Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

COST ($ in Thousands)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Total PE Cost	226,499	208,923	180,000					
WX12 Space Tracking and Surveillance System (STSS) Capability Development	215,954	201,935	180,000					
ZX40 Program-Wide Support	10,545	6,988	0					

The NFIRE Program funding will be captured in this Program Element, Project WX12, for FY2010. There is no funding allocated in PE 0603895C for FY 2010 for NFIRE.

The best way to dissuade, deter, and defeat ballistic missile threats is through integrated ballistic missile defense capabilities--weapons, sensors, and Command and Control, Battle Management and Communications (C2BMC). A potential or actual attack may cross regions and may fly higher and faster than stand-alone, autonomous capabilities operated by a single Military Service can defend against. Integrated BMD capabilities draw on space-, land-, and sea-based assets operated by multiple Services to provide both the best sensor information on the enemy missile's location and track as well as a more diverse and effective set of weapon options for the Combatant Commander to defeat the attack -- all connected by a unifying C2BMC system. As a result, an effort funded in a Program Element may be critical to success of efforts in other Program Elements -- we refer to these connections as ``interdependencies. `` Throughout the budget justification material, we have attempted to highlight interdependencies in order to explain for fully the relationship between different parts of the proposed program.

A. Mission Description and Budget Item Justification

Space sensors like Space Tracking Surveillance Systems (STSS) provide the most cost effective and operationally suitable means of providing global persistent surveillance and engagement, directly addressing the number one missile defense priority need for STRATCOM and other Combatant Commanders. The STSS Demonstrator satellites will demonstrate the ability of a space sensor to provide high precision, real time tracking of missiles and midcourse objects, thus enabling simultaneous regional, theater, and strategic missile defense. Data from STSS testing planned for FY10 will validate the ability to track cold, midcourse objects and close the fire control loop with BMDS interceptors from space. Additionally, STSS provides a new infrared sensor phenomenology for the BMDS, which, when combined with radars, provides robustness against current and advanced countermeasures.

MDA Element testing is based on an integrated, comprehensive, and phased test program. Element systems, subsystems, and components are tested early in development and are necessary prior to conducting BMD-System level testing. STSS Element Level testing is funded as part of a capabilities development program and reflected in this Program Element (PE) submission. BMD Test and Targets Element within PE 0603888C in the

consolidated MDA-wide System Test Program will execute funds in support of this PE for the planning, design, execution, and management of STSS Demonstration Satellites in the BMD System testing in accordance with the BMDS Test Policy, MDA Directive 3202.03 (Jan 09). This applies to all Flight, Integrated Ground, and Distributed Ground Tests and Post-test analysis and reconstructions listed in the Integrated Master Test Plan (IMTP). MDA is developing the STSS Demonstration Satellites to demonstrate key functions of space sensors.

Software upgrades are planned to optimize the usefulness of the Demonstration Satellites. Knowledge from the STSS Demonstration Satellites will prove the ability to close the fire control loop and inform future constellation acquisition decisions.

A.1 System Element Description

STSS delivered a satellite ground segment at the Missile Defense Space Experimentation Center (MDSEC) in 2007 and continues preparing two R&D satellites for launch in 2009. STSS Demonstration satellites will prove functions related to tracking ballistic missiles, and cuing BMDS radars and interceptors. MDA will enhance the ground segment and data processing algorithms at the MDSEC to take advantage of on-orbit experience.

Lessons learned from the Demonstration Satellites efforts will provide key data as MDA pursues longer term space sensor needs.

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

- Space sensors extend BMDS sensor coverage to a global level. STSS enables persistent tracking of ballistic missiles, and will provide accurate tracking information to the BMDS battle manager, close the global fire control loop with BMDS interceptors, and extend the effective range of BMDS interceptors and other sensors.
- Space-based sensors are not limited by basing rights issues or deployment decisions, and will allow cost effective coverage of countries and large areas not accessible from ground based sensors. Approximately fifty TPY-2 radars or approximately twenty sea-based X-Band radars are required to provide the equivalent mid-latitude coverage of a spaced-based constellation. Space based visible and Infrared (IR) sensors will complement radars and contribute to a sensor architecture more robust to countermeasures.
- Space-based sensors will enable near continuous threat observation and tracking from launch to intercept, covering threats by augmenting the coverage of the BMDS radars, and providing state vectors to C2BMC to enable interceptor fire control via multiple BMDS assets (AEGIS, GMD, THAAD)

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APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

A.3 Major System Element Goals

Goals for the STSS Demonstration Satellites include:

- Launch two low earth orbit satellites
- Demonstrate capability to acquire, track and report ballistic missile and intercept events from lift-off through midcourse to reentry
- Demonstrate capability to perform autonomous acquisition-to-track handover within a satellite
- Demonstrate capability to perform track handover to a satellite
- Demonstrate capability to uplink commands and downlink mission, health, and status data directly and via cross link
- Demonstrate closing the global fire control loop with BMDS weapons via integrated testing with other BMDS elements

