Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-210

SBIRS HIGH

As of December 31, 2010

Defense Acquisition Management
Information Retrieval
(DAMIR)

Table of Contents

Program Information

Designation And Nomenclature (Popular Name)

Space Based Infrared System (SBIRS) High Program

DoD Component

Air Force

Responsible Office

Responsible Office

Col Roger W Teague
Infrared Systems Directorate (SMC/IS)
483 N Aviation Blvd Bldg 271
LOS ANGELES AIR FORCE BASE (LAAFB)
El Segundo, CA 90245-2808
roger.teague@losangeles.af.mil

Phone 310-653-3018
Fax 310-653-4414
DSN Phone 633-3018
DSN Fax 633-4414

Date Assigned May 1, 2008

References

SAR Baseline (Development Estimate)

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated March 19, 1998

Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated March 31, 2006

Mission and Description

The Space Based Infrared Systems (SBIRS) High program is intended to satisfy key requirements delineated in the SBIRS Operational Requirements Document (ORD) dated August 15, 1996, with Annex 1 dated July 17, 1998, within the available budget and schedule. SBIRS High is an integrated system consisting of multiple space and ground elements, with incremental deployment phasing, simultaneously satisfying requirements in the following mission areas: Missile Warning, Missile Defense, Technical Intelligence and Battlespace Awareness. The constellation architecture for SBIRS High includes Highly Elliptical Orbit (HEO) sensors and Geosynchronous Earth Orbit (GEO) satellites, in addition to the following ground elements: a Continental United States (CONUS)-based Mission Control Station and Mission Control Station Backup, overseas Relay Ground Stations, Mobile Ground Stations, and associated communication links. The first increment of the SBIRS ground system was certified for operations in December 2001 and supports mission processing of the legacy Defense Support Program system satellites and fusion of HEO monotracks and other data. The SBIRS HEO system was certified for the Integrated Tactical Warning/Attack Assessment (ITW/AA) mission in November 2008 and the technical intelligence mission in August 2009.

Executive Summary

Geosynchronous Earth Orbit 1 (GEO 1) Space Vehicle (SV)
During 2010 the team completed all of the post Thermal-Vacuum (TVAC) rework and regression testing. The final installation of batteries, solar panels, and antenna wing assemblies completed January 29, 2011. Several independent assessments were conducted throughout the year to validate that the testing and verification processes contained the appropriate rigor and discipline. In preparation for GEO 1 shipment to the launch base, several additional mission assurance reviews by the Program Executive Officer for Space (AFPEO/SP), the Aerospace Corporation and industry partners were held on February 25, February 19 and February 25, 2011, respectively. GEO 1 was shipped to the launch facility on March 1, 2011.

Flight Software System (FSS)
The FSS software development completed and the software qualification activities continue making steady progress. The last part of the qualification effort, the clean dry runs / run for record (CDR/RFR), began on December 28, 2010. The CDR/RFR will be conducted in four sequential phases with data analysis and test report preparation being conducted in parallel. The final test exit review completed on February 22, 2011.

Acquisition Program Baseline (APB)
The revised APB is in development. It incorporates the latest reconciled cost estimates, increases the quantity to four GEO satellites, and establishes new schedule milestones for delivery of the GEO satellites and associated ground segment upgrades necessary to ultimately satisfy the SBIRS requirements.

Ground Development Activities
The team completed several activities in support of GEO 1 launch and message certification. The ground software for GEO 1 Launch and Early Orbit Test (LEOT) successfully supported the final system test which verified ground to spacecraft system functionality. The software, required to complete the testing to certify GEO operations, successfully executed formal dry run testing in December 2010 and will complete verification in April 2011. Contract negotiations to develop and deliver the next block of ground system capability are complete and the program office will issue Authority to Proceed (ATP) in April 2011. This effort will complete the final block (Increment 2) of the SBIRS ground segment capability.

GEO 2 Space Vehicle Activities

Following the successful GEO 2 Baseline Integrated System Test (BIST-2) Test Readiness Review (TRR) on December 10, 2010, the team proceeded with configuring for testing, including moving the space vehicle into the test stand and connecting Electrical Ground Support Equipment (EGSE) harness. Other accomplishments include full power-up of the primary and redundant side of the spacecraft and payload and completion of the radio frequency (RF) survey and spurs testing. Next steps include the GEO 2 thermal vacuum test starting in late 2011.

GEO 1 Readiness and Operations
The team performed several different exercises and rehearsals to: support operational checkout of the ground software launch baseline; exercise the procedures used to command the satellite; and ensure proficiency of the GEO operations crews. The Integrated Crew Exercise (ICE #1) was successfully conducted on December 2, 2010 at Cape Canaveral Air Force Station (CCAFS). ICE #1 consisted of two scenarios which contained anomalies, and activities associated with SV separation and Satellite Control Authority (SCA) transfer. The team completed a ground to space system test on December 12, 2010 which exercised end-to-end Telemetry, Tracking and Control (TT&C) interfaces and associated system functionality between the SBIRS ground segment and the GEO 1 spacecraft. The test also exercised current versions of ground software, command products, flight software and database. The team verified the functionality of many key tasks that are performed during Early On-orbit Testing

(EOT) and SBIRS GEO operations. Additionally, an LEOT rehearsal was conducted continuously (24/7) December 14 through 19, 2010. Participants included the integrated launch management team, operations crews and engineering staff located in several locations. The primary goal was to exercise EOT processes and sequences from spacecraft bus deployments through infrared payload checkout.

SBIRS Follow On Production (SFP) Program

The program office initiated the contract actions to begin the GEO 4 Production and completed the GEO System Critical Design Review and associated action item closure. GEO and Highly Elliptical Orbit (HEO) payload production continues with completion of the HEO 3 Pallet Static Load Test and ongoing procurement of major components such as the Pointing and Control Assembly (PCA) and the Signal Processing Assembly (SPA). Closure plans are in place to address late PCA hardware sub-vendor deliverables and Optical Telescope Assembly (OTA) bonding failures. The Host HEO accommodation effort developed solutions to all interface requirement discrepancies, including a design baseline update to the HEO payload stowed heater configuration. HEO electromagnetic interface risk reduction testing identified design deficiencies and corrective action(s) early in the test and integration cycle and demonstrated the efficacy of design improvements.

