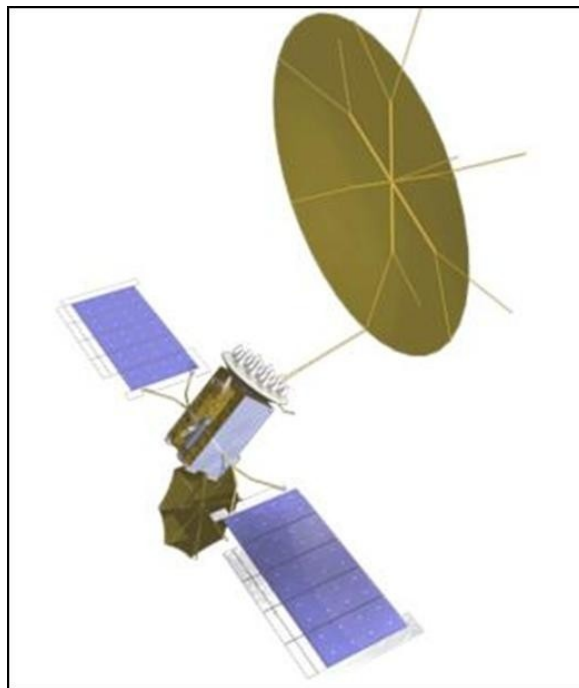




Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-345



Mobile User Objective System (MUOS)

As of FY 2015 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

Report Documentation Page

Form Approved
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Common Acronyms and Abbreviations

Acq O&M - Acquisition-Related Operations and Maintenance
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
BA - Budget Authority/Budget Activity
BY - Base Year
DAMIR - Defense Acquisition Management Information Retrieval
Dev Est - Development Estimate
DoD - Department of Defense
DSN - Defense Switched Network
Econ - Economic
Eng - Engineering
Est - Estimating
FMS - Foreign Military Sales
FY - Fiscal Year
IOC - Initial Operational Capability
\$K - Thousands of Dollars
LRIP - Low Rate Initial Production
\$M - Millions of Dollars
MILCON - Military Construction
N/A - Not Applicable
O&S - Operating and Support
Oth - Other
PAUC - Program Acquisition Unit Cost
PB - President's Budget
PE - Program Element
Proc - Procurement
Prod Est - Production Estimate
QR - Quantity Related
Qty - Quantity
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
Sch - Schedule
Spt - Support
TBD - To Be Determined
TY - Then Year
UCR - Unit Cost Reporting

Program Information

Program Name

Mobile User Objective System (MUOS)

DoD Component

Navy

Responsible Office

Responsible Office

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DSN Phone 524-7756
DSN Fax --
Date Assigned December 13, 2013

References

SAR Baseline (Production Estimate)

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated March 15, 2008

Approved APB

Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated July 24, 2012

Mission and Description

The Mobile User Objective System (MUOS) is a narrowband Military Satellite Communications (MILSATCOM) system that supports a worldwide, multi-Service population of mobile and fixed-site terminal users in the Ultra High Frequency (UHF) band, providing increased communications capabilities to smaller terminal users while still supporting interoperability to legacy terminals.

MUOS adapts a commercial third generation Wideband Code Division Multiple Access (WCDMA) cellular phone network architecture and combines it with geosynchronous satellites (in place of cell towers) to provide a new and more capable UHF MILSATCOM system. The constellation of four operational satellites and ground network control will provide greater than ten times the system capacity of the current UHF Follow-On (UFO) constellation.

MUOS includes the satellite constellation, a ground control and network management system, and a new waveform for user terminals. The space segment is comprised of a constellation of four geosynchronous satellites, plus one on-orbit spare. The ground system includes the ground transport, network management, satellite control, and associated infrastructure to both fly the satellites and manage the users' communications. MUOS is designed to support users that require greater mobility, higher data rates, and improved operational availability. The new waveform is termed the MUOS Common Air Interface (CAI), a Software Communications Architecture compliant modulation technique for the Joint Tactical Radio System terminals.

The flow of information between users when MUOS is operational will be much different than today's systems. Users will communicate with the satellite via UHF WCDMA links and the satellites will relay this to one of four interconnected ground sites located in Wahiawa (Hawaii), Chesapeake (Virginia), Niscemi (Italy), and Geraldton (Australia) via a Ka-band feeder link. These facilities identify the destination of the communications, and route the information to the appropriate ground site for Ka-band uplink to the satellite and UHF WCDMA downlink to the correct users. A network management facility, located at Wahiawa, will feature a government-controlled, priority-based resource management capability that will be adaptable and responsive to changing operational communications requirements. Additionally, MUOS will provide access to select Defense Information System Network services, providing a voice and data capability that has not been available to UHF MILSATCOM users on prior systems. For satellite telemetry, tracking, and commanding, MUOS will use existing control centers operated by the Naval Satellite Operations Center Headquarters at Point Mugu, California, and their detachment at Schriever Air Force Base, Colorado Springs, Colorado.

When MUOS is fielded, it will serve a mixed terminal population. Some users will have terminals only able to support the legacy waveforms while other users will have newer terminals able to support the MUOS CAI. Each MUOS satellite carries a legacy payload similar to that flown on UFO-11. These legacy payloads will continue to support legacy terminals, allowing for a more gradual transition to the MUOS WCDMA waveform.

Executive Summary

The MUOS program successfully completed significant program milestones in 2013. MUOS-1 is providing reliable ultra-high frequency satellite communications capability to the warfighter. The second satellite, MUOS-2, was successfully launched July 19, 2013, and was handed over to the Navy for further systems integration and test on November 15, 2013. The MUOS Waveform version 3.1.1 was posted to the Joint Tactical Network Information Repository in July 2013 and is available to the radio development community. The National Security Agency MUOS Waveform v3.1.1 Information Assurance Acceptability letter was signed on October 30, 2013, designating the waveform as an acceptable baseline.

The Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) issued an Acquisition Decision Memorandum on May 1, 2012, that directed the Navy assume responsibility for integration of the MUOS End-to-End (E2E) Capability. E2E Strategy of Risk Reduction integration and test events were executed in 2013. The first two Risk Reduction 1a and Risk Reduction 1b events were completed in March 2013 and July 2013 respectively, successfully demonstrating functionality of software waveform, ground systems, satellite and terminal during over the air tests. The third event, the Defense Information System Network Services Interface Test, was successfully completed in August 2013 demonstrating the Defense Services Network, secret, and non-secure network functionalities. The final risk reduction events conducting laboratory and reliability testing began in December 2013, with follow-on vendor and Government testing planned for calendar year 2014.

