| Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force | Date: March 2024 |
|---|---|
| **Appropriation/Budget Activity**<br>3620F: *Research, Development, Test & Evaluation, Space Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)* | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* |

| COST ($ in Millions) | Prior Years | FY 2023 | FY 2024 | FY 2025 Base | FY 2025 OCO | FY 2025 Total | FY 2026 | FY 2027 | FY 2028 | FY 2029 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Program Element | - | 106.895 | 76.554 | 79.709 | 0.000 | 79.709 | 38.592 | 36.245 | 87.712 | 89.442 | 0.000 | 515.149 |
| 643726: *PTES* | - | 106.895 | 45.917 | 24.303 | 0.000 | 24.303 | 13.383 | 5.961 | 6.879 | 7.015 | 0.000 | 210.353 |
| 643733: *PTW Over Commercial* | - | 0.000 | 30.637 | 55.406 | 0.000 | 55.406 | 25.209 | 30.284 | 80.833 | 82.427 | 0.000 | 304.796 |

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

Project 643726, Protected Tactical Enterprise Service (PTES) enables multi-domain operations for tactical warfighters in congested and contested environments using military satellites in various orbits. Project 643733, Protected Tactical Waveform (PTW) Over Commercial, develops an anti-jam (AJ) communications capability using the protected tactical waveform over commercial satellite constellations to support tactical users in joint and allied warfighting operations.

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, and in pursuit of more precise solutions for disaggregated strategic and tactical SATCOM, U.S Strategic Command (USSTRATCOM) and Air Force Space Command (AFSPC) initiated the Protected Anti-jam Tactical SATCOM (PATS) family-of-systems incremental approach, including PTES and Protected Tactical SATCOM (PTS), to mitigate adversarial jamming effects by using the PTW. The United States Space Force (USSF) is developing PTES to establish the foundational ground system that will enable PTW-based protected communications of PATS. PTES is a software intensive program needed to achieve the PATS architecture by developing the critical ground infrastructure to operationalize the PTW via military and commercial satellite systems for tactical users in all Services. As part of the PATS integrated, incremental approach, PTES ground system development will initially enable PTW over the Wideband Global Satellite Communications (WGS) system to provide an operational AJ communications capability. PTES will extend PATS development to provide PTW service using commercial satellites in various orbits and purpose-built PTS system with onboard PTW processing. The ability to securely access both military and commercial capabilities in multiple orbits will provide tactical warfighters alternate protected SATCOM paths for greater network resiliency.

The PTES program is developing a Mission Management System (MMS), a Key Management System (KMS), and Joint Hub Variants (JHVs) to enable PTW via transponded WGS satellites, and to commercial SATCOM with JHVs. The systems will be extensible to support commercial and military SATCOM systems in the future. The user equipment will consist of existing wideband terminals with upgraded PTW modems. Production-representative PTW modems for user terminals were developed by the Protected Tactical Service Field Demonstration (PTSFD) and will be separately acquired by each Service and Allied international partner. 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. A3M provides the Air Force and Army with a secure, wideband, AJ SATCOM terminal modem for tactical SATCOM operations. The WAMS modem is the Navy's next generation software-defined wideband modem for both transponded and processed satellite. The user terminal segment, not included in this acquisition, utilizing low-cost PTW modem upgrades enabled by the A3M and WAMS programs are designed to become an integral part of the growing PATS enterprise.

The PTES Prototype Development was designated as a Rapid Prototype (RP) in June 2018 from the National Defense Authorization Act (NDAA) for Fiscal Year 2016 (Public Law 114-92) under Middle Tier of Acquisitions (MTA) for Rapid Prototyping/Rapid Fielding (Section 804) to operationalize the PTW initially with WGS and has

been approved to transition into a Software Acquisition pathway. A new Project, 643733 PTW Over Commercial, was created in this Program Element in FY 2024 to segregate funding allocated to develop the capability to deliver PTW to the warfighter by leveraging commercial communication satellites. This continues efforts begun in FY 2023 under Project 643726, PTES Prototype Development. 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 and PATS systems and segments.

For the PATS WGS capability, the PTES system addresses an operational need in the Pacific region by achieving Initial Operational Capability (IOC) in FY 2025. IOC provides ground elements for PTW over WGS and consists of PTES JH installations at two WGS DoD SATCOM Teleport sites utilizing one WGS satellite. At Full Operational Capability (FOC) in FY 2026, PTES will provide worldwide PTW operations using up to all WGS satellites. For the PTW Over Commercial, the PTES system will achieve IOC providing resilient commercial capacity and path diversity across ground elements for PTW over commercial architectures in CY 2026. The PTES team will execute additional studies and proof of concept demonstrations to inform commercial requirements and MMS, KMS development. PTES will reach FOC in CY 2026 providing robust PTW operations using commercial satellites in various orbits.

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 2023 | FY 2024 | FY 2025 Base | FY 2025 OCO | FY 2025 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 110.801 | 76.554 | 88.871 | 0.000 | 88.871 |
| Current President's Budget | 106.895 | 76.554 | 79.709 | 0.000 | 79.709 |
| Total Adjustments | -3.906 | 0.000 | -9.162 | 0.000 | -9.162 |
| • 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 | -3.906 | 0.000 | | | |
| • Other Adjustments | 0.000 | 0.000 | -9.162 | 0.000 | -9.162 |

**Change Summary Explanation**

FY 2025: The FY 2025 funding request was reduced by -$9.3 million to account for the availability of prior year execution balances.