SBIRS Replenishment Production (SRP), GEO 5-6 Acquisition Strategy

The program office briefed the Acting Assistant Secretary of the Air Force for Acquisition (SAF/AQ) on the acquisition strategy for GEO satellites 5 and 6, and gained concurrence on the approach. The acquisition strategy documents are being updated to reflect the Air Force recommendation. The program office will present the acquisition strategy to the Undersecretary of Defense for Acquisition, Technology and Logistics (USD/AT&L) for approval.

Evolutionary Acquisition for Space Efficiencies (EASE)

Evolutionary Acquisition for Space Efficiency (EASE), funded in the FY 2012 President's Budget, is an acquisition strategy that encompasses the following tenets: block buys of satellites, fixed price contracting, stable research and development investment, and a modified annual funding approach. The block buy approach will result in estimated savings that can be reinvested in research and development to further improve the performance and lower the cost of follow-on systems. In addition, the modified funding proposal stabilizes funding throughout satellite production to maintain affordability and avoid significant funding increasing in specific fiscal years.

Data Exploitation Activities

The HEO Adjustable Focus Area, the sixth of seven FY 2009 congressionally funded exploitation projects, was operationally accepted by the 460th Operations Group. This capability provides the Joint Operations Planning Cell (JOPC) and operators at the Mission Control Station Backup - HEO (MCSB-H) a five-fold increase in the flexibility to define mission objectives.

Software Statement

Software development issues have significantly impacted the SBIRS program in flight software; however, Software Item Qualification Testing (SIQT) successfully completed and GEO Satellite 1 was delivered to Cape Canaveral Air Force Station in March 2011.

Threshold Breaches

APB Breaches		
Schedule		☑
Performance		☐
Cost	RDT&E	☑
	Procurement	☑
	MILCON	☐
	Acq O&M	☐
Unit Cost	PAUC	☐
	APUC	☐

Nunn-McCurdy Breaches		
Current UCR Baseline		
	PAUC	None
	APUC	None
Original UCR Baseline		
	PAUC	None
	APUC	None

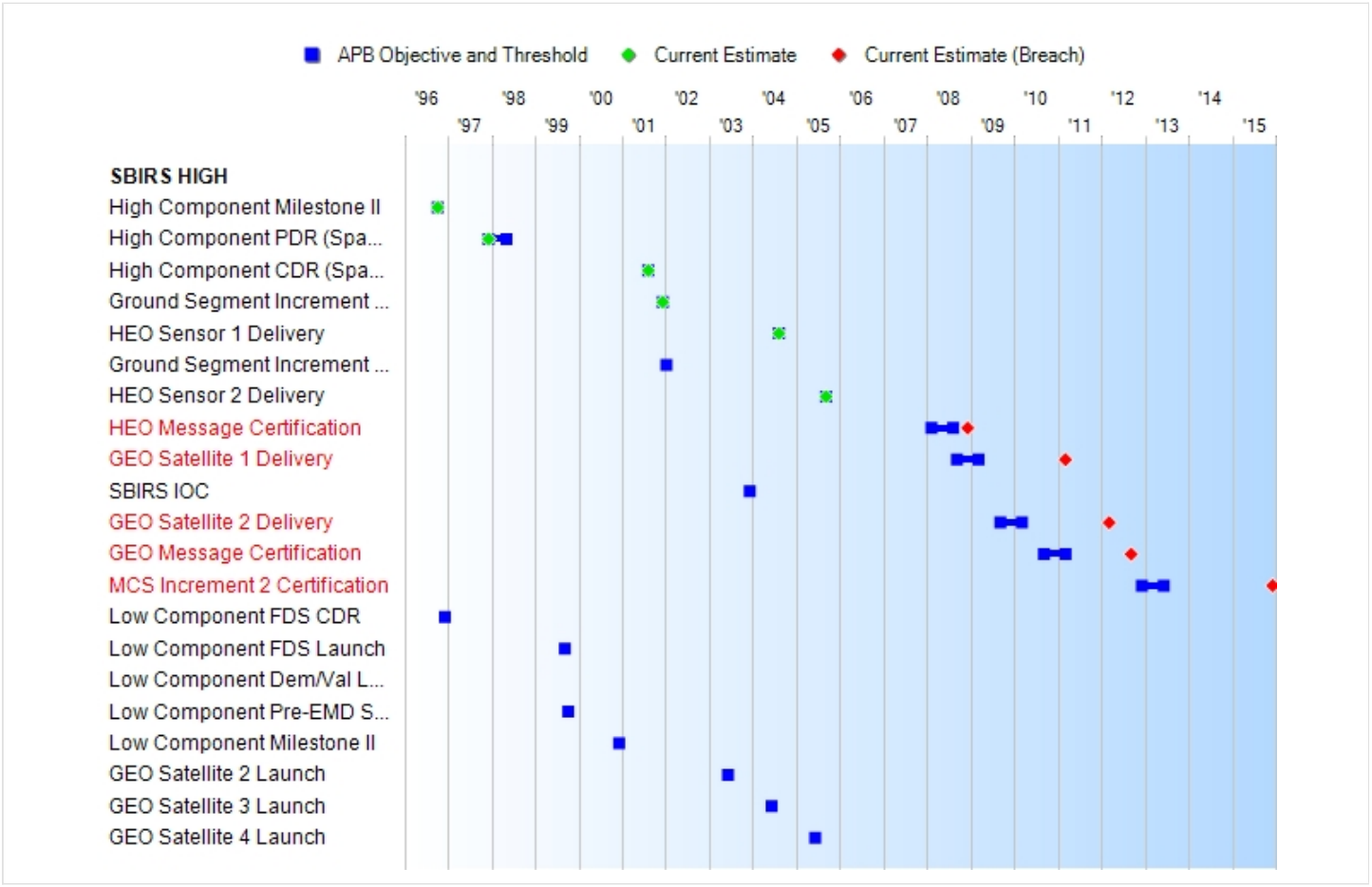
Explanation of Breach

The schedule milestone deviations against the Geosynchronous Earth Orbit (GEO) Satellite 1 delivery, GEO Satellite 2 delivery, and GEO Message Certification are attributed to technical issues with the Flight Software System (FSS) and implementation of the subsequent recovery plan, as well as some hardware issues. The schedule milestone deviation against the Mission Control Station (MCS) Increment 2 Certification is due to overall program delays.

