS receiver development to include collaboration with National Security Agency for crypto enclosure framework/algorithms and upgrade ICADS testbeds to include tech refresh/hardware, initiate ground modifications to USNDS sensor payload command plans to meet more resilient GPS IIIIF command and telemetry specifications, and begin NAPGS integration and testing. Complete long lead development of decryption unit, ICADS 7 ADP and SIGHTS ADP. Complete design through Preliminary Design Review (PDR) in 4th Quarter FY 2023 and prepare for Milestone B in 2nd Quarter FY 2024. Rapidly implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding increased due to ramp up of development activities to accomplish PDR, prepare for Milestone B, and plan integration and test with new GPS IIIIF USNDS payload receivers and cryptography units.</p>			
Accomplishments/Planned Programs Subtotals	29.157	45.887	80.429

D. Other Program Funding Summary (\$ in Millions)										
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u> <u>Total Cost</u>
• SPSF 01 01 Space Force NUDETS: <i>Nudet Detection Space</i>	6.638	6.690	7.062	-	7.062	0.000	0.000	0.000	-	Continuing Continuing

Remarks

E. Acquisition Strategy
The USNDS Acquisition Strategy is to develop, integrate, field and sustain USNDS satellite sensors and USNDS ground data processing and distribution hardware and software as well as mission operational and technical program support to sustain the USNDS capability on GPS, DSP, Alternate Host, and SBIRS; funding is sent by Military Interdepartmental Purchase Request (MIPR) from DoD and DOE to Sandia, Los Alamos National Laboratories and other agencies on existing DOE/NNSA

UNCLASSIFIED

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 7: Operational Systems Development</i>	PE 1203913SF / <i>NUDET Detection System (SPACE)</i>

contracts. The ICADS 7 Acquisition Strategy was approved in September 2021 to support planned sole source contract award in 3rd quarter FY 2022. USNDS ICS will continue until ICADS 7 contract has been awarded. USNDS requirements are defined in the Operational Requirements Document dated January 21, 2004.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203913SF / NUDET Detection System (SPACE)	Project (Number/Name) 672808 / Nuc Detonation Det Sys (sensors)
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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			
USNDS ICADS, GNT/UGNT, and Integration Support	MIPR	Sandia National Laboratory : Albuquerque, NM	-	8.479	Nov 2020	6.600	Nov 2021	3.800	Nov 2022	-		3.800	Continuing	Continuing	-
USNDS Technical Mission Analysis	RO	Aerospace : El Segundo, CA	-	0.846	Dec 2020	1.522	Nov 2021	1.853	Nov 2022	-		1.853	Continuing	Continuing	-
USNDS Enterprise SE&I	Various	TASC : El Segundo, CA	-	0.903	Dec 2020	0.833	Nov 2021	2.513	Nov 2022	-		2.513	Continuing	Continuing	-
Classified Development	TBD	Classified : Classified	-	15.000	Jan 2021	3.000	Nov 2021	-		-		-	Continuing	Continuing	-
ICADS 7	MIPR	Sandia National Laboratory : Albuquerque, NM	-	-		26.135	May 2022	62.209	Nov 2022	-		62.209	Continuing	Continuing	-
Subtotal			-	25.228		38.090		70.375		-		70.375	Continuing	Continuing	N/A

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			
USNDS On-orbit Sensor Testing	MIPR	Various : LANL, SNL, NM	-	1.977	Dec 2020	3.368	Dec 2021	3.747	Nov 2022	-		3.747	Continuing	Continuing	-
Subtotal			-	1.977		3.368		3.747		-		3.747	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			
USNDS FFRDC	RO	Aerospace, MITRE : El Segundo, CA	-	0.352	Dec 2020	0.750	Nov 2021	0.913	Nov 2022	-		0.913	Continuing	Continuing	-
USNDS A&AS	Various	Various : Various	-	1.569	Nov 2020	3.599	Nov 2021	5.314	Nov 2022	-		5.314	Continuing	Continuing	-
USNDS Other Support	Various	Various : Various	-	0.031	Nov 2020	0.080	Nov 2021	0.080	Nov 2022	-		0.080	Continuing	Continuing	-
Subtotal			-	1.952		4.429		6.307		-		6.307	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force								Date: April 2022			
Appropriation/Budget Activity 3620F / 7			R-1 Program Element (Number/Name) PE 1203913SF / NUDET Detection System (SPACE)				Project (Number/Name) 672808 / Nuc Detonation Det Sys (sensors)				
	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	-	29.157	45.887		80.429	-	80.429	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203913SF / NUDET Detection System (SPACE)	Project (Number/Name) 672808 / Nuc Detonation Det Sys (sensors)

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

UGNT	
Integration between UGNTs and the S2E2 SMGTs	
Geosynchronous Earth Orbit (GEO) Payload	
GEO Payload Integration	
ICADS 7	
ICADS 7 Development	
System Requirements Review (SRR)	
Preliminary Design Review (PDR)	
Milestone B	
Critical Design Review (CDR)	
Test Readiness Review (TRR)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203913SF / <i>NUDET Detection System (SPACE)</i>	Project (Number/Name) 672808 / <i>Nuc Detonation Det Sys (sensors)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
UGNT				
Integration between UGNTs and the S2E2 SMGTs	1	2021	4	2023
Geosynchronous Earth Orbit (GEO) Payload				
GEO Payload Integration	1	2021	4	2022
ICADS 7				
ICADS 7 Development	3	2022	4	2027
System Requirements Review (SRR)	4	2022	4	2022
Preliminary Design Review (PDR)	4	2023	4	2023
Milestone B	2	2024	2	2024
Critical Design Review (CDR)	4	2024	4	2024
Test Readiness Review (TRR)	1	2027	1	2027

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

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 1203940SF / <i>Space Situation Awareness Operations</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	-	68.070	64.763	80.903	0.000	80.903	79.710	54.549	55.781	56.866	Continuing	Continuing
673940: <i>Space Data Fusion</i>	-	0.000	64.763	58.252	0.000	58.252	55.882	31.161	31.708	32.839	Continuing	Continuing
673941: <i>Unified Data Library (UDL)</i>	-	0.000	0.000	19.507	0.000	19.507	19.889	20.267	20.851	20.743	Continuing	Continuing
67A017: <i>Sensor Service Life Extension Program</i>	-	68.070	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	68.070
67A018: <i>SF Weather Services Research</i>	-	0.000	0.000	3.144	0.000	3.144	3.939	3.121	3.222	3.284	Continuing	Continuing

Note

This program, BA 7, PE 1203940SF, project , Space Weather Analysis and Forecast System (SWAFS), is a new start.

In FY 2023, a portion of program 1203940SF, Space Situational Awareness Operations, Project 673940, Space Data Fusion, was transferred to program 1203940SF, Project 673941, Unified Data Library (UDL), for transparency.

In FY 2023, a portion of AF program 0305111F, Project 672738, Weather Service, was transferred to program 1203940SF, Project 67A018, SF Weather Services Research, in order to align ground-based space sensing projects to the USSF.

A. Mission Description and Budget Item Justification

Space Domain Awareness (SDA) is one of five core competencies of the Space Force and is the effective identification, characterization, and understanding of any factor, passive or active, associated with the space domain that could affect space operations and thereby impact the security, safety, economy, or environment of our nation. As the foundation for space control, SDA encompasses surveillance of all space objects and activities; detailed surveillance of specific space assets; monitoring space environmental conditions; monitoring cooperative space assets; gathering indications and warning on adversary space operations; and conducting integrated command, control, communications, processing, analysis, dissemination, and archiving activities.

This program fields, upgrades, operationalizes, operates, and maintains Space Force sensors and information/data integration capabilities within the SDA network while companion program element 1206425SF, Space Situational Awareness Systems, develops new network sensors and associated information integration capabilities across the network. Activities funded in this program (1203940SF) focus on surveillance of objects in earth orbit to aid tasks including satellite tracking; space object identification; tracking and cataloging; satellite attack warning; notification of satellite flyovers to U.S. forces; space treaty monitoring; and technical intelligence gathering. As a whole, this program upgrades, modifies, modernizes, operationalizes, fields, operates, and maintains sensors and information integration capabilities for an integrated, end-to-end SDA architecture that provides critical national security space solutions on tactical operational timelines.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022
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 1203940SF / <i>Space Situation Awareness Operations</i>	
<p>The Space Data Fusion project (673940) develops and/or upgrades SDA data/data exploitation capabilities, to include Space Surveillance Telescopes, TAPOUT, and provides Service Life Extension Programs (SLEPs) and pre-planned product improvement efforts to operational SDA capability. In FY 2023, this project includes Global Sensor Watch (GSW) efforts that support the SDA activities outlined above.</p> <p>The Unified Data Library project (673941) supports integration, exploitation, and delivery of data sources for command and control and battle management of space forces. UDL will continue to develop the library by on-boarding new data sets, expand data services, expand defensive cyber operations capabilities, add non-metric data to the SDA marketplace, continue to expand local area network capability to share Space Surveillance Network (SSN) data in a cyber-secure manner, purchase commercial data and services to support USSPACECOM operations, allow optimized data flow for use of existing SDA capability, and provide access to new commercial SDA innovations that will enable the broader SDA mission.</p> <p>The Sensor SLEP project (67A017) includes efforts to upgrade, operationalize, and extend the life of operational SDA sensors and to develop and expand SDA data/data exploitation capability. SLEPs extend the serviceable life of assets and maintain critical capability by replacing aging and increasingly unsustainable components with modern and sustainable equipment. Sensor SLEP efforts may include SDA sensor, SDA communications, and SDA data/data exploitation, prototyping and technology demonstrations.</p> <p>The SF Weather Services Research project (67A018) funds the operational development necessary to acquire, sustain, and modernize Air Force Weather Service (AFWS) capabilities in support of the 2018 National Defense Strategy. AFWS provides timely, accurate, resilient, and relevant environmental information to enable global battlespace situational awareness for Air Force (AF), Army, Special Operations Forces (SOF), Space Force (USSF), combatant commands, the Intelligence Community (IC), and other government agencies. AFWS provides climate impacts and assessments, as well as space and terrestrial weather sensing, forecasting, and weather analytic capabilities, at home station and deployed, in order to deliver critical environmental intelligence in support of decision makers to gain the asymmetric advantage during the full spectrum of air and space combat operations.</p> <p>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, to increase 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 existing capabilities.</p> <p>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 elements 1206392SF and 1206398SF.</p> <p>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.</p>		

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

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 1203940SF / <i>Space Situation Awareness Operations</i>
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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	69.809	64.763	0.000	0.000	0.000
Current President's Budget	68.070	64.763	80.903	0.000	80.903
Total Adjustments	-1.739	0.000	80.903	0.000	80.903
• 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	-1.739	0.000			
• Other Adjustments	0.000	0.000	80.903	0.000	80.903

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 67A017: *Sensor Service Life Extension Program*

Congressional Add: *Commercial Space Domain Awareness*

Congressional Add Subtotals for Project: 67A017

Congressional Add Totals for all Projects

	FY 2021	FY 2022
	25.000	-
	25.000	-
	25.000	-

Change Summary Explanation

FY 2021: -1.739 reduction for SBIR.

FY 2023: 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 FY 2023 cannot be made in a relevant manner.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</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
673940: <i>Space Data Fusion</i>	-	0.000	64.763	58.252	0.000	58.252	55.882	31.161	31.708	32.839	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

GSW provides an integrated, end-to-end, SDA tip & cue capability that implements a survivable architecture providing overlapping, assured, and viable surveillance options for executing event response, SDA data processing at multiple classification levels, and automated, worldwide, cross-sensor tipping & cueing. Efforts directly enable support for Space Command & Control (C2) by developing & deploying advanced software algorithms to identify, acquire, characterize, and maintain custody of both space objects of interest and new foreign launches; developing & deploying advanced data analytics, machine learning, & artificial intelligence capabilities for rapid indication & warning; enhancing space environmental monitoring solutions; integrating and optimizing access to coalition, commercial, academic, intelligence community (IC) & Missile Defense Agency sensors to better support the broader space enterprise; supporting USSPACECOM operations and training exercises; leading trials, testing and training campaigns to test & optimize capabilities in support of the broader space kill chain; enhancing sensor performance to close the solar exclusion gap by leveraging modern technology and commercial & IC sensors for greater space domain coverage; and improving legacy communication paths to enable a more complete space enterprise capability.

The Space Data Fusion effort develops the UDL to support integration, exploitation and delivery of SDA data sources for C2 and battle management of space forces. It focuses on enabling data sharing, establishing the data architecture required to aggregate multi-sensor data for broader use at different clearance levels, transforming any-source data into normalized, usable information via data exploitation tools, followed by data hand off to Battle Management Command and Control mission systems to support actual space operations. Space Data Fusion/UDL efforts include purchasing commercial SDA data and services in support of US Space Command (USSPACECOM) operations. This program is complementary and performed in parallel with program PE 1206425SF, Space Situational Awareness Systems, which develops new network sensors and improved information integration capabilities across the network.

The Space Surveillance Telescope (SST) provides rapid un-cued search, detection and tracking of dim objects in deep space, collecting data on all viewable objects in the Indo-Pacific region. As a combined program with Australia's Department of Defense, per the 2013 US Secretary of Defense (USSECDEF) and the Australian Defence Minister (AUSMINDEF) SST Partnership Memorandum of Understanding (MOU), SST improves detection and characterization of friendly and enemy military space activities; improves orbital safety of flight during maneuver, separation, conjunction assessment, and proximity operations; and improves support to defensive and offensive counterspace operations.

TAPOUT is a Low Earth Orbit (LEO) tactical SDA system which consists of a Hardware Layer, a Data Layer, and an Application layer. The planned Hardware Layer is the result of 2 years of prototyping, analysis, and collaboration with industry. 16 sites have been identified to field daytime/nighttime capable ground based EO sensors which will be remotely commanded and controlled through the Data and Application layers. The Data Layer consists of multi-source and multi-INT data feeds which are aggregated at a classified level where predictive threat warning occurs. The Application Layer consists of a series of Threat Warning and C2 applications at multiple classification levels which enable monitoring, and tactical command and control of the network.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</i>
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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, to increase 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 repurpose existing capabilities.