A.4 Major Events Schedule and Description

Major Event	Project	Timeframe	Description
Flight Test			
STSS Demonstration Satellites			
FTS-01	WX12	2Q FY 2010	• Dedicated missile target test for STSS sensor characterization
FTS-02	WX12	4Q FY 2010	• Dedicated missile target test for STSS sensor characterization
Contract Activity			
Near Field Infrared Experiment			
Laser Comm Terminal Experiments/Operations	WX12	1Q FY 2010	• Continuation of test efforts on the NFIRE secondary payload, German-provided Laser Communication Terminal payload. The payload has successfully tested both Satellite-to-Satellite and Satellite-to-Ground communications.
On-Orbit Operations	WX12	1Q FY 2010 - 4Q FY 2010	• Mission operations anticipated to continue through FY10
Laser Comm Terminal Experiments/Operations	WX12	2Q FY 2010	• Continuation of test efforts on the NFIRE secondary payload, German-provided Laser Communication Terminal payload. The payload has successfully tested both Satellite-to-Satellite and Satellite-to-Ground communications.
Laser Comm Terminal Experiments/Operations	WX12	3Q FY 2010	• Continuation of test efforts on the NFIRE secondary payload, German-provided Laser Communication Terminal payload. The payload has successfully tested both Satellite-to-Satellite and Satellite-to-Ground communications.
Laser Comm Terminal Experiments/Operations	WX12	4Q FY 2010	• Continuation of test efforts on the NFIRE secondary payload, German-provided Laser Communication Terminal payload. The payload has successfully tested both Satellite-to-Satellite and Satellite-to-Ground communications.
STSS Demonstration Satellites			
Satellite Integration and Test	WX12	1Q FY 2008 - 3Q FY 2009	• Extension of activities for Satellite Integration and Test due to hardware issues moving launch to 4QFY09.

Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

Major Event	Project	Timeframe	Description
Launch Integration and Test	WX12	3Q FY 2009 - 4Q FY 2009	• Includes efforts to mate the stacked Space Vehicles to the Launch Vehicle and perform final checkout/pre-launch activities.
Launch (2 Demonstration Satellites)	WX12	4Q FY 2009	• Launch of two Demonstration Satellites on a Delta II from Cape Canaveral, FL.
Operational and Test Readiness	WX12	4Q FY 2009 - 2Q FY 2010	• Includes satellite check-out activities.
STSS Demonstration Satellites On-Orbit Operations	WX12	4Q FY 2009 - 4Q FY 2010	• Operations and data analysis activities associated with maintaining and testing the Demonstrations Satellites on-orbit. Testing will be performed against both dedicated targets and Targets of Opportunity (TOOs).
Other			
Near Field Infrared Experiment			
Targets of Opportunity	WX12	1Q FY 2010	• Collection of data from targets of opportunity: FTX-06, JFTM-03, JTT-12
Targets of Opportunity	WX12	2Q FY 2010	• Collection of data from targets of opportunity: FTK-02, FTS-01,GTI-04
Targets of Opportunity	WX12	3Q FY 2010	• Collection of data from targets of opportunity: , FTT-13, GTD-04
Targets of Opportunity	WX12	4Q FY 2010	• Collection of data from targets of opportunity: FTM-15, GTX-05b, FTS-02
STSS Demonstration Satellites			
Targets of Opportunity	WX12	2Q FY 2010	• Ongoing planning, execution, and analyses to extract maximum benefit from Targets of Opportunity: 2Q - K-02, GTI-04
Targets of Opportunity	WX12	3Q FY 2010	• Ongoing planning, execution, and analyses to extract maximum benefit from Targets of Opportunity: 3Q , FTT-13, GTD-04
Targets of Opportunity	WX12	4Q FY 2010	• Ongoing planning, execution, and analyses to extract maximum benefit from Targets of Opportunity: 4Q - FTM-16, GTX-05b

B. Program Change Summary	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget (FY2009 PB)	231,528	242,441	266,509	
Current President's Budget (FY2010 PB)	226,499	208,923	180,000	
Total Adjustments	-5,029	-33,518	-86,509	
Congressional Program Reductions	0	-33,518	0	
Congressional Rescissions	0	0	0	
Total Congressional Increases	0	0	0	
Total Reprogramming	-1,339	0	0	
SBIR/STTR Transfer	-3,690	0	0	
Adjustments to Budget Years	0	0	-86,509	

Missile Defense Agency (MDA) Exhibit R-2 RDT&E Budget Item Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603893C Space Tracking & Surveillance System**

FY08 decrease of $5.029 million includes SBIR/STTR transfer and MDA reprogramming.