The cost deviation against the procurement appropriation is due to the addition of GEO Satellite 4 to the baseline program in the FY 2009 President's Budget (PB). Funding for GEO Satellite 5 and 6 was added to the program's budget in the FY 2011 PB. The cost deviation against the Research Development Test & Evaluation (RDT&E) appropriation is due to the additional costs required to complete the SBIRS Engineering, Manufacturing and Development (EMD) program as a result of schedule delays, as well as the additional costs required to implement the revised SBIRS ground delivery strategy.

The Milestone Decision Authority (MDA) has been notified of the above deviations via Program Deviation Reports. A revised Acquisition Program Baseline (APB) is in coordination to: update the schedule milestones to align with the current GEO 1 and GEO 2 delivery date and the revised ground delivery strategy; and to update the RDT&E, procurement, and Operations and Support (O&S) costs for GEOs 1 through 4, Highly Elliptical Orbit (HEO) payloads 1 and 2, and associated ground infrastructure.

Schedule


APB Objective and Threshold
Current Estimate
Current Estimate (Breach)
'96
'97
'98
'99
'00
'01
'02
'03
'04
'05
'06
'07
'08
'09
'10
'11
'12
'13
'14
'15
SBIRS HIGH
High Component Milestone II
High Component PDR (Spa...
High Component CDR (Spa...
Ground Segment Increment ...
HEO Sensor 1 Delivery
Ground Segment Increment ...
HEO Sensor 2 Delivery
HEO Message Certification
GEO Satellite 1 Delivery
SBIRS IOC
GEO Satellite 2 Delivery
GEO Message Certification
MCS Increment 2 Certification
Low Component FDS CDR
Low Component FDS Launch
Low Component Dem/Val L...
Low Component Pre-EMD S...
Low Component Milestone II
GEO Satellite 2 Launch
GEO Satellite 3 Launch
GEO Satellite 4 Launch

Milestones	SAR Baseline Dev Est	Current APB Development Objective/Threshold		Current Estimate	
High Component Milestone II	OCT 1996	OCT 1996	OCT 1996	OCT 1996	
High Component PDR (Space and Ground Increment 2)	DEC 1997	DEC 1997	MAY 1998	DEC 1997	
High Component CDR (Space and Ground Increment 2)	SEP 1999	AUG 2001	AUG 2001	AUG 2001	
Ground Segment Increment 1 Certification	AUG 1999	DEC 2001	DEC 2001	DEC 2001	
HEO Sensor 1 Delivery	SEP 2001	AUG 2004	AUG 2004	AUG 2004	
Ground Segment Increment 2 Certification	JAN 2002	N/A	N/A	N/A	
HEO Sensor 2 Delivery	SEP 2003	SEP 2005	SEP 2005	SEP 2005	
HEO Message Certification	N/A	FEB 2008	AUG 2008	**DEC 2008**[1]	
GEO Satellite 1 Delivery	N/A	SEP 2008	MAR 2009	**MAR 2011**[1]	
SBIRS IOC	DEC 2003	N/A	N/A	N/A	
GEO Satellite 2 Delivery	N/A	SEP 2009	MAR 2010	**MAR 2012**[1]	
GEO Message Certification	N/A	SEP 2010	MAR 2011	**SEP 2012**[1]	(Ch-1)
MCS Increment 2 Certification	N/A	DEC 2012	JUN 2013	**DEC 2015**[1]	(Ch-2)
Low Component FDS CDR	DEC 1996	N/A	N/A	N/A	
Low Component FDS Launch	SEP 1999	N/A	N/A	N/A	
Low Component Dem/Val Launch	TBD	N/A	N/A	N/A	
Low Component Pre-EMD Start	OCT 1999	N/A	N/A	N/A	
Low Component Milestone II	DEC 2000	N/A	N/A	N/A	
GEO Satellite 2 Launch	JUN 2003	N/A	N/A	N/A	
GEO Satellite 3 Launch	JUN 2004	N/A	N/A	N/A	
GEO Satellite 4 Launch	JUN 2005	N/A	N/A	N/A	

[1]*APB Breach*

Acronyms And Abbreviations

CDR - Critical Design Review
EMD - Engineering, Manufacturing and Development
FDS - Flight Demonstration System
GEO - Geosynchronous Earth Orbit
HEO - Highly Elliptical Orbit
IOC - Initial Operational Capability
MCS - Mission Control Station
PDR - Preliminary Design Review

Change Explanations

(Ch-1) The program manager's estimate for GEO Message Certification changed from November 2012 to September 2012. The current estimate is based on a launch plus a 16.6 month certification campaign, assuming launch no later than May 2011, and a nominal early orbit test campaign.

(Ch-2) The program manager's estimate for MCS Increment 2 Certification changed from December 2014 to December 2015 due to acquisition delays as well as refined schedule estimates for both the Mission Control Station (MCS) and Mission Control Station Backup (MCS-B) fit up efforts.

Memo

GEO Satellite Delivery is defined as a Directorate-accepted satellite ready for shipment to the launch facility.

Performance

Classified Performance information is provided in the classified annex to this submission.

Track To Budget

General Memo

3600F PE 0640441F, project 3616, and 3020F PE 0305915F, ICN MSSBIR, are shared. Project 3616 includes funds for the Capability and Affordability Improvement Program (CAIP) and architecture studies that are not part of this Major Defense Acquisition Program (MDAP). ICN MSSBIR includes funds for Highly Elliptical Orbit (HEO) payloads 3 and 4 that are not part of this MDAP.

RDT&E

APPN 3600	BA 05	PE 0640441F	(Air Force)
	Project 3616	SBIR High Element EMD/SBIRS High EMD	(Shared)
	Project A040	Commercially Hosted Infrared Payload (CHIRP)	

PE 0640441F, project 3616 is shared with the Capability Affordability Improvement Program (CAIP) and architecture studies, that are not part of this Major Defense Acquisition Program (MDAP) and excluded from this report.

Procurement

APPN 3020	BA 05	PE 0305915F	(Air Force)
	ICN MSSBIR	SBIR High Missile Procurement	(Shared)
APPN 3080	BA 03	PE 0305915F	(Air Force)
	ICN 836720	SBIR High Other Procurement	

PE 0305915F, ICN MSSBIR is shared with the Highly Elliptical Orbit (HEO) Replenishment Payloads, which are not part of this MDAP and excluded from this report.

