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Selected Acquisition Report (SAR)

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



Space Based Infrared System High (SBIRS High)

As of FY 2020 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

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Sensitivity Originator

No originator info Available at this time.

Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance
ACAT - Acquisition Category
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
\$B - Billions of Dollars
BA - Budget Authority/Budget Activity
Blk - Block
BY - Base Year
CAPE - Cost Assessment and Program Evaluation
CARD - Cost Analysis Requirements Description
CDD - Capability Development Document
CLIN - Contract Line Item Number
CPD - Capability Production Document
CY - Calendar Year
DAB - Defense Acquisition Board
DAE - Defense Acquisition Executive
DAMIR - Defense Acquisition Management Information Retrieval
DoD - Department of Defense
DSN - Defense Switched Network
EMD - Engineering and Manufacturing Development
EVM - Earned Value Management
FOC - Full Operational Capability
FMS - Foreign Military Sales
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
IOC - Initial Operational Capability
Inc - Increment
JROC - Joint Requirements Oversight Council
\$K - Thousands of Dollars
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
\$M - Millions of Dollars
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
O&S - Operating and Support
PAUC - Program Acquisition Unit Cost

PB - President's Budget
PE - Program Element
PEO - Program Executive Officer
PM - Program Manager
POE - Program Office Estimate
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
SCP - Service Cost Position
TBD - To Be Determined
TY - Then Year
UCR - Unit Cost Reporting
U.S. - United States
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

Program Information

Program Name

Space Based Infrared System High (SBIRS High)

DoD Component

Air Force

Responsible Office

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References

SAR Baseline (Production Estimate)

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated September 4, 2012

Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated February 27, 2013

Mission and Description

The Space Based Infrared System High (SBIRS High) program is intended to satisfy key requirements delineated in the SBIRS 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-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 technical intelligence mission in August 2009. The SBIRS GEO 1 and 2 systems were ITW/AA mission certified in August 2013 and December 2013, respectively.

The SBIRS High MDAP includes two subprograms: the Baseline subprogram, comprised of GEO satellites 1-4, HEO payloads 1-2 and associated ground elements; and the GEO 5-6 Satellites Replenishment Production "Block Buy" subprogram. The Baseline subprogram was 90% delivered by December 2015 and was last reported in the December 2015 SAR. Therefore, only the Block Buy GEO 5-6 subprogram is the subject of this SAR.

Executive Summary

Program Highlights Since Last Report

The SBIRS Block Buy Geosynchronous Earth Orbit (GEO) 5-6 program is performing within budget and schedule although forecast data shows the GEO-5 delivery date with zero margin to the APB threshold date. Production activities are 69% complete and contractor has executed to schedule for past twelve months, supporting the GEO-5 contract delivery date and APB Threshold. The critical path for the program is the bus Integration and Test efforts, currently forecasted for completion in October 2019. The program will assess progress to this milestone in determining confidence in delivering to the APB threshold date. Design risks identified with the GEO 5-6 Technology Refresh (TR) contract modification reduced during this period with the closure of all four liens established at the September 2017 System Critical Design Review. Production efforts saw success following the design closure with starts to GEO-5 payload sensor, communication panel, and propulsion integration efforts. Additionally, the program received National Security Agency certification for all three new crypto units for the program. Lockheed Martin (LM) managed to hold the GEO-5 delivery date over this reporting period. While this is good news, the Program Office is aware of risks to this posture in the vehicle integration and test, and development of the Bus Flight Software (FSW). The SBIRS Bus FSW development is behind schedule. LM implemented process changes and completed a "bottom-up" development review on software efforts. This resulted in implementation of agile feature code development and new software engineering releases, prioritized and synchronized with the ground development, along with a new forecast for Bus Software Item Qualification Test (SIQT) effort. Due to additional time required to develop more SBIRS-unique code than expected, the SIQT date is forecasted to be delayed by seven months, from April 2019 to November 2019. The program continues to conduct weekly peer reviews to monitor progress on the development, testing, and verification of the software.