This program may include necessary civilian pay expenses required to manage, execute, and deliver the 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. Accomplishments/Planned Programs (\$ in Millions)

	FY 2021	FY 2022	FY 2023
<p>Title: Global Sensor Watch (GSW)</p> <p>Description: GSW provides an integrated SDA architecture to deliver a resilient, high capacity, sensitive, timely, and comprehensive global ground and space-based network of sensors that cover the geocentric and cislunar orbital regimes. GSW is a survivable, automated cross-sensor tip and cue capability that provides overlapping, assured, and viable surveillance options for executing event response, and SDA data processing at multiple classification levels. In order to ensure the successful implementation of a survivable, overlapping, assured, and viable architecture, GSW includes the necessary sensor communication upgrades to ensure data transport/throughput, compatibility, and effects-based tactical tasking/response functionality. To do this, GSW enables highly available, non-stovepiped sensor planning, tasking, response, and data collection, as well as processed information/products/results to be stored, shared, and integrated for warfighting and analysis.</p> <p>GSW will continue coordination with Japanese Ministry of Defense (JMOD) on the development of classified C2 and SDA data sharing between a Japanese Space Operations Center (SpOC) and the U.S. Combined Space Operations Center (CSpOC). This will align Japanese sensors and United States Government (USG) and non-USG assets to provide critical national security space solutions on tactical operational timelines.</p> <p>FY 2022 Plans: GSW will upgrade sensor communications to existing systems, including radar sites at Eglin Air Force Base, Florida, and the Ground-Based Radar in Kwajalein (GBR-K), through the Sensor Comm Upgrade (SCU) effort to facilitate GSW tip and cue operations. Modernize legacy sensor message formats and protocols for greater accuracy; support USSPACECOM operations and test activities to vet new SDA capability deliveries and concepts of operations for optimizing legacy SDA sensor operations; establish a SDA tip and cue sensor test asset; continue integration of GSW tip and cue software at existing radar sites; continue automation of manual SDA processes; develop classified C2 and SDA sharing with Japanese Space Operations Center (JSpOC);</p>	0.000	45.904	58.252

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>align USG and non-USG assets to provide critical national security space solutions on tactical operational timelines; and accomplish satellite tracking, space object identification (SOI), tracking, and cataloging of data collected from Japanese assets.</p> <p>Additionally, FY 2022 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2023 Plans: Complete and operationalize GSW sensor comm upgrades for the first and second sites. Begin third phase of GSW software development for incorporating non-traditional data sources. GSW will continue to upgrade sensor communications to existing systems, including radar sites at Eglin Air Force Base, Florida, Upgraded Early Warning Radars (UEWR), Millstone Radar Site Massachusetts, Reagan Test site assets, to facilitate GSW tip and cue operations. Modernize legacy sensor message formats and protocols for greater accuracy; support USSPACECOM operations and test activities to vet new SDA capability deliveries and concepts of operations for optimizing legacy SDA sensors operations; establish a SDA tip and cue sensor test asset; continue integration of GSW tip and cue software at existing radar sites; continue automation of manual SDA processes; develop classified C2 and SDA sharing with Japanese Space Operations Center (JSpOC) and expand Security Cooperation activities with mission partners in Canada and the United Kingdom; align USG and non-USG assets to provide critical national security space solutions on tactical operational timelines; and accomplish satellite tracking, space object identification (SOI), tracking, and cataloging of data collected from global assets. TAPOUT will 1) begin operations immediately with existing sensors, 2) begin procuring and fielding TAPOUT sensors, especially long lead items that require early purchase orders to meet the 24 month FOC timeline, 3) improve external network interfaces, 4) enhance existing TAPOUT Threat Warning capabilities and tactical messaging, and 5) provide training.</p> <p>Additionally, FY 2023 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2), resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased due to increased cadence of SCU efforts that requires significant investments in terms of hardware and communications equipment.</p>				
Title: Space Data Fusion/Unified Data Library (UDL)		0.000	17.059	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Description: Space Data Fusion develops Unified Data Library (UDL) capabilities to support integration, exploitation, and delivery of data sources for command and control and battle management of space forces. UDL will continue to develop the library by onboarding new data sets, expand data services, expand defensive cyber operations capabilities, add non-metric data to the SDA marketplace, continue to expand local area network capability to share Space Surveillance Network (SSN) data in a cyber-secure manner, and purchase commercial data and services to support USSPACECOM operations, allow optimized data flow for use of existing SDA capability, and provide access to new commercial SDA innovations that will enable the broader SDA mission.</p> <p>FY 2022 Plans: Expanded UDL infrastructure to support increased number of customers and operations across multiple security environments by initiating an Enterprise Support structure that allows for the UDL to be "franchised" and proliferated at different classification levels, yet still supported by a common source of system administration for all UDL instances located at any classification level. Purchased commercial data to support SDA marketplace and provide limited resources to procure commercial SDA services. All commercial SDA related funding resulted in the timely provision of accurate data and information to government customers. Funded defensive cyber operations capability, to include persistent red team analysis of broader UDL architecture. Overall, funds covered cloud hosting cost, data service development, security, system administration, data on boarding, US Space Force related exercise support, cross domain solution services and integration of the legacy communications architecture with the UDL. Additionally, FY 2022 funding allowed the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities included but not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of C2, resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to FY 2022 due to transfer of UDL-related funding from Space Data Fusion Project to new Unified Data Library Project (673941) for transparency.</p>			
<p>Title: Space Surveillance Telescope (SST)</p> <p>Description: Space Surveillance Telescope (SST) provides rapid un-cued search, detection, and tracking of dim objects in deep space, collecting data on all viewable objects in the Indo-Pacific region. As a combined program with Australia's Department of Defence, per the 2013 USSECDEF and AUSMINDEF SST Partnership MOU, SST improves detection and characterization of friendly and enemy military space activities; improves orbital safety of flight during maneuver, separation, conjunction assessment,</p>	0.000	1.800	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
and proximity operations; and improves support to defensive and offensive counterspace operations addressing critical space domain awareness gaps.			
<i>FY 2022 Plans:</i> Complete SST Developmental/Operational Test and Evaluation (DT&E/OT&E), complete Space Force Operational Acceptance process, and support Australian Defence testing efforts for joint Initial Operational Capability (IOC)/Full Operational Capability (FOC) declaration. Continue program office and other related support and integration activities such as, but not limited to, studies, technical analysis, experimentation, prototyping, architectural development, systems engineering, demonstrations, testing, command and control integration, mission partner integration, and space test/combat range events.			
<i>FY 2023 Plans:</i> N/A			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 decreased compared to FY 2022 due to planned completion of activities.			
Accomplishments/Planned Programs Subtotals	0.000	64.763	58.252

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 SPCMOD: <i>Space Mods</i>	0.000	0.000	8.284	-	8.284	2.000	-	-	-	0.000	10.284

Remarks

D. Acquisition Strategy
The acquisition strategies for GSW, UDL, and SST include a mix of modifications to existing Air Force or Space Force contracts and directing funds to other Air Force, Space Force, or DoD organizations for contract support. In addition, UDL acquisition strategy will include contracts with commercial providers to source data through a SDA marketplace to allow delivery of needed and timely data.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</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			
GSW Exploitation	Various	MIT/LL : Lexington, MA	-	-		11.842	Nov 2021	16.150	Mar 2023	-		16.150	Continuing	Continuing	-
GSW Dynamic Tasking	Various	Various : Various	-	-		9.213	Dec 2021	9.850	Dec 2022	-		9.850	Continuing	Continuing	-
GSW Sensor Comm Upgrades	Various	Various : Various	-	-		18.891	Mar 2022	23.090	Mar 2023	-		23.090	Continuing	Continuing	-
GSW SW Development 3	Various	Sandia National Labs : Albuquerque, NM	-	-		1.000	Nov 2021	1.337	Nov 2022	-		1.337	Continuing	Continuing	-
UDL Data Science WG	C/CPFF	L3Harris : Colorado Springs, CO	-	-		0.556	Jan 2022	-		-		-	0.000	0.556	-
UDL Commercial Data	C/CPFF	Various : Various	-	-		3.000	Jan 2022	-		-		-	0.000	3.000	-
UDL Development/Data Onboarding	Various	Various : Various	-	-		3.821	Dec 2021	-		-		-	0.000	3.821	-
UDL Cloud Hosting	Various	Various : Various	-	-		6.230	Mar 2022	-		-		-	0.000	6.230	-
Space Surveillance Telescope	Various	Various : Exmouth, Australia	-	-		1.800	Oct 2021	-		-		-	0.000	1.800	-
TAPOUT	MIPR	AFRL : Various	-	-		-		2.425	Oct 2022	-		2.425	Continuing	Continuing	-
Subtotal			-	-		56.353		52.852		-		52.852	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			
A&AS	Allot	Various : Colorado Springs, CO	-	-		6.610	Dec 2021	2.650	Dec 2022	-		2.650	Continuing	Continuing	-
FFRDC	RO	Various : Colorado Springs, CO	-	-		1.500	Nov 2021	2.000	Nov 2022	-		2.000	Continuing	Continuing	-
Other Support	Various	Various : Colorado Springs, CO	-	-		0.300	Dec 2021	0.750	Dec 2022	-		0.750	Continuing	Continuing	-
Subtotal			-	-		8.410		5.400		-		5.400	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force								Date: April 2022			
Appropriation/Budget Activity 3620F / 7				R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>				Project (Number/Name) 673940 / <i>Space Data Fusion</i>			
	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	-	-	64.763		58.252	-	58.252	Continuing	Continuing	N/A	

Remarks

The Space Data Fusion project has minimal organic resources. The FY 2023 Management Services includes parallel efforts to integrate commercial, allied, academic & other non-traditional SDA data sources into UDL and establish secure connectivity between the US and Japanese Space Operations Centers.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Global Sensor Watch (GSW)	
GSW Operationalization	
GSW Sensor Comm Upgrades - First Site Operational	
GSW Sensor Comm Upgrades - Second Site Operational	
GSW SW Development 2 (Legacy)(Version Releases)	
GSW Prototypes/Integration	
GSW Command and Control (Anduril, Lattice, Snare)	
GSW SW Development 3 (Non-traditional)	
TAPOUT Experimental Operations and Development	
TAPOUT Operations Evaluation Period	
TAPOUT IOC	
TAPOUT FOC	
Unified Data Library (UDL)	
UDL Cloud Hosting	
Development/Data Onboarding (Demos, Use Cases, Commercial)	
Space Surveillance Telescope (SST)	
OT&E	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673940 / <i>Space Data Fusion</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Global Sensor Watch (GSW)				
GSW Operationalization	1	2022	4	2027
GSW Sensor Comm Upgrades - First Site Operational	1	2022	3	2023
GSW Sensor Comm Upgrades - Second Site Operational	1	2022	4	2023
GSW SW Development 2 (Legacy)(Version Releases)	1	2022	4	2026
GSW Prototypes/Integration	1	2022	1	2025
GSW Command and Control (Anduril, Lattice, Snare)	1	2022	3	2026
GSW SW Development 3 (Non-traditional)	1	2023	4	2027
TAPOUT Experimental Operations and Development	1	2023	1	2024
TAPOUT Operations Evaluation Period	4	2023	4	2024
TAPOUT IOC	4	2023	1	2024
TAPOUT FOC	3	2024	4	2024
Unified Data Library (UDL)				
UDL Cloud Hosting	1	2022	4	2022
Development/Data Onboarding (Demos, Use Cases, Commercial)	1	2022	4	2022
Space Surveillance Telescope (SST)				
OT&E	2	2022	3	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 7					R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>				Project (Number/Name) 673941 / <i>Unified Data Library (UDL)</i>			
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
673941: <i>Unified Data Library (UDL)</i>	-	0.000	0.000	19.507	0.000	19.507	19.889	20.267	20.851	20.743	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2023, the Unified Data Library (UDL) efforts were transferred from Project 673940, Space Data Fusion, into Project 673941, Unified Data Library (UDL) to provide additional clarity on UDL and commercial SDA efforts.

A. Mission Description and Budget Item Justification

The Space Data Fusion effort develops the UDL to support integration, exploitation and delivery of Space Domain Awareness (SDA) data sources for C2 and battle management of space forces. It focuses on enabling data sharing, establishing the data architecture required to aggregate multi-sensor data for broader use at different clearance levels, transforming any-source data into normalized, usable information via data exploitation tools, followed by data hand off to Battle Management Command and Control mission systems to support actual space operations. Space Data Fusion/UDL efforts include purchasing commercial SDA data and services in support of US Space Command (USSPACECOM) operations. This program is complementary and performed in parallel with program PE 1206425SF, Space Situational Awareness Systems, which develops new network sensors and improved information integration capabilities across the network.

Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Center (SSC) has transformed the organization and implementation of space acquisition to an enterprise approach, to increase 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 repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver UDL for 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. In PY \$0 was expended for civilian pay expenses in this program element, and in CY \$0 is forecasted for civilian pay expenses in this program element.

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

	FY 2021	FY 2022	FY 2023
Title: Unified Data Library (UDL)	-	-	19.507
Description: UDL capabilities support integration, exploitation, and delivery of data sources for command and control and battle management of space forces. UDL will continue to develop the library by onboarding new data sets, to include data from other domains outside of SDA, expand data services, expand defensive cyber operations capabilities, add non-metric data to the SDA marketplace, continue to expand local area network capability to share Space Surveillance Network (SSN) data in a cyber-secure			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673941 / <i>Unified Data Library (UDL)</i>
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2021	FY 2022	FY 2023
<p>manner, and purchase commercial data and services to support USSPACECOM operations, allow optimized data flow for use of existing SDA capability, and provide access to new commercial SDA innovations that will enable the broader SDA mission. This is not a new start.</p> <p><i>FY 2023 Plans:</i> Continue to expand UDL infrastructure to support increased number of customers and operations across multiple security environments by initiating an Enterprise Support structure that allows for the UDL to be "franchised" and proliferated at different classification levels, yet still supported by a common source of system administration for all UDL instances located at any classification level. All commercial SDA related funding will result in the timely provision of accurate data and information to government customers. Fund the expansion of defensive cyber operations capability, to include persistent red team analysis of broader UDL architecture. Overall, funds cover cloud hosting cost, data service development, security, system administration, data on boarding, Data as a Service platform for data ingestion, retention, processing, normalization, and analysis across the global space enterprise, Space Force related exercise support, cross domain solution services and integration of the legacy communications architecture with the UDL.</p> <p>Additionally, FY 2023 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of C2, resiliency measures and mission partner interfaces, space test/combat range events, and office support etc.</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 increased compared to FY 2022. Due to transfer of UDL-related funding from Project 673940, Space Data Fusion, into Project 673941, United Data Library, for transparency.</p>			
Accomplishments/Planned Programs Subtotals	-	-	19.507

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

N/A

Remarks

D. Acquisition Strategy

The acquisition strategy for UDL includes a mix of modifications to existing Air Force or Space Force contracts and directing funds to other Air Force, Space Force, or DoD organizations for contract support. In addition, UDL acquisition strategy will include contracts with commercial providers to source data through a SDA marketplace to allow delivery of needed and timely data.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673941 / <i>Unified Data Library (UDL)</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			
UDL Data Science Working Group	C/CPFF	L3Harris : Colorado Springs, CO	-	-		-		0.573	Jan 2023	-		0.573	Continuing	Continuing	-
UDL Commercial Data	C/CPFF	Various : TBD	-	-		-		4.365	Jan 2023	-		4.365	Continuing	Continuing	-
UDL Development/Data Onboarding	C/Various	Various : TBD	-	-		-		2.936	Dec 2022	-		2.936	Continuing	Continuing	-
UDL Cloud Hosting	C/Various	Various : TBD	-	-		-		6.429	Mar 2023	-		6.429	Continuing	Continuing	-
Technical Mission Analysis	Various	Various : Various	-	-		-		1.100	Nov 2022	-		1.100	Continuing	Continuing	-
Subtotal			-	-		-		15.403		-		15.403	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			
A&AS	Various	Various : Colorado Springs, CO	-	-		-		3.214	Dec 2022	-		3.214	Continuing	Continuing	-
FFRDC	Various	Various : Colorado Springs, CO	-	-		-		0.800	Nov 2022	-		0.800	Continuing	Continuing	-
Other Support	C/Various	Various : Colorado Springs, CO	-	-		-		0.090	Dec 2022	-		0.090	Continuing	Continuing	-
Subtotal			-	-		-		4.104		-		4.104	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		-	-	-	19.507	-	19.507	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673941 / <i>Unified Data Library (UDL)</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

Unified Data Library (UDL)																												
UDL Cloud Hosting																												
UDL - Development/Data Onboarding (Demos, Use Cases, Commercial)																												
UDL Commercial Data																												
Commercial Data																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 673941 / <i>Unified Data Library (UDL)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Unified Data Library (UDL)</i>				
UDL Cloud Hosting	1	2023	4	2027
UDL - Development/Data Onboarding (Demos, Use Cases, Commercial)	1	2023	4	2027
<i>UDL Commercial Data</i>				
Commercial Data	1	2023	4	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 7					R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>				Project (Number/Name) 67A017 / <i>Sensor Service Life Extension Program</i>			
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
67A017: <i>Sensor Service Life Extension Program</i>	-	68.070	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	68.070
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2022, PE 1203940F, Space Situation Awareness Operations, Project 67A017, Sensor Service Life Extension Program efforts were transferred to Project 673940, Space Data Fusion to more accurately describe the work being performed.