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | | Date: March 2024 |
|---|---|---|---|
| Appropriation/Budget Activity<br>3620F / 4 | R-1 Program Element (Number/Name)<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | Project (Number/Name)<br>643726 / *PTES* | |

| COST ($ in Millions) | Prior Years | FY 2023 | FY 2024 | FY 2025 Base | FY 2025 OCO | FY 2025 Total | FY 2026 | FY 2027 | FY 2028 | FY 2029 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 643726: *PTES* | - | 106.895 | 45.917 | 24.303 | 0.000 | 24.303 | 13.383 | 5.961 | 6.879 | 7.015 | 0.000 | 210.353 |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

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

PTES will deliver a software-intensive ground system to provide worldwide, AJ protected communications to warfighters who are currently unable to operate through interference by using the PTW. PTES delivers the foundational ground system to enable PTW-based protected communications for all PATS capabilities in a incremental approach by operationalizing the PTW over WGS and later for PTW Over Commercial and the future PTS system. In this Project, the PTES ground system will provide an operational AJ communications capability using PTW service over the existing WGS system. This effort also includes the development of PTES program elements such as the MMS, a KMS, and JHs, which will be extensible to PTW via transponded commercial satellites. This effort informs, supports, and reduces risk to future PATS development that will provide the PTW service using commercial satellites and purpose-built PTS with onboard PTW processing. The development for PTW over WGS in this Project, 643726, segregates efforts established in FY 2024 as a new Project, 643733, for the PTW Over Commercial increment of PTES. This new Project continues FY 2023 efforts begun in Project 643726 for the next instantiation of the PATS architecture to enable PTW service through commercial satellites with processing that will occur on the ground.

PTES will develop the MMS and KMS software, and the JH hardware. A JH is the unmanned computing and communications hardware located at a SATCOM Gateway which will provide the PTW signal processing, reachback network connectivity, and near-real-time networked control to direct the connected terminals. The JHs will require installation at large SATCOM Gateways and the system will be integrated and tested with PTW-capable modems that will be separately procured by the Navy, Air Force, and Army. In addition, the KMS and JH End Cryptographic Units (ECU) must be certified by the National Security Administration (NSA). The ECUs are required to generate transmission security (TRANSEC) and cover for all channels/data flows, encrypt/decrypt waveform messages, securely receive/store key material from NSA's Key Management Infrastructure, as well as to synchronize and process key streams for hundreds of simultaneous users.

Driven by emerging threats in the Pacific theater, PTES completed the MTA rapid prototyping effort in FY 2023 by operationally demonstrating an anti-jam tactical communications capability using user-provided terminals. On 31 May 2023, the PTES Program Office successfully transitioned the program from an MTA into the Execution Phase of the Software Acquisition Pathway. PTES plans to reach Initial Operating Capability (IOC) to be demonstrated over WGS satellites in FY 2025 and Final Operating Capability (FOC) to be demonstrated in FY 2026 for worldwide PTW operations using up to all WGS satellites.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|
| ***Title:*** PTES Prototype Ground and Software Development | 106.895 | 31.370 | 6.889 |
| ***Description:*** This Major Thrust, previously titled "PTES Prototype Development", has been segregated into another Major Thrust and new Project in FY 2024 to differentiate efforts between the PTES development contractor and the PTW Over Commercial effort. Develop and field the ground system for enabling capabilities of adaptive, AJ, wideband SATCOM under the PATS effort. Utilize Agile software development to deliver a system consisting of three PTES segments: MMS, KMS and JHs, to include ECUs, | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643726 / *PTES* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|
| integrated into existing SATCOM Gateways to enable the PTW AJ communications capability via transponded WGS satellites for tactical users currently unable to operate through interference. Support the build, test, and installation of hardware required to prototype a tactical, AJ communications capability demonstrated in an operationally relevant environment and to operate the system at IOC and FOC. Efforts include performing and assisting the PTES team in system integration and conducting contractor-led factory tests, including risk reduction and end-to-end tests of the complete PTES prototype.<br><br>***FY 2024 Plans:***<br>Continues agile process prototyping, including automation for global coverage, new theaters, and PTS integration for FY 2024. Achieve IOC in an operational environment that builds upon the operational demonstration in FY 2023 (MTA completion). Complete the development of Software Build 6 and commence Software Build 7 focused on continuously delivering increased cloud-hosted MMS and KMS functionality needed for FOC. Continuously test deployed software before being promoted to operations. Perform additional testing and integration activities with other PTW-capable modems necessary to expand PTW capability to other services and user groups. Rapidly respond to implement system resiliency and situational awareness as 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.<br>***FY 2025 Plans:***<br>Continues agile development process, including expansion towards global coverage, new theaters, and PTS integration for FY 2025. Complete the development of Software Build 7 and commence Software Build 8 focused on finalizing capability delivery and deficiency fixes necessary for FOC. 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, and activities that may leverage commercial and international opportunities.<br><br>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, and activities that may leverage commercial and international opportunities.<br>***FY 2024 to FY 2025 Increase/Decrease Statement:***<br>FY 2025 decreased due to completion of initial PTW operational capability deliveries and achieving IOC. | | | |
| ***Title:*** PTES System Development Baseline, Integration, and Test | 0.000 | 14.547 | 17.414 |
| ***Description:*** Integrates all PTES segments, including executing government-led end-to end tests of the complete PTES system until FOC. Includes Development Test/Operational Test (DT/OT), conducted by the 45th Test Squadron (TS) and STAR Delta 12 / 4th Test and Evaluation Squadron. Management of the PTES technical baseline through acquiring, designing, testing, and integrating key system segments as well as external interfaces as part of the larger SATCOM enterprise. Supports the | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643726 / *PTES* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|
| Joint Satellite Engineering Center (JSEC) and Joint Interoperability Command (JITC) to ensure risk-reduction is demonstrated, system interfaces are validated, and data needed to support cybersecurity system authorization and interoperability certifications will be obtained. Manage system capability development hand-in-hand with operator involvement to provide information for technical, integration, and programmatic decisions. Includes additional studies and proof of concept demonstrations to inform commercial requirements, build out needed improvements to the MMS, and establish needed interoperability with commercial systems required to support Joint Force needs. Tobyhanna Army Depot will be responsible for key loading and initialization of PTW capable modems.<br><br>***FY 2024 Plans:***<br>Conduct Government prioritized software development, software build testing and integration activities for IOC and FOC fielding. Lead DT/OT evaluation for PTES hardware and software ground elements enabling FOC for PTW over WGS and to inform evaluations extending to PTW over commercial architectures. Witness PTES contractor-led factory tests focusing on PTES specification requirements. Support cyber efforts, such as those required to obtain Interim Approval to Test (IATT) and Approvals to Operate (ATO), software qualification testing, regression testing, capability demonstrations, and risk reduction tests. Build-out and support cloud-hosted software on a Government approved Core Data Center that leverages existing secure resources. Complete DT/OT test events for IOC build and begin DT/OT test events for FOC build. Support pre-operational checkout phase.<br><br>***FY 2025 Plans:***<br>Complete DT/OT for IOC deficiency fix testing and execute DT/OT events for FOC build. Lead DT/OT evaluation for Government prioritized hardware and software ground element deployment enabling FOC for PTW over WGS and to inform evaluations extending to PTW over commercial architectures. Perform additional testing and integration activities with other PTW-capable modems necessary to expand PTW capability to other services and user groups. Witness PTES contractor-led factory tests focusing on PTES specification requirements. Support continuous cybersecurity assessments, such as those required to maintain Approvals to Operate (ATO), software qualification testing, regression testing, capability demonstrations, and risk reduction tests.<br><br>***FY 2024 to FY 2025 Increase/Decrease Statement:***<br>FY 2025 increased due to evolving ground and software development required for full FOC capabilities as well as onboarding additional PTW-capable modems into the PTW architecture. | | | |
| **Accomplishments/Planned Programs Subtotals** | 106.895 | 45.917 | 24.303 |