MUOS-3, MUOS-4, and MUOS-5 are satellites in various stages of production being procured via Fixed Price contract line items. The satellite that was closest to completion, and intended to fulfill the 3rd Satellite Ready to Ship milestone, experienced uncommanded shutdowns within the Legacy Payload during Thermal Vacuum testing. The root cause of the failure was identified to be insufficient solder application in the manufacture of the Output Multiplexer (OMUX) Cluster A, one of six OMUX clusters in the legacy payload. It was determined that the affected satellite could no longer meet the "3rd Satellite Ready to Ship" milestone Threshold of June 2014 per the APB. The next satellite in the production line has a Ready to Ship date of October 2014, which will result in a four month schedule breach to the "3rd Satellite Ready to Ship" milestone. Subsequent satellite deliveries are still projected to meet the MUOS APB milestones "4th Satellite Ready to Ship" and "5th Satellite Ready to Ship" Threshold dates. A program deviation report was signed by the Program Manager on December 4, 2013, and was submitted to USD (AT&L) on January 21, 2014.

All MUOS ground sites are complete with the exception of the site in Niscemi, Italy. The Italian Government approved construction of the MUOS site at Navy Radio Transmitter Facility (NRTF) Niscemi on June 1, 2011. However, on April 11, 2013, permission to proceed with construction of the Niscemi site was revoked by the President of Sicily. On July 26, 2013, the Government of Italy approved resuming construction of the MUOS installation at NRTF Niscemi. Assuming continued and assured access to the NRTF, the site will be ready for operations in May 2015.

MUOS met its statutory requirement to conduct a Configuration Steering Board on November 6, 2013.

There are no significant software-related issues with this program at this time.

Threshold Breaches

APB Breaches		
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Schedule		<input checked="" type="checkbox"/>
Performance		<input type="checkbox"/>
Cost	RDT&E	<input type="checkbox"/>
	Procurement	<input type="checkbox"/>
	MILCON	<input type="checkbox"/>
	Acq O&M	<input type="checkbox"/>
O&S Cost		<input type="checkbox"/>
Unit Cost	PAUC	<input type="checkbox"/>
	APUC	<input type="checkbox"/>

Explanation of Breach

Scheduled milestone "3rd Satellite Ready to Ship" Objective date September 2013/Threshold date June 2014 will not be met. The satellite that was closest to completion, and intended to fulfill the "3rd Satellite Ready to Ship" milestone, has experienced uncommanded shutdowns within the Legacy Payload during Thermal Vacuum testing. The root cause of the failure was identified to be insufficient solder application in the manufacture of the Output Multiplexer. It was determined that the affected satellite could no longer meet the "3rd Satellite Ready to Ship" milestone Threshold date of June 2014 per the APB.

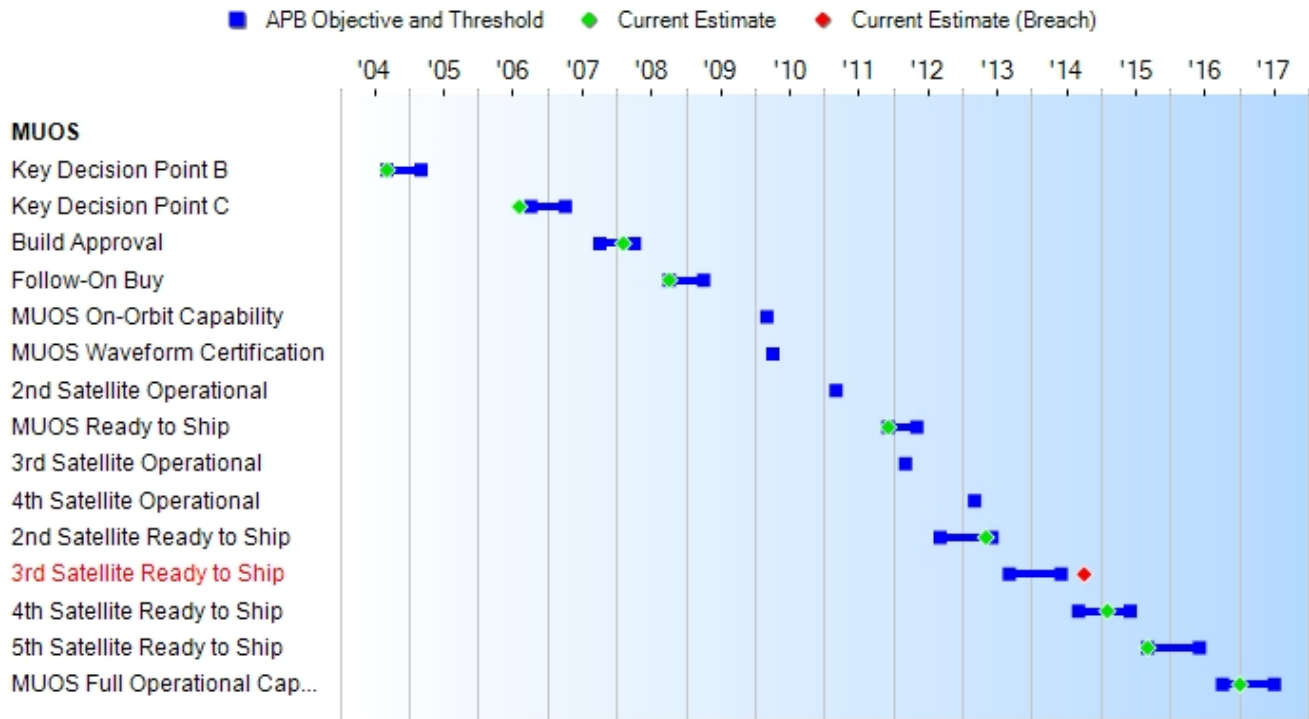
Nunn-McCurdy Breaches		
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Current UCR Baseline		
	PAUC	None
	APUC	None
Original UCR Baseline		
	PAUC	None
	APUC	None

Subsequent satellite deliveries are still projected to meet the MUOS APB milestones "4th Satellite Ready to Ship" and "5th Satellite Ready to Ship" Threshold dates.

A program deviation report was signed by the Program Manager on December 4, 2013, and was submitted to the Under Secretary of Defense (Acquisition, Technology and Logistics) on January 21, 2014.

