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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 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 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	-	125.853	226.601	222.178	0.000	222.178	227.501	230.095	233.231	241.905	Continuing	Continuing
657009: <i>Space Mod Initiative</i>	-	97.978	196.884	191.144	0.000	191.144	195.324	199.418	201.926	209.470	Continuing	Continuing
657123: <i>Integration</i>	-	27.875	29.717	31.034	0.000	31.034	32.177	30.677	31.305	32.435	Continuing	Continuing

Note

In accordance with Congressional direction in the FY 2022 and FY 2023 enacted budgets, funds in Project 657120, Next-Gen OPIR Block 0 GEO have transferred to Program Element 1206443SF, Next-Gen OPIR - GEO. FY 2024 and beyond budget is included in this PE.

In accordance with Congressional direction in the FY 2022 and FY 2023 enacted budgets, funds in Project 657121, Next-Gen OPIR Block 0 Polar have transferred to Program Element 1206444SF, Next-Gen OPIR - Polar. FY 2024 and beyond budget is included in this PE.

In accordance with Congressional direction in the FY 2022 and FY 2023 enacted budgets, funds in Project 657106, Next-Gen OPIR Ground (FORGE) have transferred to Program Element 1206440SF, Next-Gen OPIR - FORGE. FY 2024 and beyond budget is included in this PE.

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. Due to funding transfers to segregate Next-Gen OPIR into other Program Elements, PE 1206442SF is now comprised of two projects: 1. Next-Gen OPIR Space Modernization Initiative (SMI) and 2. Integration.

1. 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. They advance OPIR capabilities for missile warning and tracking, ensuring a low risk, smooth transition of advanced technology to future operational systems. Each year, Space System Command (SSC) conducts a review of all technical development needs for future OPIR systems across the stakeholder community to include the Missile Defense Agency, Space Development Agency, Air Force Research Lab, and mission partners to prioritize technical investment and develop transition roadmaps. The investments described align to the OPIR tech needs published in the Portfolio Decision Support Tool (PDST). Technology Maturation focuses development on advanced infrared sensing optics and electronics, resiliency hardware and software, and on-board processing algorithms and on-board computers. Data Exploitation provides return-on-investment aimed at ingest and fusion of current and future multiple sensor program data to enhance missile warning, missile defense, battlespace awareness and technical intelligence mission capabilities. This includes the processing and exploitation of the Wide Field of View (WFOV) Geosynchronous Earth Orbit (GEO) wideband sensor data focused on dimmer threat targets, as well as future program data including Next-Gen GEO, Missile Track Custody (MTC) Medium-Earth Orbit (MEO), and others. Data Exploitation includes maintaining the Tool, Applications, and Processing (TAP) Lab facility where enhanced

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<p>software applications and algorithms for detection, tracking and visualization are developed and delivered in support of the Space Operations Command, Delta 4, 11th Space Warning Center and 566th Intelligence Squadron operators within the OPIR Battlespace Awareness Center (OBAC) at Buckley Space Force Base (SFB). The TAP Lab facility is also host to current SBIRS program Contract Logistics Support (CLS) activities, Future Operationally Resilient Ground Evolution (FORGE) mission data processing development and testing, and is expected to host Next-Generation Interim Control Center (NICC)-Next-Gen Interim Operations (NIO) Command and Control (C2) for GEO and potentially MTC Mission Data Processing (MDP) and C2. Data Exploitation also supports other mission areas to include Civil Support such as wildland fire tracking solutions. 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/or simultaneously mature breakthrough technologies to create a leap in capability for follow-on systems to include FORGE, Next-Gen GEO and Polar, and Resilient Missile Warning/Missile Track (MW/MT) MEO.</p> <p>2. Integration (Project 657123/Program Element 1206442SF): The Next-Gen OPIR Integration project includes efforts associated with the Government's primary role in, and tasks necessary to accomplish, the critical lead system integration function between the OPIR enterprise segments (Next-Gen GEO, Next-Gen Polar, Next-Gen Ground, and the Resilient MW/MT MEO/Low Earth Orbit (LEO) architecture). This includes Enterprise Systems Engineering and Integration (SE&I) activities and Digital Engineering activities, such as Model Based System Engineering (MBSE). The focus of the Integration project is on system-level integration activities, between the Next-Gen OPIR segments, such as Space to Ground. This differs from integration within the individual program segments, 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 for execution and fielding of the Next-Gen OPIR Enterprise. Further, the Integrator, through various Federally Funded Research and Development Centers (FFRDCs), government partners, and contractors, executes unique MBSE 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. 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>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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B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	125.853	3,479.459	2,951.422	0.000	2,951.422
Current President's Budget	125.853	226.601	222.178	0.000	222.178
Total Adjustments	0.000	-3,252.858	-2,729.244	0.000	-2,729.244
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	-27.200			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	-3,225.658			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-2,729.244	0.000	-2,729.244