MILCON

APPN 3300	BA 01	PE 0640441F	(Air Force)
		SBIRS ARCHI-EMD (SPACE) Military Contruction	

Acq O&M

APPN 3400	BA 01	PE 0350915F	(Air Force)
		SBIRS Operation and Maintenance	

Cost and Funding

Cost Summary

Total Acquisition Cost and Quantity

	BY1995 $M			BY1995 $M	TY $M		
Appropriation	SAR Baseline Dev Est	Current APB Development Objective/Threshold		Current Estimate	SAR Baseline Dev Est	Current APB Development Objective	Current Estimate
RDT&E	3016.6	7018.1	7719.9	**8748.4** [1]	3386.5	8192.5	10593.6
Procurement	496.7	1342.8	1477.1	**4906.5** [1]	584.5	1723.2	6763.5
Flyaway	496.7	--	--	4251.2	--	--	5868.1
Recurring	496.7	--	--	3523.2	--	--	4911.8
Non Recurring	0.0	--	--	728.0	--	--	956.3
Support	0.0	--	--	655.3	--	--	895.4
Other Support	0.0	--	--	655.3	--	--	895.4
Initial Spares	0.0	--	--	0.0	--	--	0.0
MILCON	26.0	52.0	57.2	52.0	28.5	57.0	57.0
Acq O&M	140.2	156.4	172.0	137.5	147.8	185.9	161.1
Total	3679.5	8569.3	N/A	13844.4	4147.3	10158.6	17575.2

[1] ***APB Breach***

Quantity	SAR Baseline Dev Est	Current APB Development	Current Estimate
RDT&E	3	2	2
Procurement	2	1	4
Total	5	3	6

The above quantity represents six Geosynchronous Earth Orbit (GEO) satellites.

Cost and Funding

Funding Summary

Appropriation and Quantity Summary
FY2012 President's Budget / December 2010 SAR (TY$ M)

Appropriation	Prior	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	To Complete	Total
RDT&E	7823.4	530.0	621.6	446.7	300.1	167.4	170.4	534.0	10593.6
Procurement	1876.0	967.8	341.4	473.5	502.2	491.6	501.2	1609.8	6763.5
MILCON	57.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.0
Acq O&M	136.1	11.5	13.5	0.0	0.0	0.0	0.0	0.0	161.1
PB 2012 Total	9892.5	1509.3	976.5	920.2	802.3	659.0	671.6	2143.8	17575.2
PB 2011 Total	9970.4	1514.3	1834.6	1157.9	388.5	249.9	0.0	0.0	15115.6
Delta	-77.9	-5.0	-858.1	-237.7	413.8	409.1	671.6	2143.8	2459.6

Quantity	Undistributed	Prior	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	To Complete	Total
Development	2	0	0	0	0	0	0	0	0	2
Production	0	1	1	0	2	0	0	0	0	4
PB 2012 Total	2	1	1	0	2	0	0	0	0	6
PB 2011 Total	2	1	1	1	1	0	0	0	0	6
Delta	0	0	0	-1	1	0	0	0	0	0

Cost and Funding

Annual Funding By Appropriation

Annual Funding TY$
3600 | RDT&E | Research, Development, Test, and Evaluation, Air Force

Fiscal Year	Quantity	End Item Recurring Flyaway TY $M	Non End Item Recurring Flyaway TY $M	Non Recurring Flyaway TY $M	Total Flyaway TY $M	Total Support TY $M	Total Program TY $M
1995	--	--	--	--	--	--	113.0
1996	--	--	--	--	--	--	164.0
1997	--	--	--	--	--	--	193.0
1998	--	--	--	--	--	--	337.9
1999	--	--	--	--	--	--	502.6
2000	--	--	--	--	--	--	400.0
2001	--	--	--	--	--	--	550.1
2002	--	--	--	--	--	--	524.5
2003	--	--	--	--	--	--	782.9
2004	--	--	--	--	--	--	621.8
2005	--	--	--	--	--	--	587.1
2006	--	--	--	--	--	--	706.6
2007	--	--	--	--	--	--	693.0
2008	--	--	--	--	--	--	583.3
2009	--	--	--	--	--	--	542.4
2010	--	--	--	--	--	--	521.2
2011	--	--	--	--	--	--	530.0
2012	--	--	--	--	--	--	621.6
2013	--	--	--	--	--	--	446.7
2014	--	--	--	--	--	--	300.1
2015	--	--	--	--	--	--	167.4
2016	--	--	--	--	--	--	170.4
2017	--	--	--	--	--	--	174.8
2018	--	--	--	--	--	--	178.0
2019	--	--	--	--	--	--	181.2
Subtotal	**2**	**--**	**--**	**--**	**--**	**--**	**10593.6**

Annual Funding BY$
3600 | RDT&E | Research, Development, Test, and Evaluation, Air Force

Fiscal Year	Quantity	End Item Recurring Flyaway BY 1995 $M	Non End Item Recurring Flyaway BY 1995 $M	Non Recurring Flyaway BY 1995 $M	Total Flyaway BY 1995 $M	Total Support BY 1995 $M	Total Program BY 1995 $M
1995	--	--	--	--	--	--	111.3
1996	--	--	--	--	--	--	158.7
1997	--	--	--	--	--	--	184.3
1998	--	--	--	--	--	--	320.6
1999	--	--	--	--	--	--	471.9
2000	--	--	--	--	--	--	370.0
2001	--	--	--	--	--	--	501.7
2002	--	--	--	--	--	--	473.3
2003	--	--	--	--	--	--	696.9
2004	--	--	--	--	--	--	540.0
2005	--	--	--	--	--	--	497.2
2006	--	--	--	--	--	--	580.9
2007	--	--	--	--	--	--	555.1
2008	--	--	--	--	--	--	458.2
2009	--	--	--	--	--	--	420.7
2010	--	--	--	--	--	--	400.1
2011	--	--	--	--	--	--	401.3
2012	--	--	--	--	--	--	463.8
2013	--	--	--	--	--	--	327.9
2014	--	--	--	--	--	--	216.6
2015	--	--	--	--	--	--	118.8
2016	--	--	--	--	--	--	118.9
2017	--	--	--	--	--	--	119.9
2018	--	--	--	--	--	--	120.1
2019	--	--	--	--	--	--	120.2
Subtotal	**2**	**--**	**--**	**--**	**--**	**--**	**8748.4**

The cost profile above includes $18.2M in FY2011 and $16.6M in FY2012 for the Commercially Hosted Infrared Payload (CHIRP), BPAC 65A040.