Service Life Extension Programs (SLEPs) are efforts to upgrade, operationalize and extend the life of operational SSA sensors. These SLEPs extend the serviceable life of assets and maintain critical capability by replacing aging and increasingly unsustainable components with modern and sustainable equipment. In addition, the SLEPs themselves may be designed to increase capabilities not currently realized. As the need arises in the execution year, funds in this project may be used to begin SLEPs on additional efforts. These efforts may include prototyping and technology demonstrations.

The Global Sensor Watch (GSW) effort provides an integrated, end-to-end SDA tip & cue capability that implements a survivable architecture providing overlapping, assured, and viable surveillance options for executing event response, SDA data processing at multiple classification levels, and automated, worldwide, cross-sensor tipping & cueing. Efforts directly enable support for Space Command & Control (C2) by developing & deploying advanced software algorithms to identify, acquire, characterize, and maintain custody of both space objects of interest and new foreign launches; developing & deploying advanced data analytics, machine learning, & artificial intelligence capabilities for rapid indication & warning; enhancing space environmental monitoring solutions; integrating and optimizing access to coalition, commercial, academic, intelligence community (IC) & Missile Defense Agency sensors to better support the broader space enterprise; supporting US Space Command (USSPACECOM) operations and training exercises; leading trials, testing and training campaigns to test & optimize capabilities in support of the broader space kill chain; enhancing sensor performance to close the solar exclusion gap by leveraging modern technology and commercial & IC sensors for greater space domain coverage; and improving legacy communication paths to enable a more complete space enterprise capability.

The Space Surveillance Telescope (SST) provides rapid un-cued search, detection and tracking of dim objects in deep space, collecting data on all viewable objects in the Indo-Pacific region. As a combined program with Australia's Department of Defense, per the 2013 US Secretary of Defense (USSECDEF) and the Australian Defence Minister (AUSMINDEF) SST Partnership Memorandum of Understanding (MOU), SST improves detection and characterization of friendly and enemy military space activities; improves orbital safety of flight during maneuver, separation, conjunction assessment, and proximity operations; and improves support to defensive and offensive counterspace operations.

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, to increase 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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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A017 / <i>Sensor Service Life Extension Program</i>
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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the 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. Accomplishments/Planned Programs (\$ in Millions)

	FY 2021	FY 2022	FY 2023
<p>Title: Space Surveillance Telescope (SST) Developmental/Operational Test and Evaluation (DT&E/OT&E)</p> <p>Description: Space Surveillance Telescope (SST) provides rapid un-cued search, detection and tracking of dim objects in deep space, collecting data on all viewable objects in the Indo-Pacific region. As a combined program with Australia's Department of Defense, per the 2013 USSECDEF and AUSMINDEF SST Partnership Memorandum of Understanding (MOU), SST improves detection and characterization of friendly and enemy military space activities; improves orbital safety of flight during maneuver, separation, conjunction assessment, and proximity operations; and improves support to defensive and offensive counterspace operations addressing critical space domain awareness gaps.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: N/A</p>	4.912	0.000	0.000
<p>Title: Global Sensor Watch Program (GSW)</p> <p>Description: GSW provides an integrated SDA architecture to deliver a resilient, high capacity, sensitive, timely, and comprehensive global ground and space-based network of sensors that cover the geocentric and cislunar orbit regimes with a survivable tip & cue capability that provides overlapping, assured, and viable surveillance options for executing event response, processing of SDA data at multiple classification levels, and automated cross-sensor tipping & cueing worldwide. In order to ensure the successful implementation of a survivable, overlapping, assured, and viable architecture, GSW includes the necessary sensor comm upgrades to ensure data transport/throughput, compatibility, and effects-based tactical tasking/response functionality. To do this, GSW enables highly available, non-stovepipe sensor planning, sensor tasking, sensor response, collected sensor data, and processed information/products/results to be stored, shared, and integrated for warfighting and analysis.</p>	38.158	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A017 / <i>Sensor Service Life Extension Program</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>GSW will continue coordination with Japanese Ministry of Defense (JMOD) on the development of classified C2 and SDA data sharing between a Japanese Space Operations Center (SpOC) and Combined Space Operations Center (CSpOC). This will align Japanese sensors and United States Government (USG) and non-USG assets to provide critical national security space solutions on tactical operational timelines.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: N/A</p>			
Accomplishments/Planned Programs Subtotals	43.070	0.000	0.000

	FY 2021	FY 2022
<p>Congressional Add: Commercial Space Domain Awareness</p> <p>FY 2021 Accomplishments: The program office will execute funding through various existing and new contracts such as using the SDA Marketplace for data buys and associated services, procuring UDL enhancement and improvement on the ACCESS contract, and utilizing Small Business Innovative Research to evaluate emerging technical capability in the commercial space sector.</p>	25.000	-
Congressional Adds Subtotals	25.000	-

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
Congressional add will be executed on a variety of new and existing contracts using competitive sources to the maximum amount possible, such as Automated Non-Traditional Data Validation efforts on the MOSSAIC contract, Commercial Services Onboarding on a new contract, Data Visualization Services on multiple existing contracts, data buys and associated services via the SDA Marketplace; UDL enhancement and improvement on the ACCESS contract, and utilizing Small Business Innovative Research to evaluate emerging technical capability in the commercial space sector.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A017 / <i>Sensor Service Life Extension Program</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			
GSW Operationalization	C/TBD	Multiple : Colorado Springs, CO	-	29.958	Dec 2020	-		-		-		-	0.000	29.958	-
GSW SW Development 1	Various	AFRL : TBD	-	2.750	Feb 2021	-		-		-		-	0.000	2.750	-
GSW SW Development 2	Various	MIT/LL : Lexington, MA	-	2.800	Jan 2021	-		-		-		-	0.000	2.800	-
GSW SW Development 3	Various	Sandia National Labs : Albuquerque, NM	-	0.600	Nov 2020	-		-		-		-	0.000	0.600	-
UDL Commercial Data	Various	Various : Various	-	25.000	Jul 2021	-		-		-		-	0.000	25.000	-
Space Surveillance Telescope	Various	Multiple : Exmouth Australia	-	4.912		-		-		-		-	0.000	4.912	-
Subtotal			-	66.020		-		-		-		-	0.000	66.020	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			
A&AS	Various	Multiple : Colorado Springs, CO	-	1.200	Nov 2020	-		-		-		-	0.000	1.200	-
FFRDC	Various	Multiple : Colorado Springs, CO	-	0.700	Dec 2020	-		-		-		-	0.000	0.700	-
Other Support	Various	Multiple : Colorado Springs, CO	-	0.150	Nov 2020	-		-		-		-	0.000	0.150	-
Subtotal			-	2.050		-		-		-		-	0.000	2.050	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		-	68.070	-	-	-	0.000	68.070	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A017 / <i>Sensor Service Life Extension Program</i>

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
Sensor SLEP																												
Global Sensor Watch (GSW) Program																												
GSW Operationalization																												
Sensor Comm Upgrades - First Site																												
GSW SW Development 1 (Operationalized)																												
GSW SW Development 2 (Legacy)(Version Releases)																												
GSW Prototypes/Integration																												
GSW Command and Control (Anduril, Lattice, Snare)																												
Unified Data Library (Cloud Hosting)																												
Unified Data Library Development/ Data Onboarding (Demos, Use Cases, Commercial)																												
Sensor Comm Upgrades - Second Site																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A017 / <i>Sensor Service Life Extension Program</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Sensor SLEP				
Global Sensor Watch (GSW) Program	1	2021	4	2021
GSW Operationalization	1	2021	4	2021
Sensor Comm Upgrades - First Site	1	2021	3	2021
GSW SW Development 1 (Operationalized)	1	2021	4	2021
GSW SW Development 2 (Legacy)(Version Releases)	1	2021	4	2021
GSW Prototypes/Integration	1	2021	4	2021
GSW Command and Control (Anduril, Lattice, Snare)	1	2021	4	2021
Unified Data Library (Cloud Hosting)	1	2021	4	2021
Unified Data Library Development/Data Onboarding (Demos, Use Cases, Commercial)	1	2021	4	2021
Sensor Comm Upgrades - Second Site	3	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 7					R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>				Project (Number/Name) 67A018 / <i>SF Weather Services Research</i>			
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
67A018: <i>SF Weather Services Research</i>	-	0.000	0.000	3.144	0.000	3.144	3.939	3.121	3.222	3.284	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 7, PE 1203940SF, project , Space Weather Analysis and Forecast System (SWAFS), is a new start.

A. Mission Description and Budget Item Justification

In FY 2023, a portion of the APPN 3600 funding and activities from PE 0305111F, Project 672738, Weather Service, were transferred to PE 1203940SF, Space Situational Awareness Operations, in order to align current AF ground-based space sensing projects to the USSF.

This budget activity funds the operational development necessary to acquire, sustain, and modernize SF Weather Services Research capabilities in support of the 2018 National Defense Strategy's (NDS) three lines of effort: build a more lethal force, strengthen alliances and attract new partners, and change the way we do business.

To improve readiness for a more lethal force, SF Weather Services Research provides timely, accurate, resilient, and relevant environmental information to enable global battlespace situational awareness for Air Force (AF), Army, Special Operations Forces (SOF), Space Force (USSF), combatant commands, the Intelligence Community (IC), and other government agencies. SF Weather Services Research provides climate impacts and assessments, as well as space and terrestrial weather sensing, forecasting, and weather analytic capabilities, at home station and deployed, in order to deliver critical environmental intelligence in support of makers to gain the asymmetric advantage during the full spectrum of air and space combat operations. SF Weather Services Research decreases the risk to mission and risk to force by increasing the lethality, effectiveness, and survivability of Department of Defense (DoD) weapon systems.

To strengthen alliances and partnerships, SF Weather Services Research development efforts integrate DoD, government agency, commercial, and international partner environmental data with AFWS information system equipment for processing, storing, exploiting, and disseminating multi-domain weather information for analysis, forecasting, mission integration, and greater interoperability.

To ensure greater performance and affordability for the Department of the AF, SF Weather Services Research sensors and information systems are being modernized through improvements to architecture and system efficiency, cybersecurity, joint all-domain command and control (JADC2) and sensing grid integration, migration to cloud computing, artificial intelligence and machine learning (AI/ML) initiatives, and expanding agile software development, delivery, and integration practices. The AF Weather Enterprise digital transformation and cloud migration effort modernizes key capabilities providing the military advantage to accurately predict environmental impacts optimizing mission planning, targeting, weaponeering, mission execution, battle damage assessment, and space systems operations.

Activities include research and analysis to support current program planning. Management Service costs include Federally Funded Research and Development Centers (FFRDC) and Advisory and Assistance Service (A&AS).

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A018 / <i>SF Weather Services Research</i>

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. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Title: Space Weather Analysis and Forecast System (SWAFS)</p> <p>Description: The SWAFS legacy baseline is currently being redesigned and upgraded under the Space Domain Awareness Environmental Toolkit for Defense (SET4D) effort to satisfy Space Domain Awareness goals for a modern cloud hosted infrastructure that is cyber resilient and integrated with the Unified Data Library. The Energetic Charged Particle Hazard Assessment System (ECP HAS) is one of several models and applications within the SET4D environment designed to inform satellite operators of hazards and the impacts of those hazards to their spacecraft that will provide warfighters with the environmental awareness to safely sustain their respective orbits and missions.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans:</p> <ul style="list-style-type: none"> - Complete integration of the last component of the ECP HAS into the SET4D cloud infrastructure. This final phase will incorporate the Versatile Electron Radiation Belt (VERB) outer zone application which provides a complete picture of the space environment charging impacts on satellites. -Begin the software integration activities associated with the Military Application of the Space Environment (MASE) application for improved combat situational awareness tools hosted on the Unified Data Library (UDL). -Integrate the newest version of the Radio Frequency Ionospheric Scintillation Analysis Tool (RISA) application for improved solar forecasting capabilities. This application will enhance the prediction and forecasting capabilities associated with major solar events that impact critical VHF/UHF/HF communication lines in support of global combat operations. - Integrate new data sources such as Global Positioning System Radio Occultation and Ultraviolet Photometer Co-located/Limb-imaging Ionospheric and Thermospheric Extreme Ultraviolet Spectrograph (GROUP C Lites) and Responsive Environmental Assessment Commercially Hosted (REACH) to enhance the performance and accuracy of numerous models within the SET4D baseline. <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased compared to FY 2022. These efforts were previously conducted under PE 0305111F, Project 672738, Weather Service, and were transferred in FY 2023 due to transfer of space-related weather service funding to this SF program new project and to align current AF ground-based space sensing projects to the USSF.</p>	-	0.000	3.144
Accomplishments/Planned Programs Subtotals	-	0.000	3.144

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A018 / <i>SF Weather Services Research</i>

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

Line Item	FY 2021	FY 2022	FY 2023	FY 2023	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	Cost To	
			Base	OCO	Total					Complete	Total Cost
• SPAF 01 SPCMOD: <i>Space Mods</i>	-	-	5.111	-	5.111	3.100	2.967	3.056	3.117	Continuing	Continuing
• RDTE 04 0604002F: <i>Air Force Weather Services Research</i>	-	-	0.796	-	0.796	-	-	-	-	0.000	0.796

Remarks

D. Acquisition Strategy

AF Weather is adopting a Continuous Integration/Continuous Deployment (CI/CD) approach to delivering capabilities rapidly and routinely using multiple contracts to support a family of systems through development fielding and sustainment.