Change Summary Explanation

FY 2023: -1,713.933M; transfer funding for PE 1206442SF, Next-Generation OPIR Space, Block 0 GEO Project 657120 to correct PE 1206443SF, Next-Generation OPIR Space, Block 0 GEO Project 657120.

FY 2023: -899.196M; transfer funding for PE 1206442SF, Next-Generation OPIR Space, Block 0 Polar Project 657121 to correct PE 1206444SF, Next-Generation OPIR Space, Block 0 Polar Project 657121.

FY 2023: -612.529M; transfer funding for PE 1206442SF, Next-Generation OPIR, Ground (FORGE) Project 657106 to correct PE 1206440SF, Next-Generation OPIR, Ground (FORGE) Project 657106.

FY 2023: -27.200M; Congressionally directed reduction for inadequate justification.

FY 2024: -148.517M; transfer funding and effort for the MEO Missile Tracking Demonstration portion of PE 1206442SF, Next-Generation OPIR, Space Mod Initiative Project 657009 to PE 1206447SF, Resilient Missile Warning Missile Tracking, Resilient MW/MT - MEO Project 657MEO to centralize Missile Warning Missile Tracking activities and improve transparency.

FY 2024: -901.615M; transfer funding for PE 1206442SF, Next-Generation OPIR Space, Block 0 GEO Project 657120 to correct PE 1206443SF, Next-Generation OPIR Space, Block 0 GEO Project 657120.

FY 2024: -1002.309M; transfer funding for PE 1206442SF, Next-Generation OPIR Space, Block 0 Polar Project 657121 to correct PE 1206444SF, Next-Generation OPIR Space, Block 0 Polar Project 657121.

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FY 2024: -658.406M; transfer funding for PE 1206442SF, Next-Generation OPIR, Ground (FORGE) Project 657106 to correct PE 1206440SF, Next-Generation OPIR, Ground (FORGE) Project 657106.

FY 2024: -19.392M; to realign funding to APPN 3410, PE 1207804SF (SAG 13C), for fiscal policy compliance as Space Systems Command (SSC) establishes Headquarters functions and a Chief Information Office (CIO) for integrated cybersecurity.

FY 2024: +0.995M PBD Inflation Rates for Non-Pay and Non-Fuel Purchases.