Funds for the Capability and Affordability Improvement Program (CAIP) and Architecture Studies are part of the Evolutionary Acquisition for Space Efficiencies (EASE) effort and excluded from this report. Those R&D funds are not associated with the baseline SBIRS Program. The omitted funding profile is:
FY 2013 $128.0M
FY 2014 $128.7M
FY 2015 $129.4M
FY 2016 $130.1M
FY 2017 $129.7M
FY 2018 $132.0M
FY 2019 $134.4M

Annual Funding TY$
3020 | Procurement | Missile Procurement, Air Force

Fiscal Year	Quantity	End Item Recurring Flyaway TY $M	Non End Item Recurring Flyaway TY $M	Non Recurring Flyaway TY $M	Total Flyaway TY $M	Total Support TY $M	Total Program TY $M
2008	--	173.1	--	91.2	264.3	5.9	270.2
2009	1	836.3	--	456.4	1292.7	21.5	1314.2
2010	--	126.8	--	15.5	142.3	35.1	177.4
2011	1	606.1	0.3	287.9	894.3	48.7	943.0
2012	--	138.4	1.1	105.3	244.8	47.0	291.8
2013	2	384.0	--	--	384.0	42.6	426.6
2014	--	412.6	--	--	412.6	61.5	474.1
2015	--	413.0	--	--	413.0	52.8	465.8
2016	--	396.2	--	--	396.2	97.5	493.7
2017	--	396.2	--	--	396.2	81.3	477.5
2018	--	1027.7	--	--	1027.7	81.3	1109.0
Subtotal	**4**	**4910.4**	**1.4**	**956.3**	**5868.1**	**575.2**	**6443.3**

Annual Funding BY$
3020 | Procurement | Missile Procurement, Air Force

Fiscal Year	Quantity	End Item Recurring Flyaway BY 1995 $M	Non End Item Recurring Flyaway BY 1995 $M	Non Recurring Flyaway BY 1995 $M	Total Flyaway BY 1995 $M	Total Support BY 1995 $M	Total Program BY 1995 $M
2008	--	135.1	--	71.2	206.3	4.6	210.9
2009	1	644.6	--	351.7	996.3	16.6	1012.9
2010	--	96.4	--	11.8	108.2	26.6	134.8
2011	1	454.1	0.2	215.7	670.0	36.5	706.5
2012	--	102.1	0.8	77.6	180.5	34.7	215.2
2013	2	278.6	--	--	278.6	30.9	309.5
2014	--	294.3	--	--	294.3	43.9	338.2
2015	--	289.7	--	--	289.7	37.0	326.7
2016	--	273.3	--	--	273.3	67.2	340.5
2017	--	268.7	--	--	268.7	55.1	323.8
2018	--	685.3	--	--	685.3	54.2	739.5
Subtotal	**4**	**3522.2**	**1.0**	**728.0**	**4251.2**	**407.3**	**4658.5**

The Missile Procurement Air Force (MPAF) funding profile above represents funding for Geosynchronous Earth Orbit (GEO) satellites 3 through 6. MPAF funds for Highly Elliptical Orbit (HEO) 3 and 4 payloads are excluded. HEO 3 and 4 payloads are replenishment payloads and are baselined separately.

The omitted funding profile is:
FY 2008 $123.8M
FY 2009 $511.8M
FY 2010 $286.5M
FY 2011 $27.6M
FY 2012 $33.1M
FY 2013 $22.1M
FY 2014 $30.4M
FY 2015 $26.8M

Cost Quantity Information
3020 | Procurement | Missile Procurement, Air Force

Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned with Quantity) BY 1995 $M
2008	--	--
2009	1	697.3
2010	--	--
2011	1	594.3
2012	--	--
2013	2	2230.6
2014	--	--
2015	--	--
2016	--	--
2017	--	--
2018	--	--
Subtotal	**4**	**3522.2**

Annual Funding TY$
3080 | Procurement | Other Procurement, Air Force

Fiscal Year	Quantity	End Item Recurring Flyaway TY $M	Non End Item Recurring Flyaway TY $M	Non Recurring Flyaway TY $M	Total Flyaway TY $M	Total Support TY $M	Total Program TY $M
2004	--	--	--	--	--	96.4	96.4
2005	--	--	--	--	--	--	--
2006	--	--	--	--	--	3.6	3.6
2007	--	--	--	--	--	6.5	6.5
2008	--	--	--	--	--	3.8	3.8
2009	--	--	--	--	--	1.9	1.9
2010	--	--	--	--	--	2.0	2.0
2011	--	--	--	--	--	24.8	24.8
2012	--	--	--	--	--	49.6	49.6
2013	--	--	--	--	--	46.9	46.9
2014	--	--	--	--	--	28.1	28.1
2015	--	--	--	--	--	25.8	25.8
2016	--	--	--	--	--	7.5	7.5
2017	--	--	--	--	--	7.6	7.6
2018	--	--	--	--	--	7.8	7.8
2019	--	--	--	--	--	7.9	7.9
Subtotal	**--**	**--**	**--**	**--**	**--**	**320.2**	**320.2**

Annual Funding BY$
3080 | Procurement | Other Procurement, Air Force

Fiscal Year	Quantity	End Item Recurring Flyaway BY 1995 $M	Non End Item Recurring Flyaway BY 1995 $M	Non Recurring Flyaway BY 1995 $M	Total Flyaway BY 1995 $M	Total Support BY 1995 $M	Total Program BY 1995 $M
2004	--	--	--	--	--	84.1	84.1
2005	--	--	--	--	--	--	--
2006	--	--	--	--	--	3.0	3.0
2007	--	--	--	--	--	5.2	5.2
2008	--	--	--	--	--	3.0	3.0
2009	--	--	--	--	--	1.5	1.5
2010	--	--	--	--	--	1.5	1.5
2011	--	--	--	--	--	18.8	18.8
2012	--	--	--	--	--	37.0	37.0
2013	--	--	--	--	--	34.4	34.4
2014	--	--	--	--	--	20.3	20.3
2015	--	--	--	--	--	18.3	18.3
2016	--	--	--	--	--	5.2	5.2
2017	--	--	--	--	--	5.2	5.2
2018	--	--	--	--	--	5.3	5.3
2019	--	--	--	--	--	5.2	5.2
Subtotal	**--**	**--**	**--**	**--**	**--**	**248.0**	**248.0**

$78 million in FY 2009 Other Procurement Air Force (OPAF) funds for Highly Elliptical Orbit (HEO) 3 ground modifications are excluded. It is a replenishment program and is baselined separately.

