Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Missile Defense Agency											Date: February 2020	
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 1206895C *I Ballistic Missile Defense System Space Programs*							
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	45.122	96.146	140.565	32.068	-	32.068	28.591	41.201	39.090	39.630	Continuing	Continuing
MD33: *MD Space Exp Center (MDSEC)*	43.904	17.406	26.013	30.408	-	30.408	27.060	39.139	36.670	37.040	Continuing	Continuing
MD42: *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*	-	0.000	108.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	108.000
MD37: *Space Sensor Layer*	-	73.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	73.000
MC33: *MD Space Exp Center (MDSEC)*	0.469	5.000	5.380	0.386	-	0.386	0.396	0.405	0.420	0.428	Continuing	Continuing
MD40: *Program-Wide Support*	0.749	0.740	1.172	1.274	-	1.274	1.135	1.657	2.000	2.162	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

In FY 2019 the Hypersonic and Ballistic Tracking Space Sensor (HBTSS), formerly called the Space Sensor Layer (SSL) effort was funded in Budget Project MD37. In FY 2020 it was funded in Budget Project MD42. Both FY 2019 and FY 2020 funding was provided via Congressional plus up. Beginning in FY 2021, in accordance with Department decisions, funding responsibility has transferred from MDA to SDA for continued HBTSS development efforts. Decrease from FY 2020 to FY 2021 reflects this transfer of funding responsibility for continuation of the Hypersonic and Ballistic Tracking Space Sensor to the SDA PE 1206410SDA.

A. Mission Description and Budget Item Justification

Spacebased Kill Assessment (SKA): The SKA project will deliver hit and kill assessment from space. MDA Missile Defense System (MDS) intercept testing experience provided a solid understanding of kill assessment physics to enable exploration of this critical capability. SKA incorporates Government Accountability Office (GAO) recommendations to examine the operational feasibility of disaggregating large satellites (report number GAO-15-7) and to provide data for the business case for shared or dedicated satellite control, including the ground antenna networks (report number GAO-13-315). The favorable cost and schedule performance on SKA is also consistent with the GAO's assessment of commercially hosted payload programs (report number GAO-18-493). The SKA experiment utilizes a network of small Infrared (IR) sensors integrated onto commercial host satellites that while on orbit observe missile defense intercepts and deliver hit and kill assessment declarations to the MDS. After successful participation in MDS Flight Tests in FY 2019, the MDA Director made the decision to transition SKA to an operational element of the MDS.

HBTSS: The HBTSS, formerly known as the Space Sensor Layer (SSL), is a missile defense sensor which is part of the USD(R&E) Space Sensor Layer (SSL) which is a department-wide effort led by the Space Development Agency (SDA). This multi-tiered architecture will consist of systems in different orbits that provide an integrated capability to meet critical warfighter requirements in a contested space environment. HBTSS will execute the Defense Planning Guidance (DPG), Missile Defense Review (MDR), and FY19 National Defense Authorization Act (NDAA) guidance to provide this space tracking sensor capability. This program will develop prototype

space sensors to prove out the capability to detect and track hypersonic threats and boosting conventional ballistic missiles. The HBTSS prototype sensors will launch and demonstrate the ability to detect hypersonic and missile threats in a high clutter environment. Beginning in FY 2021, in accordance with Department decisions, funding responsibility has transferred from MDA to SDA for continued HBTSS development efforts.

This PE also funds Cybersecurity efforts necessary to support BMDS Space Programs.

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	94.484	27.565	21.236	-	21.236
Current President's Budget	96.146	140.565	32.068	-	32.068
Total Adjustments	1.662	113.000	10.832	-	10.832
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	113.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.376	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000
• Other Adjustment	2.038	0.000	10.832	-	10.832

Change Summary Explanation

Increase in FY 2020 reflects the Congressional plus ups for development of the missile defense Hypersonic and Ballistic Tracking Space Sensor (HBTSS) and for investment in MDS RDT&E mission support systems to increase protection of critical MDS data/knowledge capital.

Increase in FY 2021 provides for development to operationalize the Spacebased Kill Assessment with development of ground testing capability, continued hit kill algorithm maturation, deployment of an operationalized Payload Operations Center to support the warfighter by providing an initial real-time hit assessment capability.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206895C / *Ballistic Missile Defense System Space Programs*	Project (Number/Name) MD33 / *MD Space Exp Center (MDSEC)*	

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
MD33: *MD Space Exp Center (MDSEC)*	43.904	17.406	26.013	30.408	-	30.408	27.060	39.139	36.670	37.040	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The increase from FY 2020 to FY 2021 provides for participation in multi-phase ground test campaign, standing up SKA POC operations and support at the MDIOC, procurement of follow-on commercial data services, and implementing robust cyber security protection measures within operational architecture in support of full POC operations.

A. Mission Description and Budget Item Justification

The Spacebased Kill Assessment (SKA) system is composed of two segments: a space segment and a ground segment.

The space segment is composed of a network of small infrared (IR) sensors (sensors, processor cards and cabling), each mated to a different satellite. The total number of sensors and their network placement are specifically tailored for the hit and kill assessment missions. The space segment includes key design features to improve its resiliency.