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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
657009: <i>Space Mod Initiative</i>	-	97.978	196.884	191.144	0.000	191.144	195.324	199.418	201.926	209.470	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 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 provides return-on-investment aimed at ingest and fusion of current and future multiple sensor program data to enhance missile warning (MW), missile defense (MD), battlespace awareness (BA) and technical intelligence (TI) mission capabilities. This includes the processing and exploitation of the Wide Field of View (WFOV) Geosynchronous Earth Orbit (GEO) wideband sensor data focused on dimmer threat targets, as well as future programs data including Next-Gen GEO, Missile Track Custody (MTC) Medium-Earth Orbit (MEO), and others. Data Exploitation includes maintaining the Tool, Applications, and Processing (TAP) Lab facility where enhanced software applications and algorithms for detection, tracking and visualization are developed and delivered in support of the Space Operations Command, Delta 4, 11th Space Warning Center and 566th Intelligence Squadron operators within the Overhead Persistent Infrared Battlespace Awareness Center (OBAC) at Buckley Space Force Base (SFB). Data Exploitation also supports other mission areas to include Civil Support such as wildland fire tracking solutions. Additionally, data exploitation funds facilities and integration to support initial prototype operations until a transition to a space force operational unit is feasible. 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/or simultaneously mature breakthrough technologies to create a leap in capability for follow-on systems to include FORGE, Next-Gen GEO and Polar, and Resilient Missile Warning/Missile Track (MW/MT) MEO.

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

Title: Demonstrations/Prototypes	FY 2022	FY 2023	FY 2024
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.	5.612	108.100	32.295
The MEO MTC effort leveraged the MTC Digital Engineering Risk Reduction in FY 2021-FY 2023 and transitioned out of SMI in FY 2024 to support the first Epoch described in PE 1206447SF BPAC 657MEO. The effort successfully demonstrated a digital engineering design for warning and tracking that met the Force Design and Analysis of Alternatives (AoA) criteria for an initial			

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

warfighting capability. The SMI effort was critical to competing, maturing, designing, testing, and validating a system capable of tracking emerging missile threats outlined in the Missile Warning Missile Defense Capability Development Document (CDD).

The 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 successfully launched on 1 Jul 22 (FY 2022). The WFOV program will transition from Demonstrations to Data Exploitation after calibration and experimentation is completed in FY 2023.

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 (MBSE) tools to model performance against the Missile Track Custody Technical Requirements Document (TRD) and the Missile Warning and Missile Defense Capabilities OPIR Capability Development Document (CDD). 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 systems meet space system CDR entrance and exit criteria. Continue to mature Government Reference Digital Engineering Environment, 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.

FY 2024 Plans:

WFOV Program will transition to Data Exploitation in FY 2024.

In the execution of the MEO/Low Earth Orbit (LEO) pivot, Space Systems Command (SSC) was designated as the lead end-to-end systems integrator and chartered to contribute to establishing a combined program office with the Space Development Agency (SDA) and Missile Defense Agency (MDA). As the SSC MEO and SDA LEO programs deploy capabilities in spiral increments, a centralized Digital Engineering Environment is necessary to capture MBSE requirements management and system level performance in support of multiple programs. In FY 2024, the OPIR Digital Engineering Demo will capture performance across sensors in development, current program of record sensors, and future government reference sensors to feed the requirements baseline for future OPIR spirals. This digital engineering effort will build upon the force design for a high-fidelity systems model that performs full system requirements traceability and detailed performance modeling of system in build. This effort will also demonstrate the use of cloud-based tools and models to share across SDA, MDA, Space Warfighting Analysis Center (SWAC), and others.

