Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 1206427SF / *Space Systems Prototype Transitions (SSPT)*							
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	142.808	0.000	142.808	100.265	77.559	76.041	52.898	Continuing	Continuing
645601: *Space System Prototype Transition*	-	0.000	0.000	142.808	0.000	142.808	100.265	77.559	76.041	52.898	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Per FY 2016 National Defense Authorization Act, the Evolved Expendable Launch Vehicle (EELV) program was renamed National Security Space Launch (NSSL) program. In association with the NSSL name change direction, the Space Force has renamed the Long Duration Propulsive (EELV Secondary Payload Adapter (ESPA)) (LDPE) program to be the Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER) program. Pre-existing LDPE-1, LDPE-2 and LDPE-3A mission names will remain unchanged.

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206427F, Space Systems Prototype Transitions (SSPT) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206427SF, Space Systems Prototype Transitions (SSPT) from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

$8.787M is included in FY 2021 in the request for Appropriation 3600, Research, Development, Test & Evaluation, Air Force, PE 1206427F; these funds should have been requested under Appropriation 3620 Research, Development, Test & Evaluation, Space Force, PE 1206427SF. Justification and plans for these funds are included in RDT&E, AF, PE 1206427F, Space Systems Prototype Transitions (SSPT), R-1 Line #62.

The Space System Prototype Transition (SSPT) Program will identify and address space technology and capability gaps in order to facilitate technology transition to military space prototypes and programs of record. It will conduct a wide array of activities to model, integrate, test, and provide launch integration and support on-orbit testing of prototype technologies. The supported activities include: systems engineering, technology planning, development, demonstrations and testing, as well as modeling, simulations and exercises to support the development and maturation of tactics and procedures. This includes the development and prototyping of critical technology within the Department of Defense, across other government agencies, academic institutions and industry partners that are identified and the necessary systems engineering to effectively employ such systems.

Specifically the SSPT project will include a cost-effective framework to identify, mature and transition demonstrations and prototypes to:

- Rapidly address identified technology or capability gaps
- Accelerate the maturation of systems intended for demonstrations/prototypes that enhance/compliment/replace an existing capability
- Support a more reliable, available, maintainable and survivable military space enterprise
- Energize the space industrial base supporting U.S. national security

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 1206427SF *I Space Systems Prototype Transitions (SSPT)*

- Focus S&T Innovation and facilitate its transition to military space programs of record

This program includes efforts for Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER), Tetra, Blackjack, and Quasi-Zenith Satellite System (QZSS)-Hosted Payload (HP):

ROOSTER is designated to provide a flexible orbit capability to host and deploy numerous prototypes and payloads utilizing excess payload margin available on US Space Force Headquarters (USSF HQ) launch missions.

Tetra will provide a training platform for operators to develop and demonstrate tactics, techniques and procedures for prototype missions. The experiment directly supports the evolution of U.S. space situational awareness and control.

Blackjack is a joint technology demonstration project by DARPA and the Space Force to evaluate military utility and concepts of operation for a Proliferated Low Earth Orbit (P-LEO) satellite constellation. The project leverages industry innovation in commercial P-LEO concepts by integrating military payloads onboard commercial commoditized satellite vehicles, demonstrating onboard data processing and autonomous tasking, and transmitting encrypted data through a mesh network of satellites in LEO with the goals of augmenting existing warfighter capability, increasing national security space resiliency, and decreasing per-unit satellite costs.

QZSS-HP is a "pacesetter" hosted payload that is a high priority for the U.S. and Japan, paving the way for future Allied collaborations. It enhances Geostationary Earth Orbit (GEO) Space Situational Awareness capabilities over the Eurasian theater and facilitates resilient capabilities in the Space Surveillance Network (SSN).

