

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification					Date February 2008		
---	--	--	--	--	------------------------------	--	--

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)				R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)			
---	--	--	--	---	--	--	--

COST (\$ in Thousands)	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Total PE Cost	0	165,243	0	0	0	0	0
XX46 Sea Based X-Band Radar (SBX) Sustainment	0	165,243	0	0	0	0	0

Note: The FY07 effort is captured under the Ground Based Midcourse Defense Program Element (0603882C). FY09 effort continues in Project XXI1 under the BMDS Sensors Program Element (0603884C).

A. Mission Description and Budget Item Justification

A.1 System Element Description

As part of the effort to develop a Ballistic Missile Defense System (BMDS), the Missile Defense Agency (MDA) has developed and deployed a large BMDS Sea-Based X-Band (SBX) Radar. The SBX provides the capability to the Combatant Commanders to engage ballistic missiles in the midcourse phase of flight.

The SBX consists of four major operating systems: vessel; X-Band Radar (XBR); In-Flight Interceptor Communications System (IFICS) Data Terminal (IDT), and the Ground-Based Midcourse Defense (GMD) Communications Network (GCN). The vessel is a commercially designed, self-propelled, semi-submersible oil drilling platform that was modified to meet the functional requirements of the SBX. The vessel has a dynamic positioning capability to enable precision station keeping in potential adverse sea states and weather conditions. The XBR is a phased-array system that also features a mechanical slewing capability in azimuth and elevation. The XBR operates in the X-Band portion of the frequency spectrum and represents the world's largest X-band radar. When fully integrated with the GMD system, it will become a primary midcourse discrimination sensor for Ballistic Missile Defense. X-band technology provides this midcourse sensor with the ability to perform high resolution cued search, acquisition, tracking, and target discrimination. To perform this effort, highly sophisticated algorithms are designed to enhance target acquisition and discrimination of more complex and off-nominal threat sets and targets.

A.2 System Element Budget Justification and Contribution to the Ballistic Missile Defense System (BMDS)

The SBX provides the capability to the Combatant Commanders to engage ballistic missiles in the midcourse phase of flight.

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date February 2008
--	------------------------------

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)
--	--

A.3 Major System Element Goals

- Complete integration of XBR Software Build 2.2.1.x.
- Participate in GTD-02. Acquire performance information to support an Emergency Capability Delivery (ECD) decision for SBX incorporation into the GMD System
- Participate in FTG-04, which demonstrates the functionality of GBI engage on SBX using XBR Build 1.6.1.x Software
- Participate in GTI-03. Acquire performance information to support a Partial Capability Delivery (PCD) and Full Capability Delivery (FCD) decision for SBX incorporation into the GMD System
- Participate in GTD-03
- Participate in FTG-05 which demonstrates the functionality of GBI engage on SBX using XBR Software Build 2.2.1.x.
- Participate in DoD Targets of Opportunity as available for viewing by the SBX
- Complete Phase I and Phase II Operational Enhancement to the vessel
- Complete required 5-Year mid-cycle American Bureau of Shipping (ABS) special survey of the vessel

A.4 Major Events Schedule and Description

Major Event	Project	Timeframe	Description
Flight Test			
Flight Tests			
FTG-04	XX46	3Q FY 2008	<ul style="list-style-type: none"> • Demonstrate the functionality of GBI engage on SBX using XBR 1.6.1x Software
FTG-05	XX46	4Q FY 2008	<ul style="list-style-type: none"> • Participate in FTG-05 which demonstrates the functionality of GBI engage on SBX using XBR Build 2.2.1.x. Software.
Ground Test			
Integrated/Distributed Ground Tests			
GTD-02	XX46	1Q FY 2008	<ul style="list-style-type: none"> • Acquire performance information to support an Emergency Capability Delivery (ECD) decision for SBX incorporation into the GMD System.
GTI-03	XX46	3Q FY 2008	<ul style="list-style-type: none"> • Acquire performance information to support a Partial Capability Delivery (PCD) and Full Capability Delivery (FCD) decision for SBX incorporation into the GMD System.
GTD-03	XX46	4Q FY 2008	<ul style="list-style-type: none"> • Participate in this test.

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification		Date February 2008
---	--	------------------------------

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)
--	--

B. Program Change Summary	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008 PB)	0	0	0
Current President's Budget (FY 2009 PB)	0	165,243	0
Total Adjustments	0	165,243	0
Congressional Specific Program Adjustments	0	166,300	0
Congressional Undistributed Adjustments	0	-1,057	0
Reprogrammings	0	0	0
SBIR/STTR Transfer	0	0	0
Adjustments to Budget Years	0	0	0

FY08 increase of \$165.243 million includes the Congressionally specific transfer of the SBX program and associate \$166.3 million in FY08 funding to a unique PE and a portion of the MDA Congressional undistributed reduction.