	FY 2022	FY 2023	FY 2024

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
<p>There are two efforts that are on contract as of FY 2022. The first is the MEO specific transition to Secret Collateral Cloud using the Air Force's Cloud 1. The MEO program will leverage expertise to support a contract in FY 2024 to perform digital engineering and integration. The second is the OPIR Modeling and Simulation Center of Excellence established in FY 2022 to determine constellations and performance level trades using MEO, LEO, GEO, Highly Elliptical Orbit (HEO), and FORGE detailed models.</p> <p>To improve communication path diversity and delivery of low latency data without significantly ramping up ground entry points, development and test of Low Size Weight and Power (SWaP), high bandwidth, agile crosslinks for Medium Earth Orbit systems are necessary. Additionally, there is increasing demand for resiliency and communication path diversity of OPIR data driving the need for MEO to participate in enterprise networking of missile warning/tracking information. MEO Epoch 1 crosslinks were simplified in scope to preserve schedule and lower technical risks for initial performance/demonstration of utility. Epoch 2 must expand crosslink performance to pass and route tracking and warning data for correlation and fusion in multiple locations. As such, a demo is required prior to the start of Epoch 2 satellite development to enable a technology on-ramp. The Resilient MW/MT MEO Program Management Office (PMO) plans to combine funds with other mission partners to develop an enterprise capability.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 decreased due to the MTC Demonstration activity transferring to centralize Missile Warning and Missile Tracking activity and improve budget transparency.</p>			
<p>Title: Technology Maturation</p> <p>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 concept of operations (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.</p> <p>As a result of the SWAC AoA and Force Design, several key technologies areas were highlighted to execute the MEO/LEO pivot. A detailed manufacturability study was conducted in coordination with the SWAC during the AoA that recommend several critical technology maturation areas.</p> <p>FY 2023 Plans:</p>	7.502	2.432	39.037

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
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<p>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>			
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FY 2024 Plans:

Technology maturation will develop the next generation of FPAs that have higher dynamic range and increased resiliency. SSC will work with vendors to improve FPA manufacturing capability for larger format focal plane arrays to support the growing demands from sensor builders. FY 2024 funds will also support development of optimized intelligent tasking management. This effort will enhance the minimum-viable product for MEO Epoch 1 with scalability for future MEO growth to account for optimal tasking of area collection and real-time hypersonic containment. Furthermore, technical maturation will target investments in three-dimensional (3D) track correlation using artificial intelligence and machine learning for multi-orbit, higher volume sensor constellations. Additionally, funding will support filter technology and manufacturability to improve protection of sensors. Technology maturation will continue to invest in resilient processing algorithms and testbeds to support the hardware focused investments. Finally, additional technical maturation is required to support the crosslink demonstration in support of Epoch 2. Advances in technology should enable backwards compatibility in Epoch 2.

FY 2023 to FY 2024 Increase/Decrease Statement:

FY 2024 increased to support key technology insertion activities needed to accelerate MW/MT Epoch capability that require mature and manufacture-ready technology. In particular, for Epoch 2 and beyond, hardware technical maturation is necessary for focal plane arrays, coatings, and crosslinks. For improved performance and meeting tracking requirements in complicated missile raid scenarios, technical software maturation is required for next generation technologies in both fusion and tasking. These advances if successful, can transition as early as Epoch 1 to improve initial performance.

Title: Data Exploitation	84.864	86.352	119.812
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<p>Description: Data exploitation efforts will exploit existing and future OPIR, environmental weather, and ground radar data sources including Defense Support Program (DSP), SBIRS HEO, SBIRS GEO Scanner, SBIRS GEO Starer, WFOV demonstration (launched 01 Jul 2022), Geostationary Operational Environmental Satellites-R series (GOES-R) East/West, prototypes, and future program data sources. Exploitation efforts include RDT&E and integrating multiple sensor data through collection, processing,</p>			
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2022	FY 2023	FY 2024
<p>fusion, data dissemination, application and algorithm development and testing, network connectivity, and sensor performance assessments. SBIRS, WFOV and other space and ground-based sensors provide rich data sets for exploitation and fusion with the objective of filling sensor capability gaps in support of the new dim target threats. The SMI Data Exploitation TAP Lab provides researchers and developers access to raw and processed data and advanced DevSecOps (Development/Security/Operations) tools to develop applications and algorithms for delivery to the Buckley SFB OBAC in support of MW, MD, BA and TI mission areas. SMI data exploitation efforts are complementary to, and enhance, the exploitation capabilities delivered by the PoR and prototypes while pathfinding for future sensor PoRs. While performing data exploitation, the TAP Lab will serve as the primary software factory DevSecOps pipeline and subject matter experts to on-board new sensors into known operational fusion and correlation capabilities. SSC, SDA, and MDA will collaborate for future ground reference architecture for MEO and LEO that relies on sensors delivering formatted data to the Real-Time Transfer Service (RTS). Once published to the RTS, operational warning and defense software could then fuse and correlate data across sensors from all orbits to generate a 3D track. The 3D track will allow warning and defense operational systems to distribute and message appropriately. The TAP Lab will work with both the MEO MTC program office and SDA for early integration and testing using the FORGE framework. The TAP Lab is a critical piece in the future sensor proliferation as it provides a test and demo suite of resources to streamline sensor acceptance into certified warning and defense operations.</p> <p>Data exploitation efforts also evaluate tools for C2, mission management, and MDP to reduce risk to current and future programs. Data exploitation has also focused on pathfinding and evolving PoR ground systems to an open architecture framework. By incorporating C2, the TAP Lab offers the capability for launch and early orbit support as well operations and integration of future government owned, contractor operated OPIR prototypes.</p> <p>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 also support demonstration and prototype architecture planning and experimentation to include WFOV and other future sensor programs.</p> <p>FY 2023 Plans: Continue to innovate wildland fire tracking capabilities and incorporate applications into national fire tracking solution. Continue operations and Data Exploitation efforts on 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 FORGE. Continue to support</p>			