FY09 decrease of $33.518 million reflects Congressional reductions.

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

COST ($ in Thousands)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
WX12 Space Tracking and Surveillance System (STSS) Capability Development	215,954	201,935	180,000					
RDT&E Articles Qty	0	2	0					

Note: . The NFIRE Program funding will be captured in this Program Element for FY10. There is no funding allocated in PE 0603895C for FY 2010 for NFIRE.

A. Mission Description and Budget Item Justification

The Space Tracking and Surveillance System (STSS) project is segmented into three primary pieces: the STSS Demonstration Satellites, which includes Software updates; Government costs; and MDA Space Architecture activity. Funding will also be provided for engineering efforts associated with Common Threat activities.

The STSS Demonstration Satellites will demonstrate key functions of missile tracking with space sensors. The knowledge gained from these efforts will contribute to future MDA space sensor constellation development. The two Demonstration satellites will be operated from the ground station processing center at the Missile Defense Space Experimentation Center (MDSEC). The STSS Demonstration Satellites provide key knowledge on which to base the design of a future constellation. The STSS Demonstration Satellites effort delivered a ground segment at the MDSEC in FY07 and will launch two satellites with visible and infrared sensors into low earth orbit in FY09 for testing with other BMDS elements. These two satellites will provide valuable risk reduction for acquisition, tracking, and discrimination functionality to include stereo data fusion, cueing radars over the horizon and over-the-horizon fire control. The program will demonstrate the functions and interfaces required for space data delivery to the BMDS, validating the data quality necessary for interceptors to launch and/or engage on STSS sensor data. To provide STSS with appropriate test opportunities, MDA is procuring dedicated ballistic missile targets for on-orbit testing. The STSS-centric tests conducted with these targets will also include opportunities for secondary participation from other BMDS Elements. MDA is contracting with National Aeronautics and Space Administration (NASA) for launch services for the two Demonstration Satellites using a single Delta II launch vehicle.

Once on-orbit, STSS Demonstration Satellites will collect data within the satellites' field of view. Data collection should commence upon completion and success of initial check-out activities, which should occur in 2nd Qtr FY 2010. While maintaining the integrity of the planned STSS dedicated tests, FTS-01 and FTS-02, STSS will strive to meet reasonable expectations to view all available Targets of Opportunity (TOOs) to include participation with other BMDS target and flight tests that will provide an adequate demonstration of the MDA Space Layer capabilities and allow collection of future system risk reduction information.

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

MDA will initiate planning for integrated BMDS intercept tests based on track data passed from the STSS Demonstration Satellites through the C2BMC to Aegis, GMD, or other interceptors

Software upgrades will provide improvements to the STSS' utility to the BMDS. Lessons learned from design and development and operation of the Demonstration Satellites will guide the upgrade work.

STSS Demonstration Satellites and Software Upgrades will support the BMDS HWIL Modeling and Simulation Program through data collection efforts, allowing for enhanced modeling within the BMDS system-level HWIL single stimulation framework to support full-envelope BMDS ground test, flight test, and training events based upon Agency and warfighter needs.

In conjunction with lessons learned from the STSS Demonstration program and NFIRE program, MDA Space Architecture modeling and simulation activities will assess the capability of a low earth orbit constellation to complement sensor coverage and missile detection and tracking capabilities provided by Advanced Overhead Persistent Infrared (OPIR) sensors.

Common threat engineering produces common and consistent adversary trajectory and signature data to enable Ballistic Missile Defense (BMD) System and sub-system concept and requirements, design, verification, and assessment. Common Threat data is contained in the Adversary Capability Document (ACD) and Adversary Data Packages (ADP) and drives BMDS ground tests, flight tests, digital simulations, and pre-mission analysis activities. It is also used to develop the BMD System Description Document and BMD System Specification.

B. Accomplishments/Planned Program

	FY 2008	FY 2009	FY 2010	FY 2011
Demonstration Satellites	185,291	171,520	148,386	
RDT&E Articles (Quantity)	0	2	0	

FY08 Accomplishments:

- Completed Satellite 2 thermal vacuum testing

- Completed integrated satellite/ground System Operability Testing
- Completed Satellites 1 and 2 integration
- Initiated set up of STSS Demo Analysis Center for government validation and verification activities following STSS satellite launch
- Completed tandem satellite acoustic testing
- Planned final testing in preparation for ship to launch site
- Examined applicability of system's ability to perform other space missions such as space situational awareness

FY09 Planned Program:

- Integrate the two satellites with the NASA booster and Orbital Insertion Stage (OIS)
- Launch two STSS Demonstration Satellites into Low Earth Orbit (LEO)
- Conduct post launch analysis
- Conduct initial on-orbit check out from the MDSEC
- Conduct mission planning and mission assurance, coordinate range activities, complete target build for:
  - BMDS Flight Test for STSS Sensor Characterization--FTS-01

