Department of Defense
Fiscal Year (FY) 2017 Request for Additional Appropriations

March 2017

Missile Defense Agency

Defense-Wide Justification Book Volume 2a of 2

Research, Development, Test & Evaluation, Defense-Wide

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Defense-Wide
March Budget Amendment to the FY 2017 President's Budget Request for BASE + Overseas Contingency Operations (OCO)
Exhibit R-1 March Budget Amendment to the FY 2017 President's Budget Request for BASE + Overseas Contingency Operations (OCO)
Total Obligational Authority 13 Mar 2017
(Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2017 PB Request Base	FY 2017 Mar Amended Request Base	FY 2017 Revised PB Request Base	Sec
27	0603176C	Advanced Concepts and Performance Assessment	03	17,880		17,880	U
28	0603178C	Weapons Technology	03	71,843		71,843	U
29	0603179C	Advanced C4ISR	03	3,626		3,626	U
30	0603180C	Advanced Research	03	23,433	4,300	27,733	U
32	0603274C	Special Program - MDA Technology	03	83,745		83,745	U
		Advanced Technology Development		200,527	4,300	204,827	
66	0603881C	Ballistic Missile Defense Terminal Defense Segment	04	206,834	2,238	209,072	U
67	0603882C	Ballistic Missile Defense Midcourse Defense Segment	04	862,080		862,080	U
69	0603884C	Ballistic Missile Defense Sensors	04	230,077		230,077	U
70	0603890C	BMD Enabling Programs	04	401,594	7,000	408,594	U
71	0603891C	Special Programs - MDA	04	321,607	2,000	323,607	U
72	0603892C	AEGIS BMD	04	959,066		959,066	U
73	0603893C	Space Tracking & Surveillance System	04	32,129		32,129	U
74	0603895C	Ballistic Missile Defense System Space Programs	04	20,690		20,690	U
75	0603896C	Ballistic Missile Defense Command and Control, Battle Management and Communicati	04	439,617	16,650	456,267	U
76	0603898C	Ballistic Missile Defense Joint Warfighter Support	04	47,776		47,776	U
77	0603904C	Missile Defense Integration & Operations Center (MDIOC)	04	54,750		54,750	U
78	0603906C	Regarding Trench	04	8,785		8,785	U

R-1AMF: Budget Amendment to the FY 2017 President's Budget Request (Published Version), as of March 13, 2017 at 10:37:38

Defense-Wide
March Budget Amendment to the FY 2017 President's Budget Request for BASE + Overseas Contingency Operations (OCO)
Exhibit R-1 March Budget Amendment to the FY 2017 President's Budget Request for BASE + Overseas Contingency Operations (OCO)
Total Obligational Authority
(Dollars in Thousands)

13 Mar 2017

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

ine No	Program Element Number	Item	Act	FY 2017 PB Request Base	FY 2017 Mar Amended Request Base	FY 2017 Revised PB Request Base	Sec
79	0603907C	Sea Based X-Band Radar (SBX)	04	68,787	24,500	93,287	U
80	0603913C	Israeli Cooperative Programs	04	103,835		103,835	U
81	0603914C	Ballistic Missile Defense Test	04	293,441		293,441	U
82	0603915C	Ballistic Missile Defense Targets	04	563,576		563,576	U
86	0604115C	Technology Maturation Initiatives	04	90,266	9,100	99,366	U
92	0604873C	Long Range Discrimination Radar (LRDR)	04	162,012	11,150	173,162	U
93	0604874C	Improved Homeland Defense Interceptors	04	274,148		274,148	U
94	0604876C	Ballistic Missile Defense Terminal Defense Segment Test	04	63,444		63,444	U
95	0604878C	Aegis BMD Test	04	95,012		95,012	U
96	0604879C	Ballistic Missile Defense Sensor Test	04	83,250		83,250	U
97	0604880C	Land-Based SM-3 (LBSM3)	04	43,293		43,293	U
98	0604881C	AEGIS SM-3 Block IIA Co-Development	04	106,038		106,038	U
99	0604887C	Ballistic Missile Defense Midcourse Segment Test	04	56,481		56,481	U
100	0604894C	Multi-Object Kill Vehicle	04	71,513		71,513	U
102	0305103C	Cyber Security Initiative	04	969		969	U
		Advanced Component Development And Prototypes		5,661,070	72,638	5,733,708	
152	0901598C	Management HQ - MDA	06	31,160		31,160	U
		Management Support		31,160		31,160	
otal		Research, Development, Test & Eval, DW		5,892,757	76,938	5,969,695	

-1AMF: Budget Amendment to the FY 2017 President's Budget Request (Published Version), as of March 13, 2017 at 10:37:38

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

Line #	Budget Activity	Program Element Number	Program Element Title	Page
66	04	0603881C	Ballistic Missile Defense Terminal Defense Segment	Volume 2a - 3
70	04	0603890C	BMD Enabling Programs	Volume 2a - 5
71	04	0603891C	Special Programs - MDA	Volume 2a - 9
75	04	0603896C	Ballistic Missile Defense Command and Control, Battle Management & Communication	Volume 2a - 11
79	04	0603907C	Sea Based X-Band Radar (SBX)	Volume 2a - 15
86	04	0604115C	Technology Maturation Initiatives	Volume 2a - 17
92	04	0604873C	Long Range Discrimination Radar (LRDR)	Volume 2a - 21