The ground segment monitors the health and status of the on-orbit sensors, commands the sensors to perform the hit and kill assessment mission and analyzes the data to make a hit/kill assessment determination for the Missile Defense System (MDS). The ground segment also includes the equipment necessary for communications security and information assurance. The Missile Defense Space Center (MDSC) provides the critical infrastructure for SKA data, routing SKA data between the commercial payload integrator and the SKA Payload Analysis Center. The operational command and control center for SKA, the Payload Operations Center (POC), will support MDS Post Intercept Assessment (PIA) capabilities.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Spacebased Kill Assessment	17.406	26.013	30.408
Articles:	-	-	-
Description: The Spacebased Kill Assessment (SKA) project is designed to deliver hit and kill assessment for Homeland Defense. It includes: - SKA sensor-host satellite integration and testing - On-orbit operations by experimenting and participating in MDS flight tests - Integration of SKA into the MDS operational baseline			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD33 / *MD Space Exp Center (MDSEC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
- Integration of SKA messages into Post Intercept Assessment (PIA) module for delivery to the Warfighter - Development of hit and kill assessment algorithms required to add SKA to the operational MDS - Supporting engineering trade studies and concept evaluations for current and future space based sensors Specific and/or unique accomplishments to each Fiscal Year (FY) are as follows: ***FY 2020 Plans:*** - Continue on-orbit operations by experimenting and participating in MDS flight tests - Continue development of hit and kill assessment algorithms required to add SKA to the operational MDS - Continue development of capability for ground test participation required to add SKA to the operational MDS - Begin network upgrades and an operational training program - Complete build out of SKA Payload Operations Center (POC) at the MDIOC ***FY 2021 Plans:*** - Complete development of modeling and simulation capability for ground test participation required to add SKA to the operational MDS - Begin to participate in MDS ground testing to support operational declaration - Transition to POC for SKA operations - Complete operational network upgrades and training program ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The increase from FY 2020 to FY 2021 provides for participation in multi-phase ground test campaign, standing up SKA POC operations and support at the MDIOC, procurement of follow-on commercial data services, and implementing robust cyber security protection measures within operational architecture in support of full POC operations.			
Title: Space Sensor Layer (SSL)	0.000	0.000	0.000
Articles:	-	-	-
Description: Space Sensor Layer (SSL) is a future space-based missile tracking sensor/system concept to address warfighter requirements. The goal of this effort is to develop prototype space sensor concepts to: -Detect and track traditional and emerging threats -Support Missile Warning (MW)/Missile Defense (MD) mission -Leverage inherent multi-domain capabilities to provide as capable support to the Overhead Persistent Infrared (OPIR) Enterprise ***FY 2020 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD33 / *MD Space Exp Center (MDSEC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
N/A ***FY 2021 Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	17.406	26.013	30.408

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• 0603882C: *Ballistic Missile Defense Midcourse Defense Segment*	790.316	1,303.716	1,004.305	-	1,004.305	776.125	726.566	767.592	1,068.536	Continuing	Continuing
• 0603884C: *Ballistic Missile Defense Sensors*	382.759	352.288	281.957	-	281.957	576.699	656.539	574.703	593.592	Continuing	Continuing
• 0603892C: *AEGIS BMD*	724.731	737.269	814.936	-	814.936	674.825	553.402	478.000	449.145	Continuing	Continuing
• 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication*	500.965	549.756	593.353	-	593.353	593.330	546.471	581.376	543.971	Continuing	Continuing
• 0603904C: *Missile Defense Integration and Operations Center (MDIOC)*	51.689	56.161	55.356	-	55.356	55.721	57.457	59.798	61.334	Continuing	Continuing
• 0603914C: *Ballistic Missile Defense Test*	510.292	399.738	378.302	-	378.302	385.910	396.524	394.949	417.261	Continuing	Continuing
• 0603915C: *Ballistic Missile Defense Targets*	561.349	542.939	536.133	-	536.133	593.939	519.028	520.625	540.675	Continuing	Continuing

Remarks

D. Acquisition Strategy

SKA leverages experience that the Johns Hopkins University Applied Physics Laboratory (JHU/APL) has with its extensive history of performing kill assessment activities and conducting experiments associated with the Aegis BMD program. JHU/APL is the developer of the SKA experiment and its primary subcontractor will

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD33 / *MD Space Exp Center (MDSEC)*

be responsible for payload integration and hosting accommodation using a firm fixed price contract to contain costs. The SKA experiment uses a commercial satellite program as the platform host for a DOD payload, taking full advantage of a multi-billion dollar space and ground system that already exists.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD33 / *MD Space Exp Center (MDSEC)*

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
Spacebased Kill Assessment - Development and Experimentation	C/CPFF	JHU/APL : Laurel, MD	14.728	12.777	Nov 2018	10.385	Nov 2019	14.717	Nov 2020	-		14.717	Continuing	Continuing	Continuing
Spacebased Kill Assessment - Experimental Ops Team	C/CPFF	JHU/APL : Laurel, MD	0.000	1.056	Nov 2018	1.082	Nov 2019	1.072	Nov 2020	-		1.072	Continuing	Continuing	Continuing
Spacebased Kill Assessment - Integrate SKA into MDS Comms Network	C/CPFF	Various : Schriever AFB, CO	0.000	0.000		0.760	Dec 2019	0.000		-		0.000	0.000	0.760	0.760
Spacebased Kill Assessment - MDSC Support	C/CPFF	Northrop Grumman/ Jacobs : Schriever AFB, CO	0.185	0.366	Nov 2018	0.278	Nov 2019	0.301	Nov 2020	-		0.301	Continuing	Continuing	Continuing
Spacebased Kill Assessment - Post Intercept Assessment	C/CPFF	JHU/APL : Laurel, MD	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Spacebased Kill Assessment - Transition To Ops (Mission Systems)	C/Various	Various : MDA CO, AL	0.000	0.250	Jul 2019	7.384	Nov 2019	4.878	Nov 2020	-		4.878	Continuing	Continuing	Continuing
Spacebased Kill Assessment - Transition to Ops (Developer)	C/CPFF	JHU/APL : Laurel, MD	0.000	1.660	Sep 2019	4.192	Nov 2019	7.674	Nov 2020	-		7.674	Continuing	Continuing	Continuing
Space Sensor Layer (SSL) - Space Sensor Layer (SSL) - Ground Segment	C/CPAF	Jacobs : Schriever AFB	3.798	0.000		0.000		0.000		-		0.000	0.000	3.798	3.798
Space Sensor Layer (SSL) - Space Sensor Layer (SSL) - Space Prototype Concept Activity	MIPR	SMC SpEC OTA : Various	7.207	0.000		0.000		0.000		-		0.000	0.000	7.207	7.207
		Subtotal	25.918	16.109		24.081		28.642		-		28.642	Continuing	Continuing	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD33 / *MD Space Exp Center (MDSEC)*	

