

UNCLASSIFIED

**Department of Defense
Fiscal Year (FY) 2020 Budget Estimates**

March 2019



Space Development Agency

Defense-Wide Justification Book Volume 5 of 5

Research, Development, Test & Evaluation, Defense-Wide

UNCLASSIFIED

UNCLASSIFIED

THIS PAGE INTENTIONALLY LEFT BLANK

UNCLASSIFIED

UNCLASSIFIED

Space Development Agency • Budget Estimates FY 2020 • RDT&E Program

Table of Volumes

Defense Advanced Research Projects Agency.....	Volume 1
Missile Defense Agency.....	Volume 2
Office of the Secretary Of Defense.....	Volume 3
Chemical and Biological Defense Program.....	Volume 4
Defense Contract Audit Agency.....	Volume 5
Defense Contract Management Agency.....	Volume 5
DoD Human Resources Activity.....	Volume 5
Defense Information Systems Agency.....	Volume 5
Defense Logistics Agency.....	Volume 5
Defense Security Cooperation Agency.....	Volume 5
Defense Security Service.....	Volume 5
Defense Technical Information Center.....	Volume 5
Defense Threat Reduction Agency.....	Volume 5
Space Development Agency.....	Volume 5
The Joint Staff.....	Volume 5
United States Special Operations Command.....	Volume 5

UNCLASSIFIED

UNCLASSIFIED

Space Development Agency • Budget Estimates FY 2020 • RDT&E Program

Washington Headquarters Service..... Volume 5

Operational Test and Evaluation, Defense..... Volume 5

UNCLASSIFIED

Space Development Agency • Budget Estimates FY 2020 • RDT&E Program

Volume 5 Table of Contents

Comptroller Exhibit R-1..... Volume 5 - v

Program Element Table of Contents (by Budget Activity then Line Item Number).....Volume 5 - xvii

Program Element Table of Contents (Alphabetically by Program Element Title).....Volume 5 - xix

Exhibit R-2s..... Volume 5 - 1

UNCLASSIFIED

THIS PAGE INTENTIONALLY LEFT BLANK

UNCLASSIFIED

UNCLASSIFIED

Department of Defense
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 Mar 2019

Appropriation	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
-----	-----	-----	-----	-----
Research, Development, Test & Eval, DW				
Total Research, Development, Test & Evaluation				

UNCLASSIFIED

Department of Defense
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

05 Mar 2019

Appropriation	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Research, Development, Test & Eval, DW	105,000				105,000
Total Research, Development, Test & Evaluation	105,000				105,000

UNCLASSIFIED

Department of Defense
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 Mar 2019

	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
Summary Recap of Budget Activities				

Advanced Technology Development				
Advanced Component Development And Prototypes				
Total Research, Development, Test & Evaluation				
Summary Recap of FYDP Programs				

Space				
Total Research, Development, Test & Evaluation				

UNCLASSIFIED

Department of Defense
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

05 Mar 2019

	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Summary Recap of Budget Activities					
Advanced Technology Development	20,000				20,000
Advanced Component Development And Prototypes	85,000				85,000
Total Research, Development, Test & Evaluation	105,000				105,000
Summary Recap of FYDP Programs					
Space	105,000				105,000
Total Research, Development, Test & Evaluation	105,000				105,000

UNCLASSIFIED

Defense-Wide
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 Mar 2019

	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
Summary Recap of Budget Activities				
Advanced Technology Development				
Advanced Component Development And Prototypes				
Total Research, Development, Test & Evaluation				
Summary Recap of FYDP Programs				
Space				
Total Research, Development, Test & Evaluation				

UNCLASSIFIED

UNCLASSIFIED

Defense-Wide
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

05 Mar 2019

	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Summary Recap of Budget Activities					
Advanced Technology Development	20,000				20,000
Advanced Component Development And Prototypes	85,000				85,000
Total Research, Development, Test & Evaluation	105,000				105,000
Summary Recap of FYDP Programs					
Space	105,000				105,000
Total Research, Development, Test & Evaluation	105,000				105,000

UNCLASSIFIED

UNCLASSIFIED

Defense-Wide
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 Mar 2019

Appropriation	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
-----	-----	-----	-----	-----
Space Development Agency				
Total Research, Development, Test & Evaluation				

UNCLASSIFIED

Defense-Wide
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

05 Mar 2019

Appropriation -----	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
-----	-----	-----	-----	-----	-----
Space Development Agency	105,000				105,000
Total Research, Development, Test & Evaluation	105,000				105,000

UNCLASSIFIED

Defense-Wide
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 Mar 2019

Appropriation: 0400D Research, Development, Test & Eval, DW

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
69	1206310	SDA Space Science and Technology Research and Development	03					U
		Advanced Technology Development						
120	1206410	SDA Space Technology Development and Prototyping	04					U
		Advanced Component Development And Prototypes						
Total Research, Development, Test & Eval, DW								