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, 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 SSPT 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 1206427SF / *Space Systems Prototype Transitions (SSPT)*

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	142.808	0.000	142.808
Total Adjustments	0.000	0.000	142.808	0.000	142.808
• 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	142.808	0.000	142.808

Change Summary Explanation

FY 2021: +$142.808M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Technology Maturation and Prototype Development	0.000	0.000	36.011

Description: Plan, develop, test and transition advanced technologies into space system prototypes and capabilities to meet known and emerging threats. Conduct architecture studies, modeling and simulation, technical development, integration and test activities in preparation for transition of critical technologies into prototypes or space programs of record. Develop advanced capabilities for rapid prototyping and integration into space system programs of record and, if requested, to war-fighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs).

FY 2020 Plans:

N/A

FY 2021 Plans:

Continue prototype/technology developments across multiple mission areas, including but not limited to:
- Tetra: Continue development of Tetra-3 and Tetra-4 prototypes to support experimentation and TTP development at GEO. Award the development of Tetra-5 prototype.
- Blackjack: Continue technical analysis, design, development, test, integration and delivery of prototype, cyber, ground and data processing architecture as well as develop concepts of operations to support C2 system integration.
- QZSS-HP development (International Cooperation): Continue design, development, build and test of two Hosted Payload Interface Unit and two SSA sensors for integration into two payloads intended for hosting on two Japanese Quasi-Zenith Satellites.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 1206427SF *I Space Systems Prototype Transitions (SSPT)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
- Pursue technology investment to support the space enterprise investment strategy; commercial and allied opportunities, cross-mission proliferated payloads and buses, C2 dynamic tasking, orbital maneuver, alternative orbits, dynamic communication networks, agile signal capable terminals and fighting Position, Navigation and Timing (PNT) and Satellite Communication (SATCOM), etc. - 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			
Title: Prototype Integration, Test and On-Orbit Prototype Demonstration ***Description:*** Provide rideshare opportunities for prototypes and experiments, fund mission-unique payload integration to the rideshare or launch system, and conduct launch base integration, testing and launch operations. Conduct prototype integration and testing into the designated Command and Control system and provide operational support to conduct prototype testing, demonstration and operations. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** - Tetra: Continue payload integration and testing support for Tetra-1 and Tetra-2. Perform on-orbit demonstrations, operations and provide reach back support for Tetra-1 and Tetra-2. Provide payload integration and testing for Tetra-3 and Tetra-4. - Blackjack: Conduct technical reviews, integration and testing of prototypes with launch vehicle in support of launch and on-orbit demonstrations. Begin integration of fully assembled and tested Blackjack satellites with launch vehicles, launch the first two satellites into LEO, and conduct early orbit testing and demonstration. - QZSS-HP development (International Cooperation): Continue conducting technical reviews, integration and testing of prototypes with launch vehicle in support of two launch and on-orbit demonstrations. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A	0.000	0.000	62.420
Title: Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER) ***Description:*** LDPE has been renamed ROOSTER. It is not a new start as it was previously included in both Technology Maturation Prototype Development and the Prototype Integration, Test and On-Orbit Prototype Demonstration major thrusts.	0.000	0.000	44.377

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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 1206427SF *I Space Systems Prototype Transitions (SSPT)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
The ROOSTER bus, core, or ring provides a standard service for a wide variety of secondary payload options. It features 6 ports and accommodates ten to twelve fixed and/or separable prototype payloads. After the forward payload separates, the ROOSTER ring separates and propels to mission orbit which so far has been in GEO approximately 22,000 miles above the earth. The ROOSTER ring moves around GEO allowing payloads to be dropped off at different locations or remain hosted to the ring based on mission requirements. ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** - LDPE-1: Complete payload integration, launch site planning and processing and ground development. Begin on-orbit operations. - LDPE-2: Begin on-orbit operations. - LDPE-3A: Continue payload integration, launch support, CONOPS and mission planning. Begin ground development. - ROOSTER: Begin design and assembly to support on-orbit technology demonstration and prototypes beyond LDPE-3A. Begin preparation for integration and testing of payload providers and pre-launch support. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	0.000	0.000	142.808

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. The SSPT program consists of numerous small projects in which the program office will leverage rapid prototyping authorities to the maximum extent possible.