Annual Funding TY$
3300 | MILCON | Military Construction, Air Force

Fiscal Year	Total Program TY $M
1997	14.5
1998	14.0
1999	--
2000	--
2001	2.8
2002	18.8
2003	6.9
Subtotal	**57.0**

Annual Funding BY$
3300 | MILCON | Military Construction, Air Force

Fiscal Year	Total Program BY 1995 $M
1997	13.7
1998	13.1
1999	--
2000	--
2001	2.5
2002	16.7
2003	6.0
Subtotal	**52.0**

Annual Funding TY$
3400 | Acq O&M | Operation and Maintenance, Air Force

Fiscal Year	Total Program TY $M
1998	10.4
1999	17.0
2000	15.6
2001	17.6
2002	18.2
2003	0.3
2004	6.9
2005	7.0
2006	5.4
2007	7.6
2008	9.7
2009	10.2
2010	10.2
2011	11.5
2012	13.5
Subtotal	**161.1**

Annual Funding BY$
3400 | Acq O&M | Operation and Maintenance, Air Force

Fiscal Year	Total Program BY 1995 $M
1998	9.9
1999	16.0
2000	14.4
2001	16.1
2002	16.4
2003	0.3
2004	6.0
2005	5.9
2006	4.4
2007	6.1
2008	7.6
2009	7.9
2010	7.8
2011	8.7
2012	10.0
Subtotal	**137.5**

Low Rate Initial Production

The Space Based Infrared System (SBIRS) Program does not have Low Rate Initial Production.

Foreign Military Sales

The SBIRS Program has no Foreign Military Sales.

Nuclear Cost

The SBIRS Program has no nuclear costs.

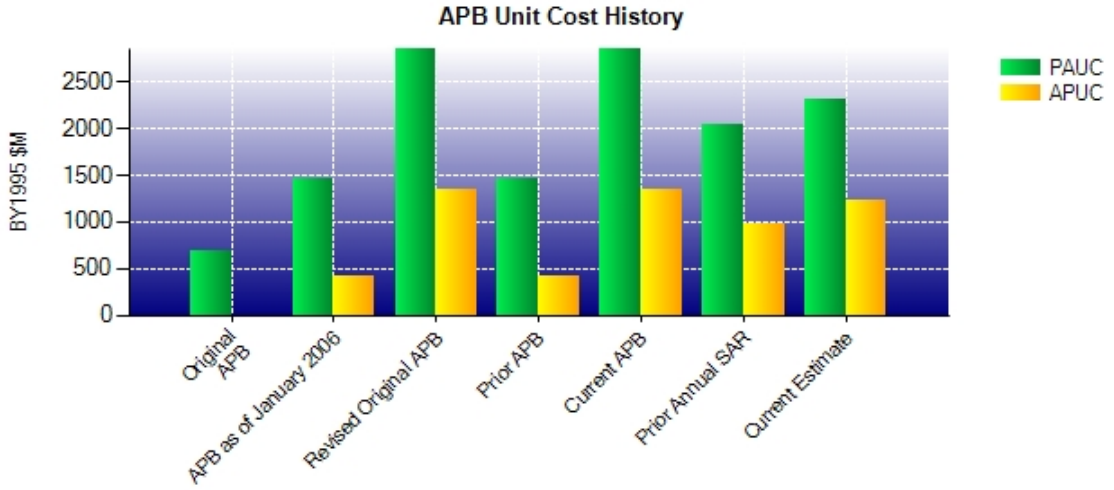
Unit Cost

Unit Cost Report

Unit Cost	BY1995 $M Current UCR Baseline (MAR 2006 APB)	BY1995 $M Current Estimate (DEC 2010 SAR)	BY % Change
Program Acquisition Unit Cost (PAUC)			
Cost	8569.3	13844.4	
Quantity	3	6	
Unit Cost	2856.433	2307.400	-19.22
Average Procurement Unit Cost (APUC)			
Cost	1342.8	4906.5	
Quantity	1	4	
Unit Cost	1342.800	1226.625	-8.65

Unit Cost	BY1995 $M Revised Original UCR Baseline (MAR 2006 APB)	BY1995 $M Current Estimate (DEC 2010 SAR)	BY % Change
Program Acquisition Unit Cost (PAUC)			
Cost	8569.3	13844.4	
Quantity	3	6	
Unit Cost	2856.433	2307.400	-19.22
Average Procurement Unit Cost (APUC)			
Cost	1342.8	4906.5	
Quantity	1	4	
Unit Cost	1342.800	1226.625	-8.65

Unit Cost History



		BY1995 $M		TY $M	
	Date	PAUC	APUC	PAUC	APUC
Original APB	OCT 1996	693.980	N/A	732.340	N/A
APB as of January 2006	SEP 2002	1467.640	420.500	1684.180	499.133
Revised Original APB	MAR 2006	2856.433	1342.800	3386.200	1723.200
Prior APB	SEP 2002	1467.640	420.500	1684.180	499.133
Current APB	MAR 2006	2856.433	1342.800	3386.200	1723.200
Prior Annual SAR	DEC 2009	2037.750	970.250	2519.267	1289.325
Current Estimate	DEC 2010	2307.400	1226.625	2929.200	1690.875

SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY $M)

Initial PAUC Dev Est	Changes								PAUC Current Est
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
829.460	-3.933	172.639	95.817	84.400	1601.200	0.000	149.617	2099.740	2929.200

Current SAR Baseline to Current Estimate (TY $M)

Initial APUC Dev Est	Changes								APUC Current Est
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
292.250	-2.500	358.375	3.475	0.000	814.850	0.000	224.425	1398.625	1690.875