UNCLASSIFIED

UNCLASSIFIED

Defense-Wide
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 Mar 2019

Appropriation: 0400D Research, Development, Test & Eval, DW

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
69	1206310	SDA Space Science and Technology Research and Development	03	20,000				20,000	U
		Advanced Technology Development		20,000				20,000	
120	1206410	SDA Space Technology Development and Prototyping	04	85,000				85,000	U
		Advanced Component Development And Prototypes		85,000				85,000	
Total Research, Development, Test & Eval, DW				105,000				105,000	

R-120PB: FY 2020 President's Budget (Published Version), as of March 5, 2019 at 08:24:53

UNCLASSIFIED

UNCLASSIFIED

Space Development Agency
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

05 Mar 2019

Appropriation: 0400D Research, Development, Test & Eval, DW

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
--	-----	-----	---	-----	-----	-----	-----	-
69	1206310	SDA Space Science and Technology Research and Development	03					U
		Advanced Technology Development						
120	1206410	SDA Space Technology Development and Prototyping	04					U
		Advanced Component Development And Prototypes						
Total Space Development Agency								

UNCLASSIFIED

Space Development Agency
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

05 Mar 2019

Appropriation: 0400D Research, Development, Test & Eval, DW

Line No	Element Number	Program Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
69	1206310	SDA Space Science and Technology Research and Development	03	20,000				20,000	U
		Advanced Technology Development		20,000				20,000	
120	1206410	SDA Space Technology Development and Prototyping	04	85,000				85,000	U
		Advanced Component Development And Prototypes		85,000				85,000	
Total Space Development Agency				105,000				105,000	

UNCLASSIFIED

Space Development Agency • Budget Estimates FY 2020 • RDT&E Program

Program Element Table of Contents (by Budget Activity then Line Item Number)

Appropriation 0400: Research, Development, Test & Evaluation, Defense-Wide

Line #	Budget Activity	Program Element Number	Program Element Title	Page
69	03	1206310SDA	Space Science and Technology Research and Development.....	Volume 5 - 1

Appropriation 0400: Research, Development, Test & Evaluation, Defense-Wide

Line #	Budget Activity	Program Element Number	Program Element Title	Page
120	04	1206410SDA	Space Technology Development and Prototyping.....	Volume 5 - 5

UNCLASSIFIED

THIS PAGE INTENTIONALLY LEFT BLANK

UNCLASSIFIED

UNCLASSIFIED

Space Development Agency • Budget Estimates FY 2020 • RDT&E Program

Program Element Table of Contents (Alphabetically by Program Element Title)

Program Element Title	Program Element Number	Line #	BA	Page
Space Science and Technology Research and Development	1206310SDA	69	03.....	Volume 5 - 1
Space Technology Development and Prototyping	1206410SDA	120	04.....	Volume 5 - 5

UNCLASSIFIED

UNCLASSIFIED

THIS PAGE INTENTIONALLY LEFT BLANK

UNCLASSIFIED

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Space Development Agency	Date: March 2019
---	-------------------------

Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
0400: Research, Development, Test & Evaluation, Defense-Wide / BA 3: Advanced Technology Development (ATD)					PE 1206310SDA / Space Science and Technology Research and Development							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	Continuing	Continuing
032: Proliferated Low Earth Orbit (pLEO) Sensor Technology	0.000	0.000	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

This is a new program element in FY 2020.

A. Mission Description and Budget Item Justification

The Space Development Agency (SDA) is established to develop the next generation space architecture to enable U.S. military operations to be responsive to emerging multi-domain threats against our national security. To achieve that goal, the SDA will help inform the Department's decision to develop and implement a proliferated architecture enabled by lower cost, commercially-derived spacecraft and routine space access, shift the Department to a development organization focused on experimentation, prototyping, and accelerated fielding, and change the Department to a concentrated, decoupled structure to generate speed. The SDA will manage, direct, and execute the development of the space capabilities in accordance with DoD's Space Vision and field space capabilities at speed and scale, with the following goals:

- bold breakthroughs designed to obsolesce our competitors,
- technology maturation and systems engineering,
- lean engineering, manufacturing, and support,
- industrial base expansion; streamlined development and acquisition process, and
- increased acquisition cooperation with the National Reconnaissance Office (NRO).