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

| Line Item | FY 2023 | FY 2024 | FY 2025 Base | FY 2025 OCO | FY 2025 Total | FY 2026 | FY 2027 | FY 2028 | FY 2029 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SPSF 01 BA01<br>PTES00: *PTES HUB* | 42.464 | 56.482 | 56.148 | - | 56.148 | 11.866 | 0.000 | 0.000 | 0.000 | 0.000 | 166.960 |

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643726 / *PTES* |

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

| Line Item | FY 2023 | FY 2024 | FY 2025 Base | FY 2025 OCO | FY 2025 Total | FY 2026 | FY 2027 | FY 2028 | FY 2029 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Remarks**

**D. Acquisition Strategy**

USSF is developing PATS in an evolutionary manner to introduce PTW capabilities providing anti-jam (AJ) communications via military and commercial satellite systems for tactical users in all Services, initially providing service over the existing military WGS satellite system and then adding commercial and purpose-built AJ PTS satellites. The PTES Prototype Development was designated as a RP in June 2018 from the NDAA for Fiscal Year 2016 (Public Law 114-92) under MTA for Rapid Prototyping/ Rapid Fielding (Section 804) to kick off the design, development, integration and testing with PTW service via WGS. The PTES program competitively awarded a single Cost-Plus Incentive Fee (CPIF) contract to Boeing on 26 November 2018 to develop and field the PTES, through declaration of FOC planned for FY 2026. The MTA-RP effort consisted of the initial deployment of the PTES ground system supporting the PATS WGS Phase with PTW leveraging codified MTA authorities and agile software development practices to rapidly field an operational leave-behind AJ capability via WGS using PTW ahead of IOC. Boeing and sub-contractors will be responsible for developing all PTES segments (MMS, KMS, and JHVs) and performing all system integration, including end-to-end tests of the complete PTES prototype. Raytheon is the major sub-contractor to develop the ECUs. The program office will secure Cloud and Infrastructure services from approved and secure Government sources. Tobyhanna Army Depot will be responsible for key loading and initialization of PTW capable modems. The 45th TS (PTES DT), STAR Delta 12 / 4th Test and Evaluation Squadron (PTES OT), JSEC, and JITC support test events. On 31 May 2023, the PTES Program Office successfully transitioned the program from an MTA into the Execution Phase of the Software Acquisition Pathway that will enable the delivery towards providing a worldwide PTW capability through FOC.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Air Force | | | Date: March 2024 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643726 / *PTES* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2023 Cost | FY 2023 Award Date | FY 2024 Cost | FY 2024 Award Date | FY 2025 Base Cost | FY 2025 Base Award Date | FY 2025 OCO Cost | FY 2025 OCO Award Date | FY 2025 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PTES Prototype Ground and Software Development | C/CPIF | Boeing : El Segundo, CA | - | 93.414 | Oct 2022 | 31.370 | Oct 2023 | 6.889 | Oct 2024 | - | | 6.889 | 0.000 | 131.673 | - |
| PTES System Development Baseline, Integration and Test | Various | Various : Various | - | - | | 3.085 | Nov 2023 | 3.008 | Nov 2024 | - | | 3.008 | 0.000 | 6.093 | - |
| Tobyhanna Army Depot | MIPR | Tobyhanna Army Depot : Tobyhanna, PA | - | - | | 1.145 | Mar 2024 | 0.000 | Mar 2025 | - | | 0.000 | 0.000 | 1.145 | - |
| Technical Mission Analysis | RO | Aerospace : El Segundo, CA | - | 0.000 | Jan 2023 | 2.250 | Jan 2024 | 3.120 | Jan 2025 | - | | 3.120 | 0.000 | 5.370 | - |
| Enterprise SE&I | Various | Various : Various | - | 8.202 | Nov 2022 | 2.833 | Nov 2023 | 6.301 | Nov 2024 | - | | 6.301 | 0.000 | 17.336 | - |
| SBIR/STTR | Allot | Not specified. : TBD | - | - | | 1.607 | | 1.208 | | - | | 1.208 | 0.000 | 2.815 | - |
| | | **Subtotal** | - | 101.616 | | 42.290 | | 20.526 | | - | | 20.526 | 0.000 | 164.432 | N/A |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2023 Cost | FY 2023 Award Date | FY 2024 Cost | FY 2024 Award Date | FY 2025 Base Cost | FY 2025 Base Award Date | FY 2025 OCO Cost | FY 2025 OCO Award Date | FY 2025 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Planning & Execution DT/OT | Various | Various : Various | - | 3.450 | Nov 2022 | 1.810 | Nov 2023 | 2.480 | Nov 2024 | - | | 2.480 | 0.000 | 7.740 | - |
| | | **Subtotal** | - | 3.450 | | 1.810 | | 2.480 | | - | | 2.480 | 0.000 | 7.740 | N/A |