Cost Plus contracts are utilized for software development and sustainment and Fixed Firm Price contracts for Commercial-off-the-shelf (COTS) systems and Contract Logistics Support (CLS) efforts. Pre-competed General Services Administration (GSA) and Defense MicroElectronics Activity (DMEA) contract vehicles are leveraged when appropriate, and competitive and small-business awards are favored.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A018 / <i>SF Weather Services Research</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Weather Service</i>	
SET4D Modernization Efforts	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1203940SF / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 67A018 / <i>SF Weather Services Research</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Weather Service</i>				
SET4D Modernization Efforts	2	2023	4	2027

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

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 1206423SF / <i>Global Positioning System III - Operational Control Segment</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	0.000	460.942	402.532	359.720	0.000	359.720	274.887	82.499	22.871	6.620	0.000	1,610.071
67A021: OCX	0.000	406.805	346.343	265.341	0.000	265.341	176.824	19.208	0.000	0.000	0.000	1,214.521
67A023: OCX Block 3F	0.000	0.000	0.000	94.379	0.000	94.379	98.063	63.291	22.871	6.620	0.000	285.224
67A025: GPS Enterprise Integrator	0.000	54.137	56.189	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	110.326

Note

In FY 2023, PE 1206423SF, Global Positioning System III - Operational Control Segment, Project 67A021, OCX Block 3F efforts were transferred to PE 1206423SF, Global Positioning System III - Operational Control Segment, Project 67A023, Space Programs in order to increase program visibility.

In FY 2023, PE 1206423SF, Global Positioning System III - Operational Control Segment, Project 67A025, GPS Enterprise Integrator efforts were transferred PE 1203269SF, Global Positioning System IIIIF, Project 653170, Space Programs in order to continue enterprise integration activities to support GPS IIIIF Space, Ground and User Segment.

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space based Positioning, Navigation and Timing (PNT) distribution system which operates through all weather. GPS supports both civil and military users in air, space, sea and land operations. GPS is a satellite-based radio navigation system that serves military and civil users worldwide. GPS users process satellite signals to determine accurate position, velocity and time. GPS must comply with Title 10 United States Code (USC) Sec 2281 which requires that the Secretary of Defense (SECDEF) ensures the continued sustainment and operation of GPS for military and civilian purposes, and 51 USC Sec 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

Program Element (PE) 1206423SF funds Research, Development, Test and Evaluation (RDT&E) for the GPS Next Generation Operational Control System (OCX), which includes OCX Blocks 0, 1, and 2, the upgrade to OCX called OCX Block 3F, which incorporates Regional Military Protection (RMP) and command and control functionality for GPS III Follow-on (GPS IIIIF) satellites, as well as GPS Enterprise Integrator (EI).

OCX acquisition was established to 1) provide command and control of legacy and GPS III satellites, 2) incorporate situational awareness to support Navigation Warfare (NAVWAR) and signal monitoring, 3) enable mission capability upgrades to support a warfighter effects-based approach to operations, and 4) integrate Department of Defense (DoD) information assurance and cybersecurity controls and capabilities. OCX Block 3F will upgrade OCX with new capabilities to synchronizes with GPS IIIIF Space Segment capabilities. GPS EI is responsible for architecture and system definition (the analysis and definition, management, maintenance, and evolution of the GPS Enterprise requirements and interface technical documents) as well as for the planning, execution, and fielding of the GPS Enterprise.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>
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OCX and OCX Block 3F funds support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, modernization initiatives, systems engineering, system development, resolving obsolescence issues, test and evaluation efforts, pre-operational support activities, and interim contractor support. These activities support upgrades and product improvements for military and civil applications necessary to enable efforts to protect the United States Military and Allies' use of GPS. Additionally, funds ensure OCX and OCX Block 3F efforts meet Joint Requirements Oversight Council (JROC) approved required capabilities.

OCX Block 3F is required to launch and operationally command and control GPS IIF space vehicles. OCX Block 3F will upgrade OCX with new capabilities to synchronize with GPS IIF Space Segment and Military GPS User Equipment (MGUE) Increment 2 capabilities. This includes master control station development, GPS system simulator modification, launch and mission planning development, training simulators, integrated logistics support products, test resources, systems engineering required to meet the Government's obligations to the international, military and civil communities, and system requirements verification. OCX Block 3F will maintain backward compatibility to support the legacy constellation develop solutions necessary to command, control and monitor GPS IIF, to include integration of RMP high power regional M-code signals, rapid warfighter effects and support to GPS auxiliary payloads.

The GPS Enterprise consists of Space, Ground Control, and User Equipment Segments and Nuclear Detonation (NUDET) Detection System (NDS). The Government is responsible for the integration of the GPS Segments such that they provide worldwide GPS capability to support the warfighter and over four billion national security, civil, Allied, and commercial GPS users.

The GPS EI project includes critical efforts associated with the Government's responsibility to accomplish integration of multiple prime contracts across the three GPS enterprise segments, along with the transition to sustainment and operational communities. GPS EI maintains the current GPS architecture and system definition, controls and validates interfaces, ensures compatibility across current Generation II and III systems, and supports ongoing developments within the Space, Ground Control, and User Equipment Segments. GPS EI also develops/manages plans for execution and fielding of new capability like the new Military Code for use at the earliest opportunity. Further, GPS EI provides modeling, simulation, and technical analyses of impacts for Government directed enterprise level trades among the GPS segments leading to definition, management, maintenance, and evolution of the GPS Enterprise requirements and interface technical documents to build and ensure the integrity of the enterprise technical baseline, and perform system requirements verification.

GPS EI project funds the technical evolution, risk reduction, enterprise-level testing and delivery of all GPS Enterprise, capabilities. The GPS EI project also assists in the analysis and assessment of futures technology to continue the advancement of the GPS enterprise ensuring GPS capabilities continue to be at the forefront. Examples for Generation II include electronic protection, for Generation III, additional anti-jamming protection and additional civil signals. To accomplish this, GPS EI delivers Test and Verification capabilities, Requirements and Interface Management, and Systems Integration support across the Space, Control, and User Segments. In this capacity, GPS EI is responsible for managing this cross-program work to provide these and other capabilities.

GPS EI's analyses guide Government decisions to ensure efficient and effective synchronization and execution across all Generation II and III GPS programs. For Enterprise-wide integration to be successful, the GPS EI: works with the GPS and NDS prime contractor teams to develop plans for early risk reduction System Integration Demonstrations to ensure system interfaces and functionality meet user and system requirements; ensures all equipment and documentation is ready when needed; integrates and analyzes enterprise schedules; and conducts formal test and verification, including Requirement Verification Plans and System Test Plans and

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>
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Procedures. GPS EI performs all these efforts across all PNT programs in all acquisition phases. The Government owns the GPS Enterprise system requirements and integration, and highly leverages the GPS EI team to eliminate the need to fund a development prime contractor to perform these functions. This enhances Government control, oversight and program accountability.

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 repurpose capabilities.

This PE may include necessary civilian pay expenses required to manage, execute, and deliver OCX and OCX Block 3F weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	481.999	413.766	0.000	0.000	0.000
Current President's Budget	460.942	402.532	359.720	0.000	359.720
Total Adjustments	-21.057	-11.234	359.720	0.000	359.720
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-11.234			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-4.073	0.000			
• SBIR/STTR Transfer	-16.984	0.000			
• Other Adjustments	0.000	0.000	359.720	0.000	359.720

Change Summary Explanation

FY2021: \$4.073M transferred for higher USSF priorities.

FY2022: \$-11.234M; Congressional reduction for unjustified growth.

FY2023: 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 FY 2023 cannot be made in a relevant manner.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A021 / OCX
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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
67A021: OCX	0.000	406.805	346.343	265.341	0.000	265.341	176.824	19.208	0.000	0.000	0.000	1,214.521
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Prior Years Funding \$4,366.725M was executed in PE 1206423F.

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space based Position, Navigation and Timing (PNT) distribution system which operates through all weather. This project funds the research and development for the Next Generation Operational Control System (OCX). This includes, but is not limited to, advanced concept development, systems engineering and analysis, modernized control segment and mission planning development, modernization/deployment of 17 monitoring stations, training simulators, integrated logistics support products, and test resources.

OCX acquisition was established to: 1) provide command and control of legacy and GPS III satellites; 2) incorporate situational awareness to support Navigation Warfare (NAVWAR) and signal monitoring; 3) enable mission capability upgrades to support a warfighter effects-based approach to operations; and 4) integrate DoD information assurance and cybersecurity controls and capabilities. OCX funds will support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, technology development, systems engineering, system development, test and evaluation efforts, pre-operational support activities, and interim contractor support, in support of upgrades and product improvements for military and civil applications necessary to support efforts to protect the United States military and Allies' use of GPS. Additionally, funds will ensure efforts to meet Joint Requirements Oversight Council (JROC) approved required capabilities.

OCX Block 0 (through Iteration 1.5) is the Launch and Checkout System (LCS) intended to conduct Launch and Early Orbit (LEO) operations and the on-orbit checkout of all GPS III satellites. OCX Block 0 is a subset of OCX Block 1.

OCX Block 1 (adds Iterations 1.6, 1.7 and 2.1 to Block 0) fields the operational capability to control all legacy satellites and civil signals (L1C/A), military signals (L1P(Y), L2P(Y)) as well as the GPS III satellites and the modernized civil signal (L2C) and the aviation safety-of-flight signal (L5). In addition, Block 1 will field the basic operational capability to control the modernized military signals (L1M and L2M M-Code), and the globally compatible signal (L1C). It also fully meets information assurance/cyber defense requirements.

OCX Block 2 fields the advanced operational capability to control the advanced features of the modernized military signals (L1M and L2M M-Code). Blocks 1 & 2 are being delivered concurrently as a result of the Oct 2016 Nunn-McCurdy review.

In FY 2023, the effort for OCX Block 3F was captured in a new Project 67A023, OCX Block 3F, for transparency. OCX Block 3F will modify OCX Blocks 1 and 2 to field new capabilities in support of the GPS III Follow-On (GPS III F) production program and incorporate Regional Military Protection (RMP) to handle future threats. OCX Block 3F will upgrade OCX with new capabilities to synchronize with GPS III F Space Segment and Military GPS User Equipment (MGUE) Increment 2 capabilities. OCX

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A021 / OCX
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Block 3F will maintain backward compatibility with the existing capabilities to support the legacy GPS constellation and integrate into Block 1 and 2 and future efforts to support GPS III F. The OCX Block 3F effort will develop solutions necessary to launch, command, control, and monitor GPS III F spacecraft and include advance collection and integration of RMP high-power regional Military Code (M-Code) signals, rapid warfighter effects, and support to GPS III F auxiliary payloads including NUDET, NDS, and Search and Rescue (SAR).

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

	FY 2021	FY 2022	FY 2023
<p>Title: OCX Development</p> <p>Description: Development of GPS OCX system to launch GPS III, operate a mixed GPS II and GPS III constellation, and provide for a robust Information Assurance system.</p> <p>FY 2022 Plans: Complete software and hardware obsolescence remediation and replacement of obsolete IBM servers. Conduct system level Site Acceptance Testing (SAT) encompassing full system interactions, external connections, performance requirements, and key performance parameters (KPPs) / key system attributes (KSAs) culminating in system acceptance and DD250. Conduct system maturity demonstrations, known as Transition Risk Reduction Opportunities (TRROs), in support of transition from the legacy OCS to OCX. Begin formal Pre-Operational Support activities for Block 0, 1, and 2, and begin government Developmental Testing and Integrated System Testing activities. Perform contract closeout activities past DD250 for applicable contract line items. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans: Continue contractor support of the Block 0 baseline that is supporting the launch and checkout of GPS III satellites. On Blocks 1 and 2, support the transition of constellation operations from the legacy OCS to OCX, and once transition completes, support constellation operations on OCX. The government is currently projecting DD250 in 1QFY23. Continue contract closeout activities past DD250 for applicable contract line items. Continue Pre-Operational Support and Interim Contractor Support (ICS) activities for Block 0 and Blocks 1 and 2. Pre-Operational support activities occur after the program office's system acceptance but prior to the warfighter's Operational Acceptance (OA). The contractor will provide extensive critical support to certify OCX as ready for Operational Testing (OT): training, demonstrations, readiness campaigns, and enterprise level tests among ground, space, and users. The contractor will continue similar support during OT that culminates in OA. Interim Contractor Support begins immediately upon OA. Simultaneous to pre-OT and OT activities, the contractor will start planned system updates to align ground capabilities with GPS enterprise changes by the space vehicle and user equipment implemented post OCX's DD250. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>	308.988	260.503	260.510

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force		Date: April 2022		
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A021 / OCX		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
FY 2023 funding increased due to concurrent efforts: 1) demonstrations, mission campaigns, and GPS enterprise tests certifying Operational Test readiness; 2) support to align OCX capabilities with critical enterprise changes post DD250.				
<p>Title: Technical Support</p> <p>Description: Development of the Standardized Space Trainer (SST) to provide GPS III operator training. Development of Enterprise Mission Planning Systems. Facilities upgrades for Control Stations and associated equipment and servers. Systems Engineering (SE) including Technical Mission Analysis (TMA), Modernization SE and Technical Support, and Test and Evaluation (T&E).</p> <p>FY 2022 Plans: Deliver SST. Demonstrate and test SST capabilities. Continue data collection, and tuning of the monitoring stations equipment and OMSRE. Begin Pre-Operational support and complete technical support of Site Acceptance Testing (SAT), TRROs, and Integrated System Test (government developmental testing).</p> <p>FY 2023 Plans: Support upgrade of Enterprise Mission Planning Systems as required. Continue data collection and tuning of the monitoring stations equipment as needed. Perform SE and technical support and analysis for transition to operations, development testing, and operational acceptance testing. Provide contract technical support and assist with closeout activities, as required. Achieve OCX Block 1 and 2 ready to operate.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to finalizing OCX software and hardware development, requiring less technical support through contract closeout.</p>		35.509	17.495	4.831
<p>Title: OCX Block 3F</p> <p>Description: OCX Block 3F will upgrade OCX Block 1 & 2 with new capabilities necessary for the launch and operation of GPS IIIIF and incorporate RMP to handle future threats. OCX Block 3F will maintain backward compatibility to support the legacy constellation develop solutions necessary to command, control and monitor GPS IIIIF, to include advance collection and integration of RMP high power regional M-code signals, rapid warfighter effects and support to GPS auxiliary payloads.</p> <p>FY 2022 Plans: Completion of Milestone B in preparation for coding. Continue development and delivery of the unclassified and classified software factory to support software development and testing. Support GPS Enterprise risk reduction efforts including GPS Systems Integration (SI) Demos to mitigate risks for key interfaces and functionality between the enterprise segments, and Tabletops to mitigate cybersecurity threats. Perform initial coding and test launch and checkout capabilities in order to conduct Enterprise Integration Touch Points (EITP) to support Launch Readiness Tests (LRT) for GPS IIIIF space vehicles. Implement</p>		62.308	68.345	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A021 / OCX
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.			
FY 2023 Plans: N/A			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased due to establishing separate Project 67A023, OCX Block 3F, for transparency.			
Accomplishments/Planned Programs Subtotals	406.805	346.343	265.341

