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

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	11.863	8.999	0.000	8.999	9.179	9.307	9.548	15.215	Continuing	Continuing
672486: <i>JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES</i>	-	0.000	7.467	7.500	0.000	7.500	7.572	7.709	7.847	11.462	Continuing	Continuing
67A011: <i>Space Analysis and Application Development</i>	-	0.000	4.396	1.499	0.000	1.499	1.607	1.598	1.701	3.753	Continuing	Continuing

Note
 Prior to the FY20 PB cycle, The Space Analysis and Application Development Program (WSC 67A011) and the Joint Navigation and Warfare Center (WSC 672486) were reported under PE 1201921F, Service Support to STRATCOM - Space Activities. Beginning in FY20, the programs will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

A. Mission Description and Budget Item Justification
 The Space Analysis and Application Development program integrates space based effects into Department's 'Model of Record' for joint campaign analysis. Current modeling and simulation (M&S) models are inadequate to represent the contribution that U.S space capabilities make to the air, sea, and land fight and do not accurately portray current and future space threats. This line of effort integrates effects of space capabilities into the Synthetic Theater Operations Research Model (STORM) and other mission and campaign-level M&S tools. Enhanced space M&S will enable the DoD to make informed decisions regarding the direction of U.S. Space Doctrine, Tactics, Techniques, Procedures, and Resource Decisions. The DoD requires the ability to conduct campaign-level analysis to quantify the holistic operational impacts of adversary space actions on military campaigns and U.S. global operations.

Navigation Warfare (NAVWAR) is deliberate defensive and offensive action to assure positioning, navigation, and timing (PNT) information through coordinated employment of space, cyberspace, and electronic warfare (EW) operations. Funds are used to create and maintain NAVWAR knowledge. NAVWAR expertise is developed in part by execution of PNT Operational Field Assessments (POFAs). GYPSY POFA's are linked to Combatant Commander's (CCMD) Tier 1 exercises (USSTRATCOM's Global Lightning and Global Thunder are examples) and provide operational realistic threat-representative, GPS-contested environments for analytical assessment of air, ground, maritime, space & cyberspace mission capability. FORTUNE POFAs are PNT capability and vulnerability assessments associated with a Service exercise or mission event. PRISM POFAs encompass all Operations, Actions, and Activities (OAAs) associated with events outside of specific CCMD and/or service exercises or mission events. Assessments inform service acquisition decisions, capability gaps, intelligence gaps and tactics, techniques and procedures (TTP) development and implementation to mitigate effects on warfighter operations in the anticipated theater NAVWAR threat environments. JNWC assesses Department wide PNT posture through the PNT Annual assessment IAW DoDI 4650.08.

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 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	11.863	9.014	0.000	9.014
Current President's Budget	0.000	11.863	8.999	0.000	8.999
Total Adjustments	0.000	0.000	-0.015	0.000	-0.015
• 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	-0.015	0.000	-0.015

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 1202140F / Service Support to SPACECOM Activities				Project (Number/Name) 672486 / JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
672486: JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES	-	0.000	7.467	7.500	0.000	7.500	7.572	7.709	7.847	11.462	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY20 all funding from RDT&E funding from PE 1201921F Service Support to STRATCOM - Space Activities, moved to PE 1202140F - Service Support to U.S. SPACECOM Activities