- Develop target hardware and conduct mission planning and range coordination activities for:
  - BMDS Flight Test for STSS Sensor Characterization--FTS-02

- Complete set up of STSS Demo Analysis Center for government validation and verification activities following STSS satellite launch

FY10 Planned Program:

- Conduct tests from the MDSEC with resident space objects, ground based and airborne targets
- Execute target mission, collect and analyze target system data for:
  - BMDS Flight Test for STSS Sensor Characterization--FTS-01

- Complete mission planning and mission assurance, coordinate range activities, complete target build execute target mission, collect and analyze target system data for:

- BMDS Flight Test for STSS Sensor Characterization--FTS-02

- Conduct cooperative tests with other BMDS elements to include planning, execution and analyses; perform data collection on other targets of opportunity including FTK-02, GTI-04 , FTT-13, GTD-04, FTM-16 and GTX-05b
- Initiate planning for integrated BMDS intercept tests based on track data passed from the STSS Demonstration Satellites through the C2BMC to Aegis, GMD, or other interceptors
- Conduct hardware/software refresh for the Ground Station to prevent obsolescence
- Continue software upgrade activity as required
- Conduct independent government validation and verification of STSS Demo Satellite data in the STSS Demo Analysis Center

	FY 2008	FY 2009	FY 2010	FY 2011
Government	29,063	14,607	17,821	
RDT&E Articles (Quantity)	0	0	0	

FY08 Accomplishments and FY09-FY10 Planned Program:

- Continue program management FFRDC support to manage execution of the MDA space program activities
- Provide program office support for travel, cost estimating and financial management support, administrative management services, hardware and software purchases and maintenance, computer network support, supplies and reimbursement of AF and MDA civilian positions

	FY 2008	FY 2009	FY 2010	FY 2011
MDA Space Architecture	1,600	15,808	0	
RDT&E Articles (Quantity)	0	0	0	

FY08 Accomplishments:

- Conducted analysis of alternatives for space-based sensors (infrared and visible) to provide global tracking of ballistic missiles

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

FY09 Planned Program:

- Conduct modeling and simulation for BMDS space layer
- Complete BMDS utility assessment of STSS
- Develop capability needs document for future BMDS space architecture

FY10 Planned Program: N/A

	FY 2008	FY 2009	FY 2010	FY 2011
Common Threat	0	0	1,185	
RDT&E Articles (Quantity)	0	0	0	

FY08 Accomplishments: N/A

FY09 Planned Program: N/A

FY10 Planned Program:

- Publish Adversary Data Package Addendum 3
- Produce scenario data for GT-11 and PA-10
- Produce and update scenario data to support BMDS Build D specification development and verification

	FY 2008	FY 2009	FY 2010	FY 2011
Near Field Infrared Experiment (NFIRE)	0	0	12,608	
RDT&E Articles (Quantity)	0	0	0	

NOTE: The NFIRE Program funding will be captured in this Program Element for FY10. There is no funding allocated in PE 0603895C for FY 2010 for NFIRE. The NFIRE satellite containing the Tracking Sensor Payload and the Laser Communications Terminal (LCT) has survived beyond the

expected life span of the satellite. Because of the performance of these elements, we will fund the NFIRE operations on the ground to continue experiments and data gathering for the BMDS.

FY10 Planned Accomplishments

- Continue On-Orbit Operations at the MDSEC to support data collection and analysis on targets of opportunity
- Conduct cooperative tests with other BMDS elements to include planning, execution and analyses; perform data collection on other targets of opportunity including FTX-06, FTT-12, JFTM-03, FTK-02, GTI-04, FTT-13, GTD-04, FTM-16 and GTX-05b
- Continue laser communication experiments to assess viability of the technology
- Continue to support, as requested by AFSPC and other agencies, Space Situational Awareness