As reported in the last SAR, a negative program development was encountered due to structural manufacturing issues on the GEO-5 Cylinder, Cruciform/Mid-Deck Panels, and the Earth Pointing Platform (EPP), the primary reason to declining schedule performance. Lockheed Martin executed the recovery plans and completed re-work and closure to the issues in 2018, mitigating eight months of schedule risk. Structure recovery efforts closed for the Cylinder and Cruciform during completion of GEO-5 Static Load Test in October. The EPP completed an extensive three-step process to develop a new design and is currently back in manufacturing. PSS Integration completed at LM Stennis facility in February 2019, on schedule and executing a newly baselined four-month propulsion build schedule, reduced from the original baseline of six months based on actuals from previous programs propulsion builds. Risk of schedule overrun remains high due to pressure in the critical path area during Vehicle Integration and Test at the LM facility in Sunnyvale.

The program continues mitigation efforts to address the contractor's eroding manufacturing and schedule performance. Efforts include leadership engagements, increased audits and surveillance and independent government analysis of technical and schedule issues. These activities include Government team participation in key meetings with LM leadership, enabling the joint team to identify and bound risks, ensure contractor efforts are aligned with issue resolution and provide additional confidence in the planned execution schedules. The Program Office conducted a thorough review of the GEO-5-6 Integrated Master Schedule in February 2019 and validated the executability of the remaining production schedule against contract delivery dates and the APB Threshold.

There are FSW issues currently being addressed as stated above.

History of Significant Developments Since Program Initiation	
History of Significant Developments Since Program Initiation	
Date	Significant Development Description
December 2008	DAE directed the SBIRS Wing to negotiate undefinitized contract options that included a Geosynchronous Earth Orbit(GEO)-5 option that planned for an advanced procurement in FY 2011, and a GEO-6 option with Lockheed Martin (LM)that planned for an advanced procurement in FY 2012.
February 2011	Program office team met twice with the Secretary of the Air Force for Acquisition (SAF/AQ) to review the GEO 5-6 acquisition strategy. The team gained agreement on the approach.
July 2011	Satellite Replenishment Production (SRP) sole source Justification Review Documents signed by the Service Acquisition Executive (SAE) provided approval to procure the GEO-5 and GEO-6 satellite vehicles from LM. A new fixed price incentive firm target (FPIF) contract established for this SRP effort.
October 2011	GEO 5-6 Acquisition Strategy Document (ASD) approved by the SAE. SBIRS Block Buy Program initiated and first year's funding began in 2011.
January 2012	Under Secretary of Defense (Acquisition, Technology and Logistics) (USD/AT&L) signed ADM authorizing increase to the SBIRS Program of Record quantity for the GEOs 5 and 6 satellites and \$75M of advance procurement funds for these satellites. DAE signed an updated SBIRS High APB that reset cost and schedule parameters and incorporated the GEO-4 satellite into the program baseline. The previously reported APB deviations against schedule and Research, Development, Test & Evaluation costs were resolved. The procurement cost remained in deviation due to a quantity difference between the APB (four units) and the DAES (six units). The USD(AT&L) directed GEO-5 and GEO-6 production be established as a major sub-program to SBIRS High. Upon implementation of the sub-program, the procurement cost deviation was resolved through early release of incremental funds to LM.
February 2012	USD(AT&L) approved the ASD for the SBIRS 5-6 production contract.
August 2012	DAE signed an ADM following the July 2012 DAB, allowing the release of the Request for Proposal (RFP) for the SBIRS GEO-5 and GEO-6 SRP contract. The RFP was released September 11, 2012, to support a mid-2013 contract award. The ADM directed the Air Force to update the SBIRS Operations and Support (O&S) cost estimate to include all manpower costs and the costs resulting from the addition of GEO 5-6 subprogram.
February 2013	USD(AT&L) signed an updated SBIRS High APB establishing the O&S costs for the newly established SBIRS Block Buy (GEOs 5-6) subprogram. It also incorporated a revised O&S cost estimate for the SBIRS Baseline (GEOs 1-4, HEOs 1-2 and Ground) subprogram.
March 2013	LM submitted the GEO-5 and GEO-6 Production proposal.
June 2014	Air Force Space Command/Space and Missile Systems Center (AFSPC/SMC) awarded the \$1.86B SRP contract to LM for production of the GEO-5 and GEO-6 satellites. GEO 5-6 production activity was added as a modification to the Advanced Procurement Contract. Through the block buy and disciplined pursuit of affordability initiatives, the Air Force saved 37%, a substantial reduction from the early estimate for two separate space vehicle buys.
June 2015	GEO 5-6 Technology Refresh (TR) Engineering Change Proposal approved. This major contract modification converted the SBIRS-unique A2100 satellite bus to a modernized and modular A2100 TR bus.
January 2016	System-level delta Preliminary Design Review (PDR) completed.
March 2016	Flight Software PDR completed.
August 2016	SBIRS Bootstrap CDR completed.