A. Mission Description and Budget Item Justification

Navigation Warfare (NAVWAR) is deliberate defensive and offensive action to assure positioning, navigation, and timing (PNT) information through coordinated employment of space, cyberspace, and electronic warfare (EW) operations. Funds are used to create and maintain NAVWAR knowledge. NAVWAR expertise is developed in part by execution of PNT Operational Field Assessments (POFAs). GYPSY POFA's are linked to Combatant Commander's (CCMD) Tier 1 exercises (USSTRATCOM's Global Thunder and Global Lightning are examples) and provide operational realistic threat-representative, GPS-contested environments for analytical assessment of air, ground, maritime, space & cyberspace mission capability. FORTUNE POFAs are PNT capability and vulnerability assessments associated with a Service exercise or mission event. PRISM POFAs encompass all Operations, Actions, and Activities (OAAs) associated with events outside of specific CCMD and/or service exercises or mission events. Assessments inform service acquisition decisions, capability gaps, intelligence gaps and tactics, techniques and procedures (TTP) development and implementation to mitigate effects on warfighter operations in the anticipated theater NAVWAR threat environments. JNWC assesses department wide PNT posture through the PNT Annual assessment IAW DoDI 4650.08.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: PNT Operational Assessments	0.000	7.467	7.500	0.000	7.500
Description: The JNWC will investigate, operationally assess, and simulate potential threats and mitigation strategies for denial of blue force PNT capabilities as well as preventing the hostile use of PNT information. Major Performers - Best value to the government selected contractors, universities, government facilities, federally funded research and development centers, laboratories, or other organizations					
FY 2020 Plans: Operational assessments - Simulate potential threats and mitigation strategies for potential denial of blue force PNT capabilities - Continuing development to prevent the hostile use of Positioning, Navigation and Timing (PNT) information.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>	Project (Number/Name) 672486 / <i>JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
No OCO requested					
<i>FY 2021 Base Plans:</i> Continuing Operational assessments - Modeling and simulation equipment, to simulate potential threats (Red force vs Blue Force capabilities)and develop mitigation strategies for potential denial of blue force PNT capabilities.					
Continued development, scenario build, specialized equipment, to prevent the hostile use of Positioning, Navigation and Timing (PNT) information.					
Planned exercises - GYPSY x2 for Combatant Command objectives, Fortune exercises x4 are for Service objectives, and PRISM events (undetermined) are for all others.					
<i>FY 2021 OCO Plans:</i> No OCO requested					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> increase between FY20 and FY21 is due to inflation					
Accomplishments/Planned Programs Subtotals	0.000	7.467	7.500	0.000	7.500

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

Remarks
Prior to the FY20 PB cycle, The Joint Navigation Warfare Center was reported under PE 1201921F, WSC 672486. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

D. Acquisition Strategy
New contracts will be awarded using competitive procedures to the maximum extent possible.

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

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / Service Support to SPACECOM Activities	Project (Number/Name) 672486 / JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Position Navigation and Timing Operational Field Assessments	PO	Multiple, Kirtland AFB NM : Kirtland, NM	-	-		7.467	Oct 2019	7.500	Oct 2020	0.000		7.500	Continuing	Continuing	-
Subtotal			-	-		7.467		7.500		0.000		7.500	Continuing	Continuing	N/A

Remarks
Prior to the FY20 PB cycle, The Joint Navigation and Warfare Center (JNWC) was reported under PE 1201921F, WSC 672486. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-	7.467	7.500	0.000	7.500	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>	Project (Number/Name) 672486 / <i>JOINT NAVWAR CENTER (JNWC) SPACE ACTIVITIES</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Navigation Warfare (NAVWAR)</i>				
NAVWAR Operational Field Assessments - Continuing	1	2020	4	2025
Create / Maintain NAVWAR Knowledge - Continuing	1	2020	4	2025
NAVWAR Operational and CONOPS Events - Continuing	1	2020	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>				Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
67A011: <i>Space Analysis and Application Development</i>	-	0.000	4.396	1.499	0.000	1.499	1.607	1.598	1.701	3.753	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

This is NOT a new start.

A. Mission Description and Budget Item Justification

The Space Analysis and Application Development program Integrates space based effects into Department's 'Model of Record' for joint campaign analysis. Current modeling and simulation (M&S) models are inadequate to represent the contribution that U.S space capabilities make to the air, sea, and land fight and do not accurately portray current and future space threats. This line of effort integrates effects of space capabilities into the Synthetic Theater Operations Research Model (STORM) and other mission and campaign-level M&S tools. Enhanced space M&S will enable the DoD to make informed decisions regarding the direction of U.S. Space Doctrine, Tactics, Techniques, Procedures, and Resource Decisions. The DoD requires the ability to conduct campaign-level analysis to quantify the holistic operational impacts of adversary space actions on military campaigns and U.S. global operations.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Space Campaign Modeling and Simulation, Development/Modification/Verification/Validation	0.000	4.396	1.499	0.000	1.499
Description: Developed, modifies, verifies, and validates new models for Space mission areas and modifies existing models to portray new capabilities					
FY 2020 Plans:					
- In coordination with HAF A/9 (HQ Air Force Studies, Analysis, and Assessments), develop schedule to identify requirements toward implementation of approved change requests and instantiation of space and contested space capabilities in STORM					
- Coordinate and update Blue space order of battle data, Red counter-space order of battle data, and Red counter-space CONOPS to support integration of contested space into mission and campaign-level M&S					