Schedule



Milestones	SAR Baseline Prod Est	Current APB Production Objective/Threshold		Current Estimate
Key Decision Point B	SEP 2004	SEP 2004	MAR 2005	SEP 2004
Key Decision Point C	OCT 2006	OCT 2006	APR 2007	AUG 2006
Build Approval	OCT 2007	OCT 2007	APR 2008	FEB 2008
Follow-On Buy	OCT 2008	OCT 2008	APR 2009	OCT 2008
MUOS On-Orbit Capability	MAR 2010	N/A	N/A	N/A
MUOS Waveform Certification	APR 2010	N/A	N/A	N/A
2nd Satellite Operational	MAR 2011	N/A	N/A	N/A
MUOS Ready to Ship	N/A	DEC 2011	MAY 2012	DEC 2011
3rd Satellite Operational	MAR 2012	N/A	N/A	N/A
4th Satellite Operational	MAR 2013	N/A	N/A	N/A
2nd Satellite Ready to Ship	N/A	SEP 2012	JUN 2013	MAY 2013
3rd Satellite Ready to Ship	N/A	SEP 2013	JUN 2014	OCT 2014 ¹ (Ch-1)
4th Satellite Ready to Ship	N/A	SEP 2014	JUN 2015	FEB 2015 (Ch-2)
5th Satellite Ready to Ship	N/A	SEP 2015	JUN 2016	SEP 2015
MUOS Full Operational Capability	MAR 2014	OCT 2016	JUL 2017	JAN 2017

¹APB Breach

Change Explanations

(Ch-1) The "3rd Satellite Ready to Ship" current estimate changed from September 2013 to October 2014. The satellite that was closest to completion has experienced uncommanded shutdowns within the Legacy Payload during Thermal Vacuum (TVAC) testing. The root cause of the failure was identified to be insufficient solder application in the manufacture of the Output Multiplexer (OMUX).

(Ch-2) The "4th Satellite Ready to Ship" current estimate changed from September 2014 to February 2015 due to delays in the OMUX delivery.

Memo

It was determined that the affected satellite could no longer meet the "3rd Satellite Ready to Ship" milestone Threshold date of June 2014 per the APB; therefore this schedule milestone is now in breach.

Subsequent satellite deliveries are still projected to meet the MUOS APB milestones "4th Satellite Ready to Ship" and "5th Satellite Ready to Ship" Threshold dates.

A program deviation report was signed by the Program Manager on December 4, 2013, and was submitted to the Under Secretary of Defense (Acquisition, Technology and Logistics) on January 21, 2014.

Performance

Characteristics	SAR Baseline Prod Est	Current APB Production Objective/Threshold		Demonstrated Performance	Current Estimate
Coverage	24 hours/day communications services at all latitudes and longitudes	24 hours/day communications services at all latitudes and longitudes	24 hours/day communications services from 65 degrees North to 65 degrees South latitude at all longitudes	Demonstrated via analysis that each MUOS satellite always has optical line of site to one MUOS RAF and there is at least one MUOS satellite accessible from any point within the coverage area from 65 degrees North to 65 degrees South measured at every 0.1 degree increments of longitude over the worst case 24 hour orbital period	24 hours/day communications services from 65 degrees North to 65 degrees South latitude at all longitudes
Capacity	300% worldwide simultaneous accesses (5,991 at 117.6 Mbps) associated with the CMTW scenario	300% worldwide simultaneous accesses (5,991 at 117.6 Mbps) associated with the CMTW scenario	1,997 worldwide simultaneous accesses (39.2 Mbps) with 502 simultaneous theater accesses (3 Mbps)	Demonstrated via analysis that threshold capacity requirement is met while simultaneously meeting all other service requirements, such	1,997 worldwide simultaneous accesses (39.2 Mbps) with 502 simultaneous theater accesses (3 Mbps)

				as link availability.	
Access and Control	Resources planned, allocated, prioritized, and dynamically configured or reconfigured in less than 5 minutes for all networks; and priority-based access is provided or the request is queued and feedback provided to the user within 3 seconds 90% of the time and 6 seconds 99% of the time	Resources planned, allocated, prioritized, and dynamically configured or reconfigured in less than 5 minutes for all networks; and priority-based access is provided or the request is queued and feedback provided to the user within 3 seconds 90% of the time and 6 seconds 99% of the time	Resources planned, allocated, prioritized, and dynamically configured or reconfigured within 15 minutes and for selected high priority networks within 5 minutes; and priority-based access is provided or the request is queued and feedback provided to the user within 6 seconds 90% of the time and 10 seconds 99% of the time	Automated functionality for resource planning, allocation and prioritization have been demonstrated via test and analysis; network configuration/reconfiguration was demonstrated via Ground System test and analysis to be accomplished in 4.7 seconds Priority-based access was demonstrated via Ground System test and system-level analysis coincident with the Capacity KPP demonstration showing that access is provided within 6 seconds (90%) and 10 seconds (99%)	Resources planned, allocated, prioritized, and dynamically configured or reconfigured in less than 5 minutes for all networks; and priority-based access is provided or the request is queued and feedback provided to the user within 6 seconds 90% of the time and 10 seconds 99% of the time
Net Ready	Fully support	Fully support	Fully support	Letter from	Fully support

