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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Missile Defense Agency										Date: May 2017		
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
0400: Research, Development, Test & Evaluation, Defense-Wide I BA 4: Advanced Component Development & Prototypes (ACD&P)					PE 0603896C I Ballistic Missile Defense Command and Control, Battle Management & Communication							
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	1,786.627	425.996	456.267	430.115	-	430.115	461.275	501.956	496.411	514.139	Continuing	Continuing
MD01: Command & Control, Battle Management, Communications (C2BMC)	1,282.742	255.003	266.312	251.033	-	251.033	268.130	293.051	285.343	296.433	Continuing	Continuing
MC01: Cyber Operations	1.474	4.256	0.905	5.305	-	5.305	11.021	15.706	15.684	19.530	Continuing	Continuing
MT01: C2BMC Test	128.186	55.799	52.727	51.555	-	51.555	46.828	51.109	47.340	47.255	Continuing	Continuing
MX01: Command & Control, Battle Management, Communications (C2BMC) Development Support	300.964	96.140	116.552	103.440	-	103.440	114.132	120.070	125.220	127.736	Continuing	Continuing
MD40: Program-Wide Support	73.261	14.798	19.771	18.782	-	18.782	21.164	22.020	22.824	23.185	Continuing	Continuing
Program MDAP/MAIS Code: 362												
Note												
N/A												
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. This program element investigates concepts and performs systems engineering to address hypersonic threats. The C2BMC enables the Ballistic Missile Defense System (BMDS) to manage complex threats, including near-simultaneous enemy missiles aimed at theater, regional, or homeland assets. 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). 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 weapon system to defeat ballistic missile threats at any range, in all theaters. The C2BMC program also works to increase coalition partners' capabilities. This effort also investigates concepts and explores system engineering issues associated with innovative space applications for a missile defense intercept and defeat system.												

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Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603896C <i>I Ballistic Missile Defense Command and Control, Battle Management & Communication</i>
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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 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	429.853	439.617	413.198	-	413.198
Current President's Budget	425.996	456.267	430.115	-	430.115
Total Adjustments	-3.857	16.650	16.917	-	16.917
• 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	2.094	0.000			
• SBIR/STTR Transfer	-5.951	0.000			
• Other Adjustment	0.000	16.650	16.917	-	16.917

Change Summary Explanation

Increase in FY 2018 from PB 2017 to PB 2018 provides development and deployment of the Post Intercept Assessment (PIA) capability, Discrimination Improvements and Countermeasures Mitigation, Command & Control risk reduction efforts for NORTHCOM C2BMC mission suite, and increased C2BMC Cybersecurity measures. Also includes implementation of reduced contract spending for Mission Support Services in accordance with Department Service Requirement Review Board reductions through increased competition

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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Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MD01 / Command & Control, Battle Management, Communications (C2BMC)			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
MD01: Command & Control, Battle Management, Communications (C2BMC)	1,282.742	255.003	266.312	251.033	-	251.033	268.130	293.051	285.343	296.433	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

N/A

A. Mission Description and Budget Item Justification

This project funds the development, deployment and operational support of C2BMC capabilities required for Ballistic Missile Defense System (BMDS) planning, situational awareness, sensor management, and engagement coordination. C2BMC capabilities are traceable to baselined BMDS specifications and associated Element specifications to ensure the BMDS functions as an integrated system. C2BMC development activities culminate in three key events: simulation-based verification focused on integration testing with other BMDS elements; Site Activation Testing; and BMDS Ground Testing verifying delivery of functioning operational software packages for designated spiral deliveries to the warfighter.

Designated Capability Deliveries include:

The Robust Medium-Range Ballistic Missile (MRBM) Defense / Improved Discrimination European Phased Adaptive Approach (EPAA) Phase 1 and 2 (Spiral 6.4) is currently deployed, providing improved battle management capabilities and Planner updates. C2BMC continues to develop/update MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) capabilities to address joint emergent warfighter operational requirements.

Enhanced Homeland Defense (Spiral 8.2-1) has completed development and is currently undergoing verification testing prior to FY 2018 fielding. This spiral provides the following critical Homeland Defense capabilities: increased Ground-based Midcourse Defense (GMD) battlespace, improved threat tracking using multiple sensors communicating via Link 16, enhanced sensor tasking to meet track quality and discrimination timeliness requirements, space situational awareness tasking support, and improved cyber capabilities. Enhanced Homeland Defense (Spiral 8.2-1) integrates the BMDS Overhead Persistent Infra-Red (OPIR) Architecture (BOA) with the BMDS to enhance BMDS missile-tracking capabilities through earlier cueing of radars and weapon systems.

Fulfilling Presidential mandate, EPAA Phase 3/Engage-on-Remote (EOR) (Spiral 8.2-3) is in development and will provide EPAA Phase 3/ EOR capability in FY 2019. EPAA Phase 3/EOR (Spiral 8.2-3) will deliver critical sensor management capability, greater engagement flexibility, and a five-fold improvement in Aegis BMD defended area by enabling Aegis to use Army Navy/Ground Transportable Radar Surveillance model 2 (AN/TPY-2) data for EOR engagements. EPAA Phase 3/EOR (Spiral 8.2-3) will also improve OPIR-based cueing.

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<p>C2BMC is in preliminary design review for Long Range Discrimination Radar (LRDR) Control for Homeland Defense (Spiral 8.2-5). LRDR for Homeland Defense (Spiral 8.2-5) is scheduled for delivery in CY 2020 to support the fielding of LRDR into the BMDS. This spiral will increase homeland and regional defense capabilities by leveraging C2BMC's ability to perform sensor management and synthesize LRDR sensor data into the BMD System tracking capability and providing LRDR-based information to GMD Fire Control (GFC) and other BMDS elements. LRDR for Homeland Defense (Spiral 8.2-5) will integrate the BMDS with the new Army Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS).</p> <p>Related disciplines provide development and deployment support to C2BMC system capabilities, including the following: C2BMC International Partner system engineering is vital to ensure friends and allies are integrated to the fullest extent possible with U.S. BMDS capabilities. Collaborative system engineering, testing and fielding facilitate interoperability with North Atlantic Treaty Organization (NATO) and partner nations such as Israel and Japan. C2BMC works with these nations to define and document international interfaces that are compatible with international standards and traceable to U.S. BMDS requirements. C2BMC participates in test events and live fire exercises hosted by international partners to ensure U.S. missile defense weapons, sensors and C2 systems are interoperable with international systems. C2BMC maintains and upgrades the U.S./NATO secure data sharing gateways located at Ramstein Air Base, Germany, for missile defense operations and training. C2BMC also supports development of Japan's BMD requirements to ensure interoperability of Japanese and U.S. BMD systems (sensors, shooters, command and control (C2)) resulting in an integrated regional, operational, and strategic defense of Japan.</p> <p>C2BMC Modeling and Simulation (M&S) maintains BMDS simulation/stimulation tools and federated models to support development and verification of deployed C2BMC Spirals. The BMDS C2BMC Model (BCM) is used for Flight Test pre-mission analysis and exercises to represent a second C2 Suite for Cross-Area of Responsibility (XAOR) functionality, and supports development and integration of GMD, AN/TPY-2, and Aegis software and models. The BCM program provides a cost effective means to assess and explore the performance space of the BMDS beyond what can be physically tested.</p> <p>The C2BMC Program Element also develops the following evolutionary capabilities: C2BMC leverages BOA enhancements to enable the BMDS to keep pace with emerging threats. C2BMC develops, integrates, and tests advanced algorithms to improve discrimination capabilities and enhance the use of space-based sensor data. BOA fuses worldwide coverage of multiple SBIRS and Intelligence Community sensor data into precision three-dimensional missile tracks which C2BMC uses for radar and fire control cueing. BMDS Overhead Persistent Infra-Red Architecture software version 5.1 will provide initial boost phase tracking when delivered to the warfighter with C2BMC Enhanced Homeland Defense (Spiral 8.2-1) in FY 2018. BMDS Overhead Persistent Infra-Red Architecture software version 6.1 will extend discrimination target tracking by adding wideband sensors when delivered with EPAA Phase 3/EOR (Spiral 8.2-3) in FY 2019.</p> <p>Post Intercept Assessment (PIA) is a BMDS capability that improves engagement effectiveness by synthesizing BMDS sensor multi-phenomenology tracking and discrimination data, communicating specific cueing and tasking messages, and implementing data analysis and decision logic tasks. Through a time-phased approach, each BMDS Element incrementally develops their contributions to the PIA solution. C2BMC's primary contributions to PIA include sensor and weapon system interfaces, sensor cueing/tasking, improved track processing, development and integration of multi-phenomenology physics-based prediction models, and the assessment decision logic and integrated display for the BMDS.</p>		

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MDA will leverage existing sensors and ground infrastructure/C2 to quickly demonstrate and deploy a detection and warning capability in support of Hypersonic Defense.				
MDA's discrimination improvements effort will develop and field integrated Element capabilities to improve BMD System ability to identify lethal and non-lethal objects. In conjunction with the discrimination improvements effort, C2BMC will continue to work to integrate LRDR into the BMDS.				
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017	FY 2018
Title: C2BMC Development and Deployment		212.196	217.634	197.853
Articles:		-	-	-
Description: Provides funding for development and deployment of C2BMC capability Spirals that will link sensors and shooters to enable integrated BMDS capabilities, integrate BOA with the BMDS architecture to enhance missile tracking capabilities and enable much earlier cueing of radars and shooters, and fulfill Cybersecurity requirements. Recurring accomplishments include the following: - Development and procurement of hardware, software, and network capability - Critical design reviews - Participation in test readiness reviews, pre-test engineering and analysis of the results of ground and flight tests, wargames, and exercises in accordance with the BMDS Integrated Master Test Plan (IMTP) - Site planning, scheduling and hardware acquisition to support planned deployment of the C2BMC Spiral capabilities. - Update of BCM verification scenarios for all C2BMC Spirals deployed and under development. Specific and/or unique accomplishments for each fiscal year (FY) are as follows: FY 2016 Accomplishments: - Conducted activities listed in Description section (above). - Completed development and fielding of MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) maintenance release to support warfighter improvements and required security updates correcting vulnerabilities. - Conducted successful BMDS Overhead Persistent Infra-Red Architecture Phase 5.1 Ship Readiness Review in preparation for participating in the ground test GT-07a campaign in FY 2017. - Completed, tested, and fielded a new near-term discrimination capability to USNORTHCOM, STRATCOM, and USPACOM enabling MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) to direct discrimination tasking for strategic threats. This upgrade will increase BMDS capability when leveraged with the corresponding AN/TPY-2 software upgrade planned for FY 2017. - Conducted data collection and analysis for final assessment of discrimination technology candidates planned for Mid-term discrimination improvements. - Completed system maturation and performance characterization of the Simultaneous Correlation of Unambiguous Tracks (SCOUT) through the GMD Controlled Test Vehicle 02+ (CTV-02+) flight test and simulation data analysis activities;, successfully				