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

C. Other Program Funding Summary

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Total Cost
PE 0603175C Ballistic Missile Defense Technology	106,437	119,308	109,760						-
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,034,478	956,686	719,465						-
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,198,664	1,507,481	982,922						-
PE 0603883C Ballistic Missile Defense Boost Defense Segment	503,475	400,751	186,697						-
PE 0603884C Ballistic Missile Defense Sensors	574,231	777,693	636,856						-
PE 0603886C Ballistic Missile Defense System Interceptors	330,874	385,493	0						-
PE 0603888C Ballistic Missile Defense Test and Targets	619,137	919,956	966,752						-
PE 0603890C Ballistic Missile Defense Enabling Programs	416,937	402,778	369,145						-
PE 0603891C Special Programs – MDA	193,157	175,712	301,566						-
PE 0603892C Ballistic Missile Defense Aegis	1,126,337	1,113,655	1,690,758						-
PE 0603894C Multiple Kill Vehicle	223,084	283,481	0						-
PE 0603895C BMD System Space Program	16,237	24,686	12,549						-
PE 0603896C BMD C2BMC	439,997	288,287	340,014						-
PE 0603897C BMD Hercules	51,387	55,764	48,186						-
PE 0603898C BMD Joint Warfighter Support	45,400	69,743	60,921						-
PE 0603904C Missile Defense Integration & Operations Center (MDIOC)	77,102	106,040	86,949						-
PE 0603906C Regarding Trench	1,945	2,968	6,164						-
PE 0603907C Sea Based X-Band Radar (SBX)	155,244	146,895	174,576						-
PE 0603908C BMD Europ Intercep Site	0	362,007	0						-
PE 0603909C BMD Europ Midcourse Radar	0	76,537	0						-
PE 0603911C BMD European Capability	0	0	50,504						-
PE 0603912C BMD European Comm Support	0	27,008	0						-
PE 0603913C Israeli Cooperative	0	0	119,634						-
PE 0605502C Small Business Innovative Research BMDO	137,409	0	0						-
PE 0901585C Pentagon Reservation	5,971	19,667	19,709						-
PE 0901598C Management Headquarters – MDA	83,907	81,174	57,403						-

Note: The Ballistic Missile Defense System (BMDS) is an integrated, interoperable, global defense system. The programs which comprise the BMDS are interdependent.

Missile Defense Agency (MDA) Exhibit R-2A RDT&E Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

D. Acquisition Strategy

STSS follows the Missile Defense Agency's capability-based acquisition strategy that emphasizes testing, incremental development, and evolutionary acquisition as an acquisition within the Capability Development category of the new MDA Block Structure.

The STSS Demonstration Satellites effort is being pursued through a single prime contractor, Northrop Grumman Space Technology (NGST), with the subcontractor Raytheon providing the sensor payload. The program develops a ground station at the MDSEC. The contract for the STSS Demonstration Satellites effort was awarded in third quarter FY02. This contract implements MDA's capability-based acquisition strategy by a) using largely existing satellite hardware as a low risk opportunity, b) building upon the lessons learned from previous development efforts and c) establishing a series of planned enhancements to bring added capability to the BMDS.

The STSS Software Upgrades effort is being pursued through the STSS Demonstration Satellites prime contractor, Northrop Grumman Space Technology (NGST), with subcontractors playing key roles as needed. The contract for the STSS Demonstration Satellites activity was awarded in third quarter FY02. Contract modification took place in FY07 to add the STSS Software Upgrades activity.

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

I. Product Development Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2009 Cost	FY 2009 Award/ Oblg Date	FY 2010 Cost	FY 2010 Award/ Oblg Date	FY 2011 Cost	FY 2011 Award/ Oblg Date	Total Cost
Demonstration Satellites										
Capability Based R&D	SS/CPAF	NGST/ CA	156,208	139,937	1/4Q	119,790	1/4Q			415,935
Launch Vehicle Integration	C/MIPR	NASA/ FL	7,246	10,140	1Q	0	N/A			17,386
Element Integration	Various	NGST/Aerospace / CA	4,141	2,514	1/3Q	10,473	1/3Q			17,128
Advanced Algorithm Development	C/MIPR	MIT/LL, Lockhead Martin, Zantech, Sparta, CSC / Hanscom AFB MA, LAAFB CA	1,150	0	N/A	0	N/A			1,150
Risk Reduction Analysis	C/MIPR	AFRL/ NM	2,629	0	4Q	0	N/A			2,629
System Engineering	FFRDC	Aerospace/ Los Angeles AFB CA, Schriever AFB CO	12,150	17,500	1/4Q	18,123	1/4Q			47,773
Knowledge Center	Various	Various/ Various	1,178	1,429	1/4Q	0	N/A			2,607
MDA Space Architecture										
System Engineering	Various	Various/ Various	1,600	0	N/A	0	N/A			1,600

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2009 Cost	FY 2009 Award/ Oblg Date	FY 2010 Cost	FY 2010 Award/ Oblg Date	FY 2011 Cost	FY 2011 Award/ Oblg Date	Total Cost
Modeling and Simulation	MIPR	Sandia National Laboratory/ Albuquerque, NM	0	6,000	2Q	0	N/A			6,000
Modeling and Simulation	MIPR	Aerospace/ Los Angeles AFB, CA	0	5,300	2Q	0	N/A			5,300
Risk Reduction Analysis	C/FFP	SPARTA/ Centreville, VA	0	2,800	1Q	0	N/A			2,800
Modeling and Simulation	MIPR	SAF/FMB/ Washington DC	0	1,708	2Q	0	N/A			1,708
Common Threat										
Common Threat	Various	Various/ Various	0	0	N/A	1,185	1/3Q			1,185
Near Field Infrared Experiment (NFIRE)										
Prime Contract	SS/CPAF	General Dynamics/ AZ	0	0	N/A	5,208	2Q			5,208
Mission Planning/Data Reduction	C/MIPR	MIT/LL/ MA	0	0	N/A	1,900	1/4Q			1,900
Satellite Operations	SS/CPFF	MDSEC/ CO	0	0	N/A	5,500	2Q			5,500
Subtotal Product Development			186,302	187,328		162,179				535,809

Remarks

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

Funding for Capability Based R&D efforts is placed on contract for NGST to complete the development of the Demonstration Satellites, perform the Space Vehicle-to-Launch Vehicle integration, assist in conducting mission planning and operations of the Demonstration Satellites, and provide Software Upgrades.