	<p>execution of all operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for Net-Centric military operations to include 1) DISR mandated GIG IT standards and profiles identified in the TV-1, 2) DISR mandated GIG KIPs identified in the KIP declaration table, 3) NCOW RM Enterprise Services 4) Information assurance requirements including availability, integrity, authentication, confidentiality, and nonrepudiation, and issuance of</p>	<p>execution of all operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for Net-Centric military operations to include 1) DISR mandated GIG IT standards and profiles identified in the TV-1, 2) DISR mandated GIG KIPs identified in the KIP declaration table, 3) NCOW RM Enterprise Services 4) Information assurance requirements including availability, integrity, authentication, confidentiality, and nonrepudiation, and issuance of</p>	<p>execution of joint critical operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for transition to Net-Centric military operations to include 1) DISR mandated GIG IT standards and profiles identified in the TV-1, 2) DISR mandated GIG KIPs identified in the KIP declaration table, 3) NCOW RM Enterprise Services 4) Information assurance requirements including availability, integrity, authentication, confidentiality, and nonrepudiation, and</p>	<p>Joint Staff J6, dated October 30, 2007, grants interoperability and supportability certification of the Net Ready Key Performance Parameter Interoperability test certification by DISA Joint Interoperability Test Command is will conclude following on-orbit testing of MUOS Satellite #2</p>	<p>execution of joint critical operational activities identified in the applicable joint and system integrated architectures and the system must satisfy the technical requirements for transition to Net-Centric military operations to include 1) DISR mandated GIG IT standards and profiles identified in the TV-1, 2) DISR mandated GIG KIPs identified in the KIP declaration table, 3) NCOW RM Enterprise Services 4) Information assurance requirements including availability, integrity, authentication, confidentiality, and nonrepudiation, and</p>
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	an ATO by the DAA, and 5) Operationally effective information exchanges; and mission critical performance and information assurance attributes, data correctness, data availability, and consistent data processing specified in the applicable joint and system integrated architecture views	an ATO by the DAA, and 5) Operationally effective information exchanges; and mission critical performance and information assurance attributes, data correctness, data availability, and consistent data processing specified in the applicable joint and system integrated architecture views	issuance of an IATO by the DAA, and 5) Operationally effective information exchanges; and mission critical performance and information assurance attributes, data correctness, data availability, and consistent data processing specified in the applicable joint and system integrated architecture views		issuance of an IATO by the DAA, and 5) Operationally effective information exchanges; and mission critical performance and information assurance attributes, data correctness, data availability, and consistent data processing specified in the applicable joint and system integrated architecture views
Types of Service	Support synchronous and asynchronous broadcast, point-to-point, and netted communications topologies plus support an asymmetrical multicast communications topology	Threshold plus support an asymmetrical multicast communications topology	Support synchronous and asynchronous broadcast, point-to-point, and netted communications topologies	Demonstrated via Ground System test that both voice and data were communicated via broadcast, point-to-point and netted topologies	Support synchronous and asynchronous broadcast, point-to-point, and netted communications topologies
Communications on the Move	Support communicat-	Support communicat-	Support communicat-	Demonstrated via	Support communica-

	ions on the move when and where needed in all environments while engaged in combat operations	ions on the move when and where needed in all environments while engaged in combat operations	ions on the move when and where needed in all environments while engaged in combat operations	analysis that service requirements can be met in all required environments	tions on the move when and where needed in all environments while engaged in combat operations
Availability	Provide an operational link availability of at least 99% averaged over any year of operation and a constellation availability over the required length of service of at least 90%	Provide an operational link availability of at least 99% averaged over any year of operation and a constellation availability over the required length of service of at least 90%	Provide an operational link availability of at least 97% averaged over any year of operation and a constellation availability over the required length of service of at least 70%	Link availability was demonstrated via analysis and showed that all MUOS users will have at least 97% link availability averaged over a year. Constellation availability was demonstrated via analysis, with results showing that the probability of 4 operational satellites on orbit over the required length of service is 87%	Provide an operational link availability of at least 97% averaged over any year of operation and a constellation availability over the required length of service of at least 70%

Requirements Source

Capability Production Document (CPD) dated January 15, 2008

Change Explanations

None

Acronyms and Abbreviations

ATO - Approval to Operate
CMTW - Combined Major Theater War
DAA - Designated Approval Authority
DISA - Defense Information Systems Agency
DISR - DOD Informational Technology Standards Region
GIG - Global Information Grid
IATO - Interim Approval to Operate
IT - Information Technology
KIPs - Key Interface Profiles
KPP - Key Performance Parameter
Mbps - megabits per second
NCOW RM - Net-Centric Operations and Warfare Reference Model
RAF - Radio Access Facility
TV-1 - Technical View 1

Track to Budget

RDT&E

Appn	BA	PE
------	----	----

Navy 1319 07 0303109N

Project	Name
---------	------

2472 Satellite Communications (SPACE)/Mobile User Objective System (Shared)

Procurement

Appn	BA	PE
------	----	----

Navy 1507 02 0303109N

Line Item	Name
-----------	------

243300 Fleet Satellite Communications Follow-On

MILCON

Appn	BA	PE
------	----	----

Navy 1205 01 0301376N

Project	Name
---------	------

P131 Facilities Restoration & Mod - Communication (Shared) (Sunk)

Acq O&M

Appn	BA	PE
------	----	----

Navy 1804 04 0303109N

Project	Name
---------	------

6M Satellite Communications (SPACE) (Shared) (Sunk)

Cost and Funding

Cost Summary

Total Acquisition Cost and Quantity

Appropriation	BY2004 \$M			BY2004 \$M	TY \$M		
	SAR Baseline Prod Est	Current APB Production Objective/Threshold	Current Estimate	Current Estimate	SAR Baseline Prod Est	Current APB Production Objective	Current Estimate
RDT&E	3245.2	3684.0	4052.4	3751.2	3636.2	4138.2	4270.7
Procurement	2460.3	2354.2	2589.6	2323.2	3104.1	2896.3	2932.9
Flyaway	--	--	--	2323.2	--	--	2932.9
Recurring	--	--	--	2323.2	--	--	2932.9
Non Recurring	--	--	--	0.0	--	--	0.0
Support	--	--	--	0.0	--	--	0.0
Other Support	--	--	--	0.0	--	--	0.0
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	30.7	30.8	33.9	30.8	34.5	34.6	34.6
Acq O&M	32.7	25.2	27.7	25.2	35.8	26.8	26.8
Total	5768.9	6094.2	N/A	6130.4	6810.6	7095.9	7265.0

Confidence Level for Current APB Cost 50% -

This cost estimate incorporates the 2011 Director, Cost Assessment and Program Evaluation (D,CAPE) Research, Development, Test and Evaluation (RDT&E) estimate (April 2011) which, like all CAPE estimates, carries a confidence level of 50%. The development estimate presented by the CAPE in April 2011, as a result of Acquisition Decision Memorandum (ADM) direction January 2011, like all life-cycle cost estimates previously performed by the CAPE, is built upon a product-oriented work breakdown structure, based on historical actual cost information to the maximum extent possible, and, most importantly, based on conservative assumptions that are consistent with actual demonstrated contractor and government performance for a series of acquisition programs in which the Department has been successful.

It is difficult to calculate mathematically the precise confidence levels associated with life-cycle cost estimates prepared for Major Defense Acquisition Programs (MDAPs). Based on the rigor in methods used in building estimates, the strong adherence to the collection and use of historical cost information, and the review of applied assumptions, we project that it is about equally likely that the estimate will prove too low or too high for execution of the program described. The program office's estimate for Procurement and Sustainment activities (December 2011), like the RDT&E estimate, was completed with a 50% confidence level.