September 2016	SBIRS 5-6 Payload Delta CDR completed.
November 2016	Ground PDR (to cover design changes due to the modernized TR bus) completed.
March 2017	SBIRS Bus Flight Software CDR completed.
May 2017	Space Vehicle CDR completed.
July 2017	A2100 TR Bus Flight Software completed the version 1.1 software acceptance review as the final baseline for the SBIRS Bus Flight Software development. The SBIRS Bootstrap, or initialization software, completed with the Software Acceptance Review. The Ground CDR completed.
September 2017	LM conducted the System-level CDR for the GEO 5-6 program culminating an 18-month effort of lower-level subsystem and segment-level CDRs. Four significant liens levied against the review. The review chairs approved continuation of the production contract in concert with liens work-off.
April 2018	Payload Sensor integration began at Northrop Grumman Azusa facility with delivery scheduled in May 2019.
September 2018	LM Flight Software team conducted 'bottom-up' review and analysis of the Flight Software progress and plan. The software item qualification testing slipped from April 2019 to November 2019. System CDR liens were closed.
October 2018	Delivery of the GEO-5 Core to Stennis for Propulsion Sub-System installation and integration.

Threshold Breaches

APB Breaches

- Schedule
- Performance
- Cost
 - RDT&E
 - Procurement
 - MILCON
 - Acq O&M
- O&S Cost
- Unit Cost
 - PAUC
 - APUC

Nunn-McCurdy Breaches

- Current UCR Baseline
 - PAUC None
 - APUC None
- Original UCR Baseline
 - PAUC None
 - APUC None

Schedule



Schedule Events				
Events	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate
GEO Satellite 5 Available for Delivery	Sep 2019	Sep 2019	Sep 2020	Sep 2020
GEO Satellite 6 Available for Delivery	Sep 2020	Sep 2020	Sep 2021	Jul 2021

Change Explanations

None

Notes

GEO Satellite "Available for Delivery" is defined as the GEO satellite successfully completing Final Integrated System Test and the satellite is available such that if operational priorities require the satellite to launch at the earliest opportunity, then the satellite will continue Final Install processing to proceed to a Consent-to-Ship Review. If operational priorities indicate a later manifest, then the satellite will be configured for storage.

GEO 5 and 6 contract delivery dates are September 30, 2020, and July 31, 2021, respectively, as of June 2014 production contract award.

The one-year period between the objective and threshold values addresses the schedule risk inherent in the first-time production under a fixed price contract for a SBIRS satellite.

Performance

No performance characteristics exist for Block Buy (GEO 5-6).

Notes

Performance characteristics were addressed in the Baseline (Geosynchronous Earth Orbit 1-4, Highly Elliptical Earth Orbit 1-2, and Ground) subprogram. Performance assessment is based on the full Space Based Infrared System constellation and Ground Segment.

Track to Budget

Procurement			
Appn	BA	PE	
Air Force	3020	05	0305915F
	Line Item	Name	
	MSSBIR	SBIRS High Missile Procurement (Sunk)	
Air Force	3021	01	0305915F
	Line Item	Name	
	MSSBIR	SBIRS High (Space) (Sunk)	
Air Force	3021	01	1203915F
	Line Item	Name	
	MSSBIR	SBIRS High (Space) (Shared)	

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 1995 \$M			BY 1995 \$M	TY \$M		
	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate	SAR Baseline Production Estimate	Current APB Production Objective	Current Estimate
RDT&E	0.0	0.0	--	0.0	0.0	0.0	0.0
Flyaway	--	--	--	0.0	--	--	0.0
Recurring	--	--	--	0.0	--	--	0.0
Non Recurring	--	--	--	0.0	--	--	0.0
Support	--	--	--	0.0	--	--	0.0
Procurement	2681.6	2681.6	2949.8	2263.5	3865.4	3865.4	3310.0
Flyaway	--	--	--	2072.3	--	--	3025.1
Recurring	--	--	--	1692.8	--	--	2487.4
Non Recurring	--	--	--	379.5	--	--	537.7
Support	--	--	--	191.2	--	--	284.9
Other Support	--	--	--	191.2	--	--	284.9
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	0.0	0.0	--	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	--	0.0	0.0	0.0	0.0
Total	2681.6	2681.6	N/A	2263.5	3865.4	3865.4	3310.0

Cost Notes

If an Independent Cost Estimate, Component Cost Estimate, or Program Office Estimate has been completed for the program in the previous year, list any program risks identified in the estimates, the potential impacts of the risks on the program cost, and approaches to mitigate the risks.