The SDA will rapidly deploy critical elements of the next-generation space capabilities, initially focusing on these essential capabilities:

- Persistent global surveillance for advanced missile targeting,
- Indications, warnings, targeting, and tracking for defense against advanced missile threats,
- Alternate position, navigation, and timing (PNT) for a GPS-denied environment,
- Global and near-real time space situational awareness,
- Development of a deterrent capability,
- Responsive, resilient, common ground-based space support infrastructure (e.g., ground stations and launch capability),
- Cross-domain, networked, node-independent battle management command, control, and communications (BMC3), including nuclear command, control, and communications (NC3), and,
- Highly-scaled, low-latency, persistent, artificial intelligence-enable global surveillance.

The establishment of a communications and data transport layer in Low Earth Orbit (LEO) is essential to developing a new, responsive space architecture, and will be SDA's primary initial focus. The SDA will heavily leverage DARPA's Blackjack program (PE 0603287E) and its plan to demonstrate a 20-satellite constellation to

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Space Development Agency	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 1206310SDA / <i>Space Science and Technology Research and Development</i>
---	--

build this transport layer. The SDA will develop an initial wedge of sub-constellations on this transport layer to provide additional capabilities, such as advanced missile warning.

This program element funds efforts to develop and demonstrate a prototype proliferated Low Earth Orbit (pLEO) communications and data transport layer and its sub-constellations in support of the DoD Space Vision.

<u>B. Program Change Summary (\$ in Millions)</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	20.000	-	20.000
Total Adjustments	0.000	0.000	20.000	-	20.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• FY 2020 Program Start	-	-	20.000	-	20.000

Change Summary Explanation

This is a new start in FY 2020.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency										Date: March 2019														
Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 1206310SDA / <i>Space Science and Technology Research and Development</i>				Project (Number/Name) 032 / <i>Proliferated Low Earth Orbit (pLEO) Sensor Technology</i>															
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost												
032: <i>Proliferated Low Earth Orbit (pLEO) Sensor Technology</i>	0.000	0.000	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	Continuing	Continuing												
<p>Note This is a new start in FY 2020.</p> <p>A. Mission Description and Budget Item Justification The Space Science and Technology Research and Development will develop and demonstrate the next generation sensor technologies to support future prototyping efforts to deliver the eight capabilities outlined in the DoD Space Vision. This effort will develop and demonstrate lower size, weight, power, and cost (SWAP-C) sensors for national security space missions.</p> <p>B. Accomplishments/Planned Programs (\$ in Millions)</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:75%;">Title: Proliferated Low Earth Orbit (pLEO) Sensor Technology</td> <td align="right">FY 2018</td> <td align="right">FY 2019</td> <td align="right">FY 2020</td> </tr> <tr> <td> Description: This effort will demonstrate LEO sensor technologies on an initial wedge of sub-constellations on the data transport layer architecture to enable other national security space missions such as global surveillance for advanced missile targeting; indications, warnings, targeting, and tracking for defense against advanced missile threats; alternate position, navigation, and timing (PNT) services for Global Positioning System (GPS) denied environments; deterrent capabilities; and other national security space missions. FY 2020 Plans: - Conduct trade studies and feasibility assessments of different sensor modalities to perform national security space missions. - Conduct Preliminary Design Review (PDR) of selected sensor payload(s). FY 2019 to FY 2020 Increase/Decrease Statement: The increase is due to establishment of this line in FY 2020. </td> <td align="right">0.000</td> <td align="center">-</td> <td align="right">20.000</td> </tr> <tr> <td align="right">Accomplishments/Planned Programs Subtotals</td> <td align="right">0.000</td> <td align="center">-</td> <td align="right">20.000</td> </tr> </table> <p>C. Other Program Funding Summary (\$ in Millions) N/A</p> <p>Remarks</p>													Title: Proliferated Low Earth Orbit (pLEO) Sensor Technology	FY 2018	FY 2019	FY 2020	Description: This effort will demonstrate LEO sensor technologies on an initial wedge of sub-constellations on the data transport layer architecture to enable other national security space missions such as global surveillance for advanced missile targeting; indications, warnings, targeting, and tracking for defense against advanced missile threats; alternate position, navigation, and timing (PNT) services for Global Positioning System (GPS) denied environments; deterrent capabilities; and other national security space missions. FY 2020 Plans: - Conduct trade studies and feasibility assessments of different sensor modalities to perform national security space missions. - Conduct Preliminary Design Review (PDR) of selected sensor payload(s). FY 2019 to FY 2020 Increase/Decrease Statement: The increase is due to establishment of this line in FY 2020.	0.000	-	20.000	Accomplishments/Planned Programs Subtotals	0.000	-	20.000
Title: Proliferated Low Earth Orbit (pLEO) Sensor Technology	FY 2018	FY 2019	FY 2020																					
Description: This effort will demonstrate LEO sensor technologies on an initial wedge of sub-constellations on the data transport layer architecture to enable other national security space missions such as global surveillance for advanced missile targeting; indications, warnings, targeting, and tracking for defense against advanced missile threats; alternate position, navigation, and timing (PNT) services for Global Positioning System (GPS) denied environments; deterrent capabilities; and other national security space missions. FY 2020 Plans: - Conduct trade studies and feasibility assessments of different sensor modalities to perform national security space missions. - Conduct Preliminary Design Review (PDR) of selected sensor payload(s). FY 2019 to FY 2020 Increase/Decrease Statement: The increase is due to establishment of this line in FY 2020.	0.000	-	20.000																					
Accomplishments/Planned Programs Subtotals	0.000	-	20.000																					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 1206310SDA / <i>Space Science and Technology Research and Development</i>	Project (Number/Name) 032 / <i>Proliferated Low Earth Orbit (pLEO) Sensor Technology</i>
<p><u>D. Acquisition Strategy</u></p> <p>Partners for these activities may include in-house research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.</p> <p><u>E. Performance Metrics</u></p> <p>Performance metrics will be specific to each of the efforts. Each effort will include measures identified in the management approach and Statement of Work (SOW). The activities will be monitored against schedules and deliverables as stated in the initiative's management approach.</p>		