Support ($ 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
Spacebased Kill Assessment - Contract Support Services (CSS)	C/Various	Various : CO, VA	0.355	0.289	Nov 2018	0.722	Nov 2019	0.527	Nov 2020	-		0.527	Continuing	Continuing	Continuing
Spacebased Kill Assessment - FFRDC/ UARC	Various	Various : CO, AL, MD, VA, CA	0.786	0.753	Nov 2018	0.902	Nov 2019	0.927	Nov 2020	-		0.927	Continuing	Continuing	Continuing
Spacebased Kill Assessment - IT User Services	C/CPAF	Northrop Grumman : AK, CA, CO, HI, NM, VA	0.046	0.000		0.054	Nov 2019	0.054	Nov 2020	-		0.054	Continuing	Continuing	Continuing
Spacebased Kill Assessment - MDA Civilian	Allot	MDA : VA	0.222	0.230	Oct 2018	0.217	Oct 2019	0.220	Oct 2020	-		0.220	Continuing	Continuing	Continuing
Spacebased Kill Assessment - Program Mission Support	C/Various	Various : CO, AL, MD, VA	0.082	0.025	Oct 2018	0.037	Oct 2019	0.038	Oct 2020	-		0.038	Continuing	Continuing	Continuing
Space Sensor Layer (SSL) - Space Sensor Layer (SSL) - Contract Support Services (CSS)	C/CPFF	Various : CO, AL	4.805	0.000		0.000		0.000		-		0.000	0.000	4.805	4.805
Space Sensor Layer (SSL) - Space Sensor Layer (SSL) - FFRDC	MIPR	Various : CA, CO, NM, VA	6.766	0.000		0.000		0.000		-		0.000	0.000	6.766	6.766
Space Sensor Layer (SSL) - Space Sensor Layer (SSL) - MDA Civilian	Allot	MDA : CO, AL	0.744	0.000		0.000		0.000		-		0.000	0.000	0.744	0.744
Space Sensor Layer (SSL) - Space Sensor Layer (SSL) - Program Mission Support	C/Various	Various : CO, AL, VA	0.978	0.000		0.000		0.000		-		0.000	0.000	0.978	0.978
Space Sensor Layer (SSL) - Space Sensor Layer (SSL) - UARC	C/CPFF	Various : UT, MD	3.202	0.000		0.000		0.000		-		0.000	0.000	3.202	3.202
		Subtotal	17.986	1.297		1.932		1.766		-		1.766	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206895C / *Ballistic Missile Defense System Space Programs*	Project (Number/Name) MD33 / *MD Space Exp Center (MDSEC)*	

Support ($ 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

Remarks

N/A

	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	43.904	17.406		26.013		30.408		-		30.408	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD33 / *MD Space Exp Center (MDSEC)*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
SKA On-Orbit Check-out	✦	✦																										
SKA Experimentation - 1Q2019-4Q2019	✦	✦	✦	✦																								
SKA Experimentation - 1Q2020-4Q2020					✧	✧	✧	✧																				
MDS Integration					✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧								
FTM-44 (AEGIS 5.1, DT Intercept Flight Test)							△																					
SKA/PIA Experimentation - 1Q2021-4Q2021									✧	✧	✧	✧																
FTT-21 (TH, DT Intercept Flight Test)										△																		
FTX-26 (OT) (SN, OT Target Only Flight Test)											△																	
SKA/PIA Experimentation - 1Q2022-4Q2022													✧	✧	✧	✧												
JFTM-07 E1 (JAPAN, DT Intercept Flight Test)														△														
JFTM-07 E2 (JAPAN, DT Intercept Flight Test)														△														
GM CTV-03+ (GM, DT Interceptor Only Flight Test)														△														
FTG-17 (GM, DT Intercept Flight Test)																	△											
FTM-37 (OT) (AEGIS 5.4.1, OT Intercept Flight Test)																	△											
SKA/PIA Operations/Experimentation - 1Q2023-4Q2023																	✧	✧	✧	✧								
FTM-38 (AEGIS 5.0, DT/OT Intercept Flight Test)																			△									
FTX-38 (AEGIS BL 10 (BMD 6.0) Test)																					△							
FTG-18 (GM, DT/OT Intercept Flight Test)																					△							
SKA/PIA Operations/Experimentation - 1Q2024-4Q2024																					✧	✧	✧	✧				
FTM-30 (AEGIS 5.1, DT/OT Intercept Flight Test)								△																				
SKA/PIA Operations/Experimentation - 1Q2025-4Q2025																									✧	✧	✧	✧

