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

Appropriation/Budget Activity 3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206760SF / <i>Protected Tactical Enterprise Service (PTES)</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	0.000	114.390	0.000	114.390	103.250	56.788	50.710	35.092	Continuing	Continuing
643726: <i>PTES</i>	-	0.000	0.000	114.390	0.000	114.390	103.250	56.788	50.710	35.092	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206760F, Protected Tactical Enterprise Service (PTES) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206760SF, Protected Tactical Enterprise Service (PTES) from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

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 need, 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 utilize 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 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 hub system to enable PTW via transponded WGS satellites, with future extension to commercial SATCOM. Production-representative PTW modems for user terminals are being developed by the Protected Tactical Service Field Demonstration (PTSFD) and will be 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 urgent operational need in the Pacific region by achieving Initial Operational Capability (IOC) in 2023. 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) relies on PTES to provide PTW ground infrastructure. The Space Force is utilizing FY 2016 National Defense Authorization Act, Section 804, Middle Tier of Acquisition for Rapid Prototyping authority to deliver a PTES Operational Demonstration meeting the Navy's Minimum Viable Product in 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 & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships,

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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, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	114.390	0.000	114.390
Total Adjustments	0.000	0.000	114.390	0.000	114.390
• 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	114.390	0.000	114.390

Change Summary Explanation

FY 2021: \$114.390M transferred from RDT&E, Air Force to RDT&E Space Force. This total includes a reduction of \$9.451M for higher Department priorities.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: PTES Prototype Development	0.000	0.000	114.390
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 2020 Plans:			

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
N/A				
FY 2021 Plans: Complete Agile Build 2 of the PTES Prototype Development. 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 2 Risk Reduction Demonstration and the Risk Reduction Test on the PTES Integration, Test and Development Environment. Conduct required cybersecurity assessments and multiple requirements management framework assessments including security, adversarial, and cyber vulnerability assessments, and End Cryptographic Unit (ECU) NSA certification. Begin Build 3, which includes operational demonstration capability, and execute the Interim Program Review for Operational Demonstration Readiness on the Government approved Data Center environment. Seek to participate in various Navy operational exercise to test for interoperability of PTES system with external organization's terminal modems over WGS. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.				
FY 2020 to FY 2021 Increase/Decrease Statement: N/A				
Accomplishments/Planned Programs Subtotals		0.000	0.000	114.390
D. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
Associated WAMS funding is contained within Navy Multiband Terminal (NMT) program.				
E. Acquisition Strategy				
PTES was designated as a rapid prototype in June 2018 under section 804 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 IOC. Boeing and sub-contractors will be responsible for developing all PTES segments (MMS, KMS, and 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.				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020				
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 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	-	-		-		86.104	Oct 2020	-		86.104	Continuing	Continuing	-	
Data Center	Various	Various : Various	-	-		-		2.482	Dec 2020	-		2.482	Continuing	Continuing	-	
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	-		-		4.795	Nov 2020	-		4.795	Continuing	Continuing	-	
Enterprise SE&I	Various	Various : Various	-	-		-		8.081	Oct 2020	-		8.081	Continuing	Continuing	-	
Subtotal			-	-		-		101.462		-		101.462	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	-	-		-		3.185	Dec 2020	-		3.185	Continuing	Continuing	-	
Subtotal			-	-		-		3.185		-		3.185	Continuing	Continuing	N/A	
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	-	-		-		0.131	Nov 2020	-		0.131	Continuing	Continuing	-	
A&AS	Various	Various : Various	-	-		-		9.506	Nov 2020	-		9.506	Continuing	Continuing	-	
Other Support	Various	Various : Various	-	-		-		0.106	Oct 2020	-		0.106	Continuing	Continuing	-	
Subtotal			-	-		-		9.743		-		9.743	Continuing	Continuing	N/A	
Project Cost Totals			-	-		0.000		114.390		-		114.390	Continuing	Continuing	N/A	

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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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																												
PTES Prototype Development																												
Software Build 2																												
Software Build 3																												
Critical Design Review (CDR)																												
Operational Demonstration (Navy Minimum Viable Product)																												
Software Build 4																												
Software Build 5																												
IOC																												
Software Build 6																												
Software Build 7																												
Developmental/Operational Testing (to include Planning)																												
Software Build 8																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
PTES				
PTES Prototype Development	1	2021	4	2025
Software Build 2	1	2021	2	2021
Software Build 3	2	2021	1	2022
Critical Design Review (CDR)	2	2021	2	2021
Operational Demonstration (Navy Minimum Viable Product)	1	2022	1	2022
Software Build 4	1	2022	4	2022
Software Build 5	4	2022	3	2023
IOC	1	2024	1	2024
Software Build 6	3	2023	2	2024
Software Build 7	2	2024	1	2025
Developmental/Operational Testing (to include Planning)	1	2021	4	2025
Software Build 8	1	2025	4	2025

Note

FOC occurs outside FYDP