Quantity	SAR Baseline Prod Est	Current APB Production	Current Estimate
RDT&E	2	2	2
Procurement	4	4	4
Total	6	6	6

The units of measure for the MUOS program consist of six satellites, six launch vehicles, the entire ground system, and the associated support.

Cost and Funding

Funding Summary

Appropriation and Quantity Summary FY2015 President's Budget / December 2013 SAR (TY\$ M)

Appropriation	Prior	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	To Complete	Total
RDT&E	3924.9	35.9	12.3	10.7	11.7	12.5	12.8	249.9	4270.7
Procurement	1807.4	16.9	208.7	40.1	10.3	10.4	10.8	828.3	2932.9
MILCON	34.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.6
Acq O&M	26.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.8
PB 2015 Total	5793.7	52.8	221.0	50.8	22.0	22.9	23.6	1078.2	7265.0
PB 2014 Total	5819.9	59.0	261.5	48.1	17.8	17.8	26.9	882.8	7133.8
Delta	-26.2	-6.2	-40.5	2.7	4.2	5.1	-3.3	195.4	131.2

Quantity	Undistributed	Prior	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	To Complete	Total
Development		2	0	0	0	0	0	0	0	2
Production		0	3	0	0	0	0	0	1	4
PB 2015 Total		2	3	0	0	0	0	0	1	6
PB 2014 Total		2	3	0	0	0	0	0	1	6
Delta		0	0	0	0	0	0	0	0	0

Cost and Funding

Annual Funding By Appropriation

Annual Funding TY\$

1319 | RDT&E | Research, Development, Test, and Evaluation, Navy

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
2000	--	--	--	--	--	--	8.6
2001	--	--	--	--	--	--	27.1
2002	--	--	--	--	--	--	32.5
2003	--	--	--	--	--	--	67.0
2004	--	--	--	--	--	--	84.4
2005	--	--	--	--	--	--	375.2
2006	--	--	--	--	--	--	449.5
2007	--	--	--	--	--	--	637.2
2008	--	--	--	--	--	--	591.3
2009	--	--	--	--	--	--	497.0
2010	--	--	--	--	--	--	398.3
2011	--	--	--	--	--	--	391.4
2012	--	--	--	--	--	--	224.2
2013	--	--	--	--	--	--	141.2
2014	--	--	--	--	--	--	35.9
2015	--	--	--	--	--	--	12.3
2016	--	--	--	--	--	--	10.7
2017	--	--	--	--	--	--	11.7
2018	--	--	--	--	--	--	12.5
2019	--	--	--	--	--	--	12.8
2020	--	--	--	--	--	--	40.1
2021	--	--	--	--	--	--	98.5
2022	--	--	--	--	--	--	20.1
2023	--	--	--	--	--	--	20.4
2024	--	--	--	--	--	--	20.8
2025	--	--	--	--	--	--	21.2

2026	--	--	--	--	--	--	21.5
2027	--	--	--	--	--	--	7.3
Subtotal	2	--	--	--	--	--	4270.7

Annual Funding BY\$
1319 | RDT&E | Research, Development, Test, and Evaluation, Navy

Fiscal Year	Quantity	End Item Recurring Flyaway BY 2004 \$M	Non End Item Recurring Flyaway BY 2004 \$M	Non Recurring Flyaway BY 2004 \$M	Total Flyaway BY 2004 \$M	Total Support BY 2004 \$M	Total Program BY 2004 \$M
2000	--	--	--	--	--	--	9.0
2001	--	--	--	--	--	--	28.0
2002	--	--	--	--	--	--	33.2
2003	--	--	--	--	--	--	67.5
2004	--	--	--	--	--	--	82.7
2005	--	--	--	--	--	--	358.3
2006	--	--	--	--	--	--	416.3
2007	--	--	--	--	--	--	576.0
2008	--	--	--	--	--	--	524.9
2009	--	--	--	--	--	--	435.6
2010	--	--	--	--	--	--	344.0
2011	--	--	--	--	--	--	329.9
2012	--	--	--	--	--	--	185.8
2013	--	--	--	--	--	--	115.2
2014	--	--	--	--	--	--	28.8
2015	--	--	--	--	--	--	9.7
2016	--	--	--	--	--	--	8.3
2017	--	--	--	--	--	--	8.9
2018	--	--	--	--	--	--	9.3
2019	--	--	--	--	--	--	9.3
2020	--	--	--	--	--	--	28.6
2021	--	--	--	--	--	--	68.9
2022	--	--	--	--	--	--	13.8
2023	--	--	--	--	--	--	13.7
2024	--	--	--	--	--	--	13.7
2025	--	--	--	--	--	--	13.7
2026	--	--	--	--	--	--	13.6
2027	--	--	--	--	--	--	4.5
Subtotal	2	--	--	--	--	--	3751.2

Annual Funding TY\$
1507 | Procurement | Weapons Procurement, Navy

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	--	203.7	--	--	203.7	--	203.7
2009	1	339.5	--	--	339.5	--	339.5
2010	1	509.9	--	--	509.9	--	509.9
2011	1	494.7	--	--	494.7	--	494.7
2012	--	238.2	--	--	238.2	--	238.2
2013	--	21.4	--	--	21.4	--	21.4
2014	--	16.9	--	--	16.9	--	16.9
2015	--	208.7	--	--	208.7	--	208.7
2016	--	40.1	--	--	40.1	--	40.1
2017	--	10.3	--	--	10.3	--	10.3
2018	--	10.4	--	--	10.4	--	10.4
2019	--	10.8	--	--	10.8	--	10.8
2020	--	10.4	--	--	10.4	--	10.4
2021	--	65.9	--	--	65.9	--	65.9
2022	1	682.0	--	--	682.0	--	682.0
2023	--	16.5	--	--	16.5	--	16.5
2024	--	17.1	--	--	17.1	--	17.1
2025	--	16.0	--	--	16.0	--	16.0
2026	--	10.6	--	--	10.6	--	10.6
2027	--	9.8	--	--	9.8	--	9.8
Subtotal	4	2932.9	--	--	2932.9	--	2932.9