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017
<p>demonstrated unique methodology to automate track processing, correlation, and extraction of data critical for discrimination declarations in a variety of complex and data-sparse scenarios.</p> <ul style="list-style-type: none"> - Provisioned Military Satellite Communications (MILSATCOM) and redundant terrestrial communication services from C2BMC to the LRDR. - Conducted successful BMDS Overhead Persistent Infra-Red Architecture Phase 6.1 Critical Design Review and began operational software development. - Modified Enhanced Homeland Defense (Spiral 8.2-1) Two-Factor Authentication (Smart-card) capability on a classified weapon system, remote administration of the systems, remote scanning, monitoring and event response, and automate anti-virus and patch management. - Initiated EPAA Phase 3/EOR (Spiral 8.2-3), baselined in January 2015, engineering and design for the development of capabilities addressing EPAA Phase 3 requirements for EOR integration of BMDS Overhead Persistent Infra-Red Architecture Phase 6.1 wideband extended tracking, integration of the Army IBCS program, and two Warfighter Improvement Process upgrades. Capability improvements will include modifications to C2BMC track processing, Link-16 track reporting, sensor resource management, and mission planning. <p>FY 2017 Plans:</p> <p>The net increase from FY 2016 to FY 2017 is attributed to additional funding for Far Term Discrimination improvements and Hypersonic Defense initial detection and warning capability offset in part by the funding decrease to realign funds from the Development project (MD01) to the Development Support project (MX01) to better align scope for all Integrated Logistics Support (ILS) to the Parallel Staging Network (PSN) Sustainment and the completed development and fielding of MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) software maintenance release.</p> <ul style="list-style-type: none"> - Conduct activities listed in Description section (above). - Complete verification and deployment of capabilities in support of the Enhanced Homeland Defense spiral. - Complete validation testing at NORTHCOM and PACOM sites to enter system level ground testing for capability declaration - Complete assessment for Near-Term discrimination improvements capability readiness for fielding - Complete Mid-Term discrimination improvements systems engineering work and integrate element level design solutions - Complete SCOUT discrimination capability initial design and begin final design and development - Complete federated model development and begin BCM development for C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) development and verification - Complete procurement and delivery of hardware for all sites to support deployment of the Enhanced Homeland Defense spiral. -- Initiate fielding of EUCOM and CENTCOM hardware to support EPAA Phase 3 -- Integrate and test improved OPIR-based cueing of radars and shooters to add the ability to track threats in all phases of flight 			

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017
<p>-- Integrate red/blue force updates into planner to stay current with the latest threat and BMDS element updates</p> <p>-- Initiate LRDR for Homeland Defense (Spiral 8.2-5) design and development activities; technology baseline planned for CY 2016</p> <p>-- Leverage existing ground infrastructure to design/develop/deploy a detection and warning capability in support of Hypersonic Defense.</p> <p>FY 2018 Plans:</p> <p>The net decrease from FY 2017 to FY 2018 is attributed to the completed development, testing and fielding of BMDS Enhanced Homeland Defense (Spiral 8.2-1) offset in part by an increase for Discrimination Improvements and Countermeasures Mitigation, LRDR Command & Control risk reduction efforts for NORTHCOM C2BMC mission suite, and BMDS Post Intercept Assessment development.</p> <p>- Conduct activities listed in Description section (above).</p> <p>- MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4):</p> <p>-- Maintain capability to develop/deploy emergent operational requirements.</p> <p>- BMDS Enhanced Homeland Defense (Spiral 8.2-1):</p> <p>-- Integrate red/blue force updates into the Planner to stay current with the latest threat and BMDS element updates.</p> <p>- EPAA Phase 3 / EOR (Spiral 8.2-3):</p> <p>-- Complete development; initiate fielding of hardware and capability to EUCOM, CENTCOM, and PACOM and support operation.</p> <p>-- Integrate EOR capability support to Aegis 5.1.</p> <p>-- Complete BMDS Overhead Persistent Infra-Red Architecture Phase 6.1 software verification testing and Ship Readiness Review (SRR).</p> <p>-- Integrate and test improved OPIR-based cueing of radars and shooters to add the ability to track threats in all phases of flight.</p> <p>- LRDR for Homeland Defense (Spiral 8.2-5):</p> <p>-- Initiate/Conduct/complete Critical Design Review (CDR) for the following capabilities:</p> <p>--- LRDR task management</p> <p>--- Regional peer-to-peer engagement coordination.</p> <p>--- Interoperability with Sea-based X-band Radar (SBX) forward based discrimination data.</p> <p>--- 2020 Integrated Air and Missile Defense Battle Command System Engagement Operations Center (EOC) interoperability.</p> <p>--- Continue prototyping OPIR enhancements to address new threats.</p> <p>--- Integrate C2BMC capabilities with Army's IAMD Battle Command System.</p> <p>- Discrimination Improvements:</p>			

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)			FY 2016	FY 2017	FY 2018
<p>-- Mature and integrate Integrated Threat Characterization solutions that refine system track purity, accuracy and covariance consistency to support the construction and transmission of correlated systems tracks and aid the formulation of a discrimination result to attach to the system track messages.</p> <p>- PIA:</p> <p>-- Initiate PIA Phase 1 and 2 development/integration actions leveraging prototypes developed in X-Lab, to establish an operational PIA capability to mature products yielding a fielded capability that enables shoot-assess-shoot shot doctrine in BMDS Increment 7.</p> <p>- M&S:</p> <p>-- Maintain BMDS simulation/stimulation tool and federated model, and BCM to support Enhanced Homeland Defense (Spiral 8.2-1) Operation. Complete federated model development and BCM development for EPAA Phase 3/EOR (Spiral 8.2-3) development and verification. Initiate BCM development for LRDR for Homeland Defense (Spiral 8.2-5) and provide OPIR modeling simulation for ground tests.</p> <p>- International Partner System Engineering:</p> <p>-- Document international interfaces and traceability to BMDS requirements with all international mission partners, provide EPAA Phase 3 situational awareness display sustainment in accordance with bi-lateral agreements, ensure NATO technical approach is consistent with US systems as NATO modifies their C2 to meet their expanding BMD mission, and provide support for Japan BMD requirements.</p>					
<p>Title: C2BMC Communications</p> <p align="right">Articles:</p> <p>Description: The BMD Communications Network (BCN) ties together an expanding set of sensors and weapons systems to enable the National Command Authority and the commanders at the strategic, theater and tactical levels to optimally engage ballistic missile threats including near simultaneous theater, regional and homeland attacks. Recurring accomplishments include the following:</p> <p>- Provide GMD Communications Network (GCN) Long Haul Communications Transport (LHCT)) services and a robust, end-to-end, high availability, operational communications network (COMNET) infrastructure with diverse paths that quickly and unambiguously share information across the global BMDS.</p> <p>- Participate in and analyze results from events scheduled in the BMDS IMTP</p> <p>- Provide engineering and deployment support of C2BMC Deployable Interface Nodes</p> <p>- Provide BMDS communications via leased DISA circuits, and resolves real-time operational issues through DISA's Network Operations and Security Center</p>			23.957 -	28.102 -	30.872 -

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017
<p>- Provide effective network management to coordinate and integrate information across diverse equipment platforms, interface with other DoD communications systems, evolve information standards and capabilities, and adhere to the DoD Risk Management Framework (RMF).</p> <p>- Upgrade BCN capability by supporting all EPAA phases and DoD teleports to enhance satellite communications.</p> <p>Specific and/or unique accomplishments for each FY are as follows:</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> - Conducted activities listed in Description section (above). - Provided engineering support to AN/GSC-52B SATCOM terminal, Modernization Enterprise Terminal (MET), at Ramstein Air Base for connectivity via Indian Ocean Defense Satellite Communication System (DSCS) - Provided network, communications and risk management support for MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) in EUCOM, STRATCOM, NORTHCOM, PACOM, and CENTCOM - Provided support of AN/TPY-2 radar communications nodes to ensure continued performance and operations including installation of new AN/TPY-2 radar communications node at a site in Japan and installation and support of AN/GSC-52B SATCOM terminals, Modernization of Enterprise Terminal-Transportable (MET-T), at a site in Japan - Fielded Protected Anti-Jam (AJ) / Anti-Scintillation (AS) Wideband Network System (PAAWNS) to missile defense locations worldwide - Upgraded the BMD Communications Network capability (development, integration and test) to support EPAA - Upgraded DoD teleports to enhance SATCOM connectivity - Provided Cyber Net Defense (CND) requirements for Homeland Defense EPAA Phase 2. <p>FY 2017 Plans:</p> <p>The FY 2016 to FY 2017 increase is attributed to fielding of modems for the PAAWNS providing anti-jam capability for SATCOM in a nuclear environment and the completion of Phase 3 EPAA (Poland) deployment.</p> <ul style="list-style-type: none"> - Conduct activities listed in Description section (above). - Acquire network circuits to support planned Enhanced Homeland Defense (Spiral 8.2-1) capability deployment. - Continue engineering support to AN/GSC-52B SATCOM terminal, Modernization Enterprise Terminal (MET), at Ramstein Air Base via the Indian Ocean DSCS. - provide Cyber Net Defense (CND) requirements for Homeland Defense EPAA Phase 3. <p>FY 2018 Plans:</p>			

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017	FY 2018
The FY 2017 to FY 2018 increase is attributed to the hardening of communication that will provide anti-jam and anti-scintillation capability. - Conduct activities listed in Description section (above). - Provide Ground-Based Midcourse Defense support to SBX communications upgrade to replace end of life / end of sale SATCOM equipment and services. - Acquire additional network circuits to support planned EPAA Phase 3/EOR (Spiral 8.2-3) capability deployment. - Initiate planning for modern tech refresh and the next generation waveform integration.				
Title: Enterprise Sensors Lab (ESL) Articles: Description: ESL performs early integration of new capabilities for future C2BMC BOA development and soaks these capabilities against real-world Targets of Opportunity (TOOs) and MDA flight and ground tests to increase the technical maturity of critical algorithms and reduce risk. To improve the real-time utilization of all available OPIR and other Intelligence Community (IC) data, ESL and supporting activities prototype and demonstrate algorithms that fuse space, airborne, and terrestrial-based sensor data into three-dimensional (3-D) tracks in the boost and early mid-course phases of threat missile flyout, enabling sensor cueing and Launch/Engage-on-Remote (LOR/EOR) intercepts. Additionally, in support of Homeland Defense, ESL extracts features in support of PIA with a goal of enabling a shoot-look-shoot capability and discrimination assessment feedback. Recurring accomplishments include providing prototype development and predicted performance characterization for emerging MDA capabilities. Specific and/or unique accomplishments to a FY are as follows: FY 2016 Accomplishments: - Conducted activities listed in Description section (above). - Incorporated initial SBIRS Geosynchronous Earth Orbit (GEO) Scanner Wideband capability to improve 3D track accuracy. - Initiated integration of SBIRS GEO Starer Wideband sensor data and OPIR to form a more accurate 3-D tracking capability. - Initiated a study to examine infrared/radio frequency (IR/RF) fusion development to yield improved discrimination analysis. - Integrated new Discriminating Sensors Technology (DST) airborne sensor data and generated real-time 3-D tracks to support simulated Aegis BMD LOR capability as part of MDA's Advanced Technology development activity. - Enhanced prototype algorithms to extract dimmer targets from sensor data to extend the length of the track and enable additional sensor cueing opportunities. FY 2017 Plans:		13.799 -	16.306 -	15.645 -