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 1203265F: <i>GPS III Space Segment</i>	10.398	7.207	1.626	-	1.626	3.300	7.600	0.000	-	0.000	30.131
• RDTE 05 1203269SF: <i>GPS III Follow-on</i>	275.819	246.365	325.927	-	325.927	309.651	254.374	193.931	167.388	214.192	1,987.647
• SPSF 01 GPSIII: <i>GPS III Space Segment</i>	24.146	84.452	103.340	-	103.340	122.753	76.037	50.443	2.831	0.000	464.002
• SPSF 01 GPS03C: <i>GPSIII Follow On</i>	591.404	852.918	657.562	-	657.562	664.149	683.441	713.958	748.954	2,100.419	7,012.805

Remarks

D. Acquisition Strategy
The Space Force is pursuing a "Block" approach for OCX in order to respond to warfighter capability requirements. The strategy calls for capability (e.g., better signal maintainability Unified S-Band (USB), SAR GPS, and near-real time Command and Control (C2)), on-ramps for the follow-on contract for GPS III Space Vehicles (SVs) (starting no earlier than SV11) which will require updates to the OCX ground segment. Enterprise studies will ensure GPS Enterprise synchronization across space and ground segments.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A021 / OCX
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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			
GPS OCX Phase B OCX Block 1 & 2 Development	C/CPAF	Raytheon : Aurora, CO	0.000	290.832	Oct 2020	243.646	Oct 2021	69.291	Oct 2022	-		69.291	0.000	603.769	3,777.644
GPS OCX Interim Contractor Support	SS/CPIF	Raytheon : Aurora, CO	0.000	-		-		167.164	Oct 2022	-		167.164	173.341	340.505	-
GPS OCX Block 3F Development	Various	Various : Various	0.000	62.308	Mar 2021	68.345	Nov 2021	-		-		-	0.000	130.653	-
GPS OCX Technical Mission Analysis	RO	Aerospace : El Segundo, CA	0.000	13.925	Dec 2020	7.488	Nov 2021	4.731	Nov 2022	-		4.731	2.110	28.254	-
GPS OCX Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	0.000	11.162	Dec 2020	2.081	Nov 2021	5.910	Nov 2022	-		5.910	4.153	23.306	-
GPS OCX Modernization/ SE & Tech Support	Various	Various : Various	0.000	5.430	Dec 2020	3.791	Nov 2021	2.872	Nov 2022	-		2.872	1.349	13.442	-
GPS OCX Standardized Space Trainer (SST)	C/CPAF	Sonalyt, Inc. : Waterford, CT	0.000	6.000	Dec 2020	0.316	Nov 2021	-		-		-	0.000	6.316	-
GPS OCX Enterprise Mission Planning	MIPR	Various : Various	0.000	5.800	Jan 2021	5.900	Jan 2022	-		-		-	0.000	11.700	-
Subtotal			0.000	395.457		331.567		249.968		-		249.968	180.953	1,157.945	N/A

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			
GPS OCX T&E	C/Various	Various : Various	0.000	4.355	Mar 2021	0.000	Mar 2022	-		-		-	0.000	4.355	-
Subtotal			0.000	4.355		0.000		-		-		-	0.000	4.355	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			
GPS OCX FFRDC	RO	Various : Various	0.000	1.790	Oct 2020	3.401	Oct 2021	1.835	Oct 2022	-		1.835	0.859	7.885	-
GPS OCX A&AS	Various	Various : Various	0.000	4.753	Feb 2021	10.425	Nov 2021	12.638	Nov 2022	-		12.638	13.520	41.336	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A021 / OCX

	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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
OCX																												
Block 1 / 2 Certificate of Conformance																												
Block 0 / 1 / 2 Pre-operational Support and Interim Contractor Support																												
System Acceptance Test (SAT)																												
Block 1 / 2 DD250																												
OCX Block 1 Ready to Operate (RTO)																												
OCX Block 3F																												
GPS System Simulator																												
Global PNT Capability																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A021 / OCX

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
OCX				
Block 1 / 2 Certificate of Conformance	1	2022	1	2022
Block 0 / 1 / 2 Pre-operational Support and Interim Contractor Support	3	2022	1	2025
System Acceptance Test (SAT)	3	2022	3	2022
Block 1 / 2 DD250	1	2023	1	2023
OCX Block 1 Ready to Operate (RTO)	2	2023	2	2023
OCX Block 3F				
GPS System Simulator	1	2022	4	2022
Global PNT Capability	1	2022	4	2022

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A023 / <i>OCX Block 3F</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
67A023: <i>OCX Block 3F</i>	0.000	0.000	0.000	94.379	0.000	94.379	98.063	63.291	22.871	6.620	0.000	285.224
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

OCX Block 3F was transferred from Project 67A021 to 67A023 in FY 2023 and is not a new start. It was established as a separate project for transparency.

A. Mission Description and Budget Item Justification

OCX Block 3F, also known as OCX 3F, will modify OCX Command and Control (C2) for new GPS III Follow-On (GPS III F) satellites and Military GPS User Equipment (MGUE) system capabilities, including Regional Military Protection (RMP) high-powered military signal to strengthen U.S. and allied forces' GPS resiliency in contested environments to mitigate future threats, and the ability to rapidly reconfigure GPS III F satellites to create time-critical warfighter effects. OCX 3F will maintain backward compatibility with the existing OCX capabilities to support the legacy GPS constellation as well as GPS III F. OCX 3F includes critical functions to launch, command, control, and monitor GPS III F spacecraft, collect and integrate RMP high-power regional Military Code (M-Code) signals for rapid warfighter effects, and support GPS III F auxiliary payloads, including Search and Rescue (SAR) and Nuclear Detonation (NUDET) Detection System (NDS).

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

	FY 2021	FY 2022	FY 2023
Title: OCX Block 3F	-	0.000	94.379
Description: This is not a new start. OCX Block 3F will upgrade OCX Block 1 & 2 with new capabilities in support of GPS III F and incorporate RMP to handle future threats. OCX 3F will maintain backward compatibility to support the legacy constellation develop solutions necessary to command, control and monitor GPS III F, to include advance collection and integration of RMP high power regional M-code signals, rapid warfighter effects and support to GPS auxiliary payloads.			
In FY 2023, OCX 3F was transferred from Project 67A021 to a separate Project 67A023 to improve transparency.			
FY 2022 Plans: N/A			
FY 2023 Plans: Continue OCX 3F C2 system development, integration and test, and training capabilities to support GPS III F launch, checkout, and on-orbit operations. Support early Mission Readiness Campaign (MRC) risk reduction integration exercises with GPS III F space vehicles. Continue software coding and development of C2 capabilities for Regional Military Protection (RMP) and Rapid Warfighter Effects (RWE). Finalize accreditation of the GPS System Simulator for 3F and work on development of the Global Position, Navigation, and Timing (PNT) critical capability. Support GPS Systems Integration (SI) Demonstrations to mitigate risks for key interfaces and functionality between the GPS space, ground and user equipment segments. Continue cybersecurity			

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A023 / <i>OCX Block 3F</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
resiliency development and test and support Tabletop exercises to identify and mitigate cybersecurity threats. Upgrade Enterprise Mission Planning Systems to use OCX 3F. Develop OCX 3F upgrades for Standardized Space Trainer (SST) to support OCX 3F C2 operator training. 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, experimentation, prototyping, etc.			
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 funding increased due to OCX 3F effort being transferred into a new, separate Project 67A023 for transparency.			
Accomplishments/Planned Programs Subtotals	-	0.000	94.379

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPSF 01 1203265SF: <i>GPS III Space Segment</i>	24.146	84.452	103.340	-	103.340	122.753	76.037	50.443	2.831	0.000	464.002
• SPSF 01 GPS03C: <i>GPS III Follow On</i>	591.404	852.918	657.562	-	657.562	664.149	683.441	713.958	748.954	2,100.419	7,012.805
• RDTE 07 1203265F: <i>GPS III Space Segment</i>	10.398	7.207	1.626	-	1.626	3.300	7.600	0.000	0.000	0.000	30.131
• RDTE 05 1203269SF: <i>GPS III Follow-On (GPS IIIIF)</i>	275.819	246.365	325.927	-	325.927	309.651	254.374	193.931	167.388	214.192	1,987.647

Remarks

D. Acquisition Strategy
OCX Block 3F is a separate, tailored Acquisition Category (ACAT) II program. It is part of the overall GPS Enterprise Modernization effort. The OCX 3F development contract was awarded sole source to Raytheon Intelligence and Space in 3rd Quarter FY 2021. The OCX 3F program uses an agile software development approach to upgrade the OCX system to support the first GPS IIIIF satellite launch, while also maintaining backwards compatibility for C2 of the existing GPS satellite constellation.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A023 / <i>OCX Block 3F</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			
OCX 3F Development	C/CPAF	Raytheon : Aurora, CO	0.000	-		-		69.823	Oct 2022	-		69.823	Continuing	Continuing	-
OCX 3F Technical Mission Analysis	RO	Aerospace : El Segundo, CA	0.000	-		-		3.932	Nov 2022	-		3.932	Continuing	Continuing	-
OCX 3F Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	0.000	-		-		2.491	Nov 2022	-		2.491	Continuing	Continuing	-
OCX 3F Enterprise Mission Planning	MIPR	Various : Various	0.000	-		-		5.900	Jan 2023	-		5.900	Continuing	Continuing	-
OCX 3F Standardized Space Trainer (SST)	C/CPAF	Sonalyt, Inc : Waterford, CT	0.000	-		-		1.943	Nov 2022	-		1.943	Continuing	Continuing	-
Subtotal			0.000	-		-		84.089		-		84.089	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			
OCX 3F FFRDC	RO	Aerospace : El Segundo, CA	0.000	-		-		1.584	Oct 2022	-		1.584	Continuing	Continuing	-
OCX 3F A&AS	Various	Various : Various	0.000	-		-		8.406	Nov 2022	-		8.406	Continuing	Continuing	-
OCX 3F Other Support	Various	Various : Various	0.000	-		-		0.300	Oct 2022	-		0.300	Continuing	Continuing	-
Subtotal			0.000	-		-		10.290		-		10.290	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		0.000	-	-	94.379	-		94.379	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force			Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A023 / <i>OCX Block 3F</i>	

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

OCX Block 3F	
GPS System Simulator	██
OCX 3F Core Software Development	██
OCX 3F Support GPS IIIF Integration Exercises	██
OCX3F Satellite Integration, Launch Readiness and Ops Test	██
OCX 3F Deploy to Master Control Station (MCS) Operations	██

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A023 / <i>OCX Block 3F</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
OCX Block 3F				
GPS System Simulator	1	2023	1	2024
OCX 3F Core Software Development	1	2023	2	2025
OCX 3F Support GPS IIIF Integration Exercises	2	2023	4	2024
OCX3F Satellite Integration, Launch Readiness and Ops Test	4	2025	1	2027
OCX 3F Deploy to Master Control Station (MCS) Operations	2	2026	2	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force										Date: April 2022		
Appropriation/Budget Activity 3620F / 7					R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>				Project (Number/Name) 67A025 / <i>GPS Enterprise Integrator</i>			
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
67A025: <i>GPS Enterprise Integrator</i>	0.000	54.137	56.189	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	110.326
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2023, PE 1206423SF, Global Positioning System III - Operational Control Segment, Project 67A025, GPS Enterprise Integrator efforts were transferred PE 1203269SF, Global Positioning System IIIIF, Project 653171, Space Programs in order to continue enterprise integration activities to support GPS IIIIF Space, Ground and User Segment.

A. Mission Description and Budget Item Justification

The GPS Program Office established and maintains the technical baseline and is responsible for the successful fielding of all the GPS Segments (space, control, and user). In order to successfully execute these responsibilities, GPS EI creates an enterprise architecture, integrates segment products, verifies the enterprise requirements are adequately met, develops and implements various Systems Engineering documents, defines methods of verification, conducts integrated system test and test analysis, develops and manages the Enterprise technical baseline which reflect multiple stakeholder requirements; Stakeholders include the Department of Defense (DoD), foreign governments, industry, and the general public (through four public interface specifications). Furthermore, GPS EI ensures PNT capabilities meet the warfighter's, civil agencies, commercial entities, international treaties, and over four billion global GPS users needs. Moreover, GPS EI is responsible for delivering a reliable PNT signal capability to military operators, the civil user community, and international partners. In addition, GPS EI validates the system performance in various mission threat scenarios during its development as well as provides in-depth technical expertise to enhance government control, oversight and program accountability. GPS EI is also responsible for all aspects of schedule and technical alignment across the GPS segments (space, control, and user).

More specifically, GPS EI is responsible for technical baseline management, integration, synchronizing, testing, and verifying GPS III, GPS IIIIF, Operational Control System (OCS), Next Generation Operational Control System (OCX), Military GPS User Equipment (MGUE) Increment 1 and Increment 2, and other Positioning, Navigation and Timing (PNT) investment projects. Additionally, GPS EI is responsible for creating and managing plans that provide early exercise of the products under development, compatibility analysis, and inter-segment testing. The inter-segment tests are required to prove OCX interoperability with GPS III satellites and Modernized User Equipment. More importantly, it ensures backwards compatibility with legacy systems such as, GPS Block II satellites, OCS and legacy user equipment. The GPS EI also manages the process through which the JROC validated requirements are matured and flowed down to the system segments, while remaining consistent with various interfaces. This enables the GPS system to meet Title 10 of the USC, Sec 2281, mandated PNT capabilities, and various other obligations to the international community that provide inter-operable PNT signals.