Annual Funding BY\$
1507 | Procurement | Weapons Procurement, Navy

Fiscal Year	Quantity	End Item Recurring Flyaway BY 2004 \$M	Non End Item Recurring Flyaway BY 2004 \$M	Non Recurring Flyaway BY 2004 \$M	Total Flyaway BY 2004 \$M	Total Support BY 2004 \$M	Total Program BY 2004 \$M
2008	--	179.0	--	--	179.0	--	179.0
2009	1	294.1	--	--	294.1	--	294.1
2010	1	434.1	--	--	434.1	--	434.1
2011	1	413.0	--	--	413.0	--	413.0
2012	--	195.7	--	--	195.7	--	195.7
2013	--	17.3	--	--	17.3	--	17.3
2014	--	13.4	--	--	13.4	--	13.4
2015	--	162.6	--	--	162.6	--	162.6
2016	--	30.6	--	--	30.6	--	30.6
2017	--	7.7	--	--	7.7	--	7.7
2018	--	7.6	--	--	7.6	--	7.6
2019	--	7.8	--	--	7.8	--	7.8
2020	--	7.3	--	--	7.3	--	7.3
2021	--	45.6	--	--	45.6	--	45.6
2022	1	462.5	--	--	462.5	--	462.5
2023	--	11.0	--	--	11.0	--	11.0
2024	--	11.1	--	--	11.1	--	11.1
2025	--	10.2	--	--	10.2	--	10.2
2026	--	6.6	--	--	6.6	--	6.6
2027	--	6.0	--	--	6.0	--	6.0
Subtotal	4	2323.2	--	--	2323.2	--	2323.2

Cost Quantity Information
1507 | Procurement | Weapons Procurement, Navy

Fiscal Year	Quantity	End Item Recurring Flyaway (Aligned with Quantity) BY 2004 \$M
2008	--	--
2009	1	446.4
2010	1	433.2
2011	1	437.0
2012	--	--
2013	--	--
2014	--	--
2015	--	--
2016	--	--
2017	--	--
2018	--	--
2019	--	--
2020	--	--
2021	--	--
2022	1	1006.6
2023	--	--
2024	--	--
2025	--	--
2026	--	--
2027	--	--
Subtotal	4	2323.2

Annual Funding TY\$
1205 | MILCON | Military Construction,
Navy and Marine Corps

Fiscal Year	Total Program TY \$M
2007	26.1
2008	8.5
Subtotal	34.6

Annual Funding BY\$
1205 | MILCON | Military Construction,
Navy and Marine Corps

Fiscal Year	Total Program BY 2004 \$M
2007	23.3
2008	7.5
Subtotal	30.8

Annual Funding TY\$
1804 | Acq O&M | Operation and
Maintenance, Navy

Fiscal Year	Total Program TY \$M
2002	4.2
2003	4.6
2004	4.5
2005	--
2006	--
2007	--
2008	4.6
2009	5.0
2010	3.9
Subtotal	26.8

Annual Funding BY\$
1804 | Acq O&M | Operation and
Maintenance, Navy

Fiscal Year	Total Program BY 2004 \$M
2002	4.3
2003	4.6
2004	4.4
2005	--
2006	--
2007	--
2008	4.1
2009	4.4
2010	3.4
Subtotal	25.2

Low Rate Initial Production

There is no LRIP for this program.

Foreign Military Sales

None

Nuclear Costs

None

Unit Cost**Unit Cost Report**

	BY2004 \$M	BY2004 \$M	
Unit Cost	Current UCR Baseline (JUL 2012 APB)	Current Estimate (DEC 2013 SAR)	BY % Change

Program Acquisition Unit Cost (PAUC)

Cost	6094.2	6130.4	
Quantity	6	6	
Unit Cost	1015.700	1021.733	+0.59

Average Procurement Unit Cost (APUC)

Cost	2354.2	2323.2	
Quantity	4	4	
Unit Cost	588.550	580.800	-1.32

	BY2004 \$M	BY2004 \$M	
Unit Cost	Original UCR Baseline (DEC 2004 APB)	Current Estimate (DEC 2013 SAR)	BY % Change

Program Acquisition Unit Cost (PAUC)

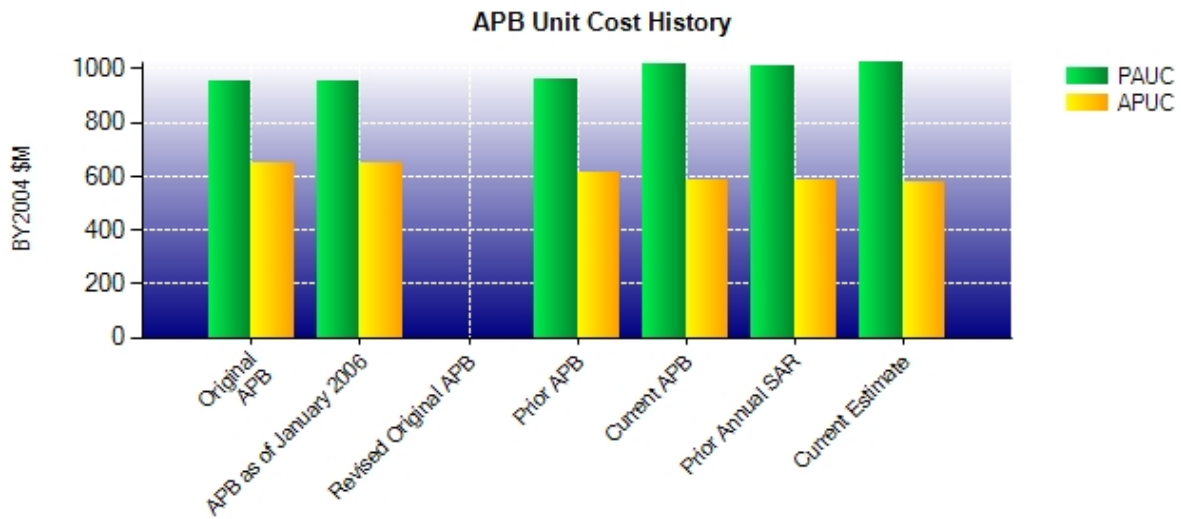
Cost	5738.0	6130.4	
Quantity	6	6	
Unit Cost	956.333	1021.733	+6.84

Average Procurement Unit Cost (APUC)

Cost	2591.0	2323.2	
Quantity	4	4	
Unit Cost	647.750	580.800	-10.34

PAUC reflects the sum of six satellites, six launch vehicles, the entire ground segment, and the associated support, divided by the total quantity of six. APUC reflects the sum of four satellites and six launch vehicles, divided by a procurement quantity of four.