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017	FY 2018
The increase in funding from FY 2016 to FY 2017 is attributed to the decision to change the functional allocation of interface requirements from C2BMC X-Lab to ESL and to accommodate increased TOO and flight test analysis for OPIR wideband data exploitation and aggregated discrimination capability experimentation. - Conduct activities listed in Description section (above). - Mature OPIR Enterprise tasking and cueing capability to support full spectrum of missile kill chain. - Support Director, Operational Test and Evaluation (DOT&E) directed Quick Reaction Test to develop and validate tactics, techniques, and procedures for OPIR-based precision cueing & tracking. - Initiate algorithm development to exploit new DST sensor data and cueing required to maintain target custody. - Accelerate BOA development and fielding effort to operationalize prototype missile warning and tracking capability in support of CJCS directed Joint Requirements Oversight Council Memorandum (JROCM). FY 2018 Plans: - Conduct activities listed in Description section (above). - Expand connectivity to Intelligence Community (IC) and similar architectures and mature IC sensor data processing yielding mutually beneficial real-time data sharing and more robust fused data products. - Initiate Exceedance Generation Processing (EGP) from SBIRS measurement level wideband data to improve tracking accuracy and custody for challenging threats. - Initiate physics-based algorithm improvements for missile typing which are necessary to address emerging treats. - Initiate prototype development and predicted performance characterization for Discriminating Sensors Technology and Space-based Kill Assessment (SKA).				
Title: C2BMC Experimentation Lab (X-Lab) Articles: Description: The C2BMC X-Lab explores, prototypes, and demonstrates future C2BMC technologies within C2BMC and as an integrated component with other BMDS elements. X-Lab evaluates proposed interfaces and data distribution architectures with the Joint Overhead persistent Infra-Red (OPIR) Ground (JOG), SBIRS to improve cueing efficiency and increase battlespace for Homeland Defense. The lab hosts fielded, in-development and prototype spiral development capabilities and enables flight and ground test participation for C2BMC, ESL, and OPIR products with robust connectivity to simulation frameworks, weapon systems, sensors, and operational assets. X-Lab performs early risk reduction activities resulting in on time, within budget deliveries to the C2BMC program contributing to a more effective BMDS.		5.051 -	4.270 -	6.663 -

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017		
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MD01 / <i>Command & Control, Battle Management, Communications (C2BMC)</i>		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017	FY 2018
<p>Recurring accomplishments include collection and analysis of metrics that demonstrate C2BMC performance utilizing representative Suite hardware and software, assessing prospective technologies' impact on the BMDS and characterizing C2BMC Spiral performance in advance of formal deliveries.</p> <p>Specific and/or unique accomplishments for each FY are as follows:</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> - Conducted activities listed in Description section (above). - Evaluated the efficacy of virtualization when applied to the C2BMC mission node and determined that the approach provides increased flexibility to the war fighter and extends C2BMC usage for more users without significant investments in additional hardware. - Developed advanced Link-16 EOR prototype providing options for near-term initial EOR operations with the Aegis BMD weapon system. - Assessed alternative approaches for coordinating strategic sensor task planning, execution, and coordination with missile defense regional CCMD (NORTHCOM/PACOM) tasking priorities and identified an option that met requirements and avoided software/schedule changes to the Enhanced Homeland Defense development cycle. <p>FY 2017 Plans:</p> <p>The decrease in funding from FY 2016 to FY 2017 is attributed to the decision to change the functional allocation of OPIR source track interface requirements from X-Lab to the ESL.</p> <ul style="list-style-type: none"> - Conduct activities listed in Description section (above). - Characterize the performance of engineering releases of Enhanced Homeland Defense and LRDR Control for Homeland Defense to mitigate risks early in the development and integration processes. - Assess alternative approaches for coordinating strategic sensor task planning, execution and coordination with missile defense regional CCMD (EUCOM/CENTCOM) tasking priorities. <p>FY 2018 Plans:</p> <p>The increase in funding from FY 2017 to FY 2018 is attributed to the funding increase for BMDS Post Intercept Assessment development.</p> <ul style="list-style-type: none"> - Conduct activities listed in Description section (above). - Initiate Post Intercept Assessment prototyping activities. -- Assess Link 16 engagement coordination capabilities for planning and managing the execution of Link 16 remote engagements. This effort will include EOR evaluation in a series of flight and ground tests. 				

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MD01 / <i>Command & Control, Battle Management, Communications (C2BMC)</i>	

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018
-- Evaluate interface requirements and message sets for prototype non-OPIR advanced sensors.			
Accomplishments/Planned Programs Subtotals	255.003	266.312	251.033

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

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0603177C: <i>Discrimination Sensor Technology</i>	27.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603179C: <i>Advanced C4ISR</i>	9.661	3.626	0.000	-	0.000	0.000	0.000	0.000	0.000	0	13.287
• 0603881C: <i>Ballistic Missile Defense Terminal Defense Segment</i>	197.617	209.072	230.162	-	230.162	194.328	253.778	264.377	267.254	Continuing	Continuing
• 0603882C: <i>Ballistic Missile Defense Midcourse Defense Segment</i>	1,260.480	862.080	828.097	-	828.097	630.842	651.047	567.451	551.701	Continuing	Continuing
• 0603884C: <i>Ballistic Missile Defense Sensors</i>	233.020	230.077	247.345	-	247.345	247.643	362.850	401.267	497.503	Continuing	Continuing
• 0603892C: <i>AEGIS BMD</i>	804.211	959.066	852.052	-	852.052	805.051	789.217	656.164	695.306	Continuing	Continuing
• 0603893C: <i>Space Tracking and Surveillance System</i>	27.262	32.129	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603895C: <i>Ballistic Missile Defense System Space Programs</i>	21.040	20.690	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603904C: <i>Missile Defense Integration and Operations Center (MDIOC)</i>	46.191	54.750	53.265	-	53.265	54.505	57.588	58.574	59.738	Continuing	Continuing
• 0603907C: <i>Sea Based X-Band Radar (SBX)</i>	81.265	93.287	130.695	-	130.695	114.545	126.250	97.666	97.659	Continuing	Continuing
• 0603914C: <i>Ballistic Missile Defense Test</i>	290.267	293.441	305.791	-	305.791	295.042	351.626	336.137	334.678	Continuing	Continuing
• 0603915C: <i>Ballistic Missile Defense Targets</i>	517.589	563.576	410.425	-	410.425	373.203	407.909	405.458	427.508	Continuing	Continuing

Remarks

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MD01 / <i>Command & Control, Battle Management, Communications (C2BMC)</i>
<p><u>D. Acquisition Strategy</u></p> <p>The C2BMC acquisition strategy is consistent with the Agency's capability-based acquisition strategy that emphasizes testing, incremental development, evolutionary acquisition, and knowledge-based funding. Lockheed Martin Mission Systems was the C2BMC prime contractor via an Other Transaction Agreement contract vehicle, which ended 1st quarter FY 2012. A sole source C2BMC follow-on contract to Lockheed Martin for Spiral Development, Operation and Sustainment, and Testing was awarded 1st quarter FY 2012 for an ordering period of five years through 1st quarter FY 2017. Spiral 8.2 will be fielded in three separate increments. Enhanced Homeland Defense (Spiral 8.2-1) will be fielded in FY 2018, fielding of EPAA Phase 3/EOR (Spiral 8.2-3) in FY 2019, and completion of system deployment with LRDR for Homeland Defense (Spiral 8.2-5) in FY 2021. This incremental fielding required a modification to the base contract increasing the ceiling by \$870 million and adding an additional five-year ordering period to extend the contract through first quarter FY 2022. Major team members to Lockheed are Northrop-Grumman, Boeing, Raytheon, and General Dynamics. They are charged with the development, testing, fielding, training, operations and sustainment, and cyber ops support of the C2BMC system. They perform development and testing of C2BMC products in Huntsville, AL; and Colorado Springs, CO; and provide worldwide on-site operations and maintenance support. Additionally, the Defense Information Systems Agency (DISA) supports C2BMC worldwide long-haul communications. C2BMC Program Office government, Federally Funded Research and Development Center/University Affiliated Research Center (FFRDC/UARC), and Contract Support Services (CSS) personnel are also fully integrated as part of the Prime contractor's team to function in an Integrated Product Team environment.</p>		
<p><u>E. Performance Metrics</u></p> <p>N/A</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency												Date: May 2017			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>						Project (Number/Name) MD01 / <i>Command & Control, Battle Management, Communications (C2BMC)</i>			
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
C2BMC Development and Deployment - Aggregated Discrim	Various	Various : Various	0.000	0.000		10.490	Oct 2016	7.765	Oct 2017	-		7.765	Continuing	Continuing	Continuing
C2BMC Development and Deployment - BOA Development	SS/CPAF	Northrop Grumman Space and Mission Systems : Colorado Springs, CO	6.573	6.221		10.315	Oct 2016	9.541	Oct 2017	-		9.541	Continuing	Continuing	Continuing
C2BMC Development and Deployment - C2BMC Hardware/Software Development, Integration & Test (I&T)	SS/CPIF	Lockheed Martin Team : Huntsville, AL/Colorado Springs, CO	430.125	118.395		116.863	Dec 2016	105.451	Dec 2017	-		105.451	Continuing	Continuing	Continuing
C2BMC Development and Deployment - C2BMC Integration	Various	Various : Various	160.198	0.000		0.000		0.000		-		0.000	0	160.198	0
C2BMC Development and Deployment - C2BMC Mid-Term Discrim-SCOUT	SS/CPFF	Northrop Grumman Space and Mission Systems : Huntsville, AL	9.751	19.377		4.900	Oct 2016	7.133	Aug 2018	-		7.133	Continuing	Continuing	Continuing
C2BMC Development and Deployment - C2BMC Mid-Term Discrim-SCOUT OGA	MIPR	Aviation and Missile Research Development and Engineering Center : Huntsville, AL	1.200	1.200		0.000		1.170	Dec 2017	-		1.170	Continuing	Continuing	Continuing
C2BMC Development and Deployment - Contract Support Services	SS/FFP	Cobham Analytic Solutions, ECS, CACI, CSC : Arlington, VA/ Huntsville, AL	203.362	24.505		25.026	Oct 2016	0.000		-		0.000	0	252.893	0
C2BMC Development and Deployment - Contract Support Services (CSS)	C/CPFF	MidAESS / TEAMS : Huntsville, AL; Colorado Springs, CO; NCR	0.000	0.000		0.000		22.966	Feb 2018	-		22.966	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency												Date: May 2017			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MD01 / Command & Control, Battle Management, Communications (C2BMC)					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
C2BMC Development and Deployment - Federally Funded Research & Development Centers / University Affiliated Research Center	MIPR	MITRE, IDA, ORNL, Aerospace, JHU/APL, GTRI : Arlington, VA/ Huntsville, AL/ Colorado Springs, CO	125.319	14.891		21.405	Oct 2016	16.136	Oct 2017	-		16.136	Continuing	Continuing	Continuing
C2BMC Development and Deployment - IT User Services	C/CPAF	Northrop Grumman : AL, AK, CA, CO, HI, NM, VA	0.000	4.898	Oct 2015	0.000		0.000		-		0.000	0	4.898	4.898
C2BMC Development and Deployment - MDA Civilian, Travel & PCS	Various	- : Huntsville, AL/ Colorado Springs, CO	105.335	22.709		21.635	Oct 2016	22.116	Oct 2017	-		22.116	Continuing	Continuing	Continuing
C2BMC Development and Deployment - OPIR Integration	SS/CPIF	Lockheed Martin : Huntsville, AL	0.000	0.000		1.000	Oct 2016	1.009	Oct 2017	-		1.009	Continuing	Continuing	Continuing
C2BMC Development and Deployment - Post Intercept Assessment	C/CPAF	SciTec : Newark, NJ	0.000	0.000		0.000		3.300	Nov 2017	-		3.300	Continuing	Continuing	Continuing
C2BMC Development and Deployment - Spiral Development	Various	Sandia, MDA Other : Various	0.000	0.000		6.000	Oct 2016	1.266	Oct 2017	-		1.266	Continuing	Continuing	Continuing
C2BMC Communications - Communication Equipment and Fielding	MIPR	DISA, PMDCATS, SPAWAR : Springfield, VA	107.226	13.192		12.884	Oct 2016	15.151	Jan 2018	-		15.151	Continuing	Continuing	Continuing
C2BMC Communications - BNOSC	SS/CPAF	Lockheed Martin Team / JRDC : Colorado Springs, CO	19.744	3.071		4.062	Oct 2016	4.566	Nov 2017	-		4.566	Continuing	Continuing	Continuing
C2BMC Communications - C2BMC Integration	Various	Services : DISA Agency	0.000	0.000		3.450	Oct 2016	3.665	Oct 2017	-		3.665	Continuing	Continuing	Continuing
C2BMC Communications - Communication Leases	MIPR	DISA : Arlington, VA	29.285	7.194		7.706	Oct 2016	7.490	Oct 2017	-		7.490	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency												Date: May 2017			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>						Project (Number/Name) MD01 / <i>Command & Control, Battle Management, Communications (C2BMC)</i>			

Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
C2BMC Communications - EUCOM Communications	MIPR	USAFE : Ramstein, DE	12.545	0.500		0.000		0.000		-		0.000	13.045	26.090	13.045
Enterprise Sensors Lab (ESL) - ESL	SS/CPAF	Sandia, Purdue, SciTech, DISA, Army, Navy, AMRDEC : Various	0.000	0.000		8.875	Oct 2016	8.161	Feb 2018	-		8.161	Continuing	Continuing	Continuing
Enterprise Sensors Lab (ESL) - Enterprise Sensor Lab	SS/CPAF	Northrop Grumman Space and Mission Systems : Colorado Springs, CO	30.651	13.799		7.431	Oct 2016	7.484	Oct 2017	-		7.484	Continuing	Continuing	Continuing
C2BMC Experimentation Lab (X-Lab) - X-Lab	SS/CPAF	Various / Lockheed Martin : Colorado Springs, CO	41.428	5.051		4.270	Oct 2016	6.663	Oct 2017	-		6.663	Continuing	Continuing	Continuing
Subtotal			1,282.742	255.003		266.312		251.033		-		251.033	-	-	-

Remarks

N/A

Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-

Remarks

N/A

Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency													Date: May 2017		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>					Project (Number/Name) MD01 / <i>Command & Control, Battle Management, Communications (C2BMC)</i>					

Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks N/A																	

Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-		-	-	-	-
Remarks N/A																	

	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,282.742	255.003	266.312	251.033	-	251.033	-	-	-

Remarks Funding in the All Prior Years column represents a summary of Prior Years Total Costs for active contracts, Military Interdepartmental Purchase Requests, and civilian salaries on the R-3.									
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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Missile Defense Agency																	Date: May 2017									
Appropriation/Budget Activity 0400 / 4									R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication									Project (Number/Name) MD01 / Command & Control, Battle Management, Communications (C2BMC)								
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 2016		FY 2017		FY 2018		FY 2019		FY 2020		FY 2021		FY 2022					
MD01 Command & Control, Battle Management, Communications (C2BMC)									◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇			
Spiral 8.2-1 NORTHCOM/PACOM Capability Declaration															△											
Spiral 8.2-1/Spiral 8.2-3 CENTCOM Capability Declaration																△										
Spiral 8.2-1/Spiral 8.2-3 EUCOM Capability Declaration																△										
Spiral 8.2-3 NORTHCOM/PACOM Capability Declaration																	△									
Spiral 8.2-5 Homeland Defense Capability Declaration																			△							

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Missile Defense Agency			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MD01 / <i>Command & Control, Battle Management, Communications (C2BMC)</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MD01 Command & Control, Battle Management, Communications (C2BMC)	1	2016	4	2022
Spiral 8.2-1 NORTHCOM/PACOM Capability Declaration	1	2018	1	2018
Spiral 8.2-1/Spiral 8.2-3 CENTCOM Capability Declaration	1	2019	1	2019
Spiral 8.2-1/Spiral 8.2-3 EUCOM Capability Declaration	1	2019	1	2019
Spiral 8.2-3 NORTHCOM/PACOM Capability Declaration	3	2019	3	2019
Spiral 8.2-5 Homeland Defense Capability Declaration	1	2021	1	2021

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency										Date: May 2017		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MC01 / Cyber Operations			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
MC01: Cyber Operations	1.474	4.256	0.905	5.305	-	5.305	11.021	15.706	15.684	19.530	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

N/A

A. Mission Description and Budget Item Justification

Command and Control, Battle Management and Communications (C2BMC) 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 MDA C2BMC 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 2016	FY 2017	FY 2018
Title: Network/System Certification and Accreditation (C&A)	4.256	0.905	5.305
Articles:	-	-	-
<p>Description: This activity maintains the Assessment and Authorization (A&A) and Certification and Accreditation (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 plans of action and milestones (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:</p> <ul style="list-style-type: none"> - Monitor and track cybersecurity and mitigations detailed in Information Technology security POA&Ms. - Conduct cybersecurity design, engineering, and architecture planning for C2BMC information technology systems - Plan and test the cybersecurity controls for C2BMC systems - Conduct Security Controls Assessment (SCA) testing continuous monitoring of C2BMC mission systems and provide POA&Ms to mitigate cybersecurity vulnerabilities. <p>Specific and/or unique accomplishments for each FY are as follows:</p>			
<p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> - Conducted activities listed in Description section (above). - Planned and completed test for Information Assurance (IA) controls for BMDS C2BMC systems. 			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017	
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MC01 / <i>Cyber Operations</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017
<p>- Conducted annual information assurance/cybersecurity reviews on the C2BMC enclaves to assess compliance in implementing and maintaining IA controls.</p> <p>FY 2017 Plans: The decrease in funding from FY 2016 to FY 2017 is attributed to initial purchase of software/hardware used to test the impact of Department of Defense Windows 10 baseline requirements in a development/lab environment without risk of C2BMC mission interruption. Initial lab results help produce a phased implementation strategy and a conclusion to move to a different operating system in the future.</p> <p>- Continue recurring accomplishments listed in Description section (above).</p> <p>FY 2018 Plans: The increase in funding from FY 2017 to FY 2018 is attributed to required upgrade of hardware and software to improve C2BMC network defense against cyber threats and enhance cybersecurity posture. The Department plans to implement Windows 10 Secure Host Baseline. Multiple Cybersecurity Studies are required that will ensure a more secure C2BMC system is procured and integrated into the BMDS as a part of future acquisition and development efforts. Completion of the studies will then flow to the application of security engineering principles to acquire, design, test, implement and field technical solutions throughout the systems architecture to ensure sufficient protections exist from a threat and risk based approach. Additionally, the increase will fund a NORTHCOM Mission Node to support the increased need for timely cybersecurity testing of vulnerability corrective actions, cybersecurity patching, and hardening on the C2BMC Program.</p> <p>- Conduct activities listed in Description section (above). - Initiate hardware/software upgrade to include Net Defense tool sets for real time cyber defense monitoring by the C2BMC Command Center that will support tier 3 defenders. - Acquire, design, test, implement and field technical solutions in compliance with DoD RMF.</p>			
Accomplishments/Planned Programs Subtotals		4.256	0.905
C. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MC01 / <i>Cyber Operations</i>
<p><u>D. Acquisition Strategy</u></p> <p>The C2BMC acquisition strategy is consistent with the Agency's capability-based acquisition strategy that emphasizes testing, incremental development, evolutionary acquisition, and knowledge-based funding. Lockheed Martin Mission Systems was the C2BMC prime contractor via an Other Transaction Agreement contract vehicle, which ended 1st quarter FY 2012. A sole source C2BMC follow-on contract to Lockheed Martin for Spiral Development, Operation and Sustainment, and Testing was awarded 1st quarter FY 2012 for an ordering period of five years through 1st quarter FY 2017. Spiral 8.2 will be fielded in three separate increments. Enhanced Homeland Defense (Spiral 8.2-1) will be fielded in FY 2018, fielding of EPAA Phase 3/EOR (Spiral 8.2-3) in FY 2019, and completion of system deployment with LRDR for Homeland Defense (Spiral 8.2-5) in FY 2021. This incremental fielding required a modification to the base contract increasing the ceiling by \$870 million and adding an additional five-year ordering period to extend the contract through first quarter FY 2022. Major team members to Lockheed are Northrop-Grumman, Boeing, Raytheon, and General Dynamics. They are charged with the development, testing, fielding, training, operations and sustainment, and cyber ops support of the C2BMC system. They perform development and testing of C2BMC products in Huntsville, AL; and Colorado Springs, CO; and provide worldwide on-site operations and maintenance support. Additionally, the Defense Information Systems Agency (DISA) supports C2BMC worldwide long-haul communications. C2BMC Program Office government, Federally Funded Research and Development Center/University Affiliated Research Center (FFRDC/UARC), and Contract Support Services (CSS) personnel are also fully integrated as part of the Prime contractor's team to function in an Integrated Product Team environment.</p> <p><u>E. Performance Metrics</u></p> <p>N/A</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency												Date: May 2017			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MC01 / Cyber Operations					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Network/System Certification and Accreditation (C&A) - Civ Cyber Labor	Various	MDA Other : Various	0.211	0.000		0.348		0.352		-		0.352	Continuing	Continuing	Continuing
Network/System Certification and Accreditation (C&A) - IA/ CND Network/System C&A	C/CPFF	Torch Technologies : Colorado Springs, CO / Huntsville, AL	1.263	4.256		0.557	Jul 2017	0.562	Jul 2018	-		0.562	Continuing	Continuing	Continuing
Network/System Certification and Accreditation (C&A) - Information Assurance	SS/CPAF	Lockheed Martin : Colorado Springs, CO / Huntsville, AL	0.000	0.000		0.000		4.391	Jan 2018	-		4.391	Continuing	Continuing	Continuing
Subtotal			1.474	4.256		0.905		5.305		-		5.305	-	-	-
Remarks N/A															
			Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			1.474	4.256		0.905		5.305		-		5.305	-	-	-
Remarks N/A															

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Missile Defense Agency														Date: May 2017																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Missile Defense Agency			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MC01 / <i>Cyber Operations</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MC01 Cyber Operations	1	2016	4	2022