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

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 Air Force Research Lab AFRL Broad Agency Announcement (BAA) contract vehicles. 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 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 missions, as required. Evolve data processing for infrared payload applications with enhanced net-centric and service-oriented features.

FY 2024 Plans:

Continue to innovate wildland fire tracking capabilities and incorporate applications into national fire tracking solutions. Deliver High Altitude Dim Event Stalker (HADES) suite of applications and algorithms that include target detection, track fusion and common operating picture visualization along with near-real-time recording capabilities to enhance ability to report on PACOM Joint Emergent Operational Need/Joint Urgent Operational Need (JEON/JUON) threats. This includes ingesting and tuning the HADES suite of applications to exploit the recently launched WFOV sensor data. Develop CONOPS for the WFOV 6-degree starrer sensor over USINDOPACOM and participate in demonstrations and exercises with the community to ensure timely data delivery. Refine and improve WFOV calibration, experimentation, exploitation and data delivery as user requests increase and more stakeholders find utility with the new sensor data. WFOV data will be used to path find new algorithm processing chains at the TAP Lab, transition to the OBAC, and deliver new products to the warfighter community.

Develop capabilities for HADES to ingest ground radar data as well as other available platform data available on RTS to fuse, evolve, and enhance the ability to detect and track missile, air, and other emerging threats. Expand exploitation lab sources and OBAC applications to support development of experimental operations. Develop prototype processes for managing an open framework architecture. Develop applications for the OBAC that transition to the FORGE. Support deployment, testing, and integration of the FORGE framework and all updates. Enhance mission resiliency and data exploitation of SBIRS and other OPIR data using BAAs and OTAs. Continue to collaborate with the IC and MDA to enhance 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 missions, as required. Evolve data processing for infrared payload applications with enhanced net-centric and service-oriented features.

In preparation for MEO and LEO Tracking Tranche 1 sensors, the TAP Lab will demonstrate a pipeline to on-board sensors into operations using a 3D track correlation and fusion ground capability, which will expedite transition of new sensors into operational systems. Additionally, it will create test, calibration, and tuning routines necessary for MEO and LEO performance validation to ensure downstream warning and defense operations can ingest sensor data. Collaborating with the FORGE MDP Application Provider, the TAP Lab will develop and incorporate 3D tracks for observers in hybrid constellations into a M&S tool to allow