Unit Cost History



	Date	BY2004 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	DEC 2004	956.333	647.750	1080.183	776.025
APB as of January 2006	DEC 2004	956.333	647.750	1080.183	776.025
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	MAR 2008	961.483	615.075	1135.100	776.025
Current APB	JUL 2012	1015.700	588.550	1182.650	724.075
Prior Annual SAR	DEC 2012	1007.600	581.875	1188.967	733.075
Current Estimate	DEC 2013	1021.733	580.800	1210.833	733.225

SAR Unit Cost History

Initial SAR Baseline to Current SAR Baseline (TY \$M)

Initial PAUC Dev Est	Changes								PAUC Prod Est
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
1080.183	49.000	0.000	2.750	0.000	3.167	0.000	0.000	54.917	1135.100

Current SAR Baseline to Current Estimate (TY \$M)

PAUC Prod Est	Changes								PAUC Current Est
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
1135.100	-12.117	0.000	4.550	33.450	49.850	0.000	0.000	75.733	1210.833

Initial SAR Baseline to Current SAR Baseline (TY \$M)

Initial APUC Dev Est	Changes								APUC Prod Est
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
776.025	39.100	0.000	4.125	0.000	-43.225	0.000	0.000	0.000	776.025

Current SAR Baseline to Current Estimate (TY \$M)

APUC Prod Est	Changes								APUC Current Est
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
776.025	-16.150	0.000	6.825	0.000	-33.475	0.000	0.000	-42.800	733.225

SAR Baseline History

Item/Event	SAR Planning Estimate (PE)	SAR Development Estimate (DE)	SAR Production Estimate (PdE)	Current Estimate
Milestone A	N/A	N/A	N/A	N/A
Milestone B	N/A	SEP 2004	SEP 2004	SEP 2004
Milestone C	N/A	OCT 2006	OCT 2006	AUG 2006
IOC	N/A	N/A	N/A	N/A
Total Cost (TY \$M)	N/A	6481.1	6810.6	7265.0
Total Quantity	N/A	6	6	6
Prog. Acq. Unit Cost (PAUC)	N/A	1080.183	1135.100	1210.833

Milestone (MS) B and C dates reflect National Security Space Acquisition Policy 03-01 dates for Key Decision Point B and C, not MS B and C as specified in DoD 5000.

IOC is synonymous with the term On-Orbit Capability, which is referenced by the MUOS Program.

Cost Variance

Summary Then Year \$M					
	RDT&E	Proc	MILCON	Acq O&M	Total
SAR Baseline (Prod Est)	3636.2	3104.1	34.5	35.8	6810.6
Previous Changes					
Economic	-4.3	-52.4	+0.1	+0.1	-56.5
Quantity	--	--	--	--	--
Schedule	--	+7.0	--	--	+7.0
Engineering	+41.0	--	--	--	+41.0
Estimating	+467.2	-126.4	--	-9.1	+331.7
Other	--	--	--	--	--
Support	--	--	--	--	--
Subtotal	+503.9	-171.8	+0.1	-9.0	+323.2
Current Changes					
Economic	-4.0	-12.2	--	--	-16.2
Quantity	--	--	--	--	--
Schedule	--	+20.3	--	--	+20.3
Engineering	+159.7	--	--	--	+159.7
Estimating	-25.1	-7.5	--	--	-32.6
Other	--	--	--	--	--
Support	--	--	--	--	--
Subtotal	+130.6	+0.6	--	--	+131.2
Total Changes	+634.5	-171.2	+0.1	-9.0	+454.4
CE - Cost Variance	4270.7	2932.9	34.6	26.8	7265.0
CE - Cost & Funding	4270.7	2932.9	34.6	26.8	7265.0

Summary Base Year 2004 \$M					
	RDT&E	Proc	MILCON	Acq O&M	Total
SAR Baseline (Prod Est)	3245.2	2460.3	30.7	32.7	5768.9
Previous Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	--	+2.5	--	--	+2.5
Engineering	+31.5	--	--	--	+31.5
Estimating	+385.4	-135.3	+0.1	-7.5	+242.7
Other	--	--	--	--	--
Support	--	--	--	--	--
Subtotal	+416.9	-132.8	+0.1	-7.5	+276.7
Current Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	--	--	--	--	--
Engineering	+108.7	--	--	--	+108.7
Estimating	-19.6	-4.3	--	--	-23.9
Other	--	--	--	--	--
Support	--	--	--	--	--
Subtotal	+89.1	-4.3	--	--	+84.8
Total Changes	+506.0	-137.1	+0.1	-7.5	+361.5
CE - Cost Variance	3751.2	2323.2	30.8	25.2	6130.4
CE - Cost & Funding	3751.2	2323.2	30.8	25.2	6130.4

Previous Estimate: December 2012

RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-4.0
Adjustment for current and prior escalation. (Estimating)	+2.7	+3.3
Increased Information Assurance Requirements. (Engineering)	+108.7	+159.7
Revised estimate for miscellaneous budget adjustments. (Estimating)	-22.3	-28.4
RDT&E Subtotal	+89.1	+130.6

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-12.2
Adjustment for current and prior escalation. (Estimating)	+4.5	+5.3
Stretch out of Procurement buy profile from FY 2021 to FY 2022 for the 6th Satellite due to program development delays. (Schedule)	0.0	+20.3
Revised estimate for miscellaneous budget adjustments. (Estimating)	-8.8	-12.8
Procurement Subtotal	-4.3	+0.6

Contracts

Appropriation: RDT&E

Contract Name **MUOS RRDD AOS Contract - Contract Line Item Number (CLIN) 1**
 Contractor Lockheed Martin (LMSSC)
 Contractor Location 1111 Lockheed Martin Way
 Sunnyvale, CA 94089-1212
 Contract Number, Type N00039-04-C-2009, CPAF/CPIF
 Award Date September 24, 2004
 Definitization Date September 24, 2004

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price at Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
2097.9	N/A	2	2280.1	N/A	2	3462.9	3474.1

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the incorporation of the Secure Communications Engineering Change Proposal (ECP), and the Enhanced Digital Receiver Unit ECP.