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Space Development Agency **Date:** March 2019

Appropriation/Budget Activity 0400: Research, Development, Test & Evaluation, Defense-Wide / BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	85.000	-	85.000	80.000	105.000	115.000	140.000	Continuing	Continuing
033: Transport Layer Architecture and Standards	-	0.000	0.000	15.000	-	15.000	15.000	15.000	15.000	15.000	Continuing	Continuing
034: Space Situational Awareness and Launch	-	0.000	0.000	10.000	-	10.000	25.000	50.000	50.000	50.000	Continuing	Continuing
039: Proliferated Low Earth Orbit (pLEO) Missile Warning Ground Integration	-	0.000	0.000	30.000	-	30.000	40.000	40.000	50.000	75.000	Continuing	Continuing
191: Space-Based Interceptors	-	0.000	0.000	15.000	-	15.000	0.000	0.000	0.000	0.000	Continuing	Continuing
193: Space-Based Discrimination	-	0.000	0.000	15.000	-	15.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

This is a new program element in FY 2020.

A. Mission Description and Budget Item Justification

The Space Development Agency (SDA) is established to develop the next generation space architecture to enable U.S. military operations to be responsive to emerging multi-domain threats against our national security. To achieve that goal, the SDA will help inform the Department's decision to develop and implement a proliferated architecture enabled by lower-cost, commercially-derived spacecraft and routine space access, shift the Department to a development organization focused on experimentation, prototyping, and accelerated fielding, and change the Department to a concentrated, decoupled structure to generate speed. The SDA will manage, direct, and execute the development of the space capabilities in accordance with DoD's Space Vision and field space capabilities at speed and scale, with the following goals:

- bold breakthroughs designed to obsolesce our competitors,
- technology maturation and systems engineering,
- lean engineering, manufacturing, and support,
- industrial base expansion; streamlined development and acquisition process, and
- increased acquisition cooperation with the National Reconnaissance Office (NRO).

The SDA will rapidly deploy critical elements of the next-generation space capabilities, initially focusing on these essential capabilities:

- Persistent global surveillance for advanced missile targeting,
- Indications, warnings, targeting, and tracking for defense against advanced missile threats,
- Alternate position, navigation, and timing (PNT) for a GPS-denied environment,

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Space Development Agency				Date: March 2019		
Appropriation/Budget Activity 0400: Research, Development, Test & Evaluation, Defense-Wide I BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 Program Element (Number/Name) PE 1206410SDA I Space Technology Development and Prototyping				
<ul style="list-style-type: none">• Global and near-real time space situational awareness,• Development of a deterrent capability• Responsive, resilient, common ground-based space support infrastructure (e.g., ground stations and launch capability),• Cross-domain, networked, node-independent battle management command, control, and communications (BMC3), including nuclear command, control, and communications (NC3), and• Highly-scaled, low-latency, persistent, artificial intelligence-enable global surveillance. <p>The establishment of a communications and data transport layer in Low Earth Orbit (LEO) is essential to developing a new, responsive space architecture, and will be SDA's primary initial focus. The SDA will heavily leverage DARPA's Blackjack program (PE 0603287E) and its plan to demonstrate a 20-satellite constellation to build this transport layer. The SDA will develop an initial wedge of sub-constellations on this transport layer to provide additional capabilities, such as advanced missile warning.</p> <p>This program element funds efforts to develop and demonstrate a prototype proliferated Low Earth Orbit (pLEO) communications and data transport layer and its sub-constellations in support of the DoD Space Vision.</p>						
B. Program Change Summary (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		0.000	0.000	0.000	-	0.000
Current President's Budget		0.000	0.000	85.000	-	85.000
Total Adjustments		0.000	0.000	85.000	-	85.000
• Congressional General Reductions		-	-			
• Congressional Directed Reductions		-	-			
• Congressional Rescissions		-	-			
• Congressional Adds		-	-			
• Congressional Directed Transfers		-	-			
• Reprogrammings		-	-			
• SBIR/STTR Transfer		-	-			
• FY 2020 Program Start		-	-	85.000	-	85.000
Change Summary Explanation						
This is a new start in FY 2020.						

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency										Date: March 2019		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping				Project (Number/Name) 033 / Transport Layer Architecture and Standards			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
033: Transport Layer Architecture and Standards	-	0.000	0.000	15.000	-	15.000	15.000	15.000	15.000	15.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2020.

A. Mission Description and Budget Item Justification

The Space Technology Development and Prototyping effort will develop and demonstrate a prototype proliferated Low Earth Orbit (pLEO) communications and data transport layer and its sub-constellations to provide the eight capabilities outlined in the DoD Space Vision. The SDA will rapidly develop and field the next generation space architecture that will enable the US to deploy space capabilities that out-pace adversarial threats. This architecture is underpinned by a communications and data transport layer, which will reside on a proliferated small satellite constellation in Low Earth Orbit (LEO). The Transport Layer will support the transfer of data between the space segment of the next generation space architecture, to potentially include payloads co-hosted with the Transport Layer or other non-collocated space elements, and the ground, to include ground support infrastructure and very large numbers of users/subscribers. The Transport Layer will provide the "connective tissue" for the next generation space architecture.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Transport Layer Architecture and Standards	0.000	0.000	15.000	0.000	15.000
Description: Develop and demonstrate a prototype a resilient and unified military communications and data transport layer, enabled by a proliferated Low Earth Orbit (pLEO) architecture. This effort will demonstrate capability to provide very low latency (low or high bandwidth) communications and data between any two points on the globe to enable mission-agnostic battle management, command, control, and communications (BMC3). This effort will leverage technologies developed under the DARPA Blackjack program and, wherever feasible, leverage commercial industry plans to provide broadband internet access from space to form the foundation of the transport layer architecture.					
FY 2019 Plans: N/A					
FY 2020 Base Plans: - Conduct Preliminary Design Review (PDR) for user terminal system.					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency				Date: March 2019	
Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>		Project (Number/Name) 033 / <i>Transport Layer Architecture and Standards</i>	

<u>B. Accomplishments/Planned Programs (\$ in Millions)</u>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Develop interface and messaging standards for data transport layer architecture.					
<i>FY 2020 OCO Plans:</i> N/A					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> This program is a new start in FY 2020.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	15.000	0.000	15.000

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

Remarks
N/A

D. Acquisition Strategy
Partners for these activities may include in-house research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.

E. Performance Metrics
Performance metrics will be specific to each of the efforts. Each effort will include measures identified in the management approach and Statement of Work (SOW). The activities will be monitored against schedules and deliverables as stated in the initiative's management approach.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Space Development Agency												Date: March 2019			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping				Project (Number/Name) 033 / Transport Layer Architecture and Standards					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
TBD	C/TBD	TBD : TBD	0.000	0.000		0.000		12.000		0.000		12.000	Continuing	Continuing	Continuing
Subtotal			0.000	0.000		0.000		12.000		0.000		12.000	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
TBD	Various	TBD : TBD	0.000	0.000		0.000		3.000		0.000		3.000	Continuing	Continuing	-
Subtotal			0.000	0.000		0.000		3.000		0.000		3.000	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	0.000		0.000		15.000		0.000		15.000	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Space Development Agency										Date: March 2019			
Appropriation/Budget Activity					R-1 Program Element (Number/Name)					Project (Number/Name)			
0400 / 4					PE 1206410SDA / Space Technology Development and Prototyping					033 / Transport Layer Architecture and Standards			

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Transport Layer Architecture and Standards																												
Conduct Preliminary Design Review (PDR) for user terminal system.																												
Develop interface and messaging standards for data transport layer architecture.																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Space Development Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 033 / <i>Transport Layer Architecture and Standards</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Transport Layer Architecture and Standards</i>				
Conduct Preliminary Design Review (PDR) for user terminal system.	1	2020	4	2021
Develop interface and messaging standards for data transport layer architecture.	1	2020	4	2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency										Date: March 2019		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping				Project (Number/Name) 034 / Space Situational Awareness and Launch			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
034: Space Situational Awareness and Launch	-	0.000	0.000	10.000	-	10.000	25.000	50.000	50.000	50.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note This is a new start in FY 2020.												
A. Mission Description and Budget Item Justification The Space Technology Development and Prototyping effort will develop and demonstrate a prototype proliferated Low Earth Orbit (pLEO) communications and data transport layer and its sub-constellations to provide the eight capabilities outlined in the DoD Space Vision. Developing and fielding a pLEO space architecture will significantly improve U.S. resilience posture in space. The Space Situational Awareness (SSA) and Launch project will further support this vision of enhanced resilience. Global and near real-time SSA will provide a detailed understanding of the space order of battle and a responsive launch capability to enable rapid constitution or replenishment of space capabilities.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Space Situational Awareness and Launch								0.000	0.000	10.000	0.000	10.000
Description: Working with commercial providers, develop and demonstrate enhanced space situational awareness (SSA) and small-to-medium launch service access to provide SSA on large numbers of small satellites in LEO, including tracking, orbit determination, orbital state and uncertainty propagation, conjunction prediction, and collision avoidance. This effort will leverage existing Government and commercial tools and approaches to extend capabilities for a pLEO environment. In addition, this effort will identify and contract for launch of small-to-medium size payloads, to demonstrate responsive constitution and replenishment.												
FY 2019 Plans: N/A												
FY 2020 Base Plans: - Conduct trade studies of existing space traffic management capabilities and approaches for pLEO applications. - Conduct trade studies of small-to-medium payload launch service providers and ability to responsively support pLEO constitution and replenishment.												
FY 2020 OCO Plans:												

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency				Date: March 2019	
Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>		Project (Number/Name) 034 / <i>Space Situational Awareness and Launch</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO
N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: This program is a new start in FY 2020.					
Accomplishments/Planned Programs Subtotals		0.000	0.000	10.000	0.000
C. Other Program Funding Summary (\$ in Millions) N/A					
Remarks N/A					
D. Acquisition Strategy Partners for these activities may include in-house research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.					
E. Performance Metrics Performance metrics will be specific to each of the efforts. Each effort will include measures identified in the management approach and Statement of Work (SOW). The activities will be monitored against schedules and deliverables as stated in the initiative's management approach.					

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Space Development Agency												Date: March 2019			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping				Project (Number/Name) 034 / Space Situational Awareness and Launch					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
TBD	C/TBD	TBD : TBD	0.000	0.000		0.000		8.000		0.000		8.000	Continuing	Continuing	Continuing
Subtotal			0.000	0.000		0.000		8.000		0.000		8.000	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
TBD	Various	TBD : TBD	0.000	0.000		0.000		2.000		0.000		2.000	Continuing	Continuing	-
Subtotal			0.000	0.000		0.000		2.000		0.000		2.000	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	0.000		0.000		10.000		0.000		10.000	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Space Development Agency										Date: March 2019	
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping					Project (Number/Name) 034 / Space Situational Awareness and Launch	

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
<i>Space Situational Awareness and Launch</i>																												
Conduct trade studies of existing space traffic management capabilities and approaches																												
Conduct trade studies of small-to-medium size payload																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Space Development Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 034 / <i>Space Situational Awareness and Launch</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Situational Awareness and Launch</i>				
Conduct trade studies of existing space traffic management capabilities and approaches	1	2020	4	2021
Conduct trade studies of small-to-medium size payload	1	2020	4	2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency										Date: March 2019		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping				Project (Number/Name) 039 / Proliferated Low Earth Orbit (pLEO) Missile Warning Ground Integration			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
039: Proliferated Low Earth Orbit (pLEO) Missile Warning Ground Integration	-	0.000	0.000	30.000	-	30.000	40.000	40.000	50.000	75.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2020.

A. Mission Description and Budget Item Justification

The pLEO Missile Warning (MW) Ground Integration project will enable a persistent global surveillance capability, enabled by a pLEO data communications transport layer, that will provide indications, warnings, targeting, and tracking to support the defeat of advanced missile threats.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: pLEO Missile Warning Ground Integration	0.000	0.000	30.000	0.000	30.000
Description: Develop and demonstrate a prototype MW ground infrastructure compatible with a proliferated Low Earth Orbit (pLEO) sensor infrastructure. This effort will focus on integrating MW technologies and on-orbit residual capability in the form of sensors, command and control software, and data products demonstrated by DARPA's Blackjack program, and any follow-on MW prototyping efforts, into a MW ground support infrastructure. To the maximum extent possible, this effort will leverage commercial approaches for pLEO constellation management while maximizing support for the legacy MW ground segment. The development will be a phased approach to transition current command and control to a new, consolidated Battle Management, Command, Control, and Communications (BMC3) infrastructure consistent with the DoD Space Vision.					
FY 2019 Plans: N/A					
FY 2020 Base Plans: - Examine current MW ground segment and conduct trade studies of alternative approaches - Conduct Preliminary Design Review of MW ground infrastructure					
FY 2020 OCO Plans:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency				Date: March 2019	
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 039 / <i>Proliferated Low Earth Orbit (pLEO) Missile Warning Ground Integration</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> This program is a new start in FY 2020.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	30.000	0.000	30.000
C. Other Program Funding Summary (\$ in Millions) N/A					
Remarks N/A					
D. Acquisition Strategy Partners for these activities may include in-house research centers, small businesses, large defense contractors, commercial space providers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.					
E. Performance Metrics Performance metrics will be specific to each of the efforts. Each effort will include measures identified in the management approach and Statement of Work (SOW). The activities will be monitored against schedules and deliverables as stated in the initiative's management approach.					

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Space Development Agency												Date: March 2019			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping				Project (Number/Name) 039 / Proliferated Low Earth Orbit (pLEO) Missile Warning Ground Integration					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
TBD	C/TBD	TBD : TBD	0.000	0.000		0.000		24.000		0.000		24.000	Continuing	Continuing	Continuing
Subtotal			0.000	0.000		0.000		24.000		0.000		24.000	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
TBD	C/Various	TBD : TBD	0.000	0.000		0.000		6.000		-		6.000	Continuing	Continuing	-
Subtotal			0.000	0.000		0.000		6.000		-		6.000	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	0.000		0.000		30.000		0.000		30.000	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Space Development Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 039 / <i>Proliferated Low Earth Orbit (pLEO) Missile Warning Ground Integration</i>	

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
<i>Missile Warning Technology</i>																												
Examine current MW ground segment and conduct trade studies of alternative																												
Conduct Preliminary Design Review of MW ground infrastructure																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Space Development Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 039 / <i>Proliferated Low Earth Orbit (pLEO) Missile Warning Ground Integration</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Missile Warning Technology</i>				
Examine current MW ground segment and conduct trade studies of alternative	1	2020	4	2021
Conduct Preliminary Design Review of MW ground infrastructure	1	2020	4	2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency										Date: March 2019		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>				Project (Number/Name) 191 / <i>Space-Based Interceptors</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
191: <i>Space-Based Interceptors</i>	-	0.000	0.000	15.000	-	15.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
This is a new start in FY 2020.

A. Mission Description and Budget Item Justification
The Space Technology Development and Prototyping effort will develop and demonstrate a prototype proliferated Low Earth Orbit (pLEO) communications and data transport layer and its sub-constellations to provide the eight capabilities outlined in the DoD Space Vision. Developing and fielding a pLEO space architecture will significantly improve U.S. resilience posture in space. This effort is focused on developing a government reference architecture for a space-based kinetic interceptor layer for boost-phase defense.

<u>B. Accomplishments/Planned Programs (\$ in Millions)</u>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<i>Title:</i> Space-Based Interceptor Assessment <i>Description:</i> The SDA, under the leadership of the Under Secretary of Defense for Research and Engineering and in coordination with the Missile Defense Agency, Joint Staff, Air Force, and Director, Cost Assessment and Program Evaluation, will execute a Space-Based Interceptor assessment. <i>FY 2020 Base Plans:</i> The space-based interceptor assessment entails developing a government reference architecture for a space-based kinetic interceptor layer for boost-phase defense. These efforts include developing an independent cost estimate and assessment of technical risks, potential countermeasures, and development timelines. <i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> This is a new start in FY 2020.	0.000	-	15.000	-	15.000
Accomplishments/Planned Programs Subtotals	0.000	-	15.000	-	15.000

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

Remarks

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 191 / <i>Space-Based Interceptors</i>
<p><u>D. Acquisition Strategy</u></p> <p>Partners for these activities may include in-house research centers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.</p> <p><u>E. Performance Metrics</u></p> <p>N/A</p>		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Space Development Agency												Date: March 2019		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>					Project (Number/Name) 191 / <i>Space-Based Interceptors</i>				

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Space-Based Interceptor Assessment	TBD	TBD : TBD	-	-		-		15.000		-		15.000	Continuing	Continuing	-
Subtotal			-	-		-		15.000		-		15.000	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-	0.000	15.000	-	15.000	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Space Development Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping	Project (Number/Name) 191 / Space-Based Interceptors	

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Space-Based Interceptor																												
Space-Based Interceptor Assessment																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Space Development Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 191 / <i>Space-Based Interceptors</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space-Based Interceptor</i>				
Space-Based Interceptor Assessment	1	2020	4	2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency										Date: March 2019																				
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>				Project (Number/Name) 193 / <i>Space-Based Discrimination</i>																					
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost																		
193: <i>Space-Based Discrimination</i>	-	0.000	0.000	15.000	-	15.000	0.000	0.000	0.000	0.000	Continuing	Continuing																		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-																				
Note This is a new start in FY 2020.																														
A. Mission Description and Budget Item Justification The Space Technology Development and Prototyping effort will develop and demonstrate a prototype proliferated Low Earth Orbit (pLEO) communications and data transport layer and its sub-constellations to provide the eight capabilities outlined in the DoD Space Vision. Developing and fielding a pLEO space architecture will significantly improve U.S. resilience posture in space. This effort is focused on developing a government reference architecture for a space-based discrimination layer for missile defense.																														
B. Accomplishments/Planned Programs (\$ in Millions) <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <tr> <th></th> <th>FY 2018</th> <th>FY 2019</th> <th>FY 2020 Base</th> <th>FY 2020 OCO</th> <th>FY 2020 Total</th> </tr> <tr> <td> Title: Space-Based Discrimination Assessment Description: The SDA, under the leadership of the Under Secretary of Defense for Research and Engineering and in coordination with the Missile Defense Agency, Joint Staff, Air Force, and Director, Cost Assessment and Program Evaluation, will execute a Space-Based Discrimination assessment. FY 2020 Base Plans: The Space-Based Discrimination assessment entails developing a government reference architecture for a space-based discrimination layer for missile defense. These efforts include developing an independent cost estimate and assessment of technical risks, potential countermeasures, and development timelines. FY 2019 to FY 2020 Increase/Decrease Statement: This is a new start in FY 2020. </td> <td align="right">0.000</td> <td align="center">-</td> <td align="right">15.000</td> <td align="center">-</td> <td align="right">15.000</td> </tr> <tr> <td align="right">Accomplishments/Planned Programs Subtotals</td> <td align="right">0.000</td> <td align="center">-</td> <td align="right">15.000</td> <td align="center">-</td> <td align="right">15.000</td> </tr> </table>														FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Title: Space-Based Discrimination Assessment Description: The SDA, under the leadership of the Under Secretary of Defense for Research and Engineering and in coordination with the Missile Defense Agency, Joint Staff, Air Force, and Director, Cost Assessment and Program Evaluation, will execute a Space-Based Discrimination assessment. FY 2020 Base Plans: The Space-Based Discrimination assessment entails developing a government reference architecture for a space-based discrimination layer for missile defense. These efforts include developing an independent cost estimate and assessment of technical risks, potential countermeasures, and development timelines. FY 2019 to FY 2020 Increase/Decrease Statement: This is a new start in FY 2020.	0.000	-	15.000	-	15.000	Accomplishments/Planned Programs Subtotals	0.000	-	15.000	-	15.000
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total																									
Title: Space-Based Discrimination Assessment Description: The SDA, under the leadership of the Under Secretary of Defense for Research and Engineering and in coordination with the Missile Defense Agency, Joint Staff, Air Force, and Director, Cost Assessment and Program Evaluation, will execute a Space-Based Discrimination assessment. FY 2020 Base Plans: The Space-Based Discrimination assessment entails developing a government reference architecture for a space-based discrimination layer for missile defense. These efforts include developing an independent cost estimate and assessment of technical risks, potential countermeasures, and development timelines. FY 2019 to FY 2020 Increase/Decrease Statement: This is a new start in FY 2020.	0.000	-	15.000	-	15.000																									
Accomplishments/Planned Programs Subtotals	0.000	-	15.000	-	15.000																									
C. Other Program Funding Summary (\$ in Millions) N/A Remarks																														

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Space Development Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 193 / <i>Space-Based Discrimination</i>
<u>D. Acquisition Strategy</u> Partners for these activities may include in-house research centers, Federally Funded Research and Development Centers, and University Affiliated Research Centers.		
<u>E. Performance Metrics</u> N/A		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Space Development Agency												Date: March 2019		
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>				Project (Number/Name) 193 / <i>Space-Based Discrimination</i>				

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Space-Based Discrimination Assessment	TBD	TBD : TBD	-	-		-		15.000		-		15.000	Continuing	Continuing	-
Subtotal			-	-		-		15.000		-		15.000	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		15.000		-		15.000	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Space Development Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / Space Technology Development and Prototyping	Project (Number/Name) 193 / Space-Based Discrimination	

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Space-Based Discrimination																												
Space-Based Discrimination Assessment																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Space Development Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206410SDA / <i>Space Technology Development and Prototyping</i>	Project (Number/Name) 193 / <i>Space-Based Discrimination</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space-Based Discrimination</i>				
Space-Based Discrimination Assessment	1	2020	4	2021

UNCLASSIFIED

THIS PAGE INTENTIONALLY LEFT BLANK

UNCLASSIFIED