FY 2022	FY 2023	FY 2024

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force		Date: March 2023
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 2022	FY 2023	FY 2024
enterprise-level tracking performance prediction against multiple scenarios based on data and analysis from multiple flight demo systems.			
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, modeling, simulation, experimentation, prototyping.			
<i>FY 2023 to FY 2024 Increase/Decrease Statement:</i> FY 2024 increased due to WFOV launch and aligned under data exploitation as a contributing sensor to the program of record by enhancing MW/MD/BA/TI and civil capabilities. Additionally, will expand the DevSecOps pipeline to onboard Next-Gen, MTC, SDA Tranche 1, other space and ground-based sensor data, and serve as pathfinder to transition the FORGE to ops to replace Block 20 legacy ground system.			
Accomplishments/Planned Programs Subtotals	97.978	196.884	191.144

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• SPAF 01 MSSBIR: <i>SBIR High (Space)</i>	156.481	0.000	-	-	-	0.000	0.000	-	-	0.000	156.481

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 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. BAAs and OTAs are planned in collaboration with 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 SpEC will be utilized to execute OTAs to conduct data exploitation improvements at the OBAC and TAP Lab. A local SSC contract is being utilized for services at the OBAC and TAP Lab.

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

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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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Demonstrations/Prototypes (Demos)	Various	Various : Various	-	4.000	Dec 2021	97.737	Dec 2022	0.000	Dec 2023	-		0.000	Continuing	Continuing	-
Demos - MEO Digital Engineering	Various	Various : Various	-	-		-		7.830	Dec 2023	-		7.830	Continuing	Continuing	-
Demos - OPIR Center of Excellence	Various	Various : Various	-	-		-		3.524	Dec 2023	-		3.524	Continuing	Continuing	-
Demos - Low SWaP Crosslink	Various	Various : Various	-	-		-		14.529	Dec 2023	-		14.529	Continuing	Continuing	-
Technology Maturation (Tech Mat)	Various	Various : Various	-	5.347	Jan 2022	2.199	Jan 2023	0.000	Jan 2024	-		0.000	Continuing	Continuing	-
Tech Mat - Resilient FPAs	MIPR	SAF/FMBIB : Washington, DC	-	-		-		14.400	Jan 2024	-		14.400	Continuing	Continuing	-
Tech Mat - Intelligent Tasking	Various	Various : Various	-	-		-		3.848	Jan 2024	-		3.848	Continuing	Continuing	-
Tech Mat - 3D Correlation/ Fusion	Various	Various : Various	-	-		-		3.848	Jan 2024	-		3.848	Continuing	Continuing	-
Tech Mat - Filters and Coating	MIPR	Various : Various	-	-		-		1.931	Jan 2024	-		1.931	Continuing	Continuing	-
Tech Mat - Resilient Algorithms/Test Bed	MIPR	Various : Various	-	-		-		3.848	Jan 2024	-		3.848	Continuing	Continuing	-
Tech Mat - Crosslink Enabling Tech	Various	Various : Various	-	-		-		3.412	Jan 2024	-		3.412	Continuing	Continuing	-
Data Exploitation (Data Ex)	Various	Various : Various	-	68.677	Jan 2022	73.836	Jan 2023	74.851	Jan 2024	-		74.851	Continuing	Continuing	-
Data Ex - TAP Lab and OBAC Support Services (TLOSS)	Various	Net-Centric Design Prof : Boulder, CO	-	-		-		18.000	Jan 2024	-		18.000	Continuing	Continuing	-
Data Ex - Wide Field of View (WFOV) Activities	MIPR	NASA : Moffett Field, CA	-	-		-		19.040	Jan 2024	-		19.040	Continuing	Continuing	-
Enterprise SE&I	Various	Various : Various	-	2.252	Dec 2021	6.633	Dec 2022	6.500	Dec 2023	-		6.500	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	3.580	Oct 2021	3.202	Oct 2022	3.298	Jan 2024	-		3.298	Continuing	Continuing	-
Subtotal			-	83.856		183.607		178.859		-		178.859	Continuing	Continuing	N/A

