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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2024 Air Force **Date:** March 2023

<b>Appropriation/Budget Activity</b> 3620F: <i>Research, Development, Test &amp; Evaluation, Space Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206444SF / <i>Next-Gen OPIR -- Polar</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	471.398	849.196	1,013.478	0.000	1,013.478	897.341	473.874	440.220	385.170	Continuing	Continuing
657121: <i>Next-Gen OPIR Space, Block 0 Polar</i>	-	471.398	849.196	1,013.478	0.000	1,013.478	897.341	473.874	440.220	385.170	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
 In accordance with Congressional transfer direction in the FY 2023 enacted budget, funds in Program Element (PE) 1206442SF, Project 657121, Next-Gen OPIR Space, Block 0 Polar, have been transferred to 1206444SF, Next-Gen OPIR - Polar. FY 2024 and beyond budget is now included in this PE.

**A. Mission Description and Budget Item Justification**

Next-Generation Overhead Persistent Infrared (OPIR) Space, Block 0 Polar (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 (NGP) 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 engineering design, unit hardware procurement, component and subsystem qualification and design, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design review (CDR) in FY 2024. Phase 2 will be awarded prior to System CDR for the manufacturing, assembly, integration & test, launch and early on orbit test, through operational acceptance of NGP satellites 1 and 2.

The Next-Gen OPIR Space Rapid Prototype (RP) Middle Tier of Acquisition (MTA) effort will close NLT 1QFY2024. Beyond the MTA portion, both NGG and NGP activities are expected to be designated as Major Capability Acquisition 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 element may include necessary civilian pay expenses required to manage, execute, and deliver Next-Gen OPIR Polar 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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<b>Appropriation/Budget Activity</b> 3620F: <i>Research, Development, Test &amp; Evaluation, Space Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206444SF / <i>Next-Gen OPIR -- Polar</i>
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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>B. Program Change Summary (\$ in Millions)</b>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024 Base</u>	<u>FY 2024 OCO</u>	<u>FY 2024 Total</u>
Previous President's Budget	471.398	0.000	0.000	0.000	0.000
Current President's Budget	471.398	849.196	1,013.478	0.000	1,013.478
Total Adjustments	0.000	849.196	1,013.478	0.000	1,013.478
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-90.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	40.000			
• Congressional Directed Transfers	0.000	899.196			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	1,013.478	0.000	1,013.478

**Change Summary Explanation**

FY 2023: +899.196M; in accordance with Congressional transfer direction in the FY 2023 enacted budget, funds in PE 1206442SF, Project 657121, Next-Gen OPIR Space, Block 0 Polar, have transferred to PE 1206444SF.

FY 2023: -90.000M; Congressionally directed reduction for expenditure delays relating to undefinitized contract action.

FY 2023: +25.000M; Congressional add for schedule risk reduction.

FY 2023: +15.000M; Congressional add for onboard resilience.

FY 2024: +1013.478M; in accordance with Congressional transfer direction in the FY 2022 enacted budget, funds in PE 1206442SF, Project 657121, Next-Gen OPIR Space, Block 0 Polar, have transferred to PE 1206444SF and for inflation.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>
<b>Title:</b> Next-Gen OPIR Space, Block 0 Polar	471.398	849.196	1,013.478
<b>Description:</b> Development of the Next-Gen OPIR Polar (NGP) 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 NGP satellites in a resilient architecture, providing real time persistent infrared coverage of the northern hemisphere.			

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<b>Appropriation/Budget Activity</b> 3620F: <i>Research, Development, Test &amp; Evaluation, Space Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206444SF / <i>Next-Gen OPIR -- Polar</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
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**FY 2023 Plans:**  
Continue to execute system engineering and bus maturation activities leading to Preliminary Design Review (PDR). Scheduled activities include Internal Design Reviews (IDRs) 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.

**FY 2024 Plans:**  
FY 2024 funds are required to execute the program Critical Design Review (CDR) campaign, begin preparations for the production, assembly, test, and launch phase of the program, and preserve FY 2028 initial launch capability (ILC) for satellite vehicle (SV) #1. Conduct critical design activities for communications payload, cryptographic units, auxiliary payloads, satellite bus, mission payload, mission unique ground system, and hardware/software early risk reduction activities to support the CDR. Scheduled activities include IDRs to demonstrate individual units are at CDR maturity. This will flow into Critical Design Audits (CDAs) to demonstrate subsystem CDR maturity and the Baseline Technical Review 9 (BTR-9), an interim review to synchronize design and analysis cycles, as well as on-going system preparation and execution, to lead to the CDR milestone. Finalize efforts to develop Engineering Design Units and Flight Hardware for component and subsystem qualification of design. Additionally, preparation work for phase 2 set to be awarded in 2nd Quarter FY 2024, to begin Polar SV 1 AI&T, which will bring the program from CDR through launch, early on orbit testing and operational acceptance. Procure long lead items to support Phase 2 scheduled dates. Continue Enterprise Planning and support for secure communications including government-furnished flight cryptologic units, long-haul communications, ground integration, launch integration efforts, etc. 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.