A Program Office Estimate was approved by the PEO on January 11, 2019. The estimate projects a schedule risk of 9.8 months against the June 2018 contractor forecasted schedule due to risk of delays to space vehicle integration efforts and flight software qualification. The impact of the risks identified in the estimate are \$181M, primarily driven by extension of the contract past the current contract date. To mitigate risks of potential schedule delays, the program office created plans to manage Cost-Plus CLIN extensions, increased oversight, and increased Defense Contract Management Agency surveillance to critical path efforts. The program office is not seeking additional funds for these risks, however will reassess based on program performance.

The Procurement profile above reflects costs for the delivery of the Geosynchronous Earth Orbit (GEO) satellites 5 and 6, as of the FY 2020 PB. The costs above reflect the requirements for GEOs 5 and 6 production, launch, operations, checkout and support.

Total Quantity			
Quantity	SAR Baseline Production Estimate	Current APB Production	Current Estimate
RDT&E	0	0	0
Procurement	2	2	2
Total	2	2	2

Quantity Notes

The above quantity represents two Geosynchronous Earth Orbit satellites.

Cost and Funding**Funding Summary**

Appropriation Summary									
FY 2020 President's Budget / December 2018 SAR (TY\$ M)									
Appropriation	Prior	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	To Complete	Total
RDT&E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Procurement	2982.8	94.0	128.1	105.1	0.0	0.0	0.0	0.0	3310.0
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2020 Total	2982.8	94.0	128.1	105.1	0.0	0.0	0.0	0.0	3310.0
PB 2019 Total	3085.9	130.0	128.0	105.0	0.0	0.0	0.0	0.0	3448.9
Delta	-103.1	-36.0	0.1	0.1	0.0	0.0	0.0	0.0	-138.9

Quantity Summary										
FY 2020 President's Budget / December 2018 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	To Complete	Total
Development	0	0	0	0	0	0	0	0	0	0
Production	0	2	0	0	0	0	0	0	0	2
PB 2020 Total	0	2	0	0	0	0	0	0	0	2
PB 2019 Total	0	2	0	0	0	0	0	0	0	2
Delta	0	0	0	0	0	0	0	0	0	0

Cost and Funding

Annual Funding By Appropriation

Annual Funding								
3020 Procurement Missile Procurement, Air Force								
Fiscal Year	Quantity	TY \$M						
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program	
2011	--	103.6	--	139.7	243.3	--	243.3	
2012	--	192.0	--	51.5	243.5	--	243.5	
2013	2	196.2	--	89.8	286.0	22.1	308.1	
2014	--	311.1	--	78.2	389.3	36.2	425.5	
2015	--	222.9	--	60.5	283.4	31.0	314.4	
Subtotal	2	1025.8	--	419.7	1445.5	89.3	1534.8	

Annual Funding 3020 Procurement Missile Procurement, Air Force							
Fiscal Year	Quantity	BY 1995 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2011	--	77.0	--	103.7	180.7	--	180.7
2012	--	140.3	--	37.6	177.9	--	177.9
2013	2	140.1	--	64.1	204.2	15.8	220.0
2014	--	218.9	--	55.0	273.9	25.5	299.4
2015	--	155.0	--	42.1	197.1	21.6	218.7
Subtotal	2	731.3	--	302.5	1033.8	62.9	1096.7

The procurement profile above reflects procurement costs for the delivery of the GEO satellites 5 and 6, as documented in the FY 2020 PB. The costs above reflect the requirements for GEOs 5 and 6 production, launch, operations, checkout and support.

The following table reflects the End Item Recurring Flyaway costs associated with a 3020 quantity buy which occurred in FY 2013. The total of FY 2011-2015 End Item Recurring Flyaway BY costs is reflected.