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency										Date: May 2017			
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MT01 / C2BMC Test				
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost	
MT01: C2BMC Test	128.186	55.799	52.727	51.555	-	51.555	46.828	51.109	47.340	47.255	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
Note N/A													
A. Mission Description and Budget Item Justification TESTING Command and Control, Battle Management and Communications (C2BMC) supports system flight and ground testing, wargames, and exercises as detailed in the MDA Integrated Master Test Plan (IMTP) to ensure C2BMC capabilities delivered are consistent with the Prioritized Capabilities List and are interoperable with other Ballistic Missile Defense System (BMDS) components. LAB INFRASTRUCTURE C2BMC gains efficiencies and minimizes laboratory resource requirements (footprint, personnel, and hardware) by utilizing the C2BMC test bed infrastructure as the laboratory environment supporting System Test, Development, and Sustainment. For System Ground and Flight Test, the labs are used for pre-test analysis, test execution and post-test analysis. For Development, the labs are utilized for software verification and validation testing and system integration testing. For Sustainment, the labs are used to assist with root cause determination for issues discovered on the fielded system and validation of any required software patches.													
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)									FY 2016	FY 2017	FY 2018		
Title: Integrated Master Test Plan Articles: Description: This activity funds C2BMC participation in BMDS flight and ground testing, wargames and exercises, and resources in accordance with the BMDS IMTP. Recurring accomplishments include: Test Execution: - Assess BMDS interoperability, integration, and functionality in lab and distributed environments, leveraging a complex set of scenarios to test the limits of the C2BMC system. Participate in and analyze results of ground tests and flight tests in accordance with the BMDS IMTP. Support all phases of the MDA Ground Test Concept of Operations (CONOPS) and the MDA Flight Test CONOPS. Provide Flight Test Predictive Analysis support. Generate, test, and distribute federated model compatible scenarios for Ground Test and Flight Test Experimentation test support. Use BMDS C2BMC Model (BCM) to support exercise integration testing activities including test case and scenario checkout.									55.799	52.727	51.555		
									-	-	-		

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017		
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication	Project (Number/Name) MT01 / C2BMC Test		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017	FY 2018
<p>Enterprise Sensors Laboratory (ESL):</p> <p>- Utilizing the ESL, plan, coordinate, and provide test operations to demonstrate prototype algorithms through flight tests, ground tests and real-world targets of opportunity. The development plans for algorithm improvements focus on track and measurement level sensor data fusion and feature extraction to improve 3-d track formation utilizing a variety of space, airborne, and terrestrial-based sensors. Results from the tests and experiments are provided back to the algorithms development activity to enable algorithm refinement.</p> <p>Experimentation Lab (X-Lab):</p> <p>- Utilizing the X-Lab, plan, coordinate, and provide test operations to demonstrate maturing C2BMC technologies and software builds within an integrated C2BMC environment through flight tests, ground tests and real-world targets of opportunity before incorporation into formal C2BMC spiral builds. The development plans for C2BMC improvements focus on the BMDS Post Intercept Assessment (PIA) capability, architecture improvements, and C2BMC algorithm improvements to mitigate development risk. Results from the tests and experiments are provided back to the C2BMC and X-Lab development activity.</p> <p>Wargame and Exercises:</p> <p>- Participate in wargames and exercises using current and future C2BMC architectures to support all requesting combatant commands, NATO partners, and Host Nations allowing warfighters to validate Ballistic Missile Defense (BMD) Techniques, Tactics, and Procedures (TTP) specific to all designated Areas of Operations (AOs) to include current and future C2BMC architectures.</p> <p>Resources:</p> <p>- Continue the development and upgrades in the C2BMC Testbed (CTB) to support flight & ground tests. Continue Cyber Testing in the CTB to support continuous C2BMC spiral development. Continue C2BMC and NATO planning demonstrations and support to NATO live fire events. Provide Situational Awareness (SA) Node sustainment for the BMDS increment development to support ongoing planning and cooperation in the development and enhancement of interoperability between U.S. BMD systems and the NATO BMD systems. Provide infrastructure, network, and troubleshooting support to C2BMC Command Center (CCC), to include the BMDS Network Operations and Security Center (BNOSC), System Test and Operations Center (STOC), C2BMC System Support Center (CSSC), BMDS Communications Network (BCN), Distributed Multi-Echelon Distributed Training system (DMETS) Infrastructure, and the Distributed Training system (DTS).</p> <p>Specific and/or unique accomplishments for each FY are as follows:</p> <p>FY 2016 Accomplishments:</p> <p>- Completed the GTD-06 P2 campaign testing the C2BMC Spiral 6.4-3.</p>				

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017	
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MT01 / <i>C2BMC Test</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017
<ul style="list-style-type: none"> - Participated in FTO-02 Events 1 and 2 to evaluate the C2BMC contribution to successful engagement of the target. - Participated in GM CTV-02+ to provide accurate and timely status of BMDS under test and situational awareness to CCMD displays. - Demonstrated IRBM engagement, and assessed C4ISR capability using space sensors for discrimination. - Initiated GT-07a Campaign to support the C2BMC S8.2-1 Test Capability Decision (TCD). - Initiated Planning of FTT-15/ FTT-18, and FTG-15. <p>ESL:</p> <ul style="list-style-type: none"> - Demonstrated prototype algorithm performance for track and measurement level sensor data fusion and feature extraction through six flight tests and over 300 real-world targets of opportunities and provided test and demonstration results back to the algorithms development activity to enable algorithm refinement. <p>X-Lab:</p> <ul style="list-style-type: none"> - Cooperatively executed multiple Hardware in the Loop and flight tests with ESL and Discrimination Sensor Technology (DST) to provide the C2BMC enterprise track reporting to support remote engagement simulations with Aegis BMD. - Conducted an experiment during GM CTV-02+. <p>Resources:</p> <ul style="list-style-type: none"> - Provided engineering, design, and installation of C2BMC Spiral 8.2-1; build-out of BMDS Overhead Persistent Infra-Red Architecture Phase 5.1; and EUCOM Region upgrades. <p>FY 2017 Plans:</p> <p>The decrease in funding from FY 2016 to FY 2017 is attributed to an adjustment from the IMTP Flight Test Program as well as moving up Spiral 8.2 build-out of labs located at the Missile Defense Integration and Operations Center (MDIOC) to meet delivery schedule.</p> <p>Test Execution:</p> <ul style="list-style-type: none"> - Through ground testing, assess the quality and completeness of message traffic between C2BMC Enhanced Homeland Defense (Spiral 8.2-1) and Army/Navy Transportable Radar Surveillance model 2 (AN/TPY-2) (FBM). - Demonstrate the contribution of C2BMC to completion of GBI engagement in a flight test event. - Demonstrate the capability of C2BMC to exchange data in accordance with BMDS specifications and System Interface Control Documents (SICDs), and demonstrate C2BMC Link 16 functionality to report system tracks to THAAD in a flight test event. - Assess the C4ISR capability using space sensors to discriminate target. - Initiate ground test planning to demonstrate C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) ability to provide Aegis BL 9C.2 Engage on Remote (EOR) and improved BOA sensor processing, and to support EPAA Phase 3/EOR (Spiral 8.2-3) fielding decision. <p>FY 2018 Plans:</p>			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MT01 / <i>C2BMC Test</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018
<p>Test Execution:</p> <ul style="list-style-type: none"> - Integrate and test the BMDS OPIR Architecture to enable earlier cueing of sensor and shooter, improve threat tracking, and provide source information for discrimination processing. - Participate in GM, Intercept Flight Test to support the remaining Increment 4, BMDS Enhanced Homeland Defense Increment, and the fielding of Enhanced Homeland Defense (Spiral 8.2-1) in NORTHCOM/PACOM by testing the following capabilities: Engagement support tasking; BMD planning, SBIRS Increment 2 interface change and communications enhancements; AN/TPY-2 Forward-Based Mode (FBM) Space Situational Awareness (SSA); Unified Client for net-centric operations; new C2BMC infrastructure and architecture update. - Continue the execution of BMDS Ground Test, participate in OTA, Intercept Flight Test, and Cycle 2/Cycle 5 testing of C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) suite to support Increment 5, European Phased Adapted Approach (EPAA) Phase 3 Situational Awareness (SA) Node sustainment and Robust IRBM Defense, fielding of C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) in NORTHCOM/PACOM and EUCOM/CENTCOM. - Demonstrate Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) capability utilizing X-Lab and ESL to provide adequate track quality to cue a Launch on Remote (LoR) using sensor data, as well as the ability to support a Post Intercept Assessment using C4ISR labs/algorithms to cue sensors to collect/process data, in order to support future Increments. - Participate in a baseline of 4 flight test events to characterize performance and obtain experimental results that will be used to mature algorithms that fuse space, airborne, and terrestrial-based sensor data into 3D tracks in the boost and early mid-course phases of threat missile flyout. - Support EPAA Phase 3 Technical Capability Declaration. 			
Accomplishments/Planned Programs Subtotals	55.799	52.727	51.555

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

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0603177C: <i>Discrimination Sensor Technology</i>	27.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603179C: <i>Advanced C4ISR</i>	9.661	3.626	0.000	-	0.000	0.000	0.000	0.000	0.000	0	13.287
• 0603882C: <i>Ballistic Missile Defense Midcourse Defense Segment</i>	1,260.480	862.080	828.097	-	828.097	630.842	651.047	567.451	551.701	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency								Date: May 2017			
Appropriation/Budget Activity 0400 / 4				R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>				Project (Number/Name) MT01 / <i>C2BMC Test</i>			

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

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0603884C: <i>Ballistic Missile Defense Sensors</i>	233.020	230.077	247.345	-	247.345	247.643	362.850	401.267	497.503	Continuing	Continuing
• 0603890C: <i>BMD Enabling Programs</i>	406.326	408.594	449.442	-	449.442	466.760	540.409	629.864	501.915	Continuing	Continuing
• 0603892C: <i>AEGIS BMD</i>	804.211	959.066	852.052	-	852.052	805.051	789.217	656.164	695.306	Continuing	Continuing
• 0603893C: <i>Space Tracking and Surveillance System</i>	27.262	32.129	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603895C: <i>Ballistic Missile Defense System Space Programs</i>	21.040	20.690	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603904C: <i>Missile Defense Integration and Operations Center (MDIOC)</i>	46.191	54.750	53.265	-	53.265	54.505	57.588	58.574	59.738	Continuing	Continuing
• 0603907C: <i>Sea Based X-Band Radar (SBX)</i>	81.265	93.287	130.695	-	130.695	114.545	126.250	97.666	97.659	Continuing	Continuing
• 0603914C: <i>Ballistic Missile Defense Test</i>	290.267	293.441	305.791	-	305.791	295.042	351.626	336.137	334.678	Continuing	Continuing
• 0603915C: <i>Ballistic Missile Defense Targets</i>	517.589	563.576	410.425	-	410.425	373.203	407.909	405.458	427.508	Continuing	Continuing

Remarks

D. Acquisition Strategy

The C2BMC acquisition strategy is consistent with the Agency's capability-based acquisition strategy that emphasizes testing, incremental development, evolutionary acquisition, and knowledge-based funding. Lockheed Martin Mission Systems was the C2BMC prime contractor via an Other Transaction Agreement contract vehicle, which ended 1st quarter FY 2012. A sole source C2BMC follow-on contract to Lockheed Martin for Spiral Development, Operation and Sustainment, and Testing was awarded 1st quarter FY 2012 for an ordering period of five years through 1st quarter FY 2017. Spiral 8.2 will be fielded in three separate increments. Enhanced Homeland Defense (Spiral 8.2-1) will be fielded in FY 2018, fielding of EPAA Phase 3/EOR (Spiral 8.2-3) in FY 2019, and completion of system deployment with LRDR for Homeland Defense (Spiral 8.2-5) in FY 2021. This incremental fielding required a modification to the base contract increasing the ceiling by \$870 million and adding an additional five-year ordering period to extend the contract through first quarter FY 2022. Major team members to Lockheed are Northrop-Grumman, Boeing, Raytheon, and General Dynamics. They are charged with the development, testing, fielding, training, operations and sustainment, and cyber ops support of the C2BMC system. They perform development and testing of C2BMC products in Huntsville, AL; and Colorado Springs, CO; and provide worldwide on-site operations and maintenance support. Additionally, the Defense Information Systems Agency (DISA) supports C2BMC worldwide long-haul communications. C2BMC Program