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD33 / *MD Space Exp Center (MDSEC)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
SKA On-Orbit Check-out	1	2019	2	2019
SKA Experimentation - 1Q2019-4Q2019	1	2019	4	2019
SKA Experimentation - 1Q2020-4Q2020	1	2020	4	2020
MDS Integration	1	2020	4	2023
FTM-44 (AEGIS 5.1, DT Intercept Flight Test)	3	2020	3	2020
SKA/PIA Experimentation - 1Q2021-4Q2021	1	2021	4	2021
FTT-21 (TH, DT Intercept Flight Test)	2	2021	2	2021
FTX-26 (OT) (SN, OT Target Only Flight Test)	3	2021	3	2021
SKA/PIA Experimentation - 1Q2022-4Q2022	1	2022	4	2022
JFTM-07 E1 (JAPAN, DT Intercept Flight Test)	2	2022	2	2022
JFTM-07 E2 (JAPAN, DT Intercept Flight Test)	2	2022	2	2022
GM CTV-03+ (GM, DT Interceptor Only Flight Test)	2	2022	2	2022
FTG-17 (GM, DT Intercept Flight Test)	1	2023	1	2023
FTM-37 (OT) (AEGIS 5.4.1, OT Intercept Flight Test)	1	2023	1	2023
SKA/PIA Operations/Experimentation - 1Q2023-4Q2023	1	2023	4	2023
FTM-38 (AEGIS 5.0, DT/OT Intercept Flight Test)	3	2023	3	2023
FTX-38 (AEGIS BL 10 (BMD 6.0) Test)	1	2024	1	2024
FTG-18 (GM, DT/OT Intercept Flight Test)	1	2024	1	2024
SKA/PIA Operations/Experimentation - 1Q2024-4Q2024	1	2024	4	2024
FTM-30 (AEGIS 5.1, DT/OT Intercept Flight Test)	4	2020	4	2020
SKA/PIA Operations/Experimentation - 1Q2025-4Q2025	1	2025	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206895C / *Ballistic Missile Defense System Space Programs*	Project (Number/Name) MD42 / *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*	

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
MD42: *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*	-	0.000	108.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	108.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY 2019 Hypersonic and Ballistic Tracking Space Sensor (HBTSS), formerly called the Space Sensor Layer (SSL), efforts were funded in project MD37 and were funded in Project MD42 for FY 2020.

Decrease from FY 2020 to FY 2021 reflects the transfer of funding responsibility for continuation of the Hypersonic and Ballistic Tracking Space Sensor from Program Element (PE) 1206895C, Budget Project MD42, to the SDA in PE 1206410SDA.

A. Mission Description and Budget Item Justification

HBTSS will provide a resilient, flexible, global capability to detect and track hypersonic threats and boosting conventional ballistic missiles. The high quality tracking data will be handed off to the hypersonic weapons systems to allow long range engagement of the threat while enhanced tracking accuracy through missile burn out will provide the warfighting community increased capability in missile defense weapons systems engagement and higher accuracy impact predictions.

The HBTSS priority is to maintain the pace of the development schedule to meet the urgent warfighter need to address rapidly developing threats. To meet this priority, HBTSS must use high technology readiness level components, take advantage of existing government capabilities to minimize development, use a management culture that does not slow down the pace of development, and use Other Transaction Authority (OTA) to minimize contracting cycle times. OTAs allow the Government to work with traditional, non-traditional, and new space businesses to identify innovative solutions.

The HBTSS requirements are derived from United States Strategic Command (USSTRATCOM) Prioritized Capabilities List (PCL), the National Defense Authorization Act for Fiscal Year 2019, and the Joint Requirements Oversight Council (JROC) Capability Development Document (CDD) for Missile Warning (MW)/Missile Defense (MD) Overhead Persistent Infrared (OPIR).

The primary technical activity in this phase is developing the target signal-to-clutter algorithms. These algorithms will be evaluated in a Signal-chain Processing Demonstration (SCPD) in which prototype data processing subsystems will process, and distribute the mission data. This activity also includes development of prototype infrared sensor payloads and provides insight into the constellation architecture, communications approach, and preliminary command and control design aspects.

Like other MDA space sensors, HBTSS is planned to integrate with the existing Joint OPIR Ground (JOG) architecture for mission tasking and data distribution. This OPIR enterprise architecture will be integrated with the terrestrial Missile Defense System (MDS) sensors to improve missile defense architecture capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD42 / *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*

MDA is collaborating with the Defense Advanced Research Projects Agency (DARPA), the U.S. Air Force, and the SDA to develop the HBTSS capability. DARPA and Air Force research focuses on spacecraft design, constellation management, and improving industrial production capacity. MDA's research focuses on developing payloads and signal-chain processing to detect and track missile targets of interest. HBTSS will provide a capability integral to the SDA enterprise architecture.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Hypersonic and Ballistic Tracking Space Sensor (HBTSS)	0.000	108.000	0.000
Articles:	-	-	-
Description: HBTSS is a space-based missile tracking sensor/system program to address warfighter requirements. The goal of this effort is to develop prototype space sensors to: -Detect and track hypersonic threats and detect and track boosting conventional ballistic missiles -Support MW/MD mission -Support other missions, as capable -Leverage inherent multi-domain capabilities to provide as capable support to the OPIR Enterprise Specific and/or unique accomplishments to each Fiscal Year (FY) are as follows: ***FY 2020 Plans:*** - Complete Preliminary Concept Reviews - Define and initiate purchases of key long-lead components for on-orbit demonstrations - Commence flight payload development for competitive prototyping of sensor concepts - Continue development and test of signal to clutter and tracking algorithms - Continue development and implementation of ground system to support on-orbit demonstrations - Continue Phase IIa efforts to include engineering requirements development, threat modeling, HBTSS acquisition support and integration of SDA space transport layer optical crosslink communications approach ***FY 2021 Plans:*** - FY 2021 HBTSS funding is budgeted in the Space Development Agency PE 1206410SDA ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2019 efforts were funded in Budget Project MD37 Space Sensor Layer (SSL) and in this budget project MD42 in FY 2020. Decrease from FY 2020 to FY 2021 reflects the transfer of funding responsibility for continuation of HBTSS from PE 1206895C, Budget Project MD42, to the SDA in PE 1206410SDA.			
Accomplishments/Planned Programs Subtotals	0.000	108.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD42 / *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*	