Cost Quantity Information		
3020 Procurement Missile Procurement, Air Force		
Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned With Quantity) BY 1995 \$M
2011	--	--
2012	--	--
2013	2	731.3
2014	--	--
2015	--	--
Subtotal	2	731.3

Annual Funding 3021 Procurement Space Procurement, Air Force							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2016	--	297.3	0.5	29.1	326.9	52.3	379.2
2017	--	184.1	--	16.3	200.4	30.3	230.7
2018	--	543.6	221.7	28.9	794.2	43.9	838.1
2019	--	33.2	31.0	3.2	67.4	26.6	94.0
2020	--	40.9	38.5	25.5	104.9	23.2	128.1
2021	--	28.9	41.9	15.0	85.8	19.3	105.1
Subtotal	--	1128.0	333.6	118.0	1579.6	195.6	1775.2

Annual Funding 3021 Procurement Space Procurement, Air Force							
Fiscal Year	Quantity	BY 1995 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2016	--	203.2	0.3	19.9	223.4	35.8	259.2
2017	--	123.2	--	10.9	134.1	20.3	154.4
2018	--	355.3	144.9	18.9	519.1	28.7	547.8
2019	--	21.3	19.8	2.1	43.2	17.0	60.2
2020	--	25.7	24.2	16.0	65.9	14.6	80.5
2021	--	17.8	25.8	9.2	52.8	11.9	64.7
Subtotal	--	746.5	215.0	77.0	1038.5	128.3	1166.8

The procurement profile above reflects procurement costs for the delivery of the Geosynchronous Earth Orbit (GEO) satellites 5 and 6, as documented in the FY 2020 PB. The costs above reflect the requirements for GEOs 5 and 6 production, launch, operations, checkout and support.

Low Rate Initial Production

There is no LRIP for this program.

Foreign Military Sales

None

Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 1995 \$M	BY 1995 \$M	% Change
	Current UCR Baseline (Feb 2013 APB)	Current Estimate (Dec 2018 SAR)	

Program Acquisition Unit Cost

Cost	2681.6	2263.5	
Quantity	2	2	
Unit Cost	1340.800	1131.750	-15.59

Average Procurement Unit Cost

Cost	2681.6	2263.5	
Quantity	2	2	
Unit Cost	1340.800	1131.750	-15.59

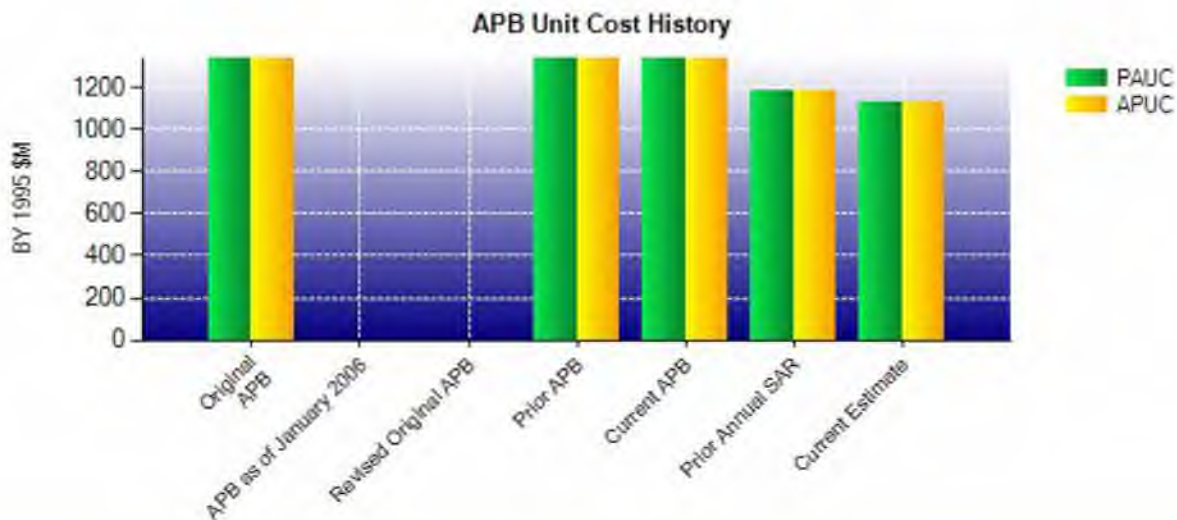
Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 1995 \$M	BY 1995 \$M	% Change
	Original UCR Baseline (Sep 2012 APB)	Current Estimate (Dec 2018 SAR)	