**FY 2023 to FY 2024 Increase/Decrease Statement:**

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2024 Air Force	<b>Date:</b> March 2023
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<b>Appropriation/Budget Activity</b> 3620F: <i>Research, Development, Test &amp; Evaluation, Space Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206444SF / <i>Next-Gen OPIR -- Polar</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>
FY 2024 funding increased to support post-PDR activities, including bus, communication payload, cryptographic units and mission payload critical design audits with ramp up leading to system CDR in 2024. Additionally, final engineering design unit hardware procurement, component and subsystem qualification & design, and critical path flight hardware procurement will occur. Finally, preparation work for phase 2 set to be awarded in 2nd Quarter FY 2024 will be accomplished, which will include all work required to execute hardware/software procurement and integration activities, to include launch, early orbit testing and operational acceptance.			
<b>Accomplishments/Planned Programs Subtotals</b>	471.398	849.196	1,013.478

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

**Remarks**

**E. Acquisition Strategy**

The Space Force intends to rapidly acquire Next-Gen systems to out-pace adversary missile and counterspace threats while maintaining survivable, global missile warning capability sufficient to enable a transition to the future Force Design Architecture. Next-Gen Polar consists of 2 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 NGP program will transition to a Major Capability Acquisition program by the end of FY 2023. The first GEO satellite is required by FY 2025 and the first Polar satellite is required in FY 2028. The program office awarded a sole source contract under the authority of a Justification & Authorization document. The NGP 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 no later than FY 2024 for NGP SVs 1 and 2. Phase 2 will be awarded prior to System CDR, encompassing build, integration, test, launch, and transition to operations for NGP SVs 1 and 2.

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

<b>Appropriation/Budget Activity</b> 3620F / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206444SF / Next-Gen OPIR -- Polar	<b>Project (Number/Name)</b> 657121 / Next-Gen OPIR Space, Block 0 Polar
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<b>Product Development (\$ in Millions)</b>				<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Next-Gen OPIR Space,Block 0 Polar Phase 1 & 2	SS/CPIF	Northrop Grumman : Redondo Beach, CA	-	441.192	Oct 2021	780.516	Oct 2022	936.190	Oct 2023	-		936.190	Continuing	Continuing	-
Enterprise Comm and Crypto	Various	Various : Various	-	-		34.768	Dec 2022	32.200	Dec 2023	-		32.200	Continuing	Continuing	-
SE&I	Various	Various : Various	-	4.399	Dec 2021	8.192	Dec 2022	11.630	Dec 2023	-		11.630	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	9.661	Oct 2021	8.775	Oct 2022	12.330	Oct 2023	-		12.330	Continuing	Continuing	-
<b>Subtotal</b>			-	455.252		832.251		992.350		-		992.350	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2022</b>		<b>FY 2023</b>		<b>FY 2024 Base</b>		<b>FY 2024 OCO</b>		<b>FY 2024 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
FFRDC	RO	Aerospace Corporation : El Segundo, CA	-	5.939	Dec 2021	4.251	Dec 2022	6.544	Dec 2023	-		6.544	Continuing	Continuing	-
A&AS	Various	Various : Various	-	10.010	Feb 2022	12.520	Feb 2023	14.406	Feb 2024	-		14.406	Continuing	Continuing	-
Other Support	Various	Various : Various	-	0.197	Oct 2021	0.174	Oct 2022	0.178	Oct 2023	-		0.178	Continuing	Continuing	-
<b>Subtotal</b>			-	16.146		16.945		21.128		-		21.128	Continuing	Continuing	N/A

	<b>Prior Years</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>		-	471.398	849.196	1,013.478	-		1,013.478	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2024 Air Force		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 3620F / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206444SF / Next-Gen OPIR -- Polar	<b>Project (Number/Name)</b> 657121 / Next-Gen OPIR Space, Block 0 Polar

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Phase 1</b>				
Design and Development, Critical Path Flight Hardware Procurement, & Risk Reduction	1	2022	4	2022
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	2	2023	3	2023
BTR-9	2	2024	2	2024
CDR	3	2024	3	2024
<b>Phase 2</b>				
Phase 2 ATP	2	2024	2	2024
SV 1 Assembly, Integration & Test	2	2024	4	2028
SV 2 Assembly, Integration & Test	3	2025	4	2028
SV 1 Ready for Launch	4	2028	4	2028

**Note**

Next-Gen Polar (Project 657121) efforts continue past 2028.