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• 0603890C: *BMD Enabling Programs*	614.855	634.449	599.380	-	599.380	552.815	544.582	560.863	582.675	Continuing	Continuing
• 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication*	500.965	549.756	593.353	-	593.353	593.330	546.471	581.376	543.971	Continuing	Continuing
• 0604181C: *Hypersonic Defense*	132.612	390.204	206.832	-	206.832	107.521	111.084	115.487	118.333	Continuing	Continuing
• 1206893C: *Space Tracking and Surveillance System*	36.114	36.349	34.144	-	34.144	34.657	35.268	36.627	37.734	Continuing	Continuing

Remarks

D. Acquisition Strategy

The HBTSS acquisition approach delivers a warfighting capability in stages called spirals. Each spiral is of limited duration, capability focused, and allows the first HBTSS spiral to maintain schedule and allows future spirals to add new technology and capabilities when ready.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD42 / *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*

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
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Ground Segment	C/Various	Jacobs : Schriever AFB, CO	0.000	0.000		19.500	Feb 2020	0.000		-		0.000	0.000	19.500	19.500
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Long Lead Procurement	C/TBD	TBD : TBD	0.000	0.000		48.000	Jun 2020	0.000		-		0.000	0.000	48.000	48.000
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Phase IIa Team 1	C/FFP	Harris Corporation : Various	0.000	0.000		8.500	Feb 2020	0.000		-		0.000	0.000	8.500	8.500
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Phase IIa Team 2	C/FFP	Leidos : San Diego, CA	0.000	0.000		8.500	Feb 2020	0.000		-		0.000	0.000	8.500	8.500
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Phase IIa Team 3	C/FFP	Northrop Grumman : Los Angeles, CA	0.000	0.000		8.500	Feb 2020	0.000		-		0.000	0.000	8.500	8.500
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Phase IIa Team 4	C/FFP	Raytheon : Los Angeles, CA	0.000	0.000		8.500	Feb 2020	0.000		-		0.000	0.000	8.500	8.500
		Subtotal	0.000	0.000		101.500		0.000		-		0.000	0.000	101.500	N/A

Remarks

Decrease from FY 2020 to FY 2021 reflects the transfer of funding responsibility for continuation of the Hypersonic and Ballistic Tracking Space Sensor from Program Element (PE) 1206895C, Budget Project MD42, to the SDA in PE 1206410SDA.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD42 / *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*

Support ($ 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
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Contract Support Services (CSS)	C/Various	Various : CO, AL	0.000	0.000		1.308	Feb 2020	0.000		-		0.000	0.000	1.308	1.308
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - FFRDC/UARC	C/Various	Various : CA, CO, AL	0.000	0.000		2.806	Feb 2020	0.000		-		0.000	0.000	2.806	2.806
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - MDA Civilian	Allot	MDA : CO, AL	0.000	0.000		1.385	Feb 2020	0.000		-		0.000	0.000	1.385	1.385
Hypersonic and Ballistic Tracking Space Sensor (HBTSS) - Program Mission Support	C/Various	Various : CA, CO, AL	0.000	0.000		1.001	Feb 2020	0.000		-		0.000	0.000	1.001	1.001
		Subtotal	0.000	0.000		6.500		0.000		-		0.000	0.000	6.500	N/A

Remarks

Decrease from FY 2020 to FY 2021 reflects the transfer of funding responsibility for continuation of the Hypersonic and Ballistic Tracking Space Sensor from Program Element (PE) 1206895C, Budget Project MD42, to the SDA in PE 1206410SDA.

	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	0.000		108.000		0.000		-		0.000	0.000	108.000	N/A

Remarks

N/A

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD42 / *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
Ground System Development						✧	✧	✧	✧																			
Long Lead Procurement							✧	✧	✧																			
Preliminary Concept Review (PCR)									✧																			

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD42 / *Hypersonic & Ballistic Tracking Space Sensor (HBTSS) Prototyping*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Ground System Development	2	2020	1	2021
Long Lead Procurement	3	2020	1	2021
Preliminary Concept Review (PCR)	1	2021	1	2021

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206895C / *Ballistic Missile Defense System Space Programs*	Project (Number/Name) MD37 / *Space Sensor Layer*	

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
MD37: *Space Sensor Layer*	-	73.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	73.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY 2019 Hypersonic and Ballistic Tracking Space Sensor (HBTSS), formerly called the Space Sensor Layer (SSL) efforts were funded in this Project MD37 and were funded in Project MD42 in Fiscal Year (FY) 2020.

A. Mission Description and Budget Item Justification

The Space Sensor Layer (SSL) priority is to maintain the pace of the development schedule to meet the urgent warfighter need to address rapidly developing threats. To meet this priority, SSL must use high technology readiness level components, take advantage of existing government capabilities to minimize development, use a management culture that does not slow down the pace of development and use Other Transaction Agreements (OTA) to minimize contracting cycle times. OTAs allow the Government to work with traditional, non-traditional, and New Space businesses to identify innovative solutions.