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MT01 / <i>C2BMC Test</i>
<p>Office government, Federally Funded Research and Development Center/University Affiliated Research Center (FFRDC/UARC), and Contract Support Services (CSS) personnel are also fully integrated as part of the Prime contractor`s team to function in an Integrated Product Team environment.</p> <p><u>E. Performance Metrics</u> N/A</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency												Date: May 2017			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MT01 / C2BMC Test					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Remarks N/A															
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Remarks N/A															
Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Master Test Plan - BMDS Level Testing GOV	MIPR	Army/Air Force : Various	0.000	0.000		2.517	Oct 2016	2.002	Oct 2017	-		2.002	Continuing	Continuing	Continuing
Integrated Master Test Plan - Enterprise Sensors Lab Infrastructure	SS/CPAF	Northrop-Grumman Corporation : Colorado Springs, CO	6.535	6.168		22.275	Oct 2016	25.004	Oct 2017	-		25.004	Continuing	Continuing	Continuing
Integrated Master Test Plan - Enterprise Sensors Lab Infrastructure Support	MIPR	Various : VA; OH; AL; NM; CA	6.161	2.085		3.534	Oct 2016	2.517	Oct 2017	-		2.517	Continuing	Continuing	Continuing
Integrated Master Test Plan - Integrated Master Test Plan BMDS Level Testing	SS/IDIQ	Lockheed Martin Team : Huntsville, AL; Colorado Springs, CO	51.718	21.404		23.614	Jul 2017	22.032	Jul 2018	-		22.032	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency													Date: May 2017			
Appropriation/Budget Activity 0400 / 4							R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>					Project (Number/Name) MT01 / <i>C2BMC Test</i>				

Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Master Test Plan - Integrated Master Test Plan BMDS level Testing (Element/System Test Lab Facilities)	SS/CPAF	Northrop-Grumman Corporation : Colorado Springs, CO	63.772	26.142		0.787	Oct 2016	0.000		-		0.000	0	90.701	0
Subtotal			128.186	55.799		52.727		51.555		-		51.555	-	-	-

Remarks N/A															
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Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-

Remarks N/A															
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			Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			128.186	55.799		52.727		51.555		-		51.555	-	-	-

Remarks N/A															
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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Missile Defense Agency

Date: May 2017

Appropriation/Budget Activity

0400 / 4

R-1 Program Element (Number/Name)

PE 0603896C / *Ballistic Missile Defense Command and Control, Battle Management & Communication*

Project (Number/Name)

MT01 / *C2BMC Test*

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 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
GTI-ISR (16) (BMDS Ground Test)			◆																									
GTD-06 Part 2 (BMDS Ground Test)			◆																									
Warfighter TP 06 (BMDS Ground Test)					◇																							
FTX-31 (DT Tracking Exercise Flight Test)					△																							
FTT-18 (TH, Intercept Flight Test)						△																						
FTT-15 (TH, Intercept Flight Test)						△																						
FTG-15 (GM, Intercept Flight Test)						△																						
SFTM-02 (AEGIS 5.1, Intercept Flight Test)						△																						
FTX-32 (DT Tracking Exercise Flight Test)						△																						
GTI-07a (BMDS Ground Test)						◇	◇																					
FTP-13 (P8-0T4) (LTPO, Intercept Flight Test)							△																					
GTD-07a (BMDS Ground Test)							◇																					
FS 17-1 (DT Tracking Exercise Flight Test)							△																					
FTM-29 (AEGIS 5.1, Intercept Flight Test)								△																				
FE-1 (DT Tracking Exercise Flight Test)								△																				
FS 17-2 (DT Tracking Exercise Flight Test)								△																				
FS 17-4 (DT Tracking Exercise Flight Test)								△																				
Warfighter TP 07a (BMDS Ground Test)									◇																			
GTI-07b (E/C) (BMDS Ground Test)									◇	◇																		
FT0-03 E1 (OTA, Intercept Flight Test)										△																		
FTG-11 (IOT&E) (GM, Intercept Flight Test)											△																	
GTD-07b (E/C) (BMDS Ground Test)											◇	◇																
FTM-31 (AEGIS SBT, Intercept Flight Test)												△																
GTI-07b (N/P) (BMDS Ground Test)												◇																

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Missile Defense Agency															Date: May 2017																																																	
Appropriation/Budget Activity					R-1 Program Element (Number/Name)										Project (Number/Name)																																																	
0400 / 4					PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication										MT01 / C2BMC Test																																																	
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 2016					FY 2017					FY 2018					FY 2019					FY 2020					FY 2021					FY 2022																													
FT0-03 E2 (OTA, Intercept Flight Test)																				△																																												
FTM-32 (AEGIS SBT, Intercept Flight Test)																				△																																												
FTM-33 (AEGIS SBT, Intercept Flight Test)																				△																																												
GTD-07b (N/P) (BMDS Ground Test)																				◇					◇																																							
FTX-23 (AEGIS 5.1, Target Only Flight Test)																									△																																							
FTX-27 (SN, Target Only Flight Test)																									△																																							
GTI-08 (E/C) (BMDS Ground Test)																									◇					◇																																		
Warfighter TP 07b (BMDS Ground Test)																														◇																																		
GTI-08 (N/P)(BMDS Ground Test)																														◇					◇																													
FTT-19 (TH, Intercept Flight Test)																														△																																		
FTM-24 (AEGIS 5.0, Intercept Flight Test)																														△																																		
GTD-08 (E/C) (BMDS Ground Test)																														◇					◇																													
FTM-30 (AEGIS 5. 1, Intercept Flight Test)																																			△																													
GTD-08 (N/P) (BMDS Ground Test)																																			◇																													
GT-21 Sprint 1 (BMDS Ground Test)																																			◇																													
FTG-17 (IOT&E) (GM, Intercept Flight Test)																																			△																													
Warfighter TP 08 (BMDS Ground Test)																																								◇																								
GT-21 Sprint 2 (BMDS Ground Test)																																								◇																								
GT-21 Sprint 3 (BMDS Ground Test)																																								◇					◇																			
FTX-26 (SN, Target Only Flight Test)																																													△																			
FTM-38 (AEGIS 5.0, Intercept Flight Test)																																													△																			
GT-21 Sprint 4 (BMDS Ground Test)																																													◇																			
FTT-21 (TH, Intercept Flight Test)																																																		△														
GT-21 Sprint 5 (BMDS Ground Test)																																																		◇														

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Missile Defense Agency														Date: May 2017															
Appropriation/Budget Activity 0400 / 4										R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication										Project (Number/Name) MT01 / C2BMC Test									
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 2016		FY 2017		FY 2018		FY 2019		FY 2020		FY 2021		FY 2022							
GT-21 Sprint 6 (BMDS Ground Test)																					◇								
FTG-18 (GM, Intercept Flight Test)																						△							
GT-22 Sprint 1 (BMDS Ground Test)																						◇							
GT-22 Sprint 2 (BMDS Ground Test)																							◇						
GT-22 Sprint 3 (BMDS Ground Test)																							◇						
FTM-35 (AEGIS 5.1, Intercept Flight Test)																								△					
FTM-37 (IOT&E) (AEGIS 5.1, Intercept Flight Test)																								△					
GT-22 Sprint 4 (BMDS Ground Test)																								◇					
GTD-22 (E/C) (BMDS Ground Test)																								◇					

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Missile Defense Agency			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MT01 / <i>C2BMC Test</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
GTI-ISR (16) (BMDS Ground Test)	3	2016	3	2016
GTD-06 Part 2 (BMDS Ground Test)	4	2016	4	2016
Warfighter TP 06 (BMDS Ground Test)	2	2017	2	2017
FTX-31 (DT Tracking Exercise Flight Test)	2	2017	2	2017
FTT-18 (TH, Intercept Flight Test)	3	2017	3	2017
FTT-15 (TH, Intercept Flight Test)	3	2017	3	2017
FTG-15 (GM, Intercept Flight Test)	3	2017	3	2017
SFTM-02 (AEGIS 5.1, Intercept Flight Test)	3	2017	3	2017
FTX-32 (DT Tracking Exercise Flight Test)	3	2017	3	2017
GTI-07a (BMDS Ground Test)	3	2017	4	2017
FTP-13 (P8-0T4) (LTPO, Intercept Flight Test)	4	2017	4	2017
GTD-07a (BMDS Ground Test)	4	2017	4	2017
FS 17-1 (DT Tracking Exercise Flight Test)	4	2017	4	2017
FTM-29 (AEGIS 5.1, Intercept Flight Test)	1	2018	1	2018
FE-1 (DT Tracking Exercise Flight Test)	1	2018	1	2018
FS 17-2 (DT Tracking Exercise Flight Test)	1	2018	1	2018
FS 17-4 (DT Tracking Exercise Flight Test)	1	2018	1	2018
Warfighter TP 07a (BMDS Ground Test)	2	2018	2	2018
GTI-07b (E/C) (BMDS Ground Test)	2	2018	3	2018
FT0-03 E1 (OTA, Intercept Flight Test)	3	2018	3	2018
FTG-11 (IOT&E) (GM, Intercept Flight Test)	4	2018	4	2018

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Missile Defense Agency				Date: May 2017	
Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>		Project (Number/Name) MT01 / <i>C2BMC Test</i>	
		Start		End	
Events	Quarter	Year	Quarter	Year	
GTD-07b (E/C) (BMDS Ground Test)	4	2018	1	2019	
FTM-31 (AEGIS SBT, Intercept Flight Test)	1	2019	1	2019	
GTI-07b (N/P) (BMDS Ground Test)	1	2019	1	2019	
FT0-03 E2 (OTA, Intercept Flight Test)	2	2019	2	2019	
FTM-32 (AEGIS SBT, Intercept Flight Test)	3	2019	3	2019	
FTM-33 (AEGIS SBT, Intercept Flight Test)	3	2019	3	2019	
GTD-07b (N/P) (BMDS Ground Test)	3	2019	4	2019	
FTX-23 (AEGIS 5.1, Target Only Flight Test)	4	2019	4	2019	
FTX-27 (SN, Target Only Flight Test)	4	2019	4	2019	
GTI-08 (E/C) (BMDS Ground Test)	4	2019	1	2020	
Warfighter TP 07b (BMDS Ground Test)	1	2020	1	2020	
GTI-08 (N/P)(BMDS Ground Test)	2	2020	3	2020	
FTT-19 (TH, Intercept Flight Test)	3	2020	3	2020	
FTM-24 (AEGIS 5.0, Intercept Flight Test)	3	2020	3	2020	
GTD-08 (E/C) (BMDS Ground Test)	3	2020	4	2020	
FTM-30 (AEGIS 5. 1, Intercept Flight Test)	4	2020	4	2020	
GTD-08 (N/P) (BMDS Ground Test)	1	2021	1	2021	
GT-21 Sprint 1 (BMDS Ground Test)	1	2021	1	2021	
FTG-17 (IOT&E) (GM, Intercept Flight Test)	1	2021	1	2021	
Warfighter TP 08 (BMDS Ground Test)	2	2021	2	2021	
GT-21 Sprint 2 (BMDS Ground Test)	2	2021	2	2021	
GT-21 Sprint 3 (BMDS Ground Test)	2	2021	3	2021	
FTX-26 (SN, Target Only Flight Test)	3	2021	3	2021	
FTM-38 (AEGIS 5.0, Intercept Flight Test)	3	2021	3	2021	
GT-21 Sprint 4 (BMDS Ground Test)	3	2021	3	2021	