**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2023 Cost | FY 2023 Award Date | FY 2024 Cost | FY 2024 Award Date | FY 2025 Base Cost | FY 2025 Base Award Date | FY 2025 OCO Cost | FY 2025 OCO Award Date | FY 2025 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FFRDC | RO | Aerospace : El Segundo, CA | - | 0.000 | Jan 2023 | 0.120 | Jan 2024 | 0.130 | Jan 2025 | - | | 0.130 | 0.000 | 0.250 | - |
| A&AS | Various | Various : Various | - | 1.559 | Jan 2023 | 1.607 | Jan 2024 | 1.107 | Jan 2025 | - | | 1.107 | 0.000 | 4.273 | - |
| Other Support | Various | Various : Various | - | 0.270 | Oct 2022 | 0.090 | Oct 2023 | 0.060 | Oct 2024 | - | | 0.060 | 0.000 | 0.420 | - |
| | | **Subtotal** | - | 1.829 | | 1.817 | | 1.297 | | - | | 1.297 | 0.000 | 4.943 | N/A |

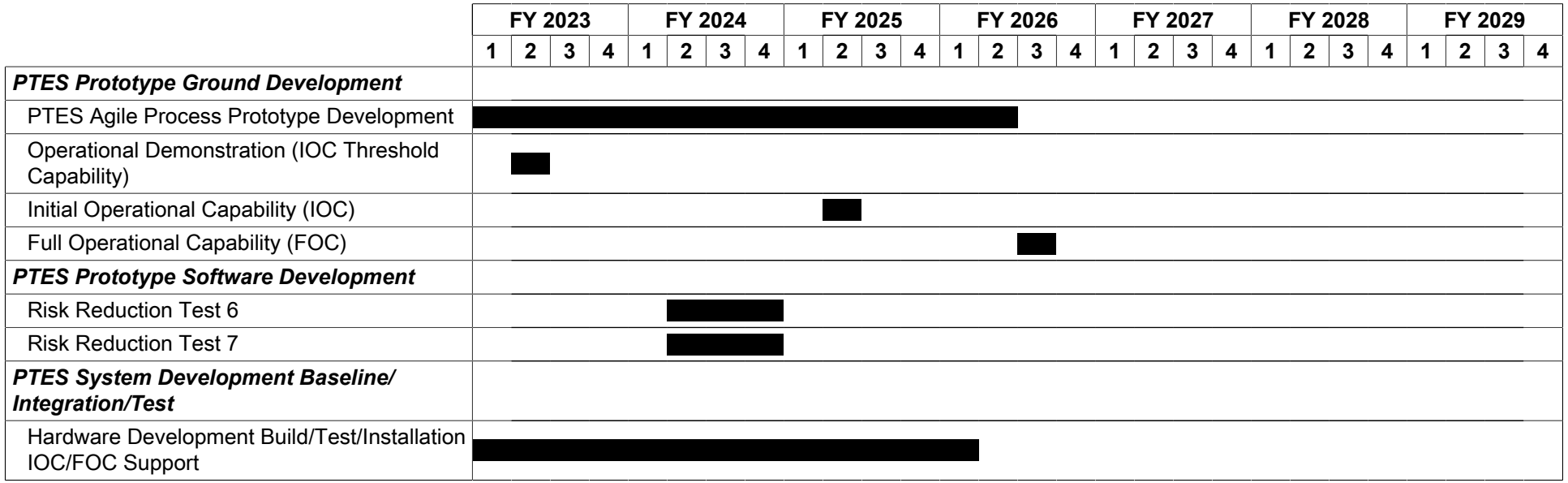
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Air Force | | | Date: March 2024 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643726 / *PTES* | |

| | Prior Years | FY 2023 | | FY 2024 | | FY 2025 Base | | FY 2025 OCO | | FY 2025 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | - | 106.895 | | 45.917 | | 24.303 | | - | | 24.303 | 0.000 | 177.115 | N/A |