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Program Element Title	Program Element Number	Line #	BA	Page
Advanced Research	0603180C	30	03	Volume 2a - 1
BMD Enabling Programs	0603890C	70	04	Volume 2a - 5
Ballistic Missile Defense Command and Control, Battle Management & Communication	0603896C	75	04	Volume 2a - 11
Ballistic Missile Defense Terminal Defense Segment	0603881C	66	04	Volume 2a - 3
Long Range Discrimination Radar (LRDR)	0604873C	92	04	Volume 2a - 21
Sea Based X-Band Radar (SBX)	0603907C	79	04	Volume 2a - 15
Special Programs - MDA	0603891C	71	04	Volume 2a - 9
Technology Maturation Initiatives	0604115C	86	04	Volume 2a - 17

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Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603180C *I Advanced Research*

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	23.025	18.476	17.364	27.733	-	27.733	19.870	20.529	21.131	21.494	Continuing	Continuing
MD25: *Advanced Technology Development*	23.025	17.980	16.549	26.900	-	26.900	18.908	19.487	20.047	20.362	Continuing	Continuing
MD40: *Program-Wide Support*	-	0.496	0.815	0.833	-	0.833	0.962	1.042	1.084	1.132	Continuing	Continuing

Program MDAP/MAIS Code: 362

Note

The FY 2017 increase funds the highly successful effort to transition advanced material technology to the Ballistic Missile Defense System, along with initiatives in Nano-technology (propellants, batteries, electronics, multifunctional structures, thermal management, and electro-optics) and Additive Manufacturing Technology for interceptor propulsion and structural components.

A. Mission Description and Budget Item Justification

Advanced Research conducts leading edge research and development to create and enable future missile defense capability. MDA executes this mission by capitalizing on the creativity and innovation of the brightest minds in our Nation's universities and small businesses, collaborative research partnerships between allied country academic institutions, and innovative ideas from industry. This includes a focus on facilitating the transition of technology to the Ballistic Missile Defense System (BMDS) through a Commercialization and Transition Office and the execution of the Rapid Innovation Fund Program. Advanced Research identifies priorities and balances the research portfolio in collaboration with the Agency's Chief Engineer and an Agency-wide executive level Research Council.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

FY 2017 Amended Budget Request Justification: $+4.300M is required to address Joint Emergent Operational Need requirement to ensure readiness of the BMDS. $+4.300M Project MD25 - Advanced Technology Development/Advanced Research to begin FY 2017 National Defense Authorization Act (NDAA) required development of a Hypersonic Threat Defense program. Leverages Army Night Vision Lab and other Services' investments in large Focal Panel Arrays (FPA) that can maintain high sensitivity at higher operating temperature.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603180C *I Advanced Research*

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	16.584	17.364	18.919	-	18.919
Current President's Budget	18.476	17.364	27.733	-	27.733
Total Adjustments	1.892	0.000	8.814	-	8.814
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.171	0.000			
• SBIR/STTR Transfer	-0.279	0.000			
• Other Adjustment	0.000	0.000	8.814	-	8.814

Change Summary Explanation

The FY 2017 adjustment reflects a realignment of Department of Defense priorities.

FY 2017 Amended Budget Request Justification: $+4.300M is required to address Joint Emergent Operational Need requirement to ensure readiness of the BMDS.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603881C *I Ballistic Missile Defense Terminal Defense Segment*

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	980.326	161.298	212.230	209.072	-	209.072	231.105	197.018	250.227	260.613	Continuing	Continuing
MD07: *THAAD*	928.249	140.019	200.395	192.699	-	192.699	215.417	181.703	232.169	241.539	Continuing	Continuing
MC07: *Cyber Operations*	0.799	0.389	0.652	5.605	-	5.605	3.325	4.117	3.964	4.069	Continuing	Continuing
MD06: *Patriot Advanced Capability-3 (PAC-3)*	5.526	0.960	1.154	1.130	-	1.130	1.168	1.186	1.248	1.267	Continuing	Continuing
MD40: *Program-Wide Support*	45.752	19.930	10.029	9.638	-	9.638	11.195	10.012	12.846	13.738	Continuing	Continuing

Program MDAP/MAIS Code: 362

Note

The decrease in cost in FY 2017 reflects the transfer to O&M for Terminal High Altitude Area Defense (THAAD) deployment support for previously fielded software.

A. Mission Description and Budget Item Justification

The Terminal Defense programs provide vital forward-deployable capabilities to support Regional defensive operations.

Terminal High Altitude Area Defense (THAAD) provides the only air transportable, fast reaction capability for the warfighter to provide area coverage against Short and Medium Range Ballistic Missiles within four hours of arrival. The THAAD element includes five major components: Interceptors, Launchers, Army Navy/Transportable Radar Surveillance - Type 2 (AN/TPY-2) Radars, THAAD Fire Control and Communication (TFCC), and THAAD Peculiar Support Equipment. THAAD delivered Battery #1 in FY 2009 and Battery #2 in FY 2010 to the U.S. Army at Fort Bliss, Texas, for initial fielding and training. Delivery and fielding schedule for all future batteries is detailed in THAAD Procurement Budget Exhibit. THAAD has completed the development of the THAAD 1.0 configuration and is developing the THAAD Build 2.0 capability. Continued development and integration will provide enhanced debris mitigation capability, improved interoperability with other BMDS elements, and training devices to support the THAAD Institutional Training Base. In FY 2016, MDA began a risk reduction effort to explore and to mature the design concept, validate the threat assessment, and develop a life cycle cost estimate for the proposed THAAD Follow On program. The program seeks to extend the THAAD interceptor's range to expand battlespace and defended area, increase THAAD's interoperability with other air and missile defense systems via the Army Integrated Battle Command System, and incorporate threat upgrades to keep pace with adversary advances. MDA will evaluate the technical merits of these future capability improvements and assess the proposed program's affordability before deciding whether to proceed with the full Follow-On THAAD program.