The SSL requirements are derived from Unites States Strategic Command (USSTRATCOM) Prioritized Capabilities List (PCL), the National Defense Authorization Act for Fiscal Year 2019, and DoD requirements from the Joint Requirements Oversight Council (JROC).

The current SSL objectives are as follows:
-Complete multiple, competing Preliminary Concept Reviews (PCR) for prototype constellations at Low-Earth Orbit altitude
-Estimate the costs and schedules for developing the competing prototype systems
-Complete risk reduction activities that will enable the MDA to initiate development of the SSL prototype, if authorized and appropriated.

The primary technical activity in this phase is developing the target signal-to-clutter algorithms. These algorithms will be evaluated in a Signal Chain Processing (SCP) demonstration in which prototype data processing subsystems will process, and distribute the mission data. This activity also includes development of prototype infrared sensor payloads and provides insight into the constellation architecture, communications approach, and preliminary command and control design aspects.

MDA is working concurrently and collaboratively with the Defense Advanced Research Projects Agency (DARPA), the U.S. Air Force Space and Missile Systems Center (SMC), and the SDA. DARPA's and SMC's research focuses on spacecraft design, constellation management, and improving industrial production capacity. MDA's research focuses on developing payloads and signal chain processing to detect and track missile targets of interest.

Like other MDA space sensors, SSL is planned to integrate with the existing Joint Overhead Persistent Infrared (OPIR) Ground (JOG) architecture for mission tasking and data distribution. This OPIR enterprise architecture will be integrated with the terrestrial Missile Defense System (MDS) sensors to improve missile defense architecture capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD37 / *Space Sensor Layer*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Space Sensor Layer (SSL)	73.000	0.000	0.000
Articles:	-	-	-
Description: SSL is a future space-based missile tracking sensor/system concept to address warfighter requirements. The goal of this effort is to develop prototype space sensor concepts to: -Detect and track traditional and emerging threats -Support Missile Warning (MW)/Missile Defense (MD) mission -Leverage inherent multi-domain capabilities to provide as capable support to the OPIR Enterprise Specific and/or unique accomplishments to each FY are as follows: ***FY 2020 Plans:*** N/A ***FY 2021 Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2019 Hypersonic and Ballistic Tracking Space Sensor (HBTSS), formerly called the Space Sensor Layer (SSL) effort were funded in this Project MD37 and were funded in Budget Project MD42 in FY 2020.			
Accomplishments/Planned Programs Subtotals	73.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• 0603890C: *BMD Enabling Programs*	614.855	634.449	599.380	-	599.380	552.815	544.582	560.863	582.675	Continuing	Continuing
• 0604181C: *Hypersonic Defense*	132.612	390.204	206.832	-	206.832	107.521	111.084	115.487	118.333	Continuing	Continuing
• 1206893C: *Space Tracking and Surveillance System*	36.114	36.349	34.144	-	34.144	34.657	35.268	36.627	37.734	Continuing	Continuing

Remarks

D. Acquisition Strategy

The SSL acquisition approach delivers a warfighting capability in stages called spirals. Each spiral is of limited duration, capability focused, and allows the first SSL spiral to maintain schedule and allows future spirals to add new technology and capabilities when ready.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD37 / *Space Sensor Layer*

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
Space Sensor Layer (SSL) - Phase IIa Team 1	C/FFP	Harris Corporation : Various	0.000	16.000	Sep 2019	0.000		0.000		-		0.000	4.000	20.000	20.000
Space Sensor Layer (SSL) - Phase IIa Team 2	C/FFP	Leidos : San Diego, CA	0.000	16.000	Sep 2019	0.000		0.000		-		0.000	4.000	20.000	20.000
Space Sensor Layer (SSL) - Phase IIa Team 3	C/FFP	Northrop Grumman : Los Angeles, CA	0.000	16.000	Sep 2019	0.000		0.000		-		0.000	4.000	20.000	20.000
Space Sensor Layer (SSL) - Phase IIa Team 4	C/FFP	Raytheon : Los Angeles, CA	0.000	16.000	Sep 2019	0.000		0.000		-		0.000	4.000	20.000	20.000
		Subtotal	0.000	64.000		0.000		0.000		-		0.000	16.000	80.000	N/A

Remarks

The SSL program is a collaborative effort between the Missile Defense Agency (MDA), Defense Advanced Research Projects Agency (DARPA), Space Development Agency (SDA) and the USAF to develop the capability to detect and track evolving threats. In FY 2020, Space Sensor Layer efforts continued in Budget Project MD42, Hypersonic and Ballistic Tracking Space Sensor. Beginning in FY 2021, in accordance with Department decisions, funding responsibility has transferred from MDA to SDA for continued SSL/ HBTSS development efforts.

Support ($ 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
Space Sensor Layer (SSL) - Contract Support Services (CSS)	C/Various	Various : CO, AL	0.000	3.058	Jun 2019	0.000		0.000		-		0.000	0.000	3.058	2.640
Space Sensor Layer (SSL) - FFRDC	Various	Various : CO, CA, NM	0.000	2.746	Jun 2019	0.000		0.000		-		0.000	0.000	2.746	4.472
Space Sensor Layer (SSL) - Ground Segment	MIPR	Naval Research Lab : Washington, DC	0.000	0.400	Aug 2019	0.000		0.000		-		0.000	0.000	0.400	0.400
Space Sensor Layer (SSL) - Ground Segment Design	C/CPAF	Jacobs : Schriever AFB	0.000	0.573	Sep 2019	0.000		0.000		-		0.000	0.000	0.573	0.573
Space Sensor Layer (SSL) - MDA Civilian	Allot	MDA : CO	0.000	0.972	Nov 2018	0.000		0.000		-		0.000	0.000	0.972	1.376