**Remarks**

PTW Over Commercial transferred to Project 643733 in FY 2024 to segregate funding allocated to develop the capability to deliver PTW to the warfighter by leveraging commercial satellites. Tobyhanna Army is an effort included in the PTES System Development Baseline, Integration & Test Support Major Thrust, and will be responsible for key loading and initialization of PTW capable modems.

| Exhibit R-4, RDT&E Schedule Profile: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643726 / *PTES* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643726 / *PTES* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***PTES Prototype Ground Development*** | | | | |
| PTES Agile Process Prototype Development | 1 | 2023 | 2 | 2026 |
| Operational Demonstration (IOC Threshold Capability) | 2 | 2023 | 2 | 2023 |
| Initial Operational Capability (IOC) | 2 | 2025 | 2 | 2025 |
| Full Operational Capability (FOC) | 3 | 2026 | 3 | 2026 |
| ***PTES Prototype Software Development*** | | | | |
| Risk Reduction Test 6 | 2 | 2024 | 4 | 2024 |
| Risk Reduction Test 7 | 2 | 2024 | 4 | 2024 |
| ***PTES System Development Baseline/Integration/Test*** | | | | |
| Hardware Development Build/Test/Installation IOC/FOC Support | 1 | 2023 | 1 | 2026 |

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | | Date: March 2024 |
|---|---|---|---|
| Appropriation/Budget Activity<br>3620F / 4 | R-1 Program Element (Number/Name)<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | Project (Number/Name)<br>643733 / *PTW Over Commercial* | |

| COST ($ in Millions) | Prior Years | FY 2023 | FY 2024 | FY 2025 Base | FY 2025 OCO | FY 2025 Total | FY 2026 | FY 2027 | FY 2028 | FY 2029 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 643733: *PTW Over Commercial* | - | 0.000 | 30.637 | 55.406 | 0.000 | 55.406 | 25.209 | 30.284 | 80.833 | 82.427 | 0.000 | 304.796 |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

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

Project 643733, PTW Over Commercial, will deliver PTW to the warfighter in various orbits utilizing commercial (to include international) SATCOM constellations enabling more resilient by design architectures. This was not a FY 2024 New Start. It is a continuation of efforts that began in the PTES Project 643726 in FY 2023 to build upon efforts to operationalize PTW over WGS. This Project reflects the next instantiation of the PATS architecture's integrated, incremental approach to enable PTW service through commercial satellites with processing that will occur on the ground. This Project will expand the development of PTES program elements to include requirement, architecture, and interface development to leverage PTES MMS/KMS systems and JHVs to enable PTW via transponded commercial satellites.

The objective of PTW Over Commercial is to upgrade the established PTES ground system to provide an operational AJ capability in various orbits including Geosynchronous Orbit (GEO) and Medium Earth Orbit (MEO) by utilizing emerging satellite technologies. Leverages PTES development to design, build, integrate, and test an AJ communications capability for a PTW utility over commercial SATCOM constellations to support filling critical tactical SATCOM gaps and improve overall theater warfighting SATCOM flexibility and resiliency. To do this, this Project will also leverage and build on emerging commercial satellite technologies through assessment, experimentation, and development efforts. The PTW Over Commercial effort will execute studies, proof of concept demonstrations, and tests to inform commercial requirements, build out needed improvements to the PTES ground system, and establish needed interoperability with commercial and international systems required to support Joint Force needs.

Collective and complimentary efforts will work to solve complex problems of interoperability, key management, and data sharing that drive the affordability, scalability and performance of USSF's future hybrid architecture.