Program Acquisition Unit Cost

Cost	2681.6	2263.5	
Quantity	2	2	
Unit Cost	1340.800	1131.750	-15.59

Average Procurement Unit Cost

Cost	2681.6	2263.5	
Quantity	2	2	
Unit Cost	1340.800	1131.750	-15.59



APB Unit Cost History					
Item	Date	BY 1995 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Sep 2012	1340.800	1340.800	1932.700	1932.700
APB as of January 2006	N/A	N/A	N/A	N/A	N/A
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	Sep 2012	1340.800	1340.800	1932.700	1932.700
Current APB	Feb 2013	1340.800	1340.800	1932.700	1932.700
Prior Annual SAR	Dec 2017	1182.250	1182.250	1724.450	1724.450
Current Estimate	Dec 2018	1131.750	1131.750	1655.000	1655.000

SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Production Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
1932.700	31.850	0.000	0.000	0.000	-177.450	0.000	-132.100	-277.700	1655.000

Current SAR Baseline to Current Estimate (TY \$M)									
Initial APUC Production Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
1932.700	31.850	0.000	0.000	0.000	-177.450	0.000	-132.100	-277.700	1655.000

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone A	N/A	N/A	N/A	N/A
Milestone B	N/A	N/A	N/A	N/A
Milestone C	N/A	N/A	N/A	N/A
IOC	N/A	N/A	N/A	N/A
Total Cost (TY \$M)	N/A	N/A	3865.4	3310.0
Total Quantity	N/A	N/A	2	2
PAUC	N/A	N/A	1932.700	1655.000

Cost Variance

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	--	3865.4	--	3865.4
Previous Changes				
Economic	--	+47.7	--	+47.7
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	-197.5	--	-197.5
Other	--	--	--	--
Support	--	-266.7	--	-266.7
Subtotal	--	-416.5	--	-416.5
Current Changes				
Economic	--	+16.0	--	+16.0
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	-157.4	--	-157.4
Other	--	--	--	--
Support	--	+2.5	--	+2.5
Subtotal	--	-138.9	--	-138.9
Total Changes	--	-555.4	--	-555.4
CE - Cost Variance	--	3310.0	--	3310.0
CE - Cost & Funding	--	3310.0	--	3310.0

Summary BY 1995 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	--	2681.6	--	2681.6
Previous Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	-142.1	--	-142.1
Other	--	--	--	--
Support	--	-175.0	--	-175.0
Subtotal	--	-317.1	--	-317.1
Current Changes				
Economic	--	--	--	--
Quantity	--	--	--	--
Schedule	--	--	--	--
Engineering	--	--	--	--
Estimating	--	-102.4	--	-102.4
Other	--	--	--	--
Support	--	+1.4	--	+1.4
Subtotal	--	-101.0	--	-101.0
Total Changes	--	-418.1	--	-418.1
CE - Cost Variance	--	2263.5	--	2263.5
CE - Cost & Funding	--	2263.5	--	2263.5

Previous Estimate: December 2017

Procurement	\$M	
	Base Year	Then Year
Current Change Explanations		
Revised escalation indices. (Economic)	N/A	+16.0
Revised estimate due to application of new outyear escalation indices (Missile Procurement, Air Force, (MPAF)). (Estimating)	-0.1	-0.2
Revised estimate due to FY 2016, FY 2017, FY 2018 funding realigned for S2E2 overrun. (Estimating)	-33.7	-51.3
Revised estimate due to FY 2018 \$50M Congressional Mark. (Estimating)	-32.7	-50.0
Revised estimate due to Congressional reduction in FY 2018 for Aerospace. (Estimating)	-1.3	-2.0
Realignment of FY 2020 & FY 2021 Flyaway funding to Support for additional enterprise support costs. (Estimating)	-2.1	-3.7
Revised estimate due to FY 2019 \$6M reduction to fund S2E2 overrun (SPAF). (Estimating)	-3.8	-6.0
Adjustment for current and prior escalation. (Estimating)	-8.4	-12.5
Revised Estimate due to application of new outyear escalation indices (SPAF). (Estimating)	-1.0	-1.7
Revised estimate due to Congressional Mark in FY 2019 for early to need which resulted in a reduction of Non-Recurring Flyaway (SPAF). (Estimating)	-19.3	-30.0
Increase in Other Support for resiliency efforts and support costs (SPAF). (Support)	+2.1	+3.6
Increase in Other Support due to an internal offset by increases in FY 2020 - FY 2021 for additional enterprise supports costs (SPAF). (Support)	0.0	+0.1
Adjustment for current and prior escalation. (Support)	-0.7	-1.2
Procurement Subtotal	-101.0	-138.9

