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

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206760SF I Protected Tactical Enterprise Service (PTES)
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	105.718	100.320	121.069	0.000	121.069	91.814	149.112	121.455	235.519	Continuing	Continuing
643726: PTES	-	105.718	100.320	121.069	0.000	121.069	91.814	149.112	121.455	235.519	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

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

Space acquisition must respond with speed and agility to emerging adversary threats. Space Systems Command (SSC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose existing capabilities.

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

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

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	109.390	100.320	0.000	0.000	0.000
Current President's Budget	105.718	100.320	121.069	0.000	121.069
Total Adjustments	-3.672	0.000	121.069	0.000	121.069
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.672	0.000			
• Other Adjustments	0.000	0.000	121.069	0.000	121.069

Change Summary Explanation

FY 2021: -3.672M; SBIR/STTR Transfer

FY 2023: +121.069M; The FY 2022 President's Budget submittal did not reflect FY 2023 through FY 2026 funding. Therefore, an explanation of the change between the two budget positions for FY 2023 cannot be made in a relevant manner.

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

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Complete Agile Build 3 and 4 of the PTES Prototype Development and commence Build 5. Conduct Operational Demonstration of PTES Minimum Viable Product. Continue to test and deliver MMS, KMS, and Key Loading Initialization Facility (KLIF) functionality on multiple system-level integration and testing events on the Government approved Data Center environment. Conduct the Build 3 Risk Reduction Test on the PTES Integration, Test and Development Environment. Continue to conduct required cybersecurity assessments and obtain cybersecurity operational Authority to Operate (ATO) and PATS Operations Center (PATSOCC) Authority to Connect (ATC). Complete Joint Hub End Cryptographic Unit (ECU) NSA certification, Joint Hub Space and Missile Defense Command (SMDC) certification, and Joint Hub System Acceptance Testing (SAT). Complete KMS ECU certification. Complete interoperability certification. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2023 Plans: Conduct Risk Reduction Test 4 upon completion of Software Build 4 of the PTES Prototype Development. Complete Software Build 5 and commence Software Build 6. Continue developmental and operational testing efforts to support two SATCOM gateways leading up to IOC in early FY 2024. Continue to test and deliver MMS, KMS, and Key Loading Initialization Facility (KLIF) functionality on multiple system-level integration and testing events on the Government approved Data Center environment. The FY 2023 funding achieves PTES functionality and automation on-time for IOC that was traded in the interest of achieving a mean viable product during the rapid prototyping phase. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY 2023 increase is due to conducting Risk Reduction Test 4, completion of Software Build 5 and the start of software Build 6. Additionally, execution of Integrated Test and Evaluation (IT&E) and Multi-service Operational Test and Evaluation (MOT&E), completing SMDC certification, and PTW extensibility to commercial architectures.</p>			
Accomplishments/Planned Programs Subtotals	105.718	100.320	121.069

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

Remarks

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

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

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force							Date: April 2022			
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	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract	

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
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	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PTES Ground																												
PTES Prototype Development																												
ECU Preliminary Design Review (PDR)																												
Software Build 2																												
Risk Reduction Test (Build 2)																												
Software Build 3																												
Risk Reduction Test (Build 3)																												
ECU Critical Design Review (CDR)																												
Operational Demonstration (IOC Threshold Capability)																												
Software Build 4																												
Risk Reduction Test (Build 4)																												
Software Build 5																												
Initial Operational Capability (IOC)																												
Software Build 6																												
Software Build 7																												
Software Build 8																												
Full Operational Capability (FOC)																												
Developmental/Operational Testing (to include Planning)																												

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

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