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|
| ***Title:*** PTW Over Commercial - Studies/Demonstrations | - | 3.250 | 0.000 |
| ***Description:*** Assess emerging commercial SATCOM technologies in multiple orbits for tactical applications and PTES integration. Execute additional studies and proof of concept demonstrations to inform commercial requirements and MMS, KMS development for PTES integration with commercial GEO and MEO SATCOM technologies. Conduct tests and demonstrations, to prepare and reduce risk for the PTW Over Commercial effort. Analyze, integrate, and test PTES system with small satellites (small sats) to evaluate the PTES architecture for GEO small sat applications. Perform a risk reduction study to evaluate PTW applications over the mPower constellation in MEO and demonstrate integration of PTES system with mPower satellites using the PTW. Perform a study to refine requirements for the JHV to understand the specific upgrades needed to implement PTW over commercial satellites using PTES JHVs in GEO and MEO constellations. | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643733 / *PTW Over Commercial* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|
| ***FY 2024 Plans:***<br>Continues FY 2023 efforts that began in the PTES Prototype Development, Project 643726. Execute and complete three studies/ demonstrations awarded in FY 2023 for: Integrating/Testing the PTES system with small sats to define tasks to integrate, test, and demonstrate emerging GEO communications small sats for protected tactical SATCOM applications; demonstrating MEO capabilities with a live PTW demonstration with initial mPower satellites without data loss, and service management concepts to burn down technical risks for PTW over mPower; and analyzing requirements for software upgrades, and potential Hardware upgrades required to implement PTW over commercial satellites in MEO and GEO.<br>***FY 2025 Plans:***<br>N/A<br>***FY 2024 to FY 2025 Increase/Decrease Statement:***<br>FY 2025 decreased to zero due to this effort being fully funded in FY23. | | | |
| ***Title:*** PTW Over Commercial - mPower<br>***Description:*** Continue obligation of funds to acquire one mPower Gateway (GW) by awarding a Task Order under NATO Support and Procurement Agency (NSPA) Indefinite Delivery, Indefinite Quantity (IDIQ) contract expected to be awarded in 2Q FY 2024. Release Boeing JHV upgrade contract RFP to enable PTES JHs to operate over MEO and GEO commercial satellite constellations by FY 2027. Continue and complete remaining three site surveys. Start site preparation for the first of the six sites to enable installation and testing of the first GW.<br>***FY 2024 Plans:***<br>Continues efforts that began in the PTES Prototype Development, Project 643726. Develop PTES system firmware/software changes to enable operations over MEO constellation of mPower commercial satellites. Procure mPower terminal systems to support one GEP site installation in FY 2024, including install for the terminal systems. Support site preparation for hardware delivery and installation and test/checkout activities for site acceptance, including demonstrating anti-jam communications through the hybrid SATCOM architecture. Support current DoD O3b Enterprise users, migrate that service to mPower. Coordinate with industry, FFRDC, and IPs to execute studies, proof-of-concept demonstrations, and prototype development, that will result in delivery of an operational capability. Activities include, but are not limited to, requirement definition studies, capability demonstrations, testbed integration and end-to-end testing.<br>***FY 2025 Plans:***<br>Continue obligation of funds to acquire two mPower Gateways (GWs) under previously awarded NATO Support and Procurement Agency (NSPA) Indefinite Delivery, Indefinite Quantity (IDIQ) Task Orders. Award Boeing JHV upgrade contract to enable PTES | - | 10.000 | 10.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643733 / *PTW Over Commercial* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|
| JHs to operate over MEO and GEO commercial satellite constellations by FY27.Continue and complete remaining three site surveys. Start site preparation for the first of the six sites to enable installation and testing of the first GW.<br><br>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, and activities that may leverage commercial and international opportunities.<br><br>***FY 2024 to FY 2025 Increase/Decrease Statement:***<br>FY 2025 increased due to mPower terminal system procurement and installation at one DoD SATCOM GW site, to include test/ checkout activities for site acceptance. | | | |
| ***Title:*** PTW Over Commercial - PTES Upgrades | - | 17.387 | 45.406 |
| ***Description:*** Build upon PTES system development, which will enable the PTW and provide AJ communications capability over Commercial constellations for tactical users in all Services and IPs. Procure and install additional PTES JHV at DoD SATCOM GEP and apply software changes to MMS to support PTW over Commercial in various orbits. Utilize other established elements of the PTES ground system and leverage ongoing development to design, build, integrate, and test end-to-end system capabilities. Includes requirement, architecture and interface development to leverage, modify and enhance PTES MMS and JHVs system elements to plan and operate over a variety of terminals.<br><br>***FY 2024 Plans:***<br>Continues efforts that began in the PTES Prototype Development Project 643726. Continue development to transition from a prototype capability towards providing a PTW capability through IOC and FOC, to include development of mission planning functionality over commercial GEO and MEO constellations. Develop PTES JHV and make the necessary MMS software changes to support PTW over commercial in various orbits based upon comprehensive study results. Finalize characterization of Doppler impacts to PTW for full implementation into PTES system in MEO constellations. Demonstrate production software and integrate into PTES baseline system. Conduct analysis and perform integration and compatibility testing with terminals capable of handling GEO and MEO constellations. Coordinate with industry, FFRDC, and IPs to execute prototype development, that will result in delivery of an operational capability. Activities include, but are not limited to, software upgrades, capability demonstrations, testbed integration, prototype development, and end-to-end testing.<br><br>***FY 2025 Plans:***<br>Continue development, integration and testing to deploy PTW capability necessary for IOC and FOC, to include development of mission planning functionality over commercial GEO and MEO constellations. Build, deliver and install PTES JHVs and make the necessary MMS software configuration updates to support PTW over commercial in various orbits based upon comprehensive study results. Demonstrate final production software and integrate into PTES baseline system. Conduct analysis and perform | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643733 / *PTW Over Commercial* |

| B. Accomplishments/Planned Programs ($ in Millions) | FY 2023 | FY 2024 | FY 2025 |
|---|---|---|---|
| integration and compatibility testing with terminals capable of handling GEO and MEO constellations. Coordinate with industry, FFRDC, and IPs to guide additional commercial development, that will result in delivery of an operational capability. Activities include, but are not limited to, software upgrades, capability demonstrations, testbed integration, prototype development, and end-to-end testing.<br><br>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, and activities that may leverage commercial and international opportunities.<br><br>***FY 2024 to FY 2025 Increase/Decrease Statement:***<br>FY 2025 increased due to purchase of PTES hardware, to be installed at DoD gateway sites, as well as implementing software upgrades supporting USSF priority to improve theater SATCOM resiliency for the warfighter. | | | |
| **Accomplishments/Planned Programs Subtotals** | - | 30.637 | 55.406 |

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

| Line Item | FY 2023 | FY 2024 | FY 2025 Base | FY 2025 OCO | FY 2025 Total | FY 2026 | FY 2027 | FY 2028 | FY 2029 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • SPSF 01 PTES00: *PTES HUB* | 42.464 | 56.482 | 56.148 | - | 56.148 | 11.866 | 0.000 | 0.000 | 0.000 | 0.000 | 166.960 |