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Missile Defense Agency				Date: May 2017	
Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>		Project (Number/Name) MT01 / <i>C2BMC Test</i>	
		Start		End	
Events	Quarter	Year	Quarter	Year	
FTT-21 (TH, Intercept Flight Test)	4	2021	4	2021	
GT-21 Sprint 5 (BMDS Ground Test)	4	2021	4	2021	
GT-21 Sprint 6 (BMDS Ground Test)	4	2021	4	2021	
FTG-18 (GM, Intercept Flight Test)	1	2022	1	2022	
GT-22 Sprint 1 (BMDS Ground Test)	1	2022	1	2022	
GT-22 Sprint 2 (BMDS Ground Test)	2	2022	2	2022	
GT-22 Sprint 3 (BMDS Ground Test)	2	2022	2	2022	
FTM-35 (AEGIS 5.1, Intercept Flight Test)	3	2022	3	2022	
FTM-37 (IOT&E) (AEGIS 5.1, Intercept Flight Test)	3	2022	3	2022	
GT-22 Sprint 4 (BMDS Ground Test)	3	2022	3	2022	
GTD-22 (E/C) (BMDS Ground Test)	4	2022	4	2022	

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency										Date: May 2017		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MX01 / Command & Control, Battle Management, Communications (C2BMC) Development Support			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
MX01: Command & Control, Battle Management, Communications (C2BMC) Development Support	300.964	96.140	116.552	103.440	-	103.440	114.132	120.070	125.220	127.736	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

N/A

A. Mission Description and Budget Item Justification

C2BMC Development Support provides operations engineering, integrated logistics, warfighter integration, deployment, and disposal of the current operational system and/or systems fielded in STRATCOM, NORTHCOM, PACOM, EUCOM, and CENTCOM and the operation of the C2BMC Control Center. This activity provides continuous support of the development, deployment, sustainment of the C2BMC training systems, and updates training material to stay current with fielded capabilities.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2016	FY 2017	FY 2018
Title: Operations Engineering	72.192	91.771	82.779
Articles:	-	-	-
Description: This activity funds C2BMC support of current operational, test, and training systems. Recurring efforts include: <ul style="list-style-type: none"> - On-site maintenance, help-desk support, and developer reach-back support to ensure operational availability - C2BMC Command Center (CCC) 24 hours a day, 365 days a year operations providing system and network monitoring, system administration, and network defense against cyber-attacks - Integrated logistics support by providing a secure supply chain; reliability, availability, and maintainability (RAM) engineering; obsolescence engineering; and sparing to ensure operational availability - Cybersecurity engineering providing C2BMC Commercial-off-the-shelf (COTS) software/hardware updates and CCC upgrades that address system vulnerabilities - Information System Security Officers (ISSOs) ensuring C2BMC compliance with latest cybersecurity requirements and policies - System modifications driven by Warfighter Improvement Process (WIP), Continuous Improvement Process (CIP), RAM and obsolescence engineering, and external systems such as SBIRS, GMD Fire Control (GFC), Aegis, Terminal High Altitude Area Defense (THAAD), Navy Link Monitoring and Management Tool (LMMT), AN/TPY-2, Standard Army Com (STACOM), DISA fiber networks, and Allied/Coalition interfaces 			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency			Date: May 2017		
Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>		Project (Number/Name) MX01 / <i>Command & Control, Battle Management, Communications (C2BMC) Development Support</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)			FY 2016	FY 2017	FY 2018
<ul style="list-style-type: none"> - CCMD integration providing C2BMC training, on-site Subject Matter Experts (SMEs), and surge SME support for real-world events, flight tests, ground tests, exercises, cyber assessments, and wargames - Facility modifications required to house current or future C2BMC equipment and transportation for moving C2BMC equipment - Integrated product support for tactical satellite communications (SATCOM) used in flight tests, hardened SATCOM, and associated shelters - Provide transportation for flight test equipment and SME support and analysis for numerous test, exercise, and real world events - Field quarterly updates to commercial-off-the-shelf software/hardware to reduce system COTS component vulnerability to cyber attack <p>Specific and/or unique accomplishments for each FY are as follows:</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> - Conducted activities listed in Description section (above). - Achieved Operational Availability of 99% - Fielded software upgrades to STRATCOM, NORTHCOM, and PACOM that updated threat systems and improved discrimination capability - Completed installation of hardened SATCOM at site KCS in PACOM and 2nd hardened SATCOM at Ramstein AB in EUCOM - Updated interfaces with AN/TPY-2, SBIRS operational & test systems, and supported SBIRS Increment 2 soak period - Re-engineered interfaces to support DISA network transition in STRATCOM, NORTHCOM, and PACOM - Added redundant communications circuits and interface with Japan at the request of PACOM - Upgraded distributed training instructor interface for EUCOM and CENTCOM based on warfighter feedback - Participated in Director, Operational Test and Evaluation (DOT&E) sponsored cybersecurity penetration testing and CCMD cyber events - Upgraded training systems to incorporate more robust cybersecurity monitoring capabilities - Completed tech refresh of SATCOM interfaces in NORTHCOM - Completed facility modifications for NORTHCOM and PACOM - Conducted tech refresh of tactical SATCOM used in flight tests. <p>FY 2017 Plans:</p> <p>The increase in funding from FY 2016 to FY 2017 is attributed to realigning funds from the Development & Deployment project (MD01) to Development Support project (MX01) to better align resources with scope of work for the install and maintenance of both MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) and Enhanced Homeland Defense (Spiral 8.2-1) operations. The increase also included funding required to integrate BMDS communications infrastructure at PACOM from DISA.</p>					

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency			Date: May 2017		
Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>		Project (Number/Name) MX01 / <i>Command & Control, Battle Management, Communications (C2BMC) Development Support</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)			FY 2016	FY 2017	FY 2018
<ul style="list-style-type: none"> - Conduct activities listed in Description section (above). - Sustain Operational Availability - Provide recurring proficiency training to CCMDs and keep training material and systems consistent with operational capabilities - Field software upgrades to EUCOM and CENTCOM that updated threat systems and improved discrimination capability - Field leap second timing adjustment patch to all operational, test, and training systems in all CCMDs - Re-engineer interfaces to support DISA network transition in EUCOM and CENTCOM - Complete tech refresh of SATCOM interfaces in PACOM, EUCOM, and CENTCOM - Complete facility modifications for EUCOM and CENTCOM. <p>FY 2018 Plans: The decrease in funding from FY 2017 to FY 2018 is attributed to the transition of the Transportable Radar Communications Complex (TRCC) and Modernization of Enterprise Terminal Transportable (MET-T) in PACOM, where the Army is assuming support responsibilities for program support of these communications capabilities.</p> <ul style="list-style-type: none"> - Conduct activities listed in Description section (above). - Maintain high Operational Availability. - Maintain MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) in EUCOM/CENTCOM and Enhanced Homeland Defense (Spiral 8.2-1) in NORTHCOM/PACOM. - Provide recurring proficiency training to CCMDs and kept training material and systems consistent with operational capabilities. - Decommission MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) in STRATCOM, NORTHCOM, and PACOM. 					
<p>Title: Concurrent Test, Training, and Operations (CTTO)</p> <p align="right">Articles:</p> <p>Description: This element provides the development and sustainment of the C2BMC Training Support System (TSS), MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) / Enhanced Homeland Defense (Spiral 8.2-1) / EPAA Phase 3/EOR (Spiral 8.2-3) Distributed Training System (DTS) (formerly known as the Distributed Multi-Echelon Training System (DMETS) for PACOM, NORTHCOM, EUCOM, and CENTCOM. C2BMC connects all BMDS Elements through virtual and physical networks to facilitate integrated test, training, and operations within two coexistent realms - Operations and Certification. This enables the warfighter to become proficient on current and future software versions at the operational console; increases the developer's capacity to perform a variety of tests and upgrades on the operational BMDS; and decreases recall-to-mission operations times from weeks and days to hours and minutes. Recurring accomplishments include sustaining current training systems for BMDS training events</p>			23.948 -	24.781 -	20.661 -

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017	
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MX01 / <i>Command & Control, Battle Management, Communications (C2BMC) Development Support</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017
<p>for the Unified Combatant Command developing the next generation training systems, to include the integration of Red Force / Blue Force capability, to keep current with the operational system capabilities. Specific and/or unique accomplishments for each FY are as follows:</p> <p>FY 2016 Accomplishments:</p> <ul style="list-style-type: none"> - Conducted activities listed in Description section (above). - Deployed MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) TSS. - Developed Enhanced Homeland Defense (Spiral 8.2-1) TSS, incorporating complete redesign of operational screens, updated GM screens, updated algorithms and models to reflect the latest BMDS capability. - Developed Enhanced Homeland Defense (Spiral 8.2-1) DTS, incorporating a complete architecture change from the standalone training architecture used in MRBM Defense/EPAA Phase 1 and 2 (Spiral 6.4) to operating as an integrated part of the operational distribution system. <p>FY 2017 Plans:</p> <p>The increase in funding from FY 2016 to FY 2017 is attributed to the deployment of Enhanced Homeland Defense (Spiral 8.2-1) TSS and DTS while simultaneously initiating development of EPAA Phase 3/EOR (Spiral 8.2-3) TSS and DTS.</p> <ul style="list-style-type: none"> - Conduct activities listed in Description section (above). - Deploy and sustain C2BMC Enhanced Homeland Defense (Spiral 8.2-1) TSS. - Deploy C2BMC Enhanced Homeland Defense (Spiral 8.2-1) DTS. - Initiate development efforts for C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) TSS that includes Cross Area of Responsibility (XAOR) and BMDS Overhead Persistent Infra-Red (OPIR) Architecture (BOA) updates and Public Key Infrastructure (PKI) implementation. - Initiate development efforts for C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) DTS that includes Modernized Integrated Database (MIDB) interface updates, Ground Based Midcourse Defense Command Launch Equipment (GMD CLE) updates, and update Hardware-in-the-Loop (HWIL) connectivity. - Initiate development efforts for C2BMC LRDR for Homeland Defense (Spiral 8.2-5) TSS that include the Integrated Air and Missile Defense Battle Command System (IBCS). <p>FY 2018 Plans:</p> <p>The decrease in funding from FY 2017 to FY 2018 is attributed to the planned decommissioning of the legacy DMETS upon completion of Enhanced Homeland Defense (Spiral 8.2-1) DTS deployment resulting in reduced development/upgrade efforts.</p> <ul style="list-style-type: none"> - Conduct activities listed in Description section (above). 			