Launch Vehicle Integration are those costs associated with the Delta II and launch services provided by NASA and the cost for transporting the satellites to the launch site for integration onto the launch vehicle.

Element Integration efforts are divided into several areas:

- Funding goes to the Navy at Pt Mugu, CA for the planning and calibration testing using F-18s for the Demonstration Satellites. Aircraft are used to generate targets for the Acquisition sensor and Track sensor with Below The Horizon (BTH) backgrounds.
- The STSS Demonstration Satellites require assets for dedicated missile tests to be conducted jointly by the Air Force Satellite Control Network (AFSCN) and the Space and Missile Center (SMC) Test Wing by utilizing mobile Remote Test Site (RTS) assets that are critical in supporting STSS launches and the subsequent operations and testing of the Demo Satellites.
- Funding for range support and its associated personnel and equipment is necessary to launch the dedicated targets. It includes radars, optics, range safety, early flight telemetry, and communications.
- The High Altitude Observatory-II assets are funded to capture data in all phases of the targets' flights with infrared sensors. The data is used to anchor results for which the performance of the Demonstration Satellites' sensor can be assessed.
- Funding for the STSS Data Analysis Center enables independent analyses and validation and verification of data from the STSS Demonstration Satellites. Costs covered include the purchase of software tools and engineering support.

Advanced Algorithm Development was accomplished by a team of multiple contractors and government organization to include, but not limited to, the Massachusetts Institute of Technology/Lincoln Laboratory (MIT/LL), Defense Microelectronics Activity, Northrop Grumman Space Technology, Lockheed Martin, Photon Research Association, SPARTA, and Computer Science Corporation/Nichols Research Corporation (CSC/Nichols).

BMD Systems Engineering provides System Description Documents and System Specifications for elements to design, build, integrate and test BMDS components. These products optimize performance at the system level and further ensure that the assessment of the designed BMD System is based on sufficient ground and flight testing. Compliance of STSS to BMD System level requirements is monitored in a series of requirements and

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

design reviews both at the system and element levels. Systems Engineering support is provided by Aerospace directly to the Demonstration Satellites effort.

Common threat engineering produces common and consistent adversary trajectory and signature data to enable Ballistic Missile Defense (BMD) System and sub-system concept and requirements, design, verification, and assessment. Common Threat data is contained in the Adversary Capability Document (ACD) and Adversary Data Packages (ADP) and drives BMDS ground tests, flight tests, digital simulations, and pre-mission analysis activities. It is also used to develop the BMD System Description Document and BMD System Specification.

NFIRE funding will be forwarded to several Contractors and government organizations to include, but not limited to General Dynamics, AFRL and the MDSEC. For FY10, STSS will provide funding for the NFIRE program in this program element, in Project WX12 as there is no funding programmed in PE 063895C.

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

II. Support Costs Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2009 Cost	FY 2009 Award/ Oblg Date	FY 2010 Cost	FY 2010 Award/ Oblg Date	FY 2011 Cost	FY 2011 Award/ Oblg Date	Total Cost
Government										
Program Mission Support	Various	SMC/ CA	2,522	3,090	1/4Q	3,867	1/4Q			9,479
OGA Civilian	Various	SMC/ CA	2,608	2,530	1/4Q	3,392	1/4Q			8,530
MDA Civilian	Various	MDA/ AL	560	560	4Q	1,338	1/4Q			2,458
OGA Contractor Support (SETA)	Various	SMC/ CA	5,863	6,427	1/4Q	7,092	1/4Q			19,382
Subtotal Support Costs			11,553	12,607		15,689				39,849

Remarks

Program support Costs include but not limited to costs for reimbursement of AF and MDA Civilian personnel that directly support the STSS program, for Demo Satellites and STSS Software Upgrades. Additionally, the cost of personnel travel, training, hardware and software maintenance, IT network support, program office administrative support, Comprehensive Cost and Requirement System (CCARs) administrative support, logistics and financial management/cost estimating support are included in this section

III. Test and Evaluation Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2009 Cost	FY 2009 Award/ Oblg Date	FY 2010 Cost	FY 2010 Award/ Oblg Date	FY 2011 Cost	FY 2011 Award/ Oblg Date	Total Cost
Subtotal Test and Evaluation										