GPS EI also supports GPS spectrum protection at international forums such as the International Telecommunications Union. Such support consists of advocating on behalf of the United States (U.S.) Government when negotiating with foreign partners. In addition, GPS EI provides technical expertise to maintain relationships with other U.S. government agencies that include the Federal Aviation Administration (FAA), National Geospatial-Intelligence Agency (NGA), National Aeronautics and Space Administration (NASA) and Departments of State (DOS), Transportation (DoT), Homeland Security (DHS), and Commerce (DOC). GPS EI Spectrum also ensures

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A025 / <i>GPS Enterprise Integrator</i>
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GPS priority for eight essential spectrum signals, including those required for civil air navigation and safety of life. Spectrum Protection prevents encroachment from commercial or foreign entities, which results in the preservation of warfighter's reliable signal. As a result, military operations and the integrity of the global economic infrastructure are protected.

GPS EI also manages GPS and other navigation system performance monitoring and publishes performance specifications and reports to ensure anomalies with GPS can be resolved. In addition GPS EI provides technical expertise for the development for GPS program technical baselines and public specifications to make certain that the Department of Defense (DOD) fulfills its commitment to the world for civilian GPS Service.

GPS EI also provides the PNT enterprise expertise in System Safety, Enterprise level System Security Engineering covering Acquisition Systems Program Security (i.e., personnel, industrial, operations, information, sensitive compartmented information, communication, and physical), Program Protection, Foreign Disclosure, Public Release reviews, Mission System Certification and Accreditation, and Enterprise Cybersecurity. GPS EI is accountable for the development, execution, and analysis of the PNT Enterprise Segments, cybersecurity, and associated test cases necessary to deliver a secure operational system.

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

	FY 2021	FY 2022	FY 2023
<p>Title: GPS Enterprise Integrator</p> <p>Description: The integration and technical baseline control of all elements of the GPS system (space/control/user) in support of both military and civil users. Test and verification of integrated system performance in preparation for operational test and evaluation.</p> <p>FY 2022 Plans: Continue SSC-led integrated test, operational evaluation, and transition to operations of the Next Generation Operational Control Segment (OCX) and MGUE Increment 1 receivers. Shift responsibility for integrated test and evaluation planning from Prime contractors to Government responsibility. Shift scope of test activities from limited, internal, contractor-led development tests to expansive, integrated, multi-stakeholder, Government-led development and operational test using operational assets, facilities and resources (OCX Site Acceptance Testing, OCX Transition Risk Reduction to Operations, IST 3-1 for OCX, MOT&E for OCX-dependent capabilities, IST 3-3 Phase 4, OT&E for Stryker). Increase support to Government-led cybersecurity and cyber survivability test and evaluation planning and analysis. Evaluate systems for effectiveness in delivering capabilities of GPS Constellation Management, GPS Enterprise M-Code PNT Determination, GPS L2C PNT Determination, and GPS L5 PNT Determination. Support integration planning for OCX Block 3F and GPS III Follow-On SVs. Support operational demonstration of Vanguard NTS-3 program and acquisition planning for transition to operations. Participate in international Global Navigation Satellite System (GNSS) forums to advocate for GPS regulatory and technical interests. Support GPS III SV09 delivery, launch planning and integration. Support miniature serial interface with next generation application specific integrated circuit prototyping. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p>FY 2023 Plans:</p>	54.137	56.189	0.000

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A025 / <i>GPS Enterprise Integrator</i>
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B. Accomplishments/Planned Programs (\$ in Millions)

In FY 2023, GPS Enterprise Integrator efforts were transferred PE 1203269SF, Global Positioning System IIIF, Project 653170, Space Programs in order to continue enterprise integration activities to support GPS IIIF Space, Ground and User Segment. FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 funding decreased because GPS Enterprise Integrator efforts were transferred to PE 1203269SF, Global Positioning System IIIF, Project 653171, Space Programs.	FY 2021	FY 2022	FY 2023
Accomplishments/Planned Programs Subtotals	54.137	56.189	0.000

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 04 1203164F: NAVSTAR <i>Global Positioning System (User Equipment) (SPACE)</i>	367.652	434.194	382.594	-	382.594	301.635	88.742	55.913	57.012	0.000	1,687.742
• RDTE 07 1203265F: <i>GPS III Space Segment</i>	10.398	7.207	1.626	-	1.626	3.300	7.600	0.000	0.000	0.000	30.131
• RDTE 05 1203269SF: <i>GPS III Follow-On (GPS IIIF)</i>	275.819	264.265	265.863	-	265.863	247.799	190.704	128.360	100.541	214.192	1,687.543
• RDTE 07 1203913F: NUDET <i>Detection System (SPACE)</i>	29.157	45.887	80.429	-	80.429	93.588	86.600	76.954	78.453	0.000	491.068
• SPSF 01 1203265SF: <i>GPS III Space Segment</i>	24.146	84.452	103.340	-	103.340	122.753	76.037	50.443	2.831	0.000	464.002
• SPSF 01 1203269SF: <i>GPS III</i>	591.404	601.418	657.562	-	657.562	664.149	683.441	713.958	748.954	2,100.419	6,761.305
• SPSF 01 1203164SF: <i>GPS UE Space</i>	2.256	2.274	0.950	-	0.950	0.901	0.838	0.888	0.840	0.000	8.947

Remarks

D. Acquisition Strategy

In accordance with a "back to basics" acquisition approach the Space Force is required to exercise complete ownership of the architecture, system definition, technical baseline, and integration of the GPS space, ground, and user segments. This complex inter-segment integration requires the government to be the integrator. To execute this responsibility, the government leverages systems engineering and integration expertise from both Federally Funded Research and Development Center (FFRDC) contractors and a Systems Engineering & Integration (SE&I) contractor. The GPS EI function of the SE&I contractor is currently funded within this PE. The SE&I effort was awarded in 2015 through a full and open competition with strategy built in year over year cost reductions as requirements stabilize. A sole source SE&I Bridge Contract began in 1QFY22. A full and open SE&I follow-on contract is scheduled to be awarded by end of FY 2022.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A025 / <i>GPS Enterprise Integrator</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			
GPS EI Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	0.000	32.191	Nov 2020	31.837	Nov 2021	-		-		-	0.000	64.028	-
GPS EI Technical Mission Analysis 1	RO	Aerospace : El Segundo, CA	0.000	6.574	Oct 2020	9.346	Oct 2021	-		-		-	0.000	15.920	-
GPS EI Technical Mission Analysis 2	Various	MITRE : Various	0.000	10.073	Oct 2020	10.042	Oct 2021	-		-		-	0.000	20.115	-
GPS EI MRTA/MSTA	C/CPAF	Draper Labs : Cambridge, MA	0.000	1.544	Dec 2020	0.517	Dec 2021	-		-		-	0.000	2.061	-
GPS EI Cybersecurity	Various	Various : El Segundo, CA	0.000	1.208	Dec 2020	1.379	Dec 2021	-		-		-	0.000	2.587	-
GPS EI Additional Product Development	Various	Various : Various	0.000	1.466	Oct 2020	0.800	Oct 2021	-		-		-	0.000	2.266	-
Subtotal			0.000	53.056		53.921		-		-		-	0.000	106.977	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			
GPS EI FFRDC	Various	Various : El Segundo, CA	0.000	0.635	Oct 2020	0.165	Oct 2021	-		-		-	0.000	0.800	-
GPS EI A&AS	Various	Various : El Segundo, CA	0.000	0.238	Oct 2020	1.903	Oct 2021	-		-		-	0.000	2.141	-
GPS EI Other Support	Various	Various : Various	0.000	0.208	Oct 2020	0.200	Oct 2021	-		-		-	0.000	0.408	-
Subtotal			0.000	1.081		2.268		-		-		-	0.000	3.349	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			0.000	54.137	56.189	-	-	-	0.000	110.326	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A025 / <i>GPS Enterprise Integrator</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Support GPS III AFL	
GPS III SV06 Available for Launch	█
GPS III SV07 Available for Launch	█
GPS III SV08 Available for Launch	█
Enterprise	
M-Code Early Use	█
Preparation and Support for OCS to OCX transition	██████████
Support GRAM-S/M Card Technical Requirements Verification	██████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206423SF / <i>Global Positioning System III - Operational Control Segment</i>	Project (Number/Name) 67A025 / <i>GPS Enterprise Integrator</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Support GPS III AFL				
GPS III SV06 Available for Launch	2	2021	2	2021
GPS III SV07 Available for Launch	3	2021	3	2021
GPS III SV08 Available for Launch	1	2022	1	2022
Enterprise				
M-Code Early Use	1	2021	1	2021
Preparation and Support for OCS to OCX transition	1	2022	4	2022
Support GRAM-S/M Card Technical Requirements Verification	1	2021	3	2022

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

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 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	-	121.199	191.713	123.601	0.000	123.601	155.835	87.484	138.451	139.596	Continuing	Continuing
673140: <i>Enterprise Ground Services EGS</i>	-	121.199	191.713	123.601	0.000	123.601	155.835	87.484	138.451	139.596	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Today's rapidly changing threat environment requires the Department of Defense to deliver agile, integrated, and resilient effects in, from, and through space to meet the nation's warfighting needs. The Enterprise Ground Services (EGS) program will provide a robust enterprise ground architecture for United States Space Force (USSF) satellite systems. EGS capability will become the primary ground command and control (C2) suite of services for the Space Force enterprise that integrates with mission partner capabilities to meet evolving current and future space domain demands that will fully enable warfighting effects to maintain United States space dominance. 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 program will perform technology maturation, development, 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-premise and cloud infrastructure to laboratories and multiple sites, exploring advanced concepts, developing prototypes and demonstrations, maturing user experience, refining Concept of Operations (CONOPs), and supporting cybersecurity operations and operational mission training. These efforts will require support such as systems engineering, integration and test, standards and interface development, architecture development, enhanced cybersecurity development and implementation. Programs and projects in the space warfighting enterprise are evaluating ways to maximize innovation, resiliency, and the ability to respond to known and emerging threats, as well as to identify shared/common platform, infrastructure, and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. Space enterprise efforts aim to execute technology risk-reduction efforts and integrate new or re-purposed 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 into its service catalog in order to support integrating legacy and new missions such as Missile Warning; Missile Defense; MILSATCOM; Positioning, Navigation, and Timing; Environmental Monitoring; Space Domain Awareness; and various classified and experimental satellites and missions to the EGS open architecture. The modifications to catalog software applications provided by EGS are being made in an agile development, security, and operations (DevSecOps) environment.

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, to increase 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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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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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authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver 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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	116.791	191.713	0.000	0.000	0.000
Current President's Budget	121.199	191.713	123.601	0.000	123.601
Total Adjustments	4.408	0.000	123.601	0.000	123.601
• 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	8.160	0.000			
• SBIR/STTR Transfer	-3.752	0.000			
• Other Adjustments	0.000	0.000	123.601	0.000	123.601

Change Summary Explanation

FY 2021: +\$8.160M reprogramming increase to refine enterprise monitoring, data analytics, transmit and receive, and flight dynamics services needed to support space enterprise scheduling and Next Generation OPIR; -\$3.752M for SBIR

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 FY 2023 cannot be made in a relevant manner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Enterprise Ground Services (EGS) Development	57.890	103.028	49.577
Description: Integrate common applications and services, refine standards and interfaces, develop and implement cybersecurity and cryptography requirements, refine training and CONOPs, and mature advanced concepts. Support prototype mission partner demonstrations and integration and test of mission-unique software. Expand the development environment in order to develop software applications and services in support of integrating additional satellite missions.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>FY 2022 Plans: Complete maturation of EGS laboratories, including providing an on-premise and cloud-based DevSecOps capability, at the Catalyst Campus in Colorado Springs, Colorado. Continue the development and deployment of C2 services, prototype mission partner demonstrations, implement cybersecurity and cryptography development, update platform development and interfaces, refine training and CONOPs, mature advanced concepts, support integration and test of mission-unique software, and integrate common applications and services at the distributed System Integration Lab (SIL). Continue expanding User Experience guidelines and user interface specifications to complete delivery of seven Enterprise services for mission partner integration and Initial Enterprise Capability Minimum Viable Product (MVP): TT&C; Ground Resource Manager; Ground Resource Scheduler; Transmit/Receive; Archiving; Platform; and Infrastructure. Expand EGS catalog services based on mission needs, including Mission Planning, Data Analytics, and Flight Dynamics. Mature EGS deployment automation and testing. Implement system resiliency and situational awareness necessary to operate in the contested space domain. Procure infrastructure for scaling to support mission partner integration onto EGS. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, and prototyping.</p> <p>FY 2023 Plans: Continue the development and deployment of existing EGS services, prototype mission partner demonstrations, implement cybersecurity and cryptography development, update platform development and interfaces, refine training and CONOPs, mature advanced concepts, support integration and test of mission-unique software, and integrate common applications and services at the distributed System Integration Lab (SIL). Continue development and update of the Enterprise Capability Minimum Viable Product (MVP): Antenna as a Service (AaaS) comprised of Ground Resource Manager, Ground Resource Scheduler, and Transmit/Receive; Archiving; Platform; and Infrastructure. Mature EGS deployment automation and testing. Provide infrastructure to support mission partners integrated with EGS. Further develop on-premise and cloud-based DevSecOps capabilities at the EGS Canopy lab at the Catalyst Campus in Colorado Springs, Colorado. Robust enterprise ground architecture can include studies to identify shared platform, infrastructure, and data layer solutions that will inform future concepts and activities in support of enterprise open frameworks and architectures as well as risk reduction activities, technical analysis for common platform, infrastructure and data layers for ground and communication systems to build upon. Additionally, FY 2023 funding will allow the program to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, and prototyping.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased due to completion of Initial Minimum Viable Product (MVP) Enterprise Capability in FY 2022.</p> <p>Title: EGS Pre-Operations (Pre-Ops) Support</p>				
		3.957	18.131	20.484

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force		Date: April 2022		
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>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Description: Maintain EGS hardware and software baselines, update software licenses, cybersecurity, help-desk operations, and associated training.</p> <p>FY 2022 Plans: Continue conducting pre-ops support activities for satellites using enterprise services to include maintaining EGS hardware and software baselines for 14 services, updating software licenses, prototyping, furthering continuous integration/continuous delivery (CI/CD) efforts, facilitating user engagement, and extending helpdesk operations at multiple locations, and associated training and cybersecurity support for EGS. Implement state-of-the-art hardware components at key EGS operational locations. Continue GEO Non-Integrated Tactical Warning/Attack Assessment (ITW/AA) Operations Migration to EGS (GNOME) effort. Scale service center capabilities to support growth of mission partners from two to eight using EGS, accomplish infrastructure technical refresh, patching, and cyber updates.</p> <p>FY 2023 Plans: Continue conducting pre-ops support activities for satellites using enterprise services to include maintaining EGS hardware and software baselines for EGS services, updating software licenses, prototyping, furthering CI/CD efforts, facilitating user engagement, help desk operations, and associated training and cybersecurity support for EGS. Implement state-of-the-art hardware components at key EGS operational locations. Improve service center capabilities to support mission partners integrating with EGS, accomplish necessary infrastructure technical refresh, patching, and cyber updates. Complete GNOME effort and continue support to missile warning (GNOME, Future Operationally Resilient Ground Evolution (FORGE)) and other mission partners integrating with EGS.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increased as pre-ops support activities increased but was partially offset by the replanned deployment to Kirtland Air Force Base (KAFB).</p>				
<p>Title: EGS Deployment</p> <p>Description: Rapidly deploy tactical C2 services and space domain capabilities to support customer-funded mission integration with EGS activities including future mission acquisition planning and risk-reduction efforts.</p> <p>FY 2022 Plans: Continue the operational deployment of C2 services and maturation of networks and links across the EGS enterprise to support growth from two to eight mission partners. 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 roadmaps to enable the phased integration of mission partners to EGS. Provide technical information and guidance to programs which are developing EGS interfaces, mission applications, factory connectivity, and integration and</p>		59.352	70.554	53.540