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency										Date: May 2017		
Appropriation/Budget Activity 0400 / 4				R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MX01 / Command & Control, Battle Management, Communications (C2BMC) Development Support				
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)										FY 2016	FY 2017	FY 2018
- Deploy and sustain C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) TSS.												
- Deploy and sustain C2BMC EPAA Phase 3/EOR (Spiral 8.2-3) DTS.												
Accomplishments/Planned Programs Subtotals										96.140	116.552	103.440
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost	
• 0603177C: Discrimination Sensor Technology	27.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing	
• 0603179C: Advanced C4ISR	9.661	3.626	0.000	-	0.000	0.000	0.000	0.000	0.000	0	13.287	
• 0603881C: Ballistic Missile Defense Terminal Defense Segment	197.617	209.072	230.162	-	230.162	194.328	253.778	264.377	267.254	Continuing	Continuing	
• 0603882C: Ballistic Missile Defense Midcourse Defense Segment	1,260.480	862.080	828.097	-	828.097	630.842	651.047	567.451	551.701	Continuing	Continuing	
• 0603884C: Ballistic Missile Defense Sensors	233.020	230.077	247.345	-	247.345	247.643	362.850	401.267	497.503	Continuing	Continuing	
• 0603890C: BMD Enabling Programs	406.326	408.594	449.442	-	449.442	466.760	540.409	629.864	501.915	Continuing	Continuing	
• 0603892C: AEGIS BMD	804.211	959.066	852.052	-	852.052	805.051	789.217	656.164	695.306	Continuing	Continuing	
• 0603893C: Space Tracking and Surveillance System	27.262	32.129	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing	
• 0603895C: Ballistic Missile Defense System Space Programs	21.040	20.690	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing	
• 0603904C: Missile Defense Integration and Operations Center (MDIOC)	46.191	54.750	53.265	-	53.265	54.505	57.588	58.574	59.738	Continuing	Continuing	
• 0603907C: Sea Based X-Band Radar (SBX)	81.265	93.287	130.695	-	130.695	114.545	126.250	97.666	97.659	Continuing	Continuing	
• 0603914C: Ballistic Missile Defense Test	290.267	293.441	305.791	-	305.791	295.042	351.626	336.137	334.678	Continuing	Continuing	

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency										Date: May 2017	
Appropriation/Budget Activity 0400 / 4				R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>				Project (Number/Name) MX01 / <i>Command & Control, Battle Management, Communications (C2BMC) Development Support</i>			
C. Other Program Funding Summary (\$ in Millions)											
			<u>FY 2018</u>	<u>FY 2018</u>	<u>FY 2018</u>					<u>Cost To</u>	
<u>Line Item</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>Base</u>	<u>OCO</u>	<u>Total</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>Complete</u>	<u>Total Cost</u>
• 0603915C: <i>Ballistic Missile Defense Targets</i>	517.589	563.576	410.425	-	410.425	373.203	407.909	405.458	427.508	Continuing	Continuing
Remarks											
D. Acquisition Strategy											
<p>The C2BMC acquisition strategy is consistent with the Agency's capability-based acquisition strategy that emphasizes testing, incremental development, evolutionary acquisition, and knowledge-based funding. Lockheed Martin Mission Systems was the C2BMC prime contractor via an Other Transaction Agreement contract vehicle, which ended 1st quarter FY 2012. A sole source C2BMC follow-on contract to Lockheed Martin for Spiral Development, Operation and Sustainment, and Testing was awarded 1st quarter FY 2012 for an ordering period of five years through 1st quarter FY 2017. Spiral 8.2 will be fielded in three separate increments. Enhanced Homeland Defense (Spiral 8.2-1) will be fielded in FY 2018, fielding of EPAA Phase 3/EOR (Spiral 8.2-3) in FY 2019, and completion of system deployment with LRDR for Homeland Defense (Spiral 8.2-5) in FY 2021. This incremental fielding required a modification to the base contract increasing the ceiling by \$870 million and adding an additional five-year ordering period to extend the contract through first quarter FY 2022. Major team members to Lockheed are Northrop-Grumman, Boeing, Raytheon, and General Dynamics. They are charged with the development, testing, fielding, training, operations and sustainment, and cyber ops support of the C2BMC system. They perform development and testing of C2BMC products in Huntsville, AL; and Colorado Springs, CO; and provide worldwide on-site operations and maintenance support. Additionally, the Defense Information Systems Agency (DISA) supports C2BMC worldwide long-haul communications. C2BMC Program Office government, Federally Funded Research and Development Center/University Affiliated Research Center (FFRDC/UARC), and Contract Support Services (CSS) personnel are also fully integrated as part of the Prime contractor's team to function in an Integrated Product Team environment.</p>											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency												Date: May 2017			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MX01 / Command & Control, Battle Management, Communications (C2BMC) Development Support					
Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Operations Engineering - Indirect Support	MIPR	DISA DECC/DISA TECC : Various	28.214	7.959		6.890	Oct 2016	4.177	Oct 2017	-		4.177	Continuing	Continuing	Continuing
Operations Engineering - Operations Engineering - Unit Personnel, Control System Improvement Sustaining Support	MIPR	Army, Navy, Air Force : Various	0.000	0.000		0.912	Oct 2016	7.081	Oct 2017	-		7.081	Continuing	Continuing	Continuing
Operations Engineering - Operations Engineering Training Support	SS/CPAF	Northrup Grumman : Boeing Huntsville, AL	0.000	0.000		1.747	Nov 2016	1.869	Nov 2017	-		1.869	Continuing	Continuing	Continuing
Operations Engineering - Teleport Sustainment	MIPR	Various : Various	7.505	0.000		0.000		0.000		-		0.000	0	7.505	7.505
Operations Engineering - Unit Personnel, Control System Improvement Sustaining Support	SS/CPFF	Lockheed Martin Team : Huntsville, AL	207.993	64.233		82.222	Dec 2016	69.652	Dec 2017	-		69.652	Continuing	Continuing	Continuing
Concurrent Test, Training, and Operations (CTTO) - CTTO/Training Enhancements	MIPR	Army : Various	0.000	0.000		8.238	Dec 2016	7.081	Dec 2017	-		7.081	Continuing	Continuing	Continuing
Concurrent Test, Training, and Operations (CTTO) - Concurrent Test, Training And Operations	SS/CPAF	Northrop Grumman : Boeing	3.875	0.735		0.000		0.000		-		0.000	0	4.610	4.610
Concurrent Test, Training, and Operations (CTTO) - Concurrent Test, Training, and Operations	SS/FPAF	COLSA ARC : Huntsville, AL	0.000	3.833		0.000		0.000		-		0.000	0	3.833	3.833
Concurrent Test, Training, and Operations (CTTO) - Training Enhancements	SS/CPIF	Lockheed Martin Team : Huntsville, Al, Colorado Springs, CO	53.377	19.380		16.543	Dec 2016	13.580	Dec 2017	-		13.580	Continuing	Continuing	Continuing
Subtotal			300.964	96.140		116.552		103.440		-		103.440	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency													Date: May 2017		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>					Project (Number/Name) MX01 / <i>Command & Control, Battle Management, Communications (C2BMC) Development Support</i>					

Product Development (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks N/A															

Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Remarks N/A															

Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Remarks N/A															

Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	-		-		-		-		-	-	-	-
Remarks N/A															

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency										Date: May 2017				
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>					Project (Number/Name) MX01 / <i>Command & Control, Battle Management, Communications (C2BMC) Development Support</i>				
		Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		300.964	96.140		116.552		103.440		-		103.440	-	-	-
Remarks N/A														

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PE 0603896C: *Ballistic Missile Defense Command and Co...*
Missile Defense Agency

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Missile Defense Agency			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MX01 / <i>Command & Control, Battle Management, Communications (C2BMC) Development Support</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MX01 Command & Control, Battle Management, Communications (C2BMC) Development Support	1	2016	4	2022

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency										Date: May 2017		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MD40 / Program-Wide Support			
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
MD40: Program-Wide Support	73.261	14.798	19.771	18.782	-	18.782	21.164	22.020	22.824	23.185	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2016, FY 2017, and FY 2018 Program Wide Support reflects proportional changes as a result of budget changes to the Ballistic Missile Defense Command and Control, Battle Management & Communication program.
Funding in the All Prior Years column represents a summary of Prior Years Total Costs for active contracts, Military Interdepartmental Purchase Requests, and / or civilian salaries on the R-3.

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire BMDS. It Includes Government Civilians, and Contract Support Services. This provides integrity and oversight of the BMDS as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes Global Deployment personnel and support performing deployment site preparation and activation and, provides facility capabilities for MDA Executing Agent locations. 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; data and unified communications support; supplies and maintenance; materiel and readiness and central property management of equipment; and similar operating expenses. PWS is allocated on a pro-rata basis and therefore, fluctuates by year based on the adjusted RDT&E profile (which excludes: 0305103C Cyber Security Initiative, 0603274C Special Programs, 0603913C Israeli Cooperative Program and 0901598C Management Headquarters).

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

		FY 2016	FY 2017	FY 2018
Title: Program Wide Support		14.798	19.771	18.782
Articles:		-	-	-
Description: N/A				
FY 2016 Accomplishments: N/A				
FY 2017 Plans: N/A				
FY 2018 Plans:				

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Exhibit R-2A, RDT&E Project Justification: FY 2018 Missile Defense Agency		Date: May 2017	
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MD40 / <i>Program-Wide Support</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2016	FY 2017
N/A			
Accomplishments/Planned Programs Subtotals		14.798	19.771
C. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			
D. Acquisition Strategy			
N/A			
E. Performance Metrics			
N/A			

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency												Date: May 2017			
Appropriation/Budget Activity 0400 / 4						R-1 Program Element (Number/Name) PE 0603896C / Ballistic Missile Defense Command and Control, Battle Management & Communication				Project (Number/Name) MD40 / Program-Wide Support					
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Wide Support - Agency Operations Management	Allot	Various : Multi: AL, CA, CO, VA	1.955	1.624		0.395	Jul 2017	0.376	Jul 2018	-		0.376	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Other Agency Services (MIPRs)	MIPR	Various : Multi: AK/AL/CA/CO/HI/MD/VA/NJ/NY/OCONUS	3.111	0.000		0.000		0.000		-		0.000	0.015	3.126	0
Program Wide Support - Agency Operations and Support Services	C/CPFF	Various : Multi: AK, AL, CA, CO, HI, VA	2.088	0.859		1.571	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Services (FFP)	C/FFP	Various : Multi: AK, AL, CA, CO, HI, VA	22.388	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Services (Reqn)	Reqn	Various : Multi: AK, AL, CA, CO, VA	40.919	6.126	Nov 2015	0.819	Oct 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Services Civilian Salaries, Travel, Training	Allot	Various : Multi: AL, CA, CO, VA	2.800	6.189	Nov 2015	16.477	Nov 2016	18.406	Nov 2017	-		18.406	2.800	46.672	0
Program Wide Support - Agency Operations, Sustainment and GPC	Allot	Various : Multi: AL, CO, VA etc.	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Program Wide Support - Facilities Maintenance SRM	MIPR	Various : Multi: AK, CA, CO, AL, MD, NJ, VA	0.000	0.000		0.509	Jan 2017	0.000		-		0.000	Continuing	Continuing	Continuing
Subtotal			73.261	14.798		19.771		18.782		-		18.782	-	-	-
Remarks N/A															

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Missile Defense Agency										Date: May 2017				
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>					Project (Number/Name) MD40 / <i>Program-Wide Support</i>				
		Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		73.261	14.798		19.771		18.782		-		18.782	-	-	-
Remarks N/A														

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Missile Defense Agency														Date: May 2017																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Missile Defense Agency			Date: May 2017
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603896C / <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	Project (Number/Name) MD40 / <i>Program-Wide Support</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MD40 Program-Wide Support	1	2016	4	2022