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD37 / *Space Sensor Layer*

Support ($ 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
Space Sensor Layer (SSL) - Program Mission Support	Various	Various : CO	0.000	0.085	Dec 2018	0.000		0.000		-		0.000	0.000	0.085	0.289
Space Sensor Layer (SSL) - UARC	C/CPFF	Space Dynamics Lab : CO, UT	0.000	1.166	Jun 2019	0.000		0.000		-		0.000	0.000	1.166	1.063
		Subtotal	0.000	9.000		0.000		0.000		-		0.000	0.000	9.000	N/A

Remarks

The SSL program is a collaborative effort between the Missile Defense Agency (MDA), Defense Advanced Research Projects Agency (DARPA), Space Development Agency (SDA) and the USAF to develop the capability to detect and track evolving threats. In FY 2020, Space Sensor Layer efforts continued in Budget Project MD42, Hypersonic and Ballistic Tracking Space Sensor. Beginning in FY 2021, in accordance with Department decisions, funding responsibility has transferred from MDA to SDA for continued SSL/ HBTSS development efforts.

	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	73.000		0.000		0.000		-		0.000	16.000	89.000	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

The SSL program is a collaborative effort between the Missile Defense Agency (MDA), Defense Advanced Research Projects Agency (DARPA), Space Development Agency (SDA) and the USAF to develop the capability to detect and track evolving threats. In FY 2020, Space Sensor Layer efforts continued in Budget Project MD42, Hypersonic and Ballistic Tracking Space Sensor. Beginning in FY 2021, in accordance with Department decisions, funding responsibility has transferred from MDA to SDA for continued SSL/ HBTSS development efforts.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD37 / *Space Sensor Layer*

Significant Event Complete ▲ Milestone Decision Complete ★ Element Test Complete ◆ System Level Test Complete ● Complete Activity ✦
Significant Event Planned △ Milestone Decision Planned ☆ Element Test Planned ◇ System Level Test Planned ○ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
Prototype Concept Development	✧	✧	✧	✧	✧	✧	✧	✧																				
Other Transaction Award					▲																							
Concept Requirement Review						△																						
Signal Chain Processing Demonstration								△																				

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD37 / *Space Sensor Layer*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Prototype Concept Development	1	2019	4	2020
Other Transaction Award	1	2020	1	2020
Concept Requirement Review	2	2020	2	2020
Signal Chain Processing Demonstration	4	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206895C / *Ballistic Missile Defense System Space Programs*	Project (Number/Name) MC33 / *MD Space Exp Center (MDSEC)*	

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
MC33: *MD Space Exp Center (MDSEC)*	0.469	5.000	5.380	0.386	-	0.386	0.396	0.405	0.420	0.428	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2020 to FY 2021 reflects completion of cyber feasibility study and hardware replacement funded through FY 2020 Congressional Plus-Up and executing steady-state support to meet cybersecurity requirements.

A. Mission Description and Budget Item Justification

Ballistic Missile Defense System (BMDS) Space Programs Cyber Operations sustain the Missile Defense Agency (MDA) Risk Management Framework (RMF) and Security Controls Assessments (SCA)/Controls Validation Testing (CVT) activities, analysis of validation results, risk assessments and reviews of proposed Program Manager/Information System Security Manager (PM/ISSM) Plans of Action and Milestones (POA&Ms) for BMDS Space Program mission systems. Activities in this Project are necessary to comply with the Federal Information Security Management Act (FISMA).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Network / System Certification and Accreditation (C&A)	5.000	5.380	0.386
Articles:	-	-	-
Description: This activity maintains the Assessment and Authorization (A&A) and C&A data repository, capturing the RMF documentation (artifacts, validation results, and Information Assurance Risk Assessment results, and Designated Approving Authority (DAA) accreditation decisions) and POA&Ms on all MDA information systems. This activity prepares and submits C&A documentation and accreditation recommendations to the MDA Chief Information Officer (CIO) /Certification Authority and the DAA. Independent Verification and Validation team actions ensure the availability, integrity, authentication, confidentiality, and non-repudiation of the MDA mission, test, and administrative systems. Recurring accomplishments include the following: - Monitor and track cybersecurity and mitigations detailed in Information Technology security POA&Ms - Conduct cybersecurity design, engineering, and architecture planning for information technology systems - Plan and test the cybersecurity controls for space systems - Conduct SCA testing continuous monitoring of mission systems and provide POA&Ms to mitigate cybersecurity vulnerabilities Specific and/or unique accomplishments to each Fiscal Year (FY) are as follows:			
FY 2020 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MC33 / *MD Space Exp Center (MDSEC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
- Invest in MDS RDT&E mission support systems to increase protection of critical MDS data/knowledge capital ***FY 2021 Plans:*** See above ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease from FY 2020 to FY 2021 reflects completion of cyber feasibility study and hardware replacement funded through FY 2020 Congressional Plus-Up and executing steady-state support to meet cybersecurity requirements.			
Accomplishments/Planned Programs Subtotals	5.000	5.380	0.386

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MC33 / *MD Space Exp Center (MDSEC)*