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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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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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>test plans and procedures. Support customer-funded mission integration plans including future mission acquisition planning and risk-reduction efforts. Support deployment of enterprise ground services to different infrastructures, to scale capabilities for additional missions to use EGS, and to support services integration. Establish initial capability at Schriever Space Force Base (SSFB).</p> <p><i>FY 2023 Plans:</i> Continue the operational deployment of C2 services and maturation of networks and links across the EGS enterprise to support mission partners. Continue integration efforts with space domain capabilities. Update service offerings and functionality for both existing and new satellites that will use EGS. Continue refining the programmatic, technical and architectural roadmaps to enable the phased integration of mission partners to EGS. Provide technical information and guidance to programs which are developing EGS interfaces, mission applications, factory connectivity, and integration and test plans and procedures. Support customer-funded mission integration plans including future mission acquisition planning and risk-reduction efforts. Build upon previous integration efforts with missile warning (GNOME, FORGE) and other mission partners. Improve capability at SSFB and Buckley Space Force Base (BSFB).</p> <p><i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 decreased due to completion of SSFB Initial Capability in FY 2022 and re-planned resource-loaded effort and schedule for deployment to KAFB.</p>			
Accomplishments/Planned Programs Subtotals	121.199	191.713	123.601

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

Remarks
N/A

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 services, system engineering services, and pre-ops support for mission users. EGS is leveraging two Small Business Innovation Research (SBIR) Phase III five-year contracts that were awarded sole source in late FY 2019 to scale EGS capabilities and enable more rapid development and deployment of tactical C2 services to operational users. Additionally, EGS provides development, integration, and pre-ops support for mission users through a five-year contract competitively awarded in FY 2020.

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

Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206770SF / Enterprise Ground Services	Project (Number/Name) 673140 / Enterprise Ground Services EGS
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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			
EGS Development	Various	Various : Various	-	43.858	Nov 2020	85.015	Nov 2021	34.855	Nov 2022	-		34.855	Continuing	Continuing	-
EGS Pre-Ops Support	Various	Various : Various	-	3.957	Dec 2020	18.131	Dec 2021	20.484	Dec 2022	-		20.484	Continuing	Continuing	-
EGS Deployment	Various	Various : Various	-	47.273	Nov 2020	57.977	Oct 2021	47.370	Nov 2022	-		47.370	Continuing	Continuing	-
EGS Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	4.595	Oct 2020	5.034	Jan 2022	5.000	Oct 2022	-		5.000	Continuing	Continuing	-
Enterprise Systems Engineering and Integration (SE&I)	Various	MITRE : Bedford, MA	-	12.079	Oct 2020	12.577	Dec 2021	6.170	Oct 2022	-		6.170	Continuing	Continuing	-
Subtotal			-	111.762		178.734		113.879		-		113.879	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			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	4.945	Oct 2020	4.905	Jan 2022	3.900	Oct 2022	-		3.900	Continuing	Continuing	-
A&AS Support	Various	Various : Various	-	4.154	Dec 2020	7.712	Jan 2022	4.722	Dec 2022	-		4.722	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.338	Dec 2020	0.362	Dec 2021	1.100	Dec 2022	-		1.100	Continuing	Continuing	-
Subtotal			-	9.437		12.979		9.722		-		9.722	Continuing	Continuing	N/A

Project Cost Totals	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	-	121.199	191.713	123.601	-	123.601	Continuing	Continuing	N/A

Remarks
 FY 2022 Product Development and Management Services requirements may vary during year of execution due to integration and cybersecurity necessary to complete delivery of seven Enterprise services for mission partner integration and initial enterprise capability Minimum Viable Product (MVP).

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206770SF / <i>Enterprise Ground Services</i>	Project (Number/Name) 673140 / <i>Enterprise Ground Services EGS</i>

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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	
Distributed System Integration Lab (SIL) Canopy	
Catalyst Campus	
Development Security and Operations (DevSecOps)	
Fight as an Enterprise MVP	
EGS Pre-Ops Support	
EGS Pre-Ops Support	
Services Integration	
GNOME (GEO Non-Integrated Tactical Warning/Attack Assessment (ITW/AA) Operations Migration to EGS)	
EGS Deployment	
EGS Deployment	
Schriever SFB Initial Capability	
Upgrade SSFB	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 7	R-1 Program Element (Number/Name) PE 1206770SF / <i>Enterprise Ground Services</i>	Project (Number/Name) 673140 / <i>Enterprise Ground Services EGS</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
EGS Development				
Distributed System Integration Lab (SIL) Canopy	1	2021	4	2027
Catalyst Campus	1	2021	4	2027
Development Security and Operations (DevSecOps)	1	2021	4	2027
Fight as an Enterprise MVP	4	2022	4	2022
EGS Pre-Ops Support				
EGS Pre-Ops Support	1	2021	4	2027
Services Integration	1	2021	4	2027
GNOME (GEO Non-Integrated Tactical Warning/Attack Assessment (ITW/AA) Operations Migration to EGS)	2	2023	2	2023
EGS Deployment				
EGS Deployment	1	2021	4	2027
Schriever SFB Initial Capability	4	2022	4	2022
Upgrade SSFB	4	2022	3	2023

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.

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs</i>	R-1 Program Element (Number/Name) PE 1203614SF / <i>JSpOC Mission System</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	0.000	155.067	154.529	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	309.596
68A035: <i>SSA/BMC2</i>	0.000	155.067	154.529	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	309.596
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: N82

A. Mission Description and Budget Item Justification

In FY 2023, PE 1203614SF, Project 68A035 SSA/BMC2 efforts was transferred to PE 1208248SF, Enterprise Space BMC2, Project 68A035 SSA/BMC2, for Space C2 software program transparency.

The FY 2018 National Defense Authorization Act (Sections 873/874) directed the Office of the Secretary of Defense (OSD) to streamline software development. The Space Command and Control (C2) program is an OSD pilot initiative in which all lifecycle funding is tracked under Budget Activity 08 (BA08), Software and Digital Technology Pilot Programs, beginning in FY 2021. Pilot programs enable the execution of modern software development practices encompassing development, procurement, modification and maintenance activities. This program includes Research, Development, Test & Evaluation (RDT&E), Space Procurement, and Operations and Maintenance funds transferred from within PE 1203614F, JSpOC Mission Systems and consolidated into the RDT&E appropriation.

The Space Force is developing a Space C2 and Space Domain Awareness (SDA) capability for the Combined Force Space Component Commander (CFSCC) and the Joint Task Force - Space Defense (JTF-SD). The Space C2 program provides a collaborative environment that will enhance and modernize SDA and Battle Management C2 (BMC2) capabilities; create decision-relevant views of the space and multi-domain environment; rapidly detect, track and characterize objects of interest; identify / exploit traditional and non-traditional sources; perform space threat analysis; and enable efficient distribution of data across the Space Surveillance Network (SSN). The program maintains enterprise infrastructure, platform and data services, and develops mission applications to enable responsive, resilient operational-level Space C2 capabilities for the National Space Defense Center (NSDC), Combined Space Operations Center (CSpOC), 18th Space Control Squadron (SPCS) and other C2 centers. Employing an agile-based Rapid Delivery Framework with a 90-day Program Increment (PI) construct fosters a collaborative and integrated environment for the community to effectively plan and deliver C2 capabilities. The enterprise-wide system will provide a common government infrastructure and standards for rapid prototyping of dynamic SDA and BMC2 applications to address the evolving and dynamic threat. The system will provide a collaborative environment that will enhance and modernize SDA and BMC2 capabilities. Funding includes technical studies, development, experimentation, integration and related support costs.

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, to increase 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 repurpose existing capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs</i>	R-1 Program Element (Number/Name) PE 1203614SF / <i>JSpOC Mission System</i>
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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 Elements 1206392SF and 1206398SF. In PY 120K was expended for civilian pay expenses in this Program Element, and in CY 0 is forecasted for civilian pay expenses in this Program Element.

This program is in Budget Activity 8, Software and Digital Technology Pilot Program because this Budget Activity includes funding provided for expenses necessary for Agile Development, Test & Evaluation, Procurement, Production and Modification, and the Operation and Maintenance of these programs.

This program is in Budget Activity 8, Software and Digital Technology Pilot Program because this budget activity includes funding provided for expenses necessary for agile development, test and evaluation, procurement, production and modification, and the operation and maintenance of these programs.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	149.742	154.529	0.000	0.000	0.000
Current President's Budget	155.067	154.529	0.000	0.000	0.000
Total Adjustments	5.325	0.000	0.000	0.000	0.000
• 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	9.999	0.000			
• SBIR/STTR Transfer	-4.674	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2021: \$9.999M increase for Warp Core data platform for machine-to-machine access to and integration from data sources and -\$4.674M decrease for SBIR.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Enterprise Space BMC2 Development	125.364	112.186	0.000	0.000	0.000
Description: This program delivers a robust and responsive Space Domain Awareness (SDA) and Battle Management Command and Control (BMC2) capability to meet emerging threats. The program will deliver capability for decision makers trying to prevent a conflict from extending to space, or winning it if it does. Capabilities and associated infrastructure include, but are not limited to, the following: SDA, Indications & Warning (I&W), Transmit/Receive, Space Control, Tactical Operations and Common Data Management Layer,					

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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs	R-1 Program Element (Number/Name) PE 1203614SF I JSpOC Mission System
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C. Accomplishments/Planned Programs (\$ in Millions)

Platforms and Infrastructure; and Cyber and Threat Warning. The program maintains foundational DevSecOps enablers such as, but not limited to, Data as a Service, Platform Support, Continuous Improvement/Continuous Deployment (CI/CD) toolchain, and infrastructure and inherent sustainment efforts that are an integral part of the agile software development process. Other activities include dedicated Systems Engineering & Integration (SE&I), Test & Evaluation (T&E), Model Based Systems Engineering (MBSE) and prototype Validation & Verification to support these efforts.

FY 2022 Plans:

Plan and develop a message standard compliant open architecture to support both the SDA and BMC2 missions to meet dynamic emerging threats. The enterprise architecture and platform/infrastructure will modernize and deliver new capabilities in the NSDC, CSpOC, and other operations centers supporting SDA, BMC2, Theater Support, Data Analytics & Visualization, and Modeling & Simulation tools. Continue developmental, system engineering and contracting efforts to integrate best in breed commercial, contractor, and government applications through the release of multiple incremental software capability drops throughout FY 2022. Additionally, FY 2022 funding will allow the program 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, and prototyping.

FY 2023 Base Plans:

N/A

FY 2023 OCO Plans:

N/A

FY 2022 to FY 2023 Increase/Decrease Statement:

FY 2023 decreased as efforts were transferred to PE 1208248SF, Enterprise Space BMC2, Project 68A035 SSA/BMC2, for Space C2 software program transparency.

Title: Space C2 Sustainment

Description: The program maintains existing capability for the CSpOC, NSDC and other C2 centers. These tasks include maintaining the Commercial Off The Shelf (COTS) software database, removing and canceling decommissioned systems and unused tools, adding new tools required for ongoing support of the system, maintaining data support systems, and maintaining day to day software operations which continuously ensures and optimizes reliability, security, resiliency, availability, flexibility and scalability of the warfighter tools. The program maintains foundational DevSecOps enablers such as, but not limited to, Data as a Service, Platform

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>Platforms and Infrastructure; and Cyber and Threat Warning. The program maintains foundational DevSecOps enablers such as, but not limited to, Data as a Service, Platform Support, Continuous Improvement/Continuous Deployment (CI/CD) toolchain, and infrastructure and inherent sustainment efforts that are an integral part of the agile software development process. Other activities include dedicated Systems Engineering & Integration (SE&I), Test & Evaluation (T&E), Model Based Systems Engineering (MBSE) and prototype Validation & Verification to support these efforts.</p> <p>FY 2022 Plans: Plan and develop a message standard compliant open architecture to support both the SDA and BMC2 missions to meet dynamic emerging threats. The enterprise architecture and platform/infrastructure will modernize and deliver new capabilities in the NSDC, CSpOC, and other operations centers supporting SDA, BMC2, Theater Support, Data Analytics & Visualization, and Modeling & Simulation tools. Continue developmental, system engineering and contracting efforts to integrate best in breed commercial, contractor, and government applications through the release of multiple incremental software capability drops throughout FY 2022. Additionally, FY 2022 funding will allow the program 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, and prototyping.</p> <p>FY 2023 Base Plans: N/A</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased as efforts were transferred to PE 1208248SF, Enterprise Space BMC2, Project 68A035 SSA/BMC2, for Space C2 software program transparency.</p> <p>Title: Space C2 Sustainment</p> <p>Description: The program maintains existing capability for the CSpOC, NSDC and other C2 centers. These tasks include maintaining the Commercial Off The Shelf (COTS) software database, removing and canceling decommissioned systems and unused tools, adding new tools required for ongoing support of the system, maintaining data support systems, and maintaining day to day software operations which continuously ensures and optimizes reliability, security, resiliency, availability, flexibility and scalability of the warfighter tools. The program maintains foundational DevSecOps enablers such as, but not limited to, Data as a Service, Platform</p>					
	29.703	42.343	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs</i>	R-1 Program Element (Number/Name) PE 1203614SF / <i>JSpOC Mission System</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Support, Continuous Improvement/Continuous Deployment (CI/CD) toolchain, and infrastructure and inherent sustainment efforts that are an integral part of the agile software development process.					
<i>FY 2022 Plans:</i> SSC will continue to fund government software centers, laboratories, and contractors for supporting the update, maintenance and modification, integration, configuration management and cybersecurity requirements of legacy software and associated hardware. Activities may include, but are not limited to, software license acquisition, program office support, studies, and technical analysis.					
<i>FY 2023 Base Plans:</i> N/A					
<i>FY 2023 OCO Plans:</i> N/A					
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> FY 2023 decreased as efforts were transferred to PE 1208248SF, Enterprise Space BMC2, Project 68A035 SSA/BMC2, for Space C2 software program transparency.					
Accomplishments/Planned Programs Subtotals	155.067	154.529	0.000	0.000	0.000

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

Remarks

E. Acquisition Strategy
The Space Force is employing agile software development practices such as flexible requirements, frequent user interaction, and rapid delivery and deficiency retirement. The program acquires tools and capabilities through an agile-based Rapid Delivery Framework that delivers and sustains new features and capabilities through a CI/CD pipeline with 90-day Program Increments. This strategy focuses on rapidly delivering capability to warfighters and leveraging commercial, industry and government partners. Currently there are multiple contractors performing on competitively-awarded contracts with no single prime contractor responsible for the entire ecosystem.