In May 2019 the first three LDPE systems were awarded competitively. The LDPE Acquisition Strategy was amended to include the addition of LDPE-3A. LDPE-3A was justified to be awarded sole source as an option to the existing contract. The acquisition strategy for the follow-on effort to LDPE, called ROOSTER is in work, but expected to be competitively awarded.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1206427SF / *Space Systems Prototype Transitions (SSPT)*	**Project (Number/Name)** 645601 / *Space System Prototype Transition*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Tetra-1,2 & 3 Integration & On-Orbit Prototype Demonstration	C/FFP	Various : Various	-	-		-		5.729	Nov 2020	-		5.729	Continuing	Continuing	-
Tetra-3 & 4 Development	C/FFP	York Space Systems : Denver, CO	-	-		-		2.916	Nov 2020	-		2.916	Continuing	Continuing	-
Tetra-5 Development	TBD	TBD : TBD	-	-		-		7.783	Apr 2021	-		7.783	Continuing	Continuing	-
LDPE-1, 2 & 3A Launch Vehicle Integration & Ops	C/CPFF	Northrop Grumman Inno Sys : Dulles, VA	-	-		-		16.270	Feb 2021	-		16.270	Continuing	Continuing	-
LDPE-3A Development	SS/FFP	Northrop Grumman Inno Sys : Dulles, VA	-	-		-		10.000	Nov 2020	-		10.000	Continuing	Continuing	-
ROOSTER Development	TBD	TBD : TBD	-	-		-		15.000	Jan 2021	-		15.000	Continuing	Continuing	-
Blackjack Development	MIPR	Various : Various	-	-		-		11.248	Nov 2020	-		11.248	Continuing	Continuing	-
Blackjack Launch/Support Activities	MIPR	Various : Various	-	-		-		47.756	Nov 2020	-		47.756	Continuing	Continuing	-
QZSS-HP Development	Various	Various : Various	-	-		-		3.055	Nov 2020	-		3.055	Continuing	Continuing	-
QZSS-HP Launch Support Activities	Various	Various : Various	-	-		-		8.935	Nov 2020	-		8.935	Continuing	Continuing	-
		Subtotal	-	-		-		128.692		-		128.692	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	RO	Various : Various	-	-		-		6.800	Jan 2021	-		6.800	Continuing	Continuing	-
A&AS	Various	Various : Various	-	-		-		6.846	Feb 2021	-		6.846	Continuing	Continuing	-
Other Support	Various	Various : El Segundo, CA	-	-		-		0.470	Oct 2020	-		0.470	Continuing	Continuing	-
		Subtotal	-	-		-		14.116		-		14.116	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3620F / 4	R-1 Program Element (Number/Name) PE 1206427SF / *Space Systems Prototype Transitions (SSPT)*	Project (Number/Name) 645601 / *Space System Prototype Transition*	

	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		142.808		-		142.808	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1206427SF / *Space Systems Prototype Transitions (SSPT)*	**Project (Number/Name)** 645601 / *Space System Prototype Transition*