Cyber Operations sustain MDA Department of Defense (DoD) Information Assurance Certification and Accreditation Program (DIACAP) and Controls Validation Testing (CVT) activities; analysis of validation results, risk assessments; reviews of proposed Program Manager/Information Assurance Manager Plans of Action and Milestones for MDA Command and Control, Battle Management and Communications (C2BMC) mission systems; and supports THAAD certification to operate in the BMDS. Cyber Operations include non-recurring requirements from FY 2015 to FY 2017 to transition all THAAD information systems from DIACAP to DoD directed Risk Management Framework.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603881C *I Ballistic Missile Defense Terminal Defense Segment*

PAC-3 is a short range U.S. Army system capability that interfaces with the BMDS. These funds ensure PAC-3 participation in BMDS interoperability integration efforts.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

FY 2017 Amended Budget Request Justification: $+2.238M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS. $+2.238M Project MC07-Cyber Operations/BMDS Cyber Operations to implement improvements for General Service systems to strengthen Cybersecurity posture while concurrently streamlining the IT operating environment.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	163.892	228.021	230.306	-	230.306
Current President's Budget	161.298	212.230	209.072	-	209.072
Total Adjustments	-2.594	-15.791	-21.234	-	-21.234
• Congressional General Reductions	0.000	-0.191			
• Congressional Directed Reductions	0.000	-15.600			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.594	0.000			
• Other Adjustment	0.000	0.000	-21.234	-	-21.234

Change Summary Explanation

The FY 2017 reduction is primarily due to the transfer of funding to support deployed THAAD software to the Operations and Maintenance request. Additional factors include the shift of software development initiation efforts such as Message Based Regional Engagement Command and Regional Peer to Peer Engagement Coordination to align with demonstration in Flight Test THAAD-19 (FTT-19) and realignment of funding to higher Department of Defense priorities.

FY 2017 Amended Budget Request Justification: $+2.238M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency											Date: March 2017	
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 0603890C / *BMD Enabling Programs*							
COST ($ in Millions)	**Prior Years**	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	923.629	395.927	404.780	408.594	-	408.594	404.993	409.481	427.603	434.868	Continuing	Continuing
MD24: *System Engineering & Integration*	368.362	126.625	141.368	139.866	-	139.866	135.296	137.233	139.846	141.901	Continuing	Continuing
MT23: *Enabling - Test*	-	32.792	16.611	17.749	-	17.749	25.501	26.040	24.704	25.077	Continuing	Continuing
MD28: *Intelligence & Security*	69.469	38.485	40.263	41.254	-	41.254	45.192	45.654	48.462	49.348	Continuing	Continuing
MD30: *BMD Information Management Systems*	151.415	90.761	95.650	92.628	-	92.628	81.212	80.427	86.691	87.939	Continuing	Continuing
MC30: *Cyber Operations*	12.314	19.189	20.017	22.881	-	22.881	21.019	21.184	23.922	24.396	Continuing	Continuing
MD31: *Modeling & Simulation*	85.843	39.589	42.668	44.458	-	44.458	47.278	47.837	50.226	50.984	Continuing	Continuing
MC31: *M&S Cyber Operations*	-	0.204	0.225	0.253	-	0.253	0.258	0.263	0.268	0.274	Continuing	Continuing
MD32: *Quality, Safety, and Mission Assurance*	148.024	29.358	29.986	31.022	-	31.022	29.582	29.970	31.470	31.967	Continuing	Continuing
MD40: *Program-Wide Support*	88.202	18.924	17.992	18.483	-	18.483	19.655	20.873	22.014	22.982	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

The increase in Project MC30 of $2.864 million between FY 2016 to FY 2017 provides for compliance with expanding White House, Secretary of Defense, U.S. Cyber Command DoD-wide Cybersecurity Initiatives, and the Federal Information Security Management Act (FISMA). The most significant increase effort includes: $2.550 million for the tri-annual license renewal of ArcSight. This aids in the safeguarding of MDA data by providing complete visibility into activity across the Information Technology (IT) infrastructure to include but not limited to: external threats such as malware and hackers; internal threats such as data breaches and fraud; risks from application flaws and configuration changes; and compliance pressures from failed audits. This software enables MDA to collect, analyze, and assess IT security, enterprise security and non-security events for rapid identification, prioritization and response.

A. Mission Description and Budget Item Justification

The BMDS Enabling Programs provide critical products and processes needed to combine element missile defense systems into a single, integrated and layered BMDS to provide new defensive capabilities and evaluate existing capabilities against the emerging threats. Specifically, the Enabling Programs:
- Define BMDS architectures and functional requirements, conduct Analyses of Alternatives for the DoD, and provide engineering requirements, execution support, and pre- and post-mission analysis for BMD System tests
- Provide validated models and simulations for BMD System assessment
- Assess BMDS performance and deliver capabilities to the Warfighter

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603890C *I BMD Enabling Programs*

- Provide multi-disciplinary security and intelligence support for BMDS acquisition, development, test, and deployment
- Provide Information Management tools and products supporting the development of BMDS capabilities while safeguarding networks and critical program information
- Evaluate quality, technical safeguards, and mission assurance effectiveness
- Assess System ability to maintain integrity and superiority with advances in technology development

This Program Element includes support for discrimination improvement efforts, which aim to develop and field an integrated set of Element capabilities to improve BMDS effectiveness and resilience against the evolving threat. The end result will be a BMDS architecture more capable of discriminating and destroying a re-entry vehicle with a higher degree of confidence, improving Warfighter shot doctrine and preserving inventory. This effort encompasses Near-term, Mid-term, and Far-term discrimination improvements capability fielding. The discrimination improvements require a coordinated effort between Systems Engineering, Ground-based Midcourse Defense (PE 0603882C), BMD Sensors (PE 0603884C), C2BMC (PE 0603896C), Aegis BMD (PE 0603892C) and Advanced C4ISR (PE 0603179C).