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

Appropriation/Budget Activity 3620F / 8	R-1 Program Element (Number/Name) PE 1203614SF / JSpOC Mission System	Project (Number/Name) 68A035 / SSA/BMC2
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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			
Space C2 Technical Mission Analysis (WS) Development	RO	Aerospace : El Segundo, CA	0.000	1.000	Jan 2021	2.000	Dec 2021	-		-		-	0.000	3.000	-
Space C2 Enterprise Systems Engineering & Integration Development	Various	Various : various	0.000	5.351	Nov 2020	5.267	Nov 2021	-		-		-	0.000	10.618	-
Space C2 Applications Development	Various	Various : Various	0.000	107.196	Nov 2020	89.314	Nov 2021	-		-		-	0.000	196.510	-
Space C2 Platform Sustainment	Various	Various : Various	0.000	20.240	Dec 2020	22.263	Dec 2021	-		-		-	0.000	42.503	-
Space C2 Infrastructure Sustainment	Various	Various : Various	0.000	4.000	Dec 2020	3.588	Dec 2021	-		-		-	0.000	7.588	-
Legacy System Sustainment	Various	Various : Various	0.000	5.462	Nov 2020	2.492	Nov 2021	-		-		-	0.000	7.954	-
Space C2 Data Management Sustainment	SS/FFP	Palantir : Denver, CO	0.000	-		14.000	Nov 2021	-		-		-	0.000	14.000	-
Subtotal			0.000	143.249		138.924		-		-		-	0.000	282.173	N/A

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			
Test	Various	Various : Various	0.000	1.562	Jan 2021	3.000	Dec 2021	-		-		-	0.000	4.562	-
Subtotal			0.000	1.562		3.000		-		-		-	0.000	4.562	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			
A&AS	C/CPAF	Various : Various	0.000	6.267	Nov 2020	7.534	Nov 2021	-		-		-	0.000	13.801	-
FFRDC	Various	Various : Various	0.000	3.691	Jan 2021	4.426	Dec 2021	-		-		-	0.000	8.117	-
Other	Various	Various : Various	0.000	0.298	May 2021	0.645	Oct 2021	-		-		-	0.000	0.943	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 8	R-1 Program Element (Number/Name) PE 1203614SF / JSpOC Mission System	Project (Number/Name) 68A035 / SSA/BMC2
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	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

Space C2	
Platform/Infrastructure	
Program Increments 8-11	
Program Increments 12-15	
Data Management	
Space C2 sustainment (maintain existing capability)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force **Date:** April 2022

Appropriation/Budget Activity 3620F / 8	R-1 Program Element (Number/Name) PE 1203614SF / <i>JSpOC Mission System</i>	Project (Number/Name) 68A035 / <i>SSA/BMC2</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Space C2				
Platform/Infrastructure	1	2021	4	2022
Program Increments 8-11	1	2021	4	2021
Program Increments 12-15	1	2022	4	2022
Data Management	1	2021	4	2022
Space C2 sustainment (maintain existing capability)	1	2021	4	2022

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs</i>	R-1 Program Element (Number/Name) PE 1208248SF / <i>Space Command & Control - Software Pilot Program</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	-	0.000	0.000	155.053	0.000	155.053	122.584	123.592	126.332	128.793	Continuing	Continuing
68A035: <i>SSA/BMC2</i>	-	0.000	0.000	155.053	0.000	155.053	122.584	123.592	126.332	128.793	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This effort is not a new start. In FY 2023, PE 1203614SF, JSpOC Mission System, Project 68A035 SSA/BMC2 efforts were transferred to PE 1208248SF, Enterprise Space BMC2, Project 68A035 SSA/BMC2 for Space Command and Control (Space C2) software program transparency.

The FY 2018 National Defense Authorization Act (Sections 873/874) directed the Office of the Secretary of Defense (OSD) to streamline software development. The Space C2 program is an OSD pilot initiative in which all lifecycle funding is tracked under Budget Activity 8 (BA 8), Software and Digital Technology Pilot Programs, beginning in FY 2021. Pilot programs enable the execution of modern software development practices encompassing development, procurement, modification and maintenance activities within a single RDT&E appropriation in this PE.

The Space Force is developing a Space C2 and Space Domain Awareness (SDA) capability for the Combined Force Space Component Commander (CFSCC) and the Joint Task Force - Space Defense (JTF-SD). The Space C2 program provides a collaborative environment that will enhance and modernize SDA and Battle Management C2 (BMC2) capabilities; create decision-relevant views of the space and multi-domain environment; rapidly detect, track and characterize objects of interest; identify / exploit traditional and non-traditional sources; perform space threat analysis; and enable efficient distribution of data across the Space Surveillance Network (SSN). The program maintains enterprise infrastructure, platform and data services, and develops mission applications to enable responsive, resilient operational-level Space C2 capabilities for the National Space Defense Center (NSDC), Combined Space Operations Center (CSpOC), 18th Space Control Squadron (SPCS) and other C2 centers. Employing an agile-based Rapid Delivery Framework with a 90-day Program Increment (PI) construct fosters a collaborative and integrated environment for the community to effectively plan and deliver C2 capabilities. The enterprise-wide system will provide a common government infrastructure and standards for rapid prototyping of dynamic SDA and BMC2 applications to address the evolving and dynamic threat. The program will also identify shared/common platform, infrastructure, and data layer solutions to support open frameworks and architectures across the enterprise ground portfolio. Funding includes technical studies, development, experimentation, integration and related support costs.

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, to increase 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 repurpose existing capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs</i>	R-1 Program Element (Number/Name) PE 1208248SF / <i>Space Command & Control - Software Pilot Program</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver Space C2 for 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. In PY \$0 was expended for civilian pay expenses in this program element, and in CY \$0 is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 8, Software and Digital Technology Pilot Program because this budget activity includes funding provided for expenses necessary for agile development, test and evaluation, procurement, production and modification, and the operation and maintenance of these programs.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	155.053	0.000	155.053
Total Adjustments	0.000	0.000	155.053	0.000	155.053
• 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	155.053	0.000	155.053

Change Summary Explanation

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

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
Title: Enterprise Space BMC2 Development	0.000	0.000	111.421
Description: This program delivers a robust and responsive Space Domain Awareness (SDA) and Battle Management Command and Control (BMC2) capability to meet emerging threats. The program will deliver capability for decision makers trying to prevent a conflict from extending to space, or winning it if it does. Capabilities and associated infrastructure include, but are not limited to, the following: SDA, Indications & Warning (I&W), Transmit/Receive, Space Control, Tactical Operations and Common Data Management Layer, Platforms and Infrastructure; and Cyber and Threat Warning. The program maintains foundational DevSecOps enablers such as, but not limited to, Data as a Service, Platform Support, Continuous Improvement/Continuous Deployment (CI/CD) toolchain, and infrastructure and inherent sustainment efforts that are an integral part of the agile software development process. Other activities include dedicated Systems Engineering & Integration (SE&I), Test & Evaluation (T&E), Model Based Systems Engineering (MBSE) and prototype Validation & Verification to support these efforts.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs</i>	R-1 Program Element (Number/Name) PE 1208248SF / <i>Space Command & Control - Software Pilot Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
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<p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: Continue to plan and develop a message standard compliant open architecture to support both the SDA and BMC2 missions to meet dynamic emerging threats. The enterprise architecture and platform/infrastructure will modernize and deliver new capabilities in the NSDC, CSpOC, and other operations centers supporting SDA, BMC2, Theater Support, Data Analytics & Visualization, and Modeling & Simulation tools. Continue developmental, system engineering and contracting efforts to integrate best in breed commercial, contractor, and government applications through the release of multiple incremental software capability in program increments 16-19 drops throughout FY 2023. FY 2023 funding will allow the program to implement system resiliency, cybersecurity, and situational awareness necessary to operate in the contested space domain, conduct studies to identify shared platform, infrastructure, and data layer solutions that will inform future concepts and activities in support of enterprise open frameworks and architectures, as well as risk reduction activities, technical analysis for common platform, infrastructure and data layers for ground and communication systems to build upon. 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, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to the FY22 funding amount in PE 1203614SF by 0.765M to support procurement in this fiscal year.</p>			
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<p>Title: Space C2 Procurement</p> <p>Description: Provides hardware, software, technical documents, integration, testing and associated support to modernize and enhance Space C2 infrastructure for operations centers.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Plans: SSC will procure Commercial and Government Off The Shelf (COTS/GOTS) hardware and software necessary to host and field critical applications as well as refresh existing hardware in use at Vandenberg Space Force Base (VSFB) and Schriever Space Force Base (SSFB). Activities may include but are not limited to program office support, studies, technical analysis, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement:</p>	0.000	0.000	2.500
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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force	Date: April 2022
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Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs	R-1 Program Element (Number/Name) PE 1208248SF I Space Command & Control - Software Pilot Program
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
FY 2023 increased compared to the FY22 funding amount in PE 1203614SF by 2.500M to support hardware procurement and associated requirements (test, documentation, etc.) at operations centers.			
Title: Space C2 Sustainment	0.000	0.000	41.132
Description: The program maintains existing capability for the CSpOC, NSDC and other C2 centers. These tasks include maintaining the Commercial Off The Shelf (COTS) software database, removing and canceling decommissioned systems and unused tools, adding new tools required for ongoing support of the system, maintaining data support systems, and maintaining day to day software operations which continuously ensures and optimizes reliability, security, resiliency, availability, flexibility and scalability of the warfighter tools.			
FY 2022 Plans: N/A			
FY 2023 Plans: SSC will continue to fund government software centers, laboratories, and contractors for supporting the update, maintenance and modification, integration, configuration management and cybersecurity requirements of infrastructure and legacy software associated hardware. The program maintains foundational DevSecOps enablers such as, but not limited to, Data as a Service, Platform Support, continuous Improvement/Continuous Deployment (CI/CD) toolchain, and infrastructure and inherent sustainment efforts that are an integral part of the agile software development process. 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, experimentation, prototyping, etc.			
FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 decreased compared to the FY22 funding amount in PE 1203614SF by 1.100M to support procurement in this fiscal year.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	155.053

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2023</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• 08 1203614SF: JSpOC Mission System	155.067	154.529	-	-	-	-	-	-	-	0.000	309.596

Remarks

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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 8: Software and Digital Technology Pilot Programs</i>	R-1 Program Element (Number/Name) PE 1208248SF / <i>Space Command & Control - Software Pilot Program</i>
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E. Acquisition Strategy

The Space Force is employing agile software development practices such as flexible requirements, frequent user interaction, and rapid delivery and deficiency retirement. The program acquires tools and capabilities through an agile-based Rapid Delivery Framework that delivers and sustains new features and capabilities through a CI/CD pipeline with 90-day Program Increments. This strategy focuses on rapidly delivering capability to warfighters and leveraging commercial, industry and government partners. Currently there are multiple contractors performing on competitively-awarded contracts with no single prime contractor responsible for the entire ecosystem.

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

Appropriation/Budget Activity 3620F / 8	R-1 Program Element (Number/Name) PE 1208248SF / <i>Space Command & Control I - Software Pilot Program</i>	Project (Number/Name) 68A035 / <i>SSA/BMC2</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			
Space C2 Applications Development	Various	Various : Various	-	0.000		0.000		88.298	Nov 2022	-		88.298	Continuing	Continuing	-
Space C2 Platform Sustainment	Various	Various : Various	-	0.000		0.000		22.132	Dec 2022	-		22.132	Continuing	Continuing	-
Space C2 Infrastructure Sustainment	Various	Various : Various	-	0.000		0.000		5.000	Nov 2022	-		5.000	Continuing	Continuing	-
Space C2 Enterprise Systems Engineering & Integration Development	Various	Various : Various	-	0.000		0.000		5.000	Nov 2022	-		5.000	Continuing	Continuing	-
Space C2 Data Sustainment	TBD	Various : Various	-	0.000		0.000		14.000	Nov 2022	-		14.000	Continuing	Continuing	-
Space C2 Procurement	TBD	TBD : TBD	-	0.000		0.000		2.500	Mar 2023	-		2.500	Continuing	Continuing	-
Space C2 Technical Mission Analysis Development	RO	Aerospace : El Segundo, CA	-	0.000		0.000		2.000	Jan 2023	-		2.000	Continuing	Continuing	-
Subtotal			-	0.000		0.000		138.930		-		138.930	Continuing	Continuing	N/A

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			
Space C2 Test	Various	Various : Various	-	0.000		0.000		3.000	Dec 2022	-		3.000	Continuing	Continuing	-
Subtotal			-	0.000		0.000		3.000		-		3.000	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			
FFRDC	Various	Various : Various	-	0.000		0.000		4.500	Dec 2022	-		4.500	Continuing	Continuing	-
A&AS	Various	Various : Various	-	0.000		0.000		7.623	Dec 2022	-		7.623	Continuing	Continuing	-
Other	Various	Various : Various	-	0.000		0.000		1.000	Oct 2022	-		1.000	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 8	R-1 Program Element (Number/Name) PE 1208248SF / <i>Space Command & Control - Software Pilot Program</i>	Project (Number/Name) 68A035 / SSA/BMC2

FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Space C2	
Platform/Infrastructure	
Program Increment 12-15	
Program Increment 16-19	
Program Increment 20-23	
Program Increment 24-27	
Program Increment 28-31	
Program Increment 32-35	
Data Management	
Space C2 Sustainment (maintain existing capability)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 8	R-1 Program Element (Number/Name) PE 1208248SF / <i>Space Command & Control - Software Pilot Program</i>	Project (Number/Name) 68A035 / <i>SSA/BMC2</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Space C2				
Platform/Infrastructure	1	2023	4	2027
Program Increment 12-15	1	2022	4	2022
Program Increment 16-19	1	2023	4	2023
Program Increment 20-23	1	2024	4	2024
Program Increment 24-27	1	2025	4	2025
Program Increment 28-31	1	2026	4	2026
Program Increment 32-35	1	2027	4	2027
Data Management	1	2023	4	2027
Space C2 Sustainment (maintain existing capability)	1	2023	4	2027

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