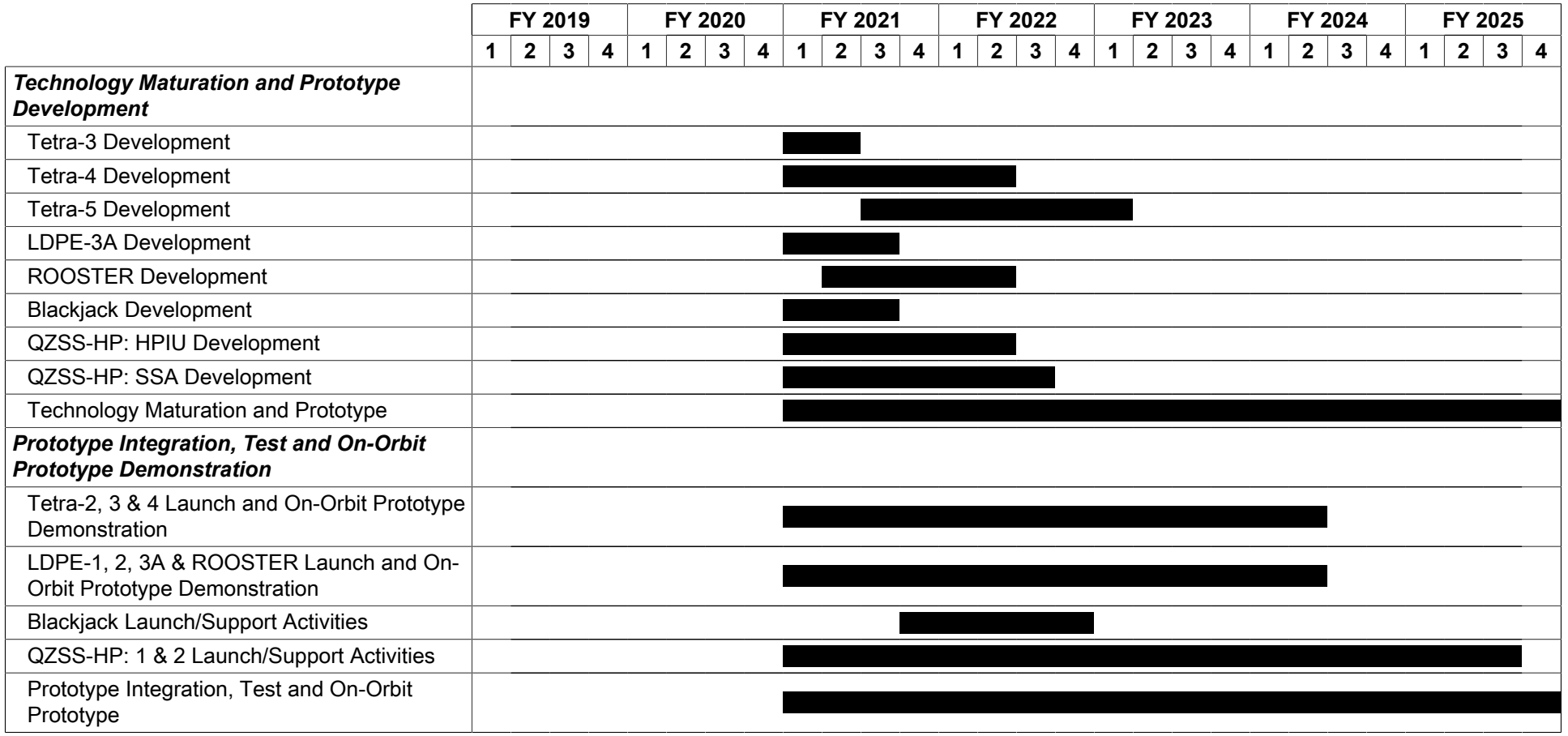

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 1206427SF / *Space Systems Prototype Transitions (SSPT)*	**Project (Number/Name)** 645601 / *Space System Prototype Transition*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Technology Maturation and Prototype Development				
Tetra-3 Development	1	2021	2	2021
Tetra-4 Development	1	2021	2	2022
Tetra-5 Development	3	2021	1	2023
LDPE-3A Development	1	2021	3	2021
ROOSTER Development	2	2021	2	2022
Blackjack Development	1	2021	3	2021
QZSS-HP: HPIU Development	1	2021	2	2022
QZSS-HP: SSA Development	1	2021	3	2022
Technology Maturation and Prototype	1	2021	4	2025
Prototype Integration, Test and On-Orbit Prototype Demonstration				
Tetra-2, 3 & 4 Launch and On-Orbit Prototype Demonstration	1	2021	2	2024
LDPE-1, 2, 3A & ROOSTER Launch and On-Orbit Prototype Demonstration	1	2021	2	2024
Blackjack Launch/Support Activities	4	2021	4	2022
QZSS-HP: 1 & 2 Launch/Support Activities	1	2021	3	2025
Prototype Integration, Test and On-Orbit Prototype	1	2021	4	2025