MDA is conducting studies to determine optimal radar site locations for defense of the U.S. from Intercontinental Ballistic Missiles (ICBMs). The locations would include a site for deployment of a long-range discrimination radar and a potential homeport for the Sea-Based X-Band Radar (SBX) on the East Coast of the United States. The initial analysis will determine the operational areas where sensors could be placed to meet the sensor discrimination needs of the BMD system. Once this analysis is complete MDA will begin development of site scoring criteria and, in the case of the SBX, assessments of transit time and time on station for candidate home port options. MDA will then develop initial screening criteria for operations and maintenance. This will be the basis for selection of at least three sites for more detailed examination, including environmental impact studies.

MD24 Systems Engineering and Integration (SE&I) defines required system-wide behavior, validates Element system designs, and verifies and assesses BMD System capability to defend the U.S. and its friends, allies, and deployed forces from ballistic missile attacks. SE&I develops technical roadmaps, knowledge points, and capability trades at the BMDS level to balance integration and capability improvement efforts.

MT23 Enabling-Test provides BMDS test planning, execution and post-test assessment, and provides critical data for proving that missile defense works.

MD28 Intelligence and Security integrates multiple technical intelligence disciplines, such as intelligence, counterintelligence, cyber security, RDA security, and threat engineering, to identify potential threats and vulnerabilities to MDA and the BMDS and develop and implement strategies to mitigate those risks.

MD30 Information Management Systems is a critical support element to MDA's RDT&E mission. This effort provides secure and affordable enterprise information capabilities in support of the Agency's global mission. These IT functions consist of MDA secure communication networks, IT systems, special purpose processing nodes, operations and monitoring centers, and disaster recovery and continuity of operations requirements. These capabilities support the rapid deployment of the BMDS while complying with DoD initiatives of the Joint Information Environment (JIE) and the Unified Capabilities Framework to ensure MDA remains compatible with the DoD Information Network (DODIN).

MC30 Cyber Operations sustains MDA's DoD Information Assurance Certification and Accreditation Program (DIACAP) and Controls Validation Testing (CVT) activities. It also funds the MDA Security Operations Center (SOC), responsible for monitoring, managing, patching, and maintaining MDA network and core Information Technology (IT) services; issuing and tracking Technical Compliance Orders; and coordinating overarching Enterprise NetOps. The MDA Computer

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603890C *I BMD Enabling Programs*

Emergency Response Team (CERT), funded in this project, monitors the classified and unclassified information technology MDA administrative IT networks and report vulnerabilities. The MDA CERT coordinates with U.S. Cyber Command to identify and implement network vulnerability updates and patches to comply with U.S. Cyber Command vulnerabilities identified for DoD networks. The project also funds Information Assurance (IA) governance management and administrative management support, annual Agency-wide computer-based IA training and metrics reporting, implementation of Public Key Infrastructure and Enabling and Communications Security (COMSEC) related activities.

MD31 Modeling and Simulation (M&S) develops system-level models, simulations, and environments as missile defense technologies continually advance and the threat changes, and evaluates performance of the Elements, Components, and overall BMD System in support of verification, validation and accreditation. MDA's M&S program provides a cost effective means to assess and explore the performance space of the BMDS beyond what can be physically tested under current test range conditions and within the Agency's fiscal constraints. M&S conceptual simulation activities provide the capability to design and develop technologies to hedge against future missile threats.

MC31 M&S Cyber Operations provides the network/system certification and accreditation of M&S related information technology networks and systems necessary to comply with the Federal Information Security Management Act.

MD32 Quality, Safety, and Mission Assurance improves quality, safety, and mission assurance throughout the product life cycle of design, manufacturing, test and system operation, in order to achieve a safe and reliable BMD System.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

FY 2017 Amended Budget Request Justification: $+7.000M is required to address Joint Emergent Operational Need and emergency warfighting readiness requirements to ensure readiness of the BMDS.

$+6.700M Project MD24–System Engineering & Integration/Future Concepts and Planning to begin NDAA-directed efforts to develop a Hypersonic Threat Defense program. Efforts include 180 day study, verification and testing of BMDS Overhead Persistent Infrared Architecture, production of plume and hardbody signature data for threat analyses, an accelerated ATMD analysis of alternatives, leveraging DoD-level resources to augment promising technology analysis, and participation in a target of opportunity mission to obtain sensor data. This is a Joint Emergent Operational Need requirement.

$+0.300M Project MT23–Enabling -Test/Engineering & Analysis to provide additional M&S support for BMDS ground test planning and execution to ensure readiness of the BMDS.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603890C *I BMD Enabling Programs*

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	401.971	409.088	423.092	-	423.092
Current President's Budget	395.927	404.780	408.594	-	408.594
Total Adjustments	-6.044	-4.308	-14.498	-	-14.498
• Congressional General Reductions	0.000	-0.343			
• Congressional Directed Reductions	0.000	-3.965			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.651	0.000			
• SBIR/STTR Transfer	-6.695	0.000			
• Other Adjustment	0.000	0.000	-14.498	-	-14.498

Change Summary Explanation

The FY 2017 adjustment reflects a realignment of Department of Defense priorities.