Missile Defense Agency (MDA) Exhibit R-3 RDT&E Project Cost Analysis	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

Remarks

IV. Management Services Cost ($ in Thousands)

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2009 Cost	FY 2009 Award/ Oblg Date	FY 2010 Cost	FY 2010 Award/ Oblg Date	FY 2011 Cost	FY 2011 Award/ Oblg Date	Total Cost
Government										
Aerospace	FFRDC	Aerospace/ CA	17,650	2,000	4Q	2,132	1/4Q			21,782
SDL	MIPR	SDL/ UT	449	0	N/A	0	N/A			449
Subtotal Management Services			18,099	2,000		2,132				22,231

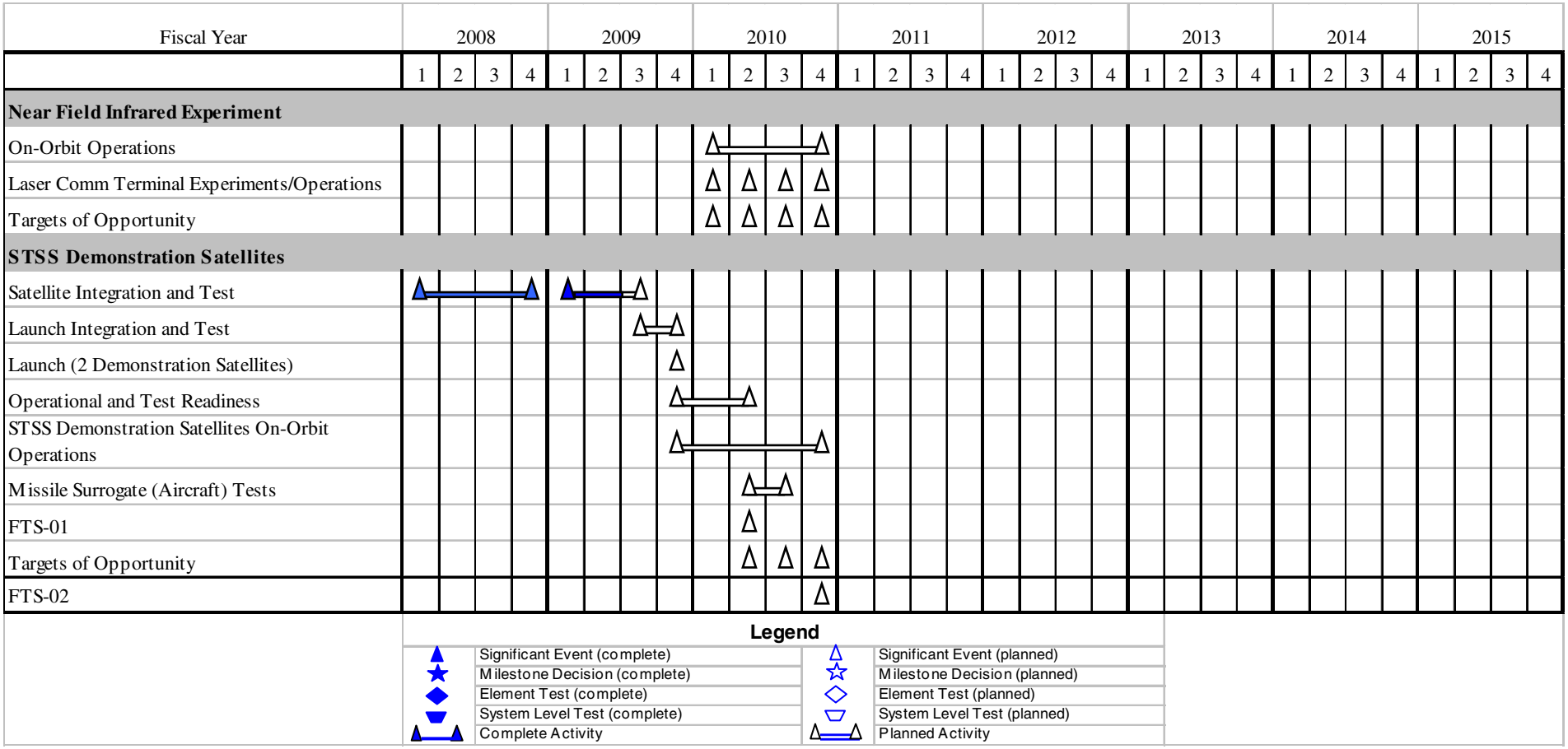
Remarks

Space Dynamics Laboratory (SDL) is funded via University Affiliated Research Center (UARC) contract.