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<ul style="list-style-type: none"> - Continue development of software and tools to model Red on Blue contested space (one versus one, many versus many, and space campaign-level) - Update likelihood assessment data for Red counter-space capability (likelihood to employ, and likelihood to be effective) to inform counter-space risk assessment and enterprise-level modeling - Review and update JMT consequence assessment used to inform risk analyses and enterprise level modeling - Utilize updated tools and data to support analytical efforts of new Space Analysis Consortium, and collaborate with partners to inform senior leader forums and decisions on space investments, requirements, acquisition, and operational risk decisions - Support cost benefit analyses of Space Control activities with quantifiable impacts to warfighter operations - Provide analysis support to inform Air Force Space Command's Space Enterprise Vision (SEV) <p>No OCO Requested</p> <p>FY 2021 Base Plans: FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Continue priority integration of 22 Joint Mission Threads, space-based capabilities, and counter-space effects on the Warfighter in STORM - Continue to develop change request proposals and submit to STORM Configuration Control Board (CCB) to improve instantiation of potential future and denied/degraded space-based capabilities and their effects on the Warfighter in STORM - In coordination with HAF A/9 (HQ Air Force Studies, Analysis, and Assessments), develop schedule to identify requirements toward implementation of approved change requests and instantiation of space and contested space capabilities in STORM 					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>	Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<ul style="list-style-type: none"> - Develop and modify user-friendly, front-end campaign-level M&S software and tools supporting sufficiently accurate and very timely exploratory analytics to optimize more costly campaign-level STORM M&S, operational planning, gaming, and concept development - Continue development of software and tools to model Red on Blue contested space (one versus one, many versus many, and space campaign-level) and analyze/assess results to determine impact/effects on U.S. military campaigns and global operations - Coordinate and update current and future Blue space order of battle data, Red counter-space order of battle data, Red counter-space CONOPS, future Blue and Red CONOPS to support integration of contested space into mission and campaign-level M&S - Continue updates to software, tools, models, and data at the mission- and campaign-level to inform senior leaders evolving inquiries and decisions on space investments, requirements, acquisition, operational COAs, operational risk, and future planning - Assess and integrate enterprise-level model data for SATCOM capabilities into campaign-level modeling - In coordination with European Command, Indo-Pacific Command, other combatant commands, and respective USSPACECOM Integrated Planning Elements; explore improved integrated risk analysis with new campaign-level M&S capabilities - Utilize updated tools and data to support analytical efforts in support of SPACECOM activities, new Space Analysis Consortium, and evolving space analytical capabilities; and collaborate with partners to inform senior leader forums and decisions on space investments, requirements, acquisition, and operational risk decisions - Support cost benefit analyses of Space Control activities with quantifiable impacts to warfighter operations - Provide analysis support to inform Air Force Space Command's Space Enterprise Vision (SEV) <p>FY 2021 OCO Plans: No OCO requested</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>	Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY20 to FY21 decrease was a planned reduction of RDT&E funding due to previously developed programs transitioning to an operational capability.					
Accomplishments/Planned Programs Subtotals	0.000	4.396	1.499	0.000	1.499

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

N/A

Remarks

Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, Service Support to U.S. SPACECOM Activities

D. Acquisition Strategy

Any new projects funded in this program will be awarded using competitive procedures to the maximum extent possible.

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

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>	Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
Model Space effects for two mission tasks and integrate into STORM for joint campaign analysis	C/CPAF	TBD : TBD	-	0.000	Oct 2019	4.396	Oct 2019	1.499	Oct 2020	0.000		1.499	Continuing	Continuing	-	
Subtotal			-	0.000		4.396		1.499		0.000		1.499	Continuing	Continuing	N/A	

Remarks
Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, USSPACECOM

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	0.000	4.396	1.499	0.000	1.499	Continuing	Continuing	N/A

Remarks
Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, USSPACECOM

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1202140F / <i>Service Support to SPACECOM Activities</i>	Project (Number/Name) 67A011 / <i>Space Analysis and Application Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Analysis Modeling and Simulation</i>				
Complete Mission-level modeling and analysis for 22 Joint Mission Threads	1	2020	4	2020
Complete priority integration of 22 Joint Mission Threads, space-based capabilities, and counter-space effects on the Warfighter in STORM	1	2021	4	2021
Run Improved STORM model and update integrated risk analysis with Combatant Commands	1	2022	4	2022
Identify and develop 10 additional Joint Mission Threads for integration into mission and campaign level modeling	1	2023	4	2023
Develop software and tools to model Red on Blue contested space environment. Develop space playbook to define Red counter-space threat	1	2024	4	2024
Update mission and campaign level M&S to inform senior leaders evolving inquiries and decisions on innovation, space investments, rapid acquisition, operational COAs, risk, and planning	1	2025	4	2025

Note

Prior to the FY20 PB cycle, The Space Analysis and Application Development Program was reported under PE 1201921F, WSC 67A011. Beginning in FY20, the program will be reported under the newly created PE 1202140F, USSPACECOM