FY 2017 Amended Budget Request Justification: $+7.000M is required to address Joint Emergent Operational Need and emergency warfighting readiness requirements to ensure readiness of the BMDS.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603891C / *Special Programs - MDA*

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	789.077	301.201	400.387	323.607	-	323.607	307.410	284.785	264.031	268.024	Continuing	Continuing
MD27: *Special Programs*	789.077	301.201	400.387	323.607	-	323.607	307.410	284.785	264.031	268.024	Continuing	Continuing

Program MDAP/MAIS Code: 362

Note

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	310.261	400.387	349.606	-	349.606
Current President's Budget	301.201	400.387	323.607	-	323.607
Total Adjustments	-9.060	0.000	-25.999	-	-25.999
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.567	0.000			
• SBIR/STTR Transfer	-5.493	0.000			
• Other Adjustment	0.000	0.000	-25.999	-	-25.999

Change Summary Explanation

FY 2015 reprogramming decreases PE0603891C and increases PE0603274C. Details are reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.
FY 2017 other adjustments reflect realignment to Department of Defense priorities. Details are reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

FY 2017 Amended Budget Request Justification: $+2.000M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS.

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Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency											Date: March 2017	
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 0603896C *I Ballistic Missile Defense Command and Control, Battle Management & Communication*							
COST ($ in Millions)	**Prior Years**	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	1,369.761	420.516	429.853	456.267	-	456.267	413.198	432.763	454.601	462.065	Continuing	Continuing
MD01: *Command & Control, Battle Management, Communications (C2BMC)*	1,028.662	254.080	260.100	266.312	-	266.312	232.379	240.621	255.093	255.258	Continuing	Continuing
MC01: *Cyber Operations*	0.655	0.819	0.543	0.905	-	0.905	0.942	0.979	1.018	1.058	Continuing	Continuing
MT01: *C2BMC Test*	76.296	51.890	56.318	52.727	-	52.727	55.665	53.188	55.129	56.207	Continuing	Continuing
MX01: *Command & Control, Battle Management, Communications (C2BMC) Development Support*	215.379	89.235	93.097	116.552	-	116.552	104.221	115.994	120.027	125.174	Continuing	Continuing
MD40: *Program-Wide Support*	48.769	24.492	19.795	19.771	-	19.771	19.991	21.981	23.334	24.368	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

MD01 - The decrease in funding from FY 2016 to FY 2017 is attributed to realigning funds from the Development project (MD01) to Sustainment project (MX01) to better align scope for all Integrated Logistics Support (ILS) to the Parallel Staging Network (PSN) Sustainment.

MX01 - The increase in funding from FY 2016 to FY 2017 is attributed to realigning funds from the Development project (MD01) to Sustainment project (MX01) to better align resources with scope of work. Additionally, funding increased to meet requirement to support both Spiral 6.4 and Spiral 8.2-1 operations

MT01 - The increase in funding from FY 2015 to FY 2016, along with the decrease in FY 2017 is attributed to moving forward the build-out of the Spiral 8.2 Labs located at the MDIOC to meet delivery schedule.

A. Mission Description and Budget Item Justification

The Ballistic Missile Defense Command and Control, Battle Management and Communications (C2BMC) Program provides hardware and develops software to link separate sensors and weapons into an integrated, layered missile defense system that provides greater performance and defensive coverage than is possible with stand-alone elements. The C2BMC enables the BMDS to manage complex threats, including near-simultaneous enemy missiles aimed at theater, regional, or homeland assets. The systems linked through C2BMC include Patriot, Terminal High Altitude Area Defense (THAAD), Aegis Ballistic Missile Defense (BMD), Aegis Ashore, Ground Based Midcourse Defense (GMD), and Army Integrated Air and Missile Defense Battle Command System (IBCS); and sensors such as the Army Navy/ Ground Transportable Radar Surveillance model 2 (AN/TPY-2) radar, Sea-Based X-Band Radar (SBX), Space-Based Infrared System (SBIRS), and BMDS Overhead Persistent Infra-Red (OPIR) Architecture (BOA). In FY 2015, the C2BMC Program successfully tested and activated a C2BMC Deployable Interface Node (CDIN) in

support of a second forward based AN/TPY-2 in the Pacific Command (PACOM). This capability improves homeland defense against emerging threats from North Korea and provides the Combatant Commander (CCMD) greater flexibility for regional defense in the PACOM Area of Responsibility (AOR). C2BMC delivered long haul communication upgrades to EUCOM, CENTCOM and PACOM AN/TPY-2 sites and to the Aegis Ashore site in Romania. The C2BMC Program also delivered the capability to integrate BMDS Middle East and European missile defense capabilities allowing both CCMD to leverage each other's assets.

Based on defined BMDS architectures and system specifications, C2BMC provides the warfighter the capability to plan the BMD fight while concurrently tracking all potential ballistic missile threats, and pairing any sensor with any shooter to defeat ballistic missile threats at any range, in all theaters. The C2BMC program will deliver full AN/TPY-2 X-Band radar sensor control and capabilities for improved threat object correlation to develop a common threat track from multiple sensors, with sufficient data accuracy and timeliness to enable successful engagements. The C2BMC program also works to increase coalition partners' capabilities.