SAR Baseline History

Item/Event	SAR Planning Estimate (PE)	SAR Development Estimate (DE)	SAR Production Estimate (PdE)	Current Estimate
Milestone I	N/A	N/A	N/A	N/A
Milestone II	N/A	OCT 1996	N/A	OCT 1996
Milestone III	N/A	N/A	N/A	N/A
IOC	N/A	DEC 2003	N/A	N/A
Total Cost (TY $M)	2670.3	4147.3	N/A	17575.2
Total Quantity	N/A	5	N/A	6
Prog. Acq. Unit Cost (PAUC)	N/A	829.460	N/A	2929.200

Cost Variance

Cost Variance Summary

Summary Then Year $M					
	RDT&E	Proc	MILCON	Acq O&M	Total
SAR Baseline (Dev Est)	3386.5	584.5	28.5	147.8	4147.3
Previous Changes					
Economic	-11.0	-13.8	-1.4	+1.9	-24.3
Quantity	-152.7	+2018.0	--	--	+1865.3
Schedule	+561.0	-0.7	--	--	+560.3
Engineering	+514.2	--	+7.8	-15.6	+506.4
Estimating	+5442.2	+1992.8	+22.1	+27.0	+7484.1
Other	--	--	--	--	--
Support	--	+576.5	--	--	+576.5
Subtotal	+6353.7	+4572.8	+28.5	+13.3	+10968.3
Current Changes					
Economic	-3.0	+3.8	--	-0.1	+0.7
Quantity	--	--	--	--	--
Schedule	--	+14.6	--	--	+14.6
Engineering	--	--	--	--	--
Estimating	+856.4	+1266.6	--	+0.1	+2123.1
Other	--	--	--	--	--
Support	--	+321.2	--	--	+321.2
Subtotal	+853.4	+1606.2	--	--	+2459.6
Total Changes	+7207.1	+6179.0	+28.5	+13.3	+13427.9
CE - Cost Variance	10593.6	6763.5	57.0	161.1	17575.2
CE - Cost & Funding	10593.6	6763.5	57.0	161.1	17575.2

Summary Base Year 1995 $M					
	RDT&E	Proc	MILCON	Acq O&M	Total
SAR Baseline (Dev Est)	3016.6	496.7	26.0	140.2	3679.5
Previous Changes					
Economic	--	--	--	--	--
Quantity	-128.4	+1477.4	--	--	+1349.0
Schedule	+416.6	-115.1	--	--	+301.5
Engineering	+460.5	--	+6.8	-13.5	+453.8
Estimating	+4390.7	+1587.1	+19.2	+10.8	+6007.8
Other	--	--	--	--	--
Support	--	+434.9	--	--	+434.9
Subtotal	+5139.4	+3384.3	+26.0	-2.7	+8547.0
Current Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	--	--	--	--	--
Engineering	--	--	--	--	--
Estimating	+592.4	+805.1	--	--	+1397.5
Other	--	--	--	--	--
Support	--	+220.4	--	--	+220.4
Subtotal	+592.4	+1025.5	--	--	+1617.9
Total Changes	+5731.8	+4409.8	+26.0	-2.7	+10164.9
CE - Cost Variance	8748.4	4906.5	52.0	137.5	13844.4
CE - Cost & Funding	8748.4	4906.5	52.0	137.5	13844.4

Previous Estimate: December 2009

RDT&E	$M	
Current Change Explanations	**Base Year**	**Then Year**
Revised escalation indices. (Economic)	N/A	-3.0
Revised estimate to complete the Engineering, Manufacturing and Development (EMD) ground effort in order to satisfy the August 1996 Operational Requirements Document (ORD) requirements. This completes the final block (Increment 2) of the SBIRS ground segment capability, which funds FY 2016 and beyond, and reflects total acquisition costs. (Estimating)	+488.0	+717.1
Revised estimate to complete the EMD space segment effort for Geosynchronous Earth Orbit (GEO) 1 and GEO 2 integration, launch, early orbit test, and check out (Estimating)	+153.3	+206.8
Revised estimate of required technical and program office support. (Estimating)	-49.3	-68.1
Adjustment for current and prior escalation. (Estimating)	+0.4	+0.6
RDT&E Subtotal	+592.4	+853.4

Procurement	$M	
Current Change Explanations	**Base Year**	**Then Year**
Revised escalation indices. (Economic)	N/A	+3.8
Revised schedule estimate due to shift of Geosynchronous Earth Orbit (GEO) 5 procurement from FY 2012 to FY 2013. (Schedule)	0.0	+14.6
Adjustment for current and prior escalation. (Estimating)	-1.2	-1.8
Revised estimate due to reallocation between GEO and Highly Elliptical Orbit (HEO) costs based on definitized contract values (Estimating)	-59.9	-77.4
Revised estimate due to updated GEO 3 Non End Item requirement based on definitized contract value (Estimating)	-12.7	-16.9
Revised estimate to fully fund GEOs 5 and 6 under the full funding strategy, including non end item costs, such as launch, early on-orbit test, and contractor operations support. (Estimating)	+1332.0	+1883.6
Revised estimate due to acquisition strategy change from full funding to a block buy for GEOs 5 and 6. (Estimating)	-453.1	-520.9
Adjustment for current and prior escalation. (Support)	0.0	+0.1
Increase in Other Support (Air Force) due to revised estimate for SBIRS Survivable Endurable Evolution (S2E2) based on a extension of the planned procurement schedule by one year; as well as the inclusion of to complete costs for S2E2, SBIRS Mobile and Fixed Site procurement, and the High Altitude Electromagnetic Pulse (HEMP) Protection Program. (Support)	+77.1	+108.4
Increase in Other Support (Air Force) primarily due to revised support requirement into FY 2018 for GEOs 5 and 6. (Support)	+143.3	+212.7
Procurement Subtotal	+1025.5	+1606.2

Acq O&M	$M	
Current Change Explanations	**Base Year**	**Then Year**
Revised escalation indices. (Economic)	N/A	-0.1
Revised estimate due to corrected calculation. (Estimating)	0.0	+0.1
Acq O&M Subtotal	0.0	0.0

Contracts

Appropriation: RDT&E

Contract Name	**SBIRS High EMD Mod**
Contractor	Lockheed Martin Corporation
Contractor Location	Sunnyvale, CA 94089
Contract Number, Type	F04701-95-C-0017, CPAF
Award Date	November 08, 1996
Definitization Date	November 08, 1996

Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
1590.1	N/A	2	5620.2	N/A	2	8620.0	8675.0

Variance	Cost Variance	Schedule Variance
Cumulative Variances To Date	-324.1	-63.9
Previous Cumulative Variances	-188.6	-53.6
Net Change	-135.5	-10.3

Cost And Schedule Variance Explanations

The net unfavorable cost variance of $135.5M is primarily due to technical issues associated with the Space Vehicle (SV), Software Product, and Integrated Ground Product.