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

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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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Demonstrations/Prototypes -WFOV Testbed</i>	
Prepare for Launch Activity	
<i>Demonstration/Prototypes - Track Custody Demo</i>	
Develop and Test	
Architecture Analysis	
Mission Payload Critical Design Review	
Mission Payload, Bus Build & Test	
TCD Space Vehicle Critical Design Review	
<i>Demonstration/Prototypes</i>	
Rapid Prototyping Studies and additional Design Development	
Digital Engineering Models	
<i>Technology Maturation</i>	
Development High Dynamic Range (HDR) FPAs	
Operational HDR (TRL 5-6)	
Develop Manufacturable Filters	
Develop low SWaP Crosslink	
Resilient Algorithm Development & Test Bed	
Intelligent Tasking	
3D Correlation/Fusion	
<i>Data Exploitation</i>	
Execute BAAs	
SpEC OTAs	
TAP Lab & OBAC Facilities and Infrastructure	

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

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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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
WFOV Early On-Orbit Calibration, Experimentation and Exploitation																												
WFOV Taskings and Mission Planning																												
High Altitude Dim Event Stalker (HADES) MVP to OBAC																												
Turn HADES to ingest WFOV calibrated wideband (Focused on Emerging Threats)																												
HADES IOC on FORGE																												
HADES FOC on FORGE																												
TAP Lab - Host/Support FORGE MDP Integration and Testing																												
TAP Lab - Host/Support Next-Gen Ground/ Interim Operations Control Center (NICC) GEO C2																												
Host/Support Resilient MWMT MEO C2																												
Tune HADES to ingest Ground Radar Data, Next-Gen OPIR, MTC MEO, SDA LEO Tranches, and future sensors																												

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

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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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>Demonstration/Prototypes - Track Custody Demo</i>				
Develop and Test	1	2022	4	2023
Architecture Analysis	3	2022	4	2022
Mission Payload Critical Design Review	4	2022	1	2023
Mission Payload, Bus Build & Test	1	2023	4	2023
TCD Space Vehicle Critical Design Review	4	2023	4	2023
<i>Demonstration/Prototypes</i>				
Rapid Prototyping Studies and additional Design Development	1	2024	4	2028
Digital Engineering Models	1	2024	4	2028
<i>Technology Maturation</i>				
Development High Dynamic Range (HDR) FPAs	1	2022	4	2028
Operational HDR (TRL 5-6)	1	2026	1	2026
Develop Manufacturable Filters	1	2024	1	2026
Develop low SWaP Crosslink	1	2024	1	2026
Resilient Algorithm Development & Test Bed	1	2022	4	2028
Intelligent Tasking	1	2024	1	2026
3D Correlation/Fusion	1	2024	1	2026
<i>Data Exploitation</i>				
Execute BAAs	1	2022	4	2023
SpEC OTAs	4	2022	4	2028
TAP Lab & OBAC Facilities and Infrastructure	1	2022	4	2028

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

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
WFOV Early On-Orbit Calibration, Experimentation and Exploitation	1	2023	2	2026
WFOV Taskings and Mission Planning	1	2023	2	2026
High Altitude Dim Event Stalker (HADES) MVP to OBAC	1	2022	4	2023
Turn HADES to ingest WFOV calibrated wideband (Focused on Emerging Threats)	4	2022	2	2023
HADES IOC on FORGE	2	2023	2	2023
HADES FOC on FORGE	2	2025	2	2025
TAP Lab - Host/Support FORGE MDP Integration and Testing	1	2023	2	2026
TAP Lab - Host/Support Next-Gen Ground/Interim Operations Control Center (NICC) GEO C2	1	2023	4	2026
Host/Support Resilient MWMT MEO C2	1	2023	2	2027
Tune HADES to ingest Ground Radar Data, Next-Gen OPIR, MTC MEO, SDA LEO Tranches, and future sensors	2	2023	4	2028