The C2BMC program provides continuous incremental capability upgrades to the Warfighter via software Spirals; therefore, there are necessary overlaps in the fielded and in-development Spirals' activities. C2BMC structures software Spiral development and support cycles to meet defined fielding dates within the established Ground Test campaign schedules while allowing sufficient time for development and verification and validation test activities. The fieldings of Spirals are phased to accommodate fiscal and performance priorities, in coordination with Combatant Commanders' intent. Currently, Spiral 6.4 provides continuous global operations across five Combatant Commands (CCMDs) and supports EPAA Phases 1 and 2. The next Spiral (Spiral 8.2-1) has completed development and is currently in verification testing in preparation for scheduled fielding in FY 2017. Spiral 8.2-1 will support Enhanced Homeland Defense capability by providing increased GMD battlespace, Link 16 track reporting of additional sensors, enhanced sensor tasking to meet track quality and discrimination timeliness requirements to support GMD engagements, and space situational awareness tasking support. Spiral 8.2-1 will also provide access to the BMDS OPIR assets and upgraded SBIRS sensor data to enable much earlier cueing for radars and shooters. Spiral 8.2-3 is currently in development and is scheduled for FY 2019 delivery. Spiral 8.2-3 will enable Aegis BMD to provide a five-fold increase in defended area by providing critical sensor management and track reporting improvements for Aegis BMD Engage-on-Remote (EOR) functionality in support of EPAA Phase 3, improve OPIR-based cueing of radars and shooters in all phases of threat engagements, and provide integration with the new Army Integrated Air and Missile Defense Battle Command System (IBCS). C2BMC is conducting requirements analysis for the future Spiral 8.2-5 which will integrate and control the Long Range Discrimination Radar (LRDR) into the BMDS in the 2020 time frame. C2BMC will perform sensor management of the LRDR and fusion of LRDR sensor data into the C2BMC system tracking capability. C2BMC will update interfaces to provide appropriate LRDR-based information to the GMD Fire Control (GFC) and other BMDS elements.

C2BMC also provides the Ballistic Missile Defense (BMD) Communications Network (BCN), which connects an expanding set of sensors and weapons systems, to enable the National Command Authority and the strategic, theater, and tactical level commanders to optimally engage ballistic missile threats including near simultaneous theater, regional and homeland attacks. The BCN provides a robust, end-to-end, high availability, operational communications network infrastructure with diverse paths to rapidly share information across the global Ballistic Missile Defense System (BMDS). The C2BMC system and networks are protected from cyber-attacks by layered defenses that start with circuits comprising the BCN that are isolated from the known networks. Where the BCN and the known networks meet, layers of firewalls, encryption devices, routers and switches each with specific access control lists (ACLs), further protect the internal systems and allow only identified and approved users and systems access to the C2BMC data. Effective network management will coordinate and integrate across diverse equipment platforms, interface with other DoD communications systems, evolve information standards and capabilities, and adhere to the DoD Risk Management Framework (RMF). Defense Information Systems Agency (DISA) services are highly leveraged in providing worldwide communications.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603896C *I Ballistic Missile Defense Command and Control, Battle Management & Communication*

This Program Element includes support for discrimination improvement efforts, which aim to develop and field an integrated set of Element capabilities to improve BMDS effectiveness and resilience against the evolving threat. The end result will be a BMDS architecture more capable of discriminating and destroying a re-entry vehicle with a high degree of confidence, improving Warfighter shot doctrine and preserving inventory. This effort encompasses Near -term, Mid-term, and Far-term discrimination improvements capability fielding. The discrimination improvements require a coordinated effort between Systems Engineering (PE 0603890C), Ground-based Midcourse Defense (PE 0603882C), BMD Sensors (PE 0603884C), C2BMC, Aegis BMD (PE 0603892C) and Advanced C4ISR (PE 0603179C).

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

FY 2017 Amended Budget Request Justification: $+16.650M is required to address Joint Emergent Operational Need requirements to ensure readiness of the BMDS. $+16.650M Project MD01–C2BMC/C2BMC Development and Deployment to begin OSD Joint Rapid Acquisition Cell (JRAC)-directed efforts to develop and field a limited capability to provide missile warning and tracking of hypersonic weapons.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	428.277	450.085	461.759	-	461.759
Current President's Budget	420.516	429.853	456.267	-	456.267
Total Adjustments	-7.761	-20.232	-5.492	-	-5.492
• Congressional General Reductions	0.000	-0.378			
• Congressional Directed Reductions	0.000	-19.854			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.634	0.000			
• SBIR/STTR Transfer	-7.127	0.000			
• Other Adjustment	0.000	0.000	-5.492	-	-5.492

Change Summary Explanation

In FY2015, C2BMC received a $15M mark for Spiral 8.2-3 unjustified growth without baseline. Subsequent to baselining Spiral 8.2-3 in January 2015, program of $7.239M was restored from within the agency in support of Spiral 8.2-3 Early Development Tasks and sensor-to-host interface, cybersecurity strategy and crypto redesign and hardware redesign in support of hit assessment experimentation.

The FY 2017 adjustment reflects a realignment of Department of Defense priorities.

FY 2017 Amended Budget Request Justification: $+16.650M is required to address Joint Emergent Operational Need requirements to ensure readiness of the BMDS.

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Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603907C *I Sea Based X-Band Radar (SBX)*

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	286.017	64.610	71.266	93.287	-	93.287	73.329	70.423	85.881	74.189	Continuing	Continuing
MX46: *Sea Based X-Band Radar Development Support*	275.958	60.882	68.061	90.178	-	90.178	69.759	66.842	81.471	70.276	Continuing	Continuing
MD40: *Program-Wide Support*	10.059	3.728	3.205	3.109	-	3.109	3.570	3.581	4.410	3.913	Continuing	Continuing

Program MDAP/MAIS Code: 362

Note

N/A

A. Mission Description and Budget Item Justification

The SBX is an advanced X-Band radar that provides the capability for mid-course acquisition, tracking, discrimination and hit-assessment of ballistic missiles. The SBX radar is mounted on a mobile, ocean-going, semi-submersible platform, enabling it to cover any region of the globe. The SBX supports the Ballistic Missile Defense System (BMDS) Homeland defense mission by tracking and discriminating sophisticated Intercontinental Ballistic Missile (ICBM) threats.