**Remarks**

**D. Acquisition Strategy**

The PTW Over Commercial acquisition strategy strives to provide SATCOM enterprise resiliency enhancements by efficiently using existing designs with reduced nonrecurring engineering by leveraging, where possible, existing contracts and government relationships, to include but not limited to the USSF, US Army, Air Force Research Laboratory (AFRL), Space Warfighting Analysis Center (SWAC), USSF Commercial Satellite Communications Office (CSCO), and the Defense Information Systems Agency (DISA). PTES plans to coordinate with industry, FFRDC, and IPs to execute studies/demonstrations that will inform delivering an operational capability in this Commercial instantiation of PATS. A Firm Fixed Price (FFP) contract was awarded to Astranis on 27 September 2023 to evaluate PTW SATCOM applications for GEO small sats within the PTES architecture. To inform and develop PTW capability in MEO, PTES plans for Massachusetts Institute of Technology/Lincoln Labs (MIT/LL) to conduct a demonstration of PTW implemented over initial mPower commercial MEO satellites, the first allied hybrid government/commercial SATCOM solution. For the acquisition/integration of PTES with the mPower constellation, PTES will procure mPower gateways via CSCO's contract with NSPA, which funds mPower bandwidth capacity in the COMSATCOM PE 1206445SF, Project 650140. The Commercial PTW-PTES acquisition approach plans to leverage the PTES RP MTA acquisition strategy and existing CPIF development contract vehicle with Boeing to award a study to analyze PTW over commercial hardware and software requirements for MEO/GEO constellations and to modify JHVs. A Boeing contract modification will also be awarded to develop the Commercial PTW capability by upgrading existing software that was developed under the PTES RP MTA to enable AJ communications capability over commercial constellations in various orbits. This effort supports the acquisition of gateways by upgrading the PTES system to integrate JHV with mPower terminals. The PTW Over Commercial acquisition will be executed in multiple

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| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643733 / *PTW Over Commercial* |

thrusts to accommodate different constellations and providers. In the mPower thrust, PTW Over Commercial program management office (PMO) will acquire six mPower GWs to support PTW services over mPower MEO constellation. Post acquisition, the thrust will be transitioned to operation and maintenance (O&M). In the PTES Upgrades thrust, PTW services will be provided over GEO constellations; providers for this thrust are TBD.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Air Force | | | Date: March 2024 |
|---|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643733 / *PTW Over Commercial* | |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2023 Cost | FY 2023 Award Date | FY 2024 Cost | FY 2024 Award Date | FY 2025 Base Cost | FY 2025 Base Award Date | FY 2025 OCO Cost | FY 2025 OCO Award Date | FY 2025 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PTW Over Commercial - Studies/Demos (Small Sats) | SS/FFP | Astranis : San Francisco, CA | - | - | | 1.990 | Oct 2023 | - | | - | | - | 0.000 | 1.990 | - |
| PTW Over Commercial - Studies/Demos (MEO) | TBD | MIT/LL : Boston, MA | - | - | | 1.200 | Oct 2023 | - | | - | | - | 0.000 | 1.200 | - |
| PTW Over Commercial - Studies/Demos (JHVs) | SS/CPIF | Boeing : El Segundo, CA | - | - | | 0.060 | Oct 2023 | - | | - | | - | 0.000 | 0.060 | - |
| PTW Over Commercial - mPower | MIPR | CSCO : Ft Meade, MD | - | - | | 10.000 | Jan 2024 | 10.000 | Jan 2025 | - | | 10.000 | 0.000 | 20.000 | - |
| PTW Over Commercial - PTES Upgrades | SS/CPIF | Boeing : El Segundo, CA | - | - | | 14.733 | Apr 2024 | 40.760 | Oct 2024 | - | | 40.760 | 0.000 | 55.493 | - |
| Technical Mission Analysis | RO | Aerospace : El Segundo, CA | - | - | | - | | - | | - | | - | 0.000 | 0.000 | - |
| Enterprise SE&I | Various | Various : Various | - | - | | - | | 0.830 | Nov 2024 | - | | 0.830 | 0.000 | 0.830 | - |
| SBIR/STTR | Allot | TBD : TBD | - | - | | 1.072 | Mar 2024 | 1.991 | Mar 2025 | - | | 1.991 | 0.000 | 3.063 | - |
| | | **Subtotal** | - | - | | 29.055 | | 53.581 | | - | | 53.581 | 0.000 | 82.636 | N/A |