The net unfavorable schedule variance of $10.3M, respectively, is primarily due to difficulties with the Space Vehicle (SV), Software Product, Operations and Support, and System Engineering, Integration and Test (SEIT).

Contract Comments

The contractor requested an Over Target Baseline (OTB) to capture the cost and schedule associated with program delays. The OTB is currently underway, with an estimated completion in the first quarter of calendar year 2011. The cumulative schedule variance is expected to be reset to zero at the completion of the OTB, while the cumulative cost variance will not be reset.

The current Engineering, Manufacturing and Development (EMD) contract Estimated Price at Completion, as reported in the November 2010 Contract Performance Report (CPR), is $8,620M, compared to $8,018.7M in the previous Selected Acquisition Report (SAR). The $601.3M increase is the result of a one year extension of the effort, added contractual scope and award fee for Contractor Logistics Support for FY 2010 and 2011 and the Ground Block 10 re-plan. The Program Manager’s Estimated Price at Completion is $8,675M and is based on theService Cost Position,which includes Flight Software System (FSS) impacts,theground baseline effort, and assumes a Geosynchronous Earth Orbit (GEO) satellite 1 launch in May 2011.

The increase from the initial target contract price to the current contract target price is largely due to multiple program restructures and program extensions.

Appropriation: Procurement

Contract Name	**SBIRS Follow-on Production**
Contractor	Lockheed Martin Corporation
Contractor Location	Sunnyvale, CA 94089
Contract Number, Type	FA8810-08-C-0002, CPAF
Award Date	March 14, 2008
Definitization Date	April 08, 2009

Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
370.0	N/A	0	2379.1	N/A	0	2847.7	2847.7

Variance	Cost Variance	Schedule Variance
Cumulative Variances To Date	-20.4	-39.2
Previous Cumulative Variances	+6.4	-10.9
Net Change	-26.8	-28.3

Cost And Schedule Variance Explanations

The net unfavorable cost variance of $26.8M is primarily due to the Pointing and Control Assembly (PCA) subcontractor performance and actual costs not aligned with the baseline plan; higher material costs; unplanned labor required to execute the baseline schedule as well as recovery plans; and multiple technical issues in Payload on the Highly Elliptical Orbit (HEO) production.

The net unfavorable schedule variance of $28.3M is primarily driven by subcontractor payment plans that are not aligned with the baseline; payload testing delays in Geosynchronous Earth Orbit (GEO) 3 production; and PCA hardware delays in HEO 3 production.

Contract Comments

The Geosynchronous Earth Orbit (GEO) satellite 3 and Highly Elliptical Orbit (HEO) payload 3 production efforts were definitized in June 2010. The Integrated Baseline Review (IBR) for the GEO satellite 3 and HEO payload 3 is complete and the team is closing out the remaining action items, with an estimated completion in the first quarter calendar year 2011. The contract Estimated Price at Completion, as reported in the November 2010 Contract Performance Report (CPR) is $2,847.7M, compared to $2,119.9M in the previous Selected Acquisition Report (SAR). The $727.8M increase is due to the exercise of the HEO 3 Launch and Early On-orbit Test support (LEOT) option, the HEO payload 4 production option, and the GEO satellite 4 long lead procurement option. An IBR on the GEO 4 and HEO 4 production efforts is expected in the summer of 2011.

The increase from the initial target price to the current contractor target is due to added scope from the exercise of the GEO 3 and HEO 3 production efforts, GEO 4 and HEO 4 long lead and production efforts, and theHEO 3 launch and early-orbit-test support effort subsequent to the original award.

Deliveries and Expenditures

Deliveries To Date	Plan To Date	Actual To Date	Total Quantity	Percent Delivered
Development	0	0	2	0.00%
Production	0	0	4	0.00%
Total Program Quantities Delivered	0	0	6	0.00%

Expenditures and Appropriations (TY $M)			
Total Acquisition Cost	17575.2	Years Appropriated	17
Expenditures To Date	8839.8	Percent Years Appropriated	68.00%
Percent Expended	50.30%	Appropriated to Date	11401.8
Total Funding Years	25	Percent Appropriated	64.87%

Operating and Support Cost

Assumptions And Ground Rules
Operations and Maintenance funds support the activation of the SBIRS High System, including Component ground operating and training facilities at worldwide sites. SBIRS Increment 1 ground system became operational in December 2001. These funds support the procurement of temporary facilities, minor construction, office equipment, furniture, travel, supplies, and communication links necessary for the activation of the SBIRS Mission Control Station, the Mission Control Station Backup, Outside Continental United States Relay Ground Stations, and Initial Qualification Training facility. Also supported with these funds are the repair and transportation of Government Furnished Equipment and Temporary Duty costs for training of the initial cadre of operators. The SBIRS High profile reflects a 30-year Life Cycle Cost and is based upon the Operations and Maintenance Database jointly maintained by Headquarters, Air Force Space Command (HQ AFSPC) and the program office, reviewed and updated in January 2010. Comparable Operating and Support cost estimates for the legacy system, Defense Support Program, are not available.

Costs BY1995 $M		
Cost Element	**SBIRS HIGH Avg Annual Cost for SBIRS High System**	**Defense Support Prog**
Unit-Level Manpower	42.76	--
Unit Operations	3.55	--
Maintenance	50.32	--
Sustaining Support	31.02	--
Continuing System Improvements	0.00	--
Indirect Support	10.97	--
Other	--	--
Total Unitized Cost (Base Year 1995 $)	138.62	--

Total O&S Costs $M	SBIRS HIGH	Defense Support Prog
Base Year	4158.6	--
Then Year	6421.1	--