SBX Test and Operational Support status includes 120-days at sea per year for BMDS flight and ground test participation while remaining recallable to an active, operational status when indications and warnings signal the need for enhanced discrimination. The SBX is located in a Pacific port when not required at sea. The SBX maintains vessel certifications for operations at sea as well as software compatibility with the BMDS.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

FY 2017 Amended Budget Request Justification: $+24.500M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS.
$+9.400M Project MX46-SBX Radar Dev Support/XBR Operations and Support to 1) extend SBX Operations to support NORTHCOM readiness requirements, 2) address emerging DoD Execution Order requiring implementation of a DoD Regional Clock for the BMDS to improve warfighter readiness by ensuring integrity and availability of positioning data, and 3) update X-Band Radar and GMD Fire Control (GFC) interfaces to the x86 architecture to resolve incompatibility and increase radar availability.
$+15.100M Project MX46-SBX Radar Dev Support/Vessel Operations and Support to 1) upgrade and obtain military certification for flight deck use for helicopters up to 16 tons, day or night without maintenance facilities (NAVAIR Level 2 Class 3) to support passenger transfer, resupply and increase radar availability

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0603907C *I Sea Based X-Band Radar (SBX)*

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	64.409	72.866	71.267	-	71.267
Current President's Budget	64.610	71.266	93.287	-	93.287
Total Adjustments	0.201	-1.600	22.020	-	22.020
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-1.600			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.275	0.000			
• SBIR/STTR Transfer	-1.074	0.000			
• Other Adjustment	0.000	0.000	22.020	-	22.020

Change Summary Explanation

The FY 2017 decrease reflects a realignment of funds from the Sea Based X-Band Radar (SBX) Program Element (0603907C) to the Long Range Discrimination Radar Program Element (0604873C) for evolving requirements to support updates to radar capability, technical requirements and configuration.

FY 2017 Amended Budget Request Justification: $+24.500M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency											Date: March 2017	
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 0604115C / *Technology Maturation Initiatives*							
COST ($ in Millions)	**Prior Years**	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	27.225	99.366	-	99.366	149.901	205.787	198.136	201.431	Continuing	Continuing
MD98: *Directed Energy Prototype Development*	-	0.000	0.000	23.744	-	23.744	46.938	80.900	66.052	60.418	Continuing	Continuing
MD99: *Discrimination Sensor Prototype Development*	-	0.000	20.467	57.382	-	57.382	69.903	109.286	115.812	127.654	Continuing	Continuing
MT99: *Technology Maturation Initiatives Test*	-	0.000	2.357	13.508	-	13.508	25.539	4.963	5.918	2.554	Continuing	Continuing
MC98: *Cyber Operations*	-	0.000	0.166	0.168	-	0.168	0.258	0.176	0.179	0.182	Continuing	Continuing
MD40: *Program Wide Support*	-	0.000	4.235	4.564	-	4.564	7.263	10.462	10.175	10.623	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

The FY 2017 increase reflects funding for directed energy prototype preliminary design completion and long lead material buys and discrimination sensor prototype build completion and aircraft integration.

A. Mission Description and Budget Item Justification

Technology Maturation Initiatives further develops technology that is matured beyond the laboratory. Technology Maturation Initiatives builds on the Reaper and Multi Spectral Targeting System-C sensor, missile tracking technology successfully developed under the Discrimination Sensor Technology program element 0603177C, improving accuracy, adding range, and conducting operationally representative airborne sensor tests. This program element also incorporates industry technology breakthroughs to develop and demonstrate low to mid power lasers on a high altitude airborne platform. Together, these advanced components and tests address complex tracking, discrimination, and boost phase kill challenges for the Ballistic Missile Defense System (BMDS) in support of the Strategic Command's Prioritized Capabilities List and address evolving threats to the homeland from the Pacific theatre.

The MDA will develop two prototype airborne platforms, a laser demonstrator to address finding, tracking and engaging boosting missiles at the standoff ranges required for missile defense and an advanced sensor demonstrator for precision tracking and discrimination of lethal objects. The advanced sensor platform utilizes the operationally proven MQ-9 Reaper to provide a viable quick reaction capability once the technology is demonstrated. The MDA will choose a laser platform from industry concepts to address different requirements; high energy laser capable, larger aperture capacity and high altitude operation.

MD98, Directed Energy Prototype Development, develops, integrates and tests laser and beam control systems on a high altitude airborne platform. This airborne platform addresses a broad spectrum of directed energy mission applications while developing a missile defense concept of operations doctrine for incorporating lasers into the BMDS. The MDA's directed energy plan incrementally demonstrates and improves the constituent components required to execute a directed energy kill chain;

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0604115C / *Technology Maturation Initiatives*

acquisition, tracking and lethality. Under the Directed Energy Prototype Development project, the Agency will select from industry concepts to integrate and test a low to mid power laser, nominally 10 to 150 kilowatts, on a high altitude airborne platform. Directed Energy Prototype Development shapes future BMDS acquisition decisions by advancing and documenting the technology readiness levels of emerging and developing technology, while simultaneously assessing the performance and contributions of the prototype systems to the BMDS architecture.