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification					Date February 2008		
--	--	--	--	--	------------------------------	--	--

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)				R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)			
---	--	--	--	---	--	--	--

COST (\$ in Thousands)	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
XX46 Sea Based X-Band Radar (SBX) Sustainment	0	165,243	0	0	0	0	0
RDT&E Articles Qty	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification

The Sea-Based X-Band (SBX) Radar consists of four major operating systems: vessel; X-Band Radar (XBR); In-Flight Interceptor Communications System (IFICS) Data Terminal (IDT), and the Ground-Based Midcourse Defense (GMD) Communications Network (GCN). The vessel is a commercially designed, self-propelled, semi-submersible oil drilling platform that was modified to meet the functional requirements of the SBX. The vessel has a dynamic positioning capability to enable precision station keeping in potential adverse sea states and weather conditions. The XBR is a phased-array system that also features a mechanical slewing capability in azimuth and elevation. The XBR operates in the X-Band portion of the frequency spectrum and represents the world's largest X-band radar. When fully integrated with the GMD system, it will become the primary midcourse discrimination sensor for Ballistic Missile Defense. X-band technology provides this midcourse sensor with the ability to perform high resolution cued search, acquisition, tracking, and target discrimination. To perform this effort, highly sophisticated algorithms are designed to enhance target acquisition and discrimination of more complex and off-nominal threat sets and targets.

The SBX will operate from various locations in the Pacific Ocean in FY08 continuing its integration into the Ballistic Missile Defense System (BMDS) through support of system flight and ground tests. Additionally, the SBX is scheduled to spend time at the Pearl Harbor shipyard to implement enhancements to the SBX vessel that resulted from recommendations of an Operational Viability Assessment (OVA) panel. Security surrounding the SBX is a vital part of the operations of the SBX.

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification		Date February 2008	
APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)		R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)	
<u>B. Accomplishments/Planned Program</u>			
	FY 2007	FY 2008	FY 2009
Sea-Based X-Band Radar Development	0	43,643	0
RDT&E Articles (Quantity)	0	0	0
<p>The X-Band Radar is a phased-array radar mounted on a mechanical slewing capability in azimuth and elevation. The XBR operates in the X-band portion of the frequency spectrum and is the world's largest X-band radar. The XBR is affixed to a commercially designed, self-propelled, semi-submersible oil drilling platform that was modified to meet the functional requirements of the SBX. The SBX consists of four major operating systems:</p> <ul style="list-style-type: none"> • The Vessel (self-propelled, semi-submersible oil drilling platform) • The X-Band Radar (XBR) • In-Flight Interceptor Communications System (IFICS) Data Terminal • The Ground-Based Midcourse Defense (GMD) Communications Network (GCN) <p>When fully integrated with the GMD System, it will become the primary midcourse discrimination sensor for Ballistic Missile Defense. The XBR has the ability to perform high resolution cued search, acquisition, tracking, target discrimination, and debris assessments.</p> <p>The SBX will operate from various locations in the Pacific Ocean in FY08 continuing its integration into the Ballistic Missile Defense System (BMDS) through support of system flight and ground tests. Additionally, the SBX is scheduled to spend time at the Pearl Harbor shipyard to implement enhancements to the SBX vessel that resulted from recommendations of an Operational Viability Assessment (OVA) panel.</p> <p>FY08 Planned Program:</p> <ul style="list-style-type: none"> • Software development and maintenance • System Engineering and Program Management • Discrimination and Algorithm development • Enhancement of Liquid Conditioning Control System (Radar Cooling) • Certification of Mooring for SBX in Kulak Bay, Adak, AK 			