Contracts

Contract Identification

Appropriation: Procurement
Contract Name: SBIRS GEO 5-6 Advance Procurement/Production
Contractor: Lockheed Martin Corporation
Contractor Location: Sunnyvale, CA 94089
Contract Number: FA8810-13-C-0001
Contract Type: Fixed Price Incentive(Firm Target) (FPIF)
Award Date: February 19, 2013
Definitization Date: February 19, 2013

Contract Price

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
284.4	N/A	0	2167.4	2167.4	2	2285.3	2384.4

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to added scope. The initial contract price included the Geosynchronous Earth Orbit (GEO) 5-6 Advance Procurement (AP) effort which awarded on February 19, 2013. The program office added an Engineering Change Proposal (ECP) in September 2013, and the full Production effort awarded on June 24, 2014. The entire GEO 5-6 contract consists of AP (plus the ECP) and Production efforts. This is a Fixed Price Incentive Fee contract that includes Cost Plus funding Contract Line Item Numbers (CLINs) (Cost Plus CLINs are not included in the Ceiling Price). The target price increased in CY 2017 primarily due to the Hydrazine Bi-Propellant Thruster Modification awarded on September 12, 2017. The target price increased in CY 2018 primarily due to exercising the option on CLIN 0400 GEO 5-6 Contract Operation Support (KOS) on October 17, 2018. The Current Contract Target Price (all CLINs) is \$2,167.4M and the current Contract Price Ceiling (FPIF CLINs only) is \$2,024.9M but is shown in the above table as the target price due to DAMIR system limitation wherein a ceiling price cannot be lower than a target price.

There is no contract quantity associated with the AP portion of this contract. The quantity of two reflects the award of the GEO 5-6 full Production effort. The Contractor Estimated Price at Completion is \$2,285.3M, which represents the initial Advance Procurement (plus ECP) & Production award. The Government Estimated Price at Completion is \$2,384.4M (all CLINs).

Contract Variance

Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (2/24/2019)	-58.0	-92.3
Previous Cumulative Variances	+10.3	-82.4
Net Change	-68.3	-9.9

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to Bus Structural non-conformances with the Geosynchronous Earth Orbit (GEO)-5 Core, Cruciform, Bulk-head panels, and the Earth Pointing Platform (EPP). All required unplanned, additional design and manufacturing effort. Flight Software (FSW) also fell behind plan during this period. Amount of 're-use' code from common products is below the baseline plan. Quality issues at the Lockheed Martin (LM) Waterton facility also drove increased effort in many components and hardware. The cost variance degraded by \$68.3M since the 2017 Annual SAR.

The unfavorable net change in the schedule variance is due to Bus Structural non-conformances with the GEO-5 Core, Cruciform, Bulk-head panels, and the EPP. All required unplanned, additional design and manufacturing effort. FSW also fell behind plan during this period. Amount of 're-use' code from common products is below the baseline plan. Quality issues at the LM Waterton facility also drove increased effort in many components and hardware. The Schedule variance degraded by \$9.9M since the 2017 Annual SAR.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	0	0	0	--
Production	0	0	2	0.00%
Total Program Quantity Delivered	0	0	2	0.00%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	3310.0	Years Appropriated	9
Expended to Date	1920.4	Percent Years Appropriated	81.82%
Percent Expended	58.02%	Appropriated to Date	3076.8
Total Funding Years	11	Percent Appropriated	92.95%

The above data is current as of March 11, 2019.