The Directed Energy prototype addresses the following BMDS priorities:
- Precisely tracking boosting missiles from launch detection through destruction
- Cost effectively killing threat missiles in boost phase before they deploy multiple re-entry vehicles or countermeasures

MD99, Discrimination Sensor Prototype Development, incrementally develops, integrates, and tests next-generation sensors and detectors on the operationally proven MQ-9 to demonstrate airborne Launch-on-Remote, Engage-on-Remote, discrimination and handover improvements for missile defense. These advanced sensors improve the probability of engagement success for stressing threats, expand the BMD battle space and increase the ability to negate larger raid sizes.

The Discrimination Sensor prototype significantly enhances the following BMDS priorities:

- Providing track information with sufficient quality for successful launch-on-remote/engage-on-remote intercepts
- End-to-end correlation of sensor track and discrimination data
- Discriminating lethal objects from countermeasures
- Timely and accurate kill assessment

MT99, Technology Maturation Initiatives Test, captures the cost to test the prototype systems developed under the Directed Energy Prototype Development and Discrimination Sensor Prototype Development projects under realistic conditions in conjunction with on-going BMDS testing and through dedicated live fire tests to inform continued prototype testing, full development and limited fielding decisions.

MC98, Cyber Operations, sustains the MDA DoD Information Assurance Certification and Accreditation Program and Controls Validation Testing activities for Technology Maturation Initiatives.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

FY 2017 Amended Budget Request Justification: $+9.100M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS. $+9.100M Project MT99-Technology Maturation Initiatives Test/Technology Maturation Initiatives Test to leverage an upcoming hypersonic test event for data collection, and to support threat model validation, detection, tracking and simulated engagement concepts evaluation to address an Emerging Threat and to investigate and demonstrate sensors and systems for integrating left and right of launch.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0604115C *I Technology Maturation Initiatives*

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	0.000	96.300	109.674	-	109.674
Current President's Budget	0.000	27.225	99.366	-	99.366
Total Adjustments	0.000	-69.075	-10.308	-	-10.308
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-69.075			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustment	0.000	0.000	-10.308	-	-10.308

Change Summary Explanation

The FY 2017 funding adjustment reflects transfers of test related costs to the BMD Test program element (0603914C), and BMD Targets program element (0603915C).

FY 2017 Amended Budget Request Justification: $+9.100M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS.

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Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0604873C / *Long Range Discrimination Radar (LRDR)*

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	-	49.606	137.564	173.162	-	173.162	310.347	76.843	98.874	102.320	Continuing	Continuing
MD96: *Long Range Discrim Radar (LRDR)*	-	49.606	131.514	161.353	-	161.353	300.338	71.133	94.843	99.080	Continuing	Continuing
MD40: *Program Wide Support*	-	0.000	6.050	11.809	-	11.809	10.009	5.710	4.031	3.240	Continuing	Continuing

Program MDAP/MAIS Code: 362

Note

Beginning in FY 2015, funding was realigned to the Long Range Discrimination Radar (LRDR) Program Element 0604873C, Project MD96, from Ballistic Missile Defense Sensors Program Element 0603884C, Project MD96.

The FY 2017 increase reflects LRDR program transition from the design phase to the production and integration phase and initiation of the purchase of subsystem components and materials.

A. Mission Description and Budget Item Justification

The Ballistic Missile Defense (BMD) Vision Study, conducted by MDA with United States Strategic Command (USSTRATCOM), identified the need to provide a Long Range Discrimination Radar (LRDR) to the BMDS to address the need to provide persistent (24 hours a day, 7 days a week, 365 days a year) precision tracking and discrimination capability. The development, integration and fielding of the LRDR will provide an improved persistent midcourse BMDS discrimination capability in the Pacific sensor architecture, optimize employment of the Ground-Based Midcourse Defense (GMD) interceptor inventory, and address evolving threats. In addition the radar will provide larger hit assessment coverage, potentially improving warfighting capability to manage the Ground Based Interceptor (GBI) inventory and improve the capacity of the BMDS.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

FY 2017 Amended Budget Request Justification: $+11.150M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS. $+11.150M Project MD96–LRDR/Long Range Discrimination Radar to purchase and install Front End Electronics (FEE) on the LRDR Primary Array to improve MDA's ability to adapt and mitigate threat growth with additional sensitivity without radar down time. Also improves system performance by reducing field installation cost (increased flexibility/supportability). Funds also provide removal of Polychlorinated Biphenyl-contaminated paint on structural steel encountered in Ballistic Missile Early Warning System (BMEWS) buildings (receive antennas not affected) in preparation for construction of LRDR.

Exhibit R-2, RDT&E Budget Item Justification: Request for Additional Appropriations 2017 Missile Defense Agency	Date: March 2017
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 0604873C *I Long Range Discrimination Radar (LRDR)*

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	50.500	137.564	154.327	-	154.327
Current President's Budget	49.606	137.564	173.162	-	173.162
Total Adjustments	-0.894	0.000	18.835	-	18.835
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.894	0.000			
• Other Adjustment	0.000	0.000	18.835	-	18.835

Change Summary Explanation

FY 2017 increase reflects a realignment of funds to the Long Range Discrimination Radar (0604873C) Program Element to address Agency priorities. This PE encompasses LRDR program transition from the design phase to the production and integration phase. During FY 2017, MDA will conduct Critical Design Reviews (CDRs) at the component, subsystem, and system levels. Following a successful system CDR, MDA will order parts based on the approved designs. MDA will begin manufacturing and testing high-volume components and will develop the major software elements. In addition, MDA will prepare site infrastructure for construction and integration activities.

FY 2017 Amended Budget Request Justification: $+11.150M is required to address emergency warfighting readiness requirements to ensure readiness of the BMDS.