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification		Date February 2008	
APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)		R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)	
	FY 2007	FY 2008	FY 2009
SBX System Integration	0	28,200	0
RDT&E Articles (Quantity)	0	0	0
<p>The XBR in coordination with the other SBX payloads functions as the primary BMDS midcourse sensor. The SBX program requires management and oversight of the overall SBX System, which includes integration of these on-board major sub-system payloads to successfully operate as designed within the overall BMDS. The principle payloads are: the X-Band Radar (XBR), the In-Flight Interceptor Communications System Data Terminal, a GMD Communications Network (GCN), and an Embedded Test (ET) node on the SBX marine platform. Functions in the system integration efforts include: vessel payload modification and integration, testing and operability verification efforts, and coordination and support of BMDS flight and ground test efforts. Integration efforts address the respective BMDS operational component requirements and the Warfighter/USER concept of operations. Additionally, preparations will continue for the transition of SBX from MDA to the U.S. Navy.</p>			
	FY 2007	FY 2008	FY 2009
System Force Protection	0	6,200	0
RDT&E Articles (Quantity)	0	0	0
<p>System Force Protection for the SBX in FY08 is divided into two functions: On-board protection of the vessel, and portside security for the SBX vessel and its Off-Shore Support (OSS) vessel, currently the Motor/Vessel (M/V) Dove while docked. On-board protection security functions include: on-board visitor control, access control to sensitive areas, protection against hostile boarding of the SBX, inspection and control of incoming personnel, supplies and equipment, and deterring of vessels encroaching into the SBX's restricted zone. Portside security functions include: inspection and control of all supplies and equipment being readied for transport onto the SBX, access control of the docking area, and visitor control to the SBX and M/V Dove.</p>			
	FY 2007	FY 2008	FY 2009
SBX Vessel Operations and Support	0	52,200	0
RDT&E Articles (Quantity)	0	0	0
<p>Operations and Sustainment (O&S) of the SBX vessel refers to the general O&S functions associated with the SBX platform, its support vessel, and land-based support facilities. The maritime functions of the SBX include the vessel maritime crew which provides safety at sea functions, navigation and propulsion of the vessel, lodging and food services/provisions, vessel maintenance (spares and repair parts), and fuel procurement and power generations for both the vessel and mission equipment. The support vessel operations include operation the Motor/Vessel (M/V) Dove. The functions</p>			

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date February 2008
--	------------------------------

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)
---	---

of the M/V Dove include: SBX maritime and mission equipment crew transport and transfer, fueling of the SBX, provision re-supply, transport and transfer of all equipment and hardware to and from the SBX, anchor handling, and when necessary, towing of the SBX. Logistical shore facilities are also required to support the SBX mission. There are two shore sites associated with the operations and support of the SBX: the Primary Support Base (PSB) located in Adak, Alaska (the home port for the SBX), and the Operational Support Site (OSS) located in Anchorage, Alaska. The PSB provides the functions of fuel coordination, environmental response capabilities, and is the shipping/receiving point for personnel and supplies to/from the SBX-1. The OSS manages SBX schedules, provides administrative and logistical support, and is the primary coordination point with Combatant Commanders (COCOMs) and MDA Test Schedules.

	FY 2007	FY 2008	FY 2009
XBR Operations and Support	0	35,000	0
RDT&E Articles (Quantity)	0	0	0

The X-Band Radar (XBR) aboard the SBX is the primary midcourse sensor for the BMDS. Operations and Support (O&S) efforts for the XBR include: manpower for operating and maintaining the radar, spare and repair parts procurement, and hardware maintenance. The on-vessel XBR personnel perform the functions of 24/7 radar operations, calibration of the radar and support/test equipment, maintenance and repair of the radar associated equipment, and system test planning and post mission analysis for radar specific and BMDS tests. Spares and repair parts procurement includes the supply chain management, quality inspection of the spares, repair part logistics tracking, and procurement of spares and repair parts. Hardware maintenance functions include the repair, at the contractor's site, or replacement of hardware components necessary in the operation of the XBR.

C. Other Program Funding Summary

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0207998C BRAC	0	103,219	159,938	61,931	8,724	0	0	333,812
PE 0603175C Ballistic Missile Defense Technology	183,849	108,423	118,718	115,234	120,152	127,012	130,358	903,746
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,082,454	1,045,276	1,019,073	795,659	719,847	548,283	439,752	5,650,344
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,985,140	2,243,213	2,209,262	2,276,848	1,385,258	946,437	1,103,532	13,149,690
PE 0603883C Ballistic Missile Defense Boost Defense Segment	622,218	510,241	421,229	423,927	652,642	799,792	991,839	4,421,888
PE 0603884C Ballistic Missile Defense Sensors	514,989	586,121	1,221,143	1,184,280	1,099,649	1,077,632	823,583	6,507,397

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date February 2008
--	------------------------------