Project Total Cost			215,954	201,935		180,000				597,889

Remarks

Missile Defense Agency (MDA) Exhibit R-4 Schedule Profile	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: **RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)**	R-1 NOMENCLATURE: **0603893C Space Tracking & Surveillance System**



Missile Defense Agency (MDA) Exhibit R-4A Schedule Detail	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

Schedule Profile	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Near Field Infrared Experiment								
On-Orbit Operations			1Q-4Q					
Laser Comm Terminal Experiments/Operations			1Q,2Q,3Q,4Q					
Targets of Opportunity			1Q,2Q,3Q,4Q					
STSS Demonstration Satellites								
Satellite Integration and Test	1Q-4Q	1Q-3Q						
Launch Integration and Test		3Q-4Q						
Launch (2 Demonstration Satellites)		4Q						
Operational and Test Readiness		4Q	1Q-2Q					
STSS Demonstration Satellites On-Orbit Operations		4Q	1Q-4Q					
Missile Surrogate (Aircraft) Tests			2Q-3Q					
FTS-01			2Q					
Targets of Opportunity			2Q,3Q,4Q					
FTS-02			4Q					

Missile Defense Agency (MDA) Exhibit R-2A Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

COST ($ in Thousands)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
ZX40 Program-Wide Support	10,545	6,988	0					
RDT&E Articles Qty	0	0	0					

A. Mission Description and Budget Item Justification

Program-Wide Support provides funding for common non-headquarters support functions across the entire program. Includes costs for both government civilians performing these functions, as well as outside services and support contractors that augment government staff in these areas. Other costs included provide facility capabilities for MDA Executing Agent locations, such as physical and technical security, legal services, travel and training, office and equipment leases, utilities and communications, supplies and maintenance, and similar operating expenses. Also includes funding for charges on canceled appropriations in accordance with Public Law 101-510, legal settlements, and foreign currency fluctuations on a limited number of foreign contracts.

B. Accomplishments/Planned Program

	FY 2008	FY 2009	FY 2010	FY 2011
Civilian Salaries and Support	10,545	6,988	0	
RDT&E Articles (Quantity)	0	0	0	

See Section A: Mission Description and Budget Item Justification

Missile Defense Agency (MDA) Exhibit R-2A Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

C. Other Program Funding Summary

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Total Cost
PE 0603175C Ballistic Missile Defense Technology	106,437	119,308	109,760						-
PE 0603881C Ballistic Missile Defense Terminal Defense Segment	1,034,478	956,686	719,465						-
PE 0603882C Ballistic Missile Defense Midcourse Defense Segment	2,198,664	1,507,481	982,922						-
PE 0603883C Ballistic Missile Defense Boost Defense Segment	503,475	400,751	186,697						-
PE 0603884C Ballistic Missile Defense Sensors	574,231	777,693	636,856						-
PE 0603886C Ballistic Missile Defense System Interceptors	330,874	385,493	0						-
PE 0603888C Ballistic Missile Defense Test and Targets	619,137	919,956	966,752						-
PE 0603890C Ballistic Missile Defense Enabling Programs	416,937	402,778	369,145						-
PE 0603891C Special Programs – MDA	193,157	175,712	301,566						-
PE 0603892C Ballistic Missile Defense Aegis	1,126,337	1,113,655	1,690,758						-
PE 0603894C Multiple Kill Vehicle	223,084	283,481	0						-
PE 0603895C BMD System Space Program	16,237	24,686	12,549						-
PE 0603896C BMD C2BMC	439,997	288,287	340,014						-
PE 0603897C BMD Hercules	51,387	55,764	48,186						-
PE 0603898C BMD Joint Warfighter Support	45,400	69,743	60,921						-
PE 0603904C Missile Defense Integration & Operations Center (MDIOC)	77,102	106,040	86,949						-
PE 0603906C Regarding Trench	1,945	2,968	6,164						-
PE 0603907C Sea Based X-Band Radar (SBX)	155,244	146,895	174,576						-
PE 0603908C BMD Europ Intercep Site	0	362,007	0						-
PE 0603909C BMD Europ Midcourse Radar	0	76,537	0						-
PE 0603911C BMD European Capability	0	0	50,504						-
PE 0603912C BMD European Comm Support	0	27,008	0						-
PE 0603913C Israeli Cooperative	0	0	119,634						-
PE 0605502C Small Business Innovative Research BMDO	137,409	0	0						-
PE 0901585C Pentagon Reservation	5,971	19,667	19,709						-
PE 0901598C Management Headquarters – MDA	83,907	81,174	57,403						-

Note: The Ballistic Missile Defense System (BMDS) is an integrated, interoperable, global defense system. The programs which comprise the BMDS are interdependent.

Missile Defense Agency (MDA) Exhibit R-2A Project Justification	Date: May 2009
APPROPRIATION/BUDGET ACTIVITY: RDT&E, DW/04 Advanced Component Development and Prototypes (ACD&P)	R-1 NOMENCLATURE: 0603893C Space Tracking & Surveillance System

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