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	December 06, 2018
Source of Estimate:	POE
Quantity to Sustain:	1
Unit of Measure:	Integrated System
Service Life per Unit:	35.00 Years
Fiscal Years in Service:	FY 1999 - FY 2033

Operating and Support (O&S) costs are incurred for the continued operations, maintenance, sustainment, and support of the SBIRS High System, including ground equipment and facilities at worldwide sites. The on-orbit space vehicles and sensors are supported from their respective factories including: anomaly resolution support, on-orbit maintenance, operational product development/checkout, and flight software/database maintenance. The ground segment consists of the Mission Control Station, the Mission Control Station Backup, Relay Ground Stations, Relocatable (Mobile) Terminals, and the Communications Network. Costs include both government and contractor manpower, supplies, equipment (primarily commercial-off-the-shelf hardware and software), travel/transportation, and communications circuits.

Originally, estimated O&S costs for the total Space Based Infrared System (SBIRS) High program spanned both the Baseline (not required to report after December 2015 SAR) and Geosynchronous Earth Orbit (GEO) 5-6 Block Buy subprogram. O&S costs for the GEO 5-6 Block Buy subprogram covers FY 2029 through FY 2033 based upon operational acceptance and design life. The Quantity to Sustain one integrated system encompasses four GEO satellites, two Highly Elliptical Earth Orbit (HEO) payloads and the associated ground infrastructure. The mission related O&S costs are not assigned to individual satellites. All on-orbit and ground components together are required to meet the mission.

Ground Rules and Assumptions: The 35-year service life start date (FY 1999) is based upon increment one entry into Development Test/Operational Test, and end date (FY 2033) is based upon final GEO-6 satellite and 12-year design life.

During this time-period, the Next Generation Overhead Persistent Infrared (Next Gen OPIR) program is scheduled to have assets on-orbit and will be operated by the same units using the same ground segment. O&S costs in the following tables reflect sustainment of SBIRS Block Buy (GEO 5-6) and Next Gen OPIR program additional types of on-orbit assets. Sustainment costs are allocated based upon SBIRS constellation per the APB (4 GEO + 2 HEO) and Next Gen OPIR on-orbit assets / launch schedule per Cost Analysis Requirement Document version 19.2 from FY 2029 to FY 2033.

Sustainment Strategy

The current SBIRS sustainment strategy employs an organizational and depot maintenance concept with organic and contractor workload at both levels. Contractor Logistics Support is provided under one contract and includes organic depot partnership. There is also direct organic support of the Mobile Terminal vehicles and equipment.

Antecedent Information

The Antecedent System is the Defense Support Program. Comparable O&S cost estimates for this system are not available.

Annual O&S Costs BY1995 \$M			
Cost Element	Block Buy (GEO 5-6) Average Annual Cost Per Integrated System	Defense Support Program (Antecedent) N/A	
Unit-Level Manpower	33.200		0.000
Unit Operations	7.300		0.000
Maintenance	67.700		0.000
Sustaining Support	26.300		0.000
Continuing System Improvements	11.000		0.000
Indirect Support	11.800		0.000
Other	0.000		0.000
Total	157.300		--

Annual O&S Costs reflect the average SBIRS share over the FY2029-2033 timeframe in order to match the time-period used to compute the Objective, Threshold, and Current Estimate in the next table. Annual O&S Costs in prior versions of this report were based upon the entire 35-year service life of the SBIRS System.

Item	Total O&S Cost \$M			
	Block Buy (GEO 5-6)		Current Estimate	Defense Support Program (Antecedent)
	Current Production APB Objective/Threshold			
Base Year	795.3	874.8	786.4	N/A
Then Year	1551.1	N/A	1548.4	N/A

Equation to Translate Annual Cost to Total Cost

Total O&S Cost Share from FY2029-2033 of \$786.4M / 5 years = \$157.3M.

O&S Cost Variance		
Category	BY 1995 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2017 SAR	861.8	
Programmatic/Planning Factors	0.0	
Cost Estimating Methodology	51.4	Updated indirect cost factors -- primarily use of AFSPC vice AF Composite Base Operating Support non-pay factor
Cost Data Update	-6.8	More recent actual cost data: lower higher headquarters costs, partially offset with higher system improvement costs
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	51.8	Additional cybersecurity and technical baseline management requirements
Other	-171.8	Added depot/factory infrastructure and AF Reserve Units, offset due to sharing common costs with the Next Gen OPIR program

Total Changes	-75.4
Current Estimate	786.4

Disposal Estimate Details

Date of Estimate:

Source of Estimate:

Disposal/Demilitarization Total Cost (BY 1995 \$M):

Disposal costs have not been estimated at this time.