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force										Date: March 2023		
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 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
657123: <i>Integration</i>	-	27.875	29.717	31.034	0.000	31.034	32.177	30.677	31.305	32.435	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Government works with the Enterprise System Engineering & Integration (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 (MBSE) 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 2022	FY 2023	FY 2024
Title: Next-Gen OPIR Space, Integration	27.875	29.717	31.034
<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 OPIR enterprise material segments (Next-Gen Geosynchronous Earth Orbit (GEO) (NGG), Next-Gen Polar (NGP), Next-Gen Ground, and the Resilient Missile Warning/ Missile Track (MW/MT) architecture). The Next-Gen 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 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, 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>FY 2024 Plans: Continue to plan and execute the critical lead system integration function across the System of Systems. Activities include NGG space-to-ground compatibility testing and planning for major pre-launch enterprise integration events such as NGG pre-launch</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Air Force	Date: March 2023
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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 2022	FY 2023	FY 2024
<p>readiness testing. Continue development of Space/Ground interface, analysis for the Future Operationally Resilient Ground Evolution (FORGE) Next-Gen GEO Transition, analysis and integration for NGG space vehicle 2 bus integration and intersegment testing. Conduct NGP System level Critical Design Review (CDR) with NGP prime contractor. Conduct System Requirements Review for Survivable/Endurable Next-Gen OPIR requirements. Continue management of missile warning technical baseline and cross-segment requirement verification 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 2023 to FY 2024 Increase/Decrease Statement:</i> FY 2024 increased due to inflation, an increase in NGG pre-launch preparations, and NGP CDR.</p>			
Accomplishments/Planned Programs Subtotals	27.875	29.717	31.034

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 Next-Gen OPIR space and ground segments. While this complex intersegment integration is traditionally performed by a prime contractor under a systems development contract, for Next-Gen OPIR, this approach requires the government to be the integrator. To execute this responsibility, the government leverages systems engineering and integration expertise from the SE&I contractor. The Program Office intends to contract for this capability through a SE&I follow-on Contract. There is a contractor finishing the execution of the current SE&I contract in 2022 with options into FY 2023, and the follow-on effort will be a competitive award expected for award in FY 2023. 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 function requires system analysis, integration planning, integration execution, leveraging that expertise from the Prime Contractors for NGG, NGP, and FORGE. These prime contractors have System Engineering, Integrations and Test (SEIT) scope on the respective contracts.

The follow-on SE&I 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-4, RDT&E Schedule Profile: PB 2024 Air Force **Date:** March 2023

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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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Next-Gen OPIR GEO to Ground</i>	
System CDR	
Technical Baseline Management	
SV1 Space to Ground Compatibility Test	
SV2 Space to Ground Compatibility Test	
SV1 Pre-Launch Readiness Test	
SV2 Pre-Launch Readiness Test	
SV1 On-Orbit Performance Characterization/ tuning	
SV2 On-Orbit Performance Characterization/ tuning	
<i>Next-Gen OPIR, Space Polar</i>	
PDR	
Next-Gen Polar-1 Launch	
<i>FORGE - Next-Gen Transition</i>	
Next-Gen GEO Development	
Next-Gen Polar Development	
System Level CDR	
EForge SRR	

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

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	2028
SV1 Space to Ground Compatibility Test	1	2024	1	2024
SV2 Space to Ground Compatibility Test	2	2026	2	2026
SV1 Pre-Launch Readiness Test	2	2025	2	2025
SV2 Pre-Launch Readiness Test	1	2026	2	2026
SV1 On-Orbit Performance Characterization/tuning	3	2025	4	2025
SV2 On-Orbit Performance Characterization/tuning	3	2027	4	2027
<i>Next-Gen OPIR, Space Polar</i>				
PDR	3	2023	3	2023
Next-Gen Polar-1 Launch	4	2028	4	2028
<i>FORGE - Next-Gen Transition</i>				
Next-Gen GEO Development	1	2024	4	2027
Next-Gen Polar Development	1	2024	4	2027
System Level CDR	1	2024	1	2024
EFORGE SRR	1	2024	1	2024