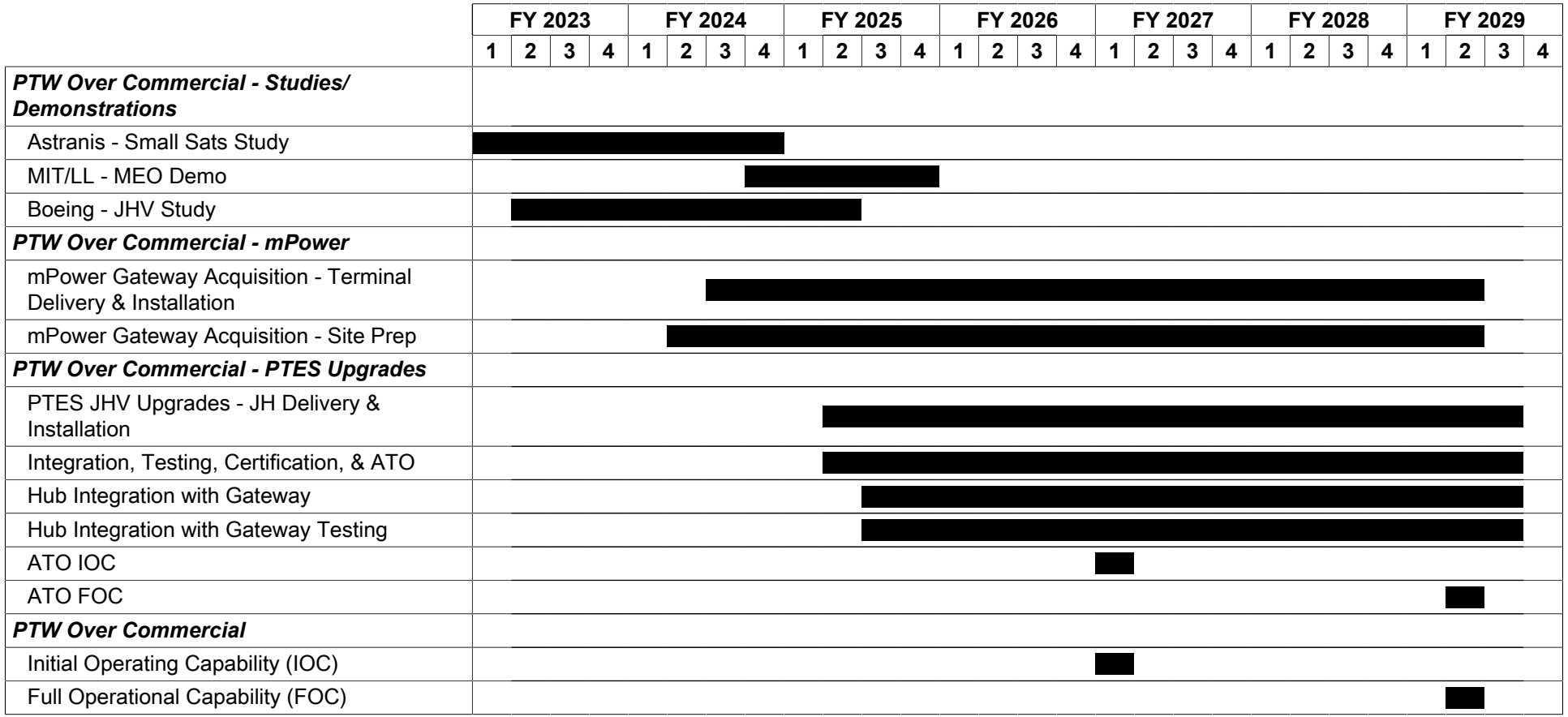
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2023 Cost | FY 2023 Award Date | FY 2024 Cost | FY 2024 Award Date | FY 2025 Base Cost | FY 2025 Base Award Date | FY 2025 OCO Cost | FY 2025 OCO Award Date | FY 2025 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FFRDC | SS/TBD | MITRE : Hanscom AFB, MA | - | - | | 0.050 | Nov 2023 | 0.000 | Nov 2024 | - | | 0.000 | 0.000 | 0.050 | - |
| A&AS | Various | Various : Various | - | - | | 1.532 | Nov 2023 | 1.825 | Nov 2024 | - | | 1.825 | 0.000 | 3.357 | - |
| | | **Subtotal** | - | - | | 1.582 | | 1.825 | | - | | 1.825 | 0.000 | 3.407 | N/A |

| | Prior Years | FY 2023 | | FY 2024 | | FY 2025 Base | | FY 2025 OCO | | FY 2025 Total | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | - | - | | 30.637 | | 55.406 | | - | | 55.406 | 0.000 | 86.043 | N/A |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643733 / *PTW Over Commercial* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2025 Air Force | | Date: March 2024 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3620F / 4 | **R-1 Program Element (Number/Name)**<br>PE 1206760SF / *Protected Tactical Enterprise Service (PTES)* | **Project (Number/Name)**<br>643733 / *PTW Over Commercial* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events by Sub Project** | **Quarter** | **Year** | **Quarter** | **Year** |
| ***PTW Over Commercial - Studies/Demonstrations*** | | | | |
| Astranis - Small Sats Study | 1 | 2023 | 4 | 2024 |
| MIT/LL - MEO Demo | 4 | 2024 | 4 | 2025 |
| Boeing - JHV Study | 2 | 2023 | 2 | 2025 |
| ***PTW Over Commercial - mPower*** | | | | |
| mPower Gateway Acquisition - Terminal Delivery & Installation | 3 | 2024 | 2 | 2029 |
| mPower Gateway Acquisition - Site Prep | 2 | 2024 | 2 | 2029 |
| ***PTW Over Commercial - PTES Upgrades*** | | | | |
| PTES JHV Upgrades - JH Delivery & Installation | 2 | 2025 | 3 | 2029 |
| Integration, Testing, Certification, & ATO | 2 | 2025 | 3 | 2029 |
| Hub Integration with Gateway | 3 | 2025 | 3 | 2029 |
| Hub Integration with Gateway Testing | 3 | 2025 | 3 | 2029 |
| ATO IOC | 1 | 2027 | 1 | 2027 |
| ATO FOC | 2 | 2029 | 2 | 2029 |
| ***PTW Over Commercial*** | | | | |
| Initial Operating Capability (IOC) | 1 | 2027 | 1 | 2027 |
| Full Operational Capability (FOC) | 2 | 2029 | 2 | 2029 |