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)
---	---

	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	Total Cost
PE 0603886C Ballistic Missile Defense System Interceptors	341,358	340,107	386,817	500,966	708,803	815,433	553,136	3,646,620
PE 0603888C Ballistic Missile Defense Test and Targets	584,615	621,861	673,691	672,976	690,938	708,991	719,209	4,672,281
PE 0603890C Ballistic Missile Defense System Core	425,889	413,934	432,262	482,947	605,219	561,947	571,498	3,493,696
PE 0603891C Special Programs - MDA	347,377	196,892	288,315	304,234	538,050	818,136	786,349	3,279,353
PE 0603892C Ballistic Missile Defense Aegis	1,125,426	1,126,337	1,157,783	1,234,220	1,078,539	1,066,712	1,102,542	7,891,559
PE 0603893C Space Tracking & Surveillance System	311,402	231,528	242,441	266,509	560,130	735,727	938,191	3,285,928
PE 0603894C Multiple Kill Vehicle	133,615	229,943	354,455	488,294	649,632	708,582	879,385	3,443,906
PE 0603895C BMD System Space Program	0	16,552	29,771	41,638	56,199	133,915	157,548	435,623
PE 0603896C BMD C2BMC	249,179	447,616	289,277	287,194	270,762	256,767	259,159	2,059,954
PE 0603897C BMD Hercules	46,268	52,462	55,955	55,289	56,400	51,902	52,784	371,060
PE 0603898C BMD Joint Warfighter Support	49,833	49,394	69,982	73,997	77,205	80,168	81,948	482,527
PE 0603904C Missile Defense Integration & Operations Center	104,389	78,557	96,404	100,437	100,366	101,512	102,840	684,505
PE 0603905C BMD Concurrent Test and Operations	21,870	0	0	0	0	0	0	21,870
PE 0603906C Regarding Trench	0	1,986	2,978	4,964	4,963	8,933	8,933	32,757
PE 0605502C Small Business Innovative Research - MDA	142,510	0	0	0	0	0	0	142,510
PE 0901585C Pentagon Reservation	15,527	6,019	19,734	5,040	5,284	5,370	5,456	62,430
PE 0901598C Management Headquarters - MDA	93,350	80,392	86,453	70,355	69,855	69,855	69,855	540,115

D. Acquisition Strategy

The SBX will continue to follow the Missile Defense Agency's capability-based acquisition strategy that emphasizes testing, development and evolutionary acquisition through the use of MDA's new block structure and spiral development.

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date February 2008
---	------------------------------

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)
---	---

I. Product Development Cost (\$ in Thousands)								
Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Sea-Based X-Band Radar Development								
SBX and XBR Development	SS/CPAF	Boeing/ AL/AK/AZ/CA/CO /HI/MA/TX/VA	0	43,643	2/3Q	0	N/A	43,643
SBX System Integration								
SBX Systems Integration	SS/CPAF	Boeing/ AL/AK/AZ/CA/CO /HI/MA/TX/VA	0	28,200	2/3Q	0	N/A	28,200
Subtotal Product Development			0	71,843		0		71843

Remarks

II. Support Costs Cost (\$ in Thousands)								
Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/ Oblg Date	FY 2009 Cost	FY 2009 Award/ Oblg Date	Total Cost
Sea-Based X-Band Radar Development								
System Force Protection								
Systems Force Protection	SS/CPFF	ALUTIIA/ AK/VA	0	6,200	3Q	0	N/A	6,200
SBX Vessel Operations and Support								
SBX Operations and Support (Vessel)	SS/CPAF	Boeing/ AL/AK/AZ/CA/CO /HI/MA/TX/VA	0	52,200	2/3Q	0	N/A	52,200

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date February 2008
---	------------------------------

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)
---	---

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/Oblg Date	FY 2009 Cost	FY 2009 Award/Oblg Date	Total Cost
XBR Operations and Support								
XBR Operations and Support	SS/CPIF	Raytheon/ AL/AK/HI	0	35,000	3/4Q	0	N/A	35,000
Subtotal Support Costs			0	93,400		0		93400

Remarks

III. Test and Evaluation Cost (\$ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/Oblg Date	FY 2009 Cost	FY 2009 Award/Oblg Date	Total Cost
Subtotal Test and Evaluation								

Remarks

IV. Management Services Cost (\$ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2008 Cost	FY 2008 Award/Oblg Date	FY 2009 Cost	FY 2009 Award/Oblg Date	Total Cost
Subtotal Management Services								

Remarks

Project Total Cost			0	165,243		0		165,243
--------------------	--	--	---	---------	--	---	--	---------

Remarks

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile	Date February 2008
--	------------------------------

APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)
--	--

Fiscal Year	2007				2008				2009				2010				2011				2012				2013			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Flight Tests																												
FTG-04								▲																				
FTG-05								▲																				
Integrated/Distributed Ground Tests																												
GTD-02								▲																				
GTI-03								▲																				
GTD-03								▲																				

Legend	
▲	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

UNCLASSIFIED

Missile Defense Agency (MDA) Exhibit R-4A Schedule Detail						Date February 2008	
APPROPRIATION/BUDGET ACTIVITY RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)				R-1 NOMENCLATURE 0603907C Sea Based X-Band Radar (SBX)			
Schedule Profile	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Flight Tests							
FTG-04		3Q					
FTG-05		4Q					
Integrated/Distributed Ground Tests							
GTD-02		1Q					
GTI-03		3Q					
GTD-03		4Q					