Variance	Cost Variance	Schedule Variance
Cumulative Variances To Date (11/24/2013)	-372.0	-0.9
Previous Cumulative Variances	-292.3	-11.8
Net Change	-79.7	+10.9

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to technical issues primarily in the Ground Segment and Satellite Assembly, Integration, and Test Segment. MUOS-2 experienced cost inefficiencies as a result of issues with Single Line Flow testing. The inefficiencies resulted in schedule delays which have driven the overall extension of the Contract Line Item Number (CLIN) 0001 Period of Performance.

The favorable net change in the schedule variance is due to successful Launch, On-Orbit Testing, and On-Orbit System Validation for MUOS-2. Subsequently, handover of MUOS-2 from the contractor to the Government completed on November 15, 2013.

General Contract Variance Explanation

The CLIN is more than 90% complete, and handover of the satellites (quantity of two) to the government has occurred. The final Contract Performance Report for this CLIN was submitted November 24, 2013.

Contract Comments

This contract is more than 90% complete; therefore, this is the final report for this contract.

The difference between the Contract Price and both the Contractor's Estimated Price at Completion, and the Program Manager's Price at Completion, is driven by adjustments made for Over Target Baseline (OTB) #1 and OTB #2.

Appropriation: Procurement

Contract Name **MUOS RRDD AOS Contract - Contract Line Item Number (CLIN) 3**
 Contractor Lockheed Martin (LMSSC)
 Contractor Location 1111 Lockheed Martin Way
 Sunnyvale, CA 94089-1212
 Contract Number, Type N00039-04-C-2009/3, FPIF
 Award Date September 24, 2004
 Definitization Date September 24, 2004

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price at Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
279.0	298.5	1	282.5	332.5	1	332.6	332.5

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the inclusion of a contract Engineering Change Proposal.

Variance	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/26/2014)	-5.5	-27.6
Previous Cumulative Variances	+3.6	-15.1
Net Change	-9.1	-12.5

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to post-mate testing inefficiencies realized in Satellite Assembly, Integration, and Test Segment for the 3rd Satellite Output Multiplexer (OMUX).

The unfavorable net change in the schedule variance is due to a result of the 3rd Satellite OMUX issue investigation and on-going resolution. The 3rd Satellite OMUX issues have resulted in the delayed launch and handover to the Navy.

Contract Comments

This contract is more than 90% complete; therefore, this is the final report for this contract.

Although this CLIN is more than 90% complete, we will continue to report in the SAR until the full quantity (one satellite) has been delivered to the Government.

The Program Manager's Estimated Price at Completion is equal to the current Contract Ceiling Price.

Appropriation: Procurement

Contract Name **MUOS RRDD AOS Contract – Contract Line Item Number (CLIN) 5**
 Contractor Lockheed Martin (LMSSC)
 Contractor Location 1111 Lockheed Martin Way
 Sunnyvale, CA 94089-1212
 Contract Number, Type N00039-04-C-2009/5, FPIF
 Award Date September 24, 2004
 Definitization Date September 24, 2004

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price at Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
287.7	307.7	1	277.8	324.7	1	325.2	324.7

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the change in methodology to align the target price to the Contract Performance Report data reported by the Prime Contractor, which excludes \$9.9M Mission Success Fee. In previous SAR submissions, the Mission Success Fee was included in the target price. In accordance with guidance, the Original Target Price remains unchanged, and continues to include the \$9.9M of Fee.

Variance	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/26/2014)	+26.1	-12.3
Previous Cumulative Variances	+25.0	-11.7
Net Change	+1.1	-0.6

Cost and Schedule Variance Explanations

The favorable net change in the cost variance is due to cost efficiencies in the Program Management and Payload Segments. The favorable net change is also attributable to labor rates and efficiencies realized as a result of having multiple spacecraft in production.

The unfavorable net change in the schedule variance is due to the delayed shipment of the System Module. Single Line Flow assembly, integration, and test activities were delayed, resulting in the late start of Launch Base and Systems Engineering and Integration Team launch preparation tasks.

Contract Comments

The Program Manager’s Estimated Price at Completion is equal to the current Contract Ceiling Price.

Appropriation: Procurement

Contract Name **MUOS RRDD AOS Contract – Contract Line Item Number (CLIN) 7**
 Contractor Lockheed Martin (LMSSC)
 Contractor Location 1111 Lockheed Martin Way
 Sunnyvale, CA 94089-1212
 Contract Number, Type N00039-04-C-2009/7, FPIF
 Award Date September 24, 2004
 Definitization Date September 24, 2004

Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price at Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
288.5	339.6	1	288.5	339.6	1	327.5	339.6

Variance	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/26/2014)	+24.1	-9.3
Previous Cumulative Variances	+18.7	-3.7
Net Change	+5.4	-5.6

Cost and Schedule Variance Explanations

The favorable net change in the cost variance is due to labor efficiencies experienced in Legacy Subsystem, Base to User, Program Management, and Space Segment Engineering.

The unfavorable net change in the schedule variance is due to the delayed start of Single Line Flow, delayed manufacturing of trim tabs and thermal blankets, and the late completion of antenna diplex feeds.

Contract Comments

The Program Manager's Estimated Price at Completion is equal to the current Contract Ceiling Price.

Deliveries and Expenditures

Delivered to Date	Plan to Date	Actual to Date	Total Quantity	Percent Delivered
Development	2	2	2	100.00%
Production	0	0	4	0.00%
Total Program Quantity Delivered	2	2	6	33.33%

Expended and Appropriated (TY \$M)

Total Acquisition Cost	7265.0	Years Appropriated	15
Expended to Date	5231.0	Percent Years Appropriated	53.57%
Percent Expended	72.00%	Appropriated to Date	5846.5
Total Funding Years	28	Percent Appropriated	80.47%

The above data is current as of 2/28/2014.

Operating and Support Cost

MUOS

Assumptions and Ground Rules

Cost Estimate Reference:

Current program office estimate reviewed with the Office of the Secretary of Defense, Cost Assessment and Program Evaluation, December 2012, based on the approved Logistics Requirements Funding Summary (LRFS) dated November 8, 2012.

Sustainment Strategy:

The MUOS constellation consists of five satellites, four operational and one on-orbit spare. In addition, the APB includes procurement of a sixth satellite to replace the first satellite at end-of-life. MUOS O&S costs include sustainment of all satellites and four ground sites located in Wahiawa (Hawaii), Chesapeake (Virginia), Niscemi (Italy), and Geraldton (Australia).

Antecedent Information:

The antecedent system to MUOS was the Ultra High Frequency (UHF) Follow-on (UFO) satellite communications program