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
Network / System Certification and Accreditation (C&A) - CORE Upgrade	C/CPFF	Northrop Grumman : Schriever AFB, CO	0.000	1.157	Jan 2019	0.000		0.000		-		0.000	0.000	1.157	1.157
Network / System Certification and Accreditation (C&A) - Contractor Support Services (CSS)	C/Various	Various : AL, CO, MD	0.469	0.812	Dec 2018	0.380	Nov 2019	0.386	Nov 2020	-		0.386	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A) - MDSEA Solutions	C/CPFF	Jacobs : Schriever AFB, CO	0.000	1.106	Feb 2019	0.000		0.000		-		0.000	0.000	1.106	1.106
Network / System Certification and Accreditation (C&A) - Network/Comm Assurance	Various	Various : Various	0.000	0.148	Apr 2019	1.500	Mar 2020	0.000		-		0.000	0.000	1.648	1.648
Network / System Certification and Accreditation (C&A) - SKA Communications	C/CPFF	JHU/APL : MD	0.000	0.360	Feb 2019	0.000		0.000		-		0.000	0.000	0.360	0.360
Network / System Certification and Accreditation (C&A) - Strengthening Risk Management Framework	C/CPAF	Northrop Grumman : Schriever AFB, CO	0.000	1.417	Mar 2019	3.500	Mar 2020	0.000		-		0.000	0.000	4.917	3.917
		Subtotal	0.469	5.000		5.380		0.386		-		0.386	Continuing	Continuing	N/A

Remarks

N/A

	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
Project Cost Totals	0.469	5.000		5.380		0.386		-		0.386	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206895C / *Ballistic Missile Defense System Space Programs*	Project (Number/Name) MC33 / *MD Space Exp Center (MDSEC)*	

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

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MC33 / *MD Space Exp Center (MDSEC)*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
MC33 Cyber Operations	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MC33 / *MD Space Exp Center (MDSEC)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
MC33 Cyber Operations	1	2019	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 1206895C / *Ballistic Missile Defense System Space Programs*	Project (Number/Name) MD40 / *Program-Wide Support*	

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
MD40: *Program-Wide Support*	0.749	0.740	1.172	1.274	-	1.274	1.135	1.657	2.000	2.162	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Wide Support (PWS) is allocated on a pro-rata basis across multiple Agency Program Elements (PE) each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire MDS. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the MDS as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes personnel to support global deployments performing deployment site preparation and activation, and provides facility capabilities for MDA Executing Agent locations worldwide. Other MDA wide costs include: physical and technical security; civilian drug testing; audit readiness; the Science, Technology, Engineering, and Mathematics (STEM) program; legal services and settlements; travel and agency training; office, equipment, vehicle, and warehouse leases; utilities and base operations across multiple geographic locations; commercial and ancillary facility services; management of all facility aspects regardless of lifecycle stage; supplies and maintenance; compliance with statutory environmental requirements; data and unified communications support; materiel and readiness and central property management of equipment; Facilities Sustainment, Restoration and Modernization (FSRM) program, (formerly Real Property Maintenance) to keep the Department's inventory of facilities in good working order; and similar operating expenses. PWS is allocated on a pro-rata basis across most Agency PEs and therefore fluctuates per PE by fiscal year based on the total Agency budget in that fiscal year.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Title: Program Wide Support	0.740	1.172	1.274
Articles:	-	-	-
Description: PWS contains non-headquarters management costs in support of MDA functions and activities across the entire MDS. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the MDS as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes personnel to support global deployments performing deployment site preparation and activation, and provides facility capabilities for MDA Executing Agent locations worldwide. Other MDA wide costs include: physical and technical security; civilian drug testing; audit readiness; the Science, Technology, Engineering, and Mathematics (STEM) program; legal services and settlements; travel and agency training; office, equipment, vehicle, and warehouse leases; utilities and base operations across multiple geographic locations; commercial and ancillary facility services; management of all facility aspects regardless of lifecycle stage; supplies and maintenance; compliance with statutory environmental requirements; data and unified communications support; materiel and readiness and central property management of equipment; Facilities Sustainment,			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD40 / *Program-Wide Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Restoration and Modernization (FSRM) program, (formerly Real Property Maintenance) to keep the Department's inventory of facilities in good working order; and similar operating expenses. PWS is allocated on a pro-rata basis across most Agency PEs and therefore fluctuates per PE by fiscal year based on the total Agency budget in that fiscal year. ***FY 2020 Plans:*** - SEE ABOVE. ***FY 2021 Plans:*** - SEE ABOVE. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase from FY 2020 to FY 2021 reflects the PWS allocation on a pro-rata basis across multiple Agency PE's each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.			
Accomplishments/Planned Programs Subtotals	0.740	1.172	1.274

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency			Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD40 / *Program-Wide Support*	

Support ($ 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
Program Wide Support - Agency Facilities and Maintenance	MIPR	Various : Multi: AL, CA, CO, VA	0.000	0.000		0.000		0.371	Nov 2020	-		0.371	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations Management	C/CPAF	Various Multi: AL, CA, : CO, VA	0.050	0.012	Jul 2019	0.018	Jul 2020	0.000		-		0.000	0.000	0.080	0.000
Program Wide Support - Agency Operations and Support Services	C/CPFF	Various : Multi: AL, CO, CA, VA	0.699	0.728	Apr 2019	1.154	Jul 2020	0.903	Dec 2020	-		0.903	Continuing	Continuing	Continuing
		Subtotal	0.749	0.740		1.172		1.274		-		1.274	Continuing	Continuing	N/A

Remarks

N/A

	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	0.749	0.740		1.172		1.274		-		1.274	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD40 / *Program-Wide Support*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
MD40 Program-Wide Support	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 1206895C / *Ballistic Missile Defense System Space Programs*	**Project (Number/Name)** MD40 / *Program-Wide Support*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
MD40 Program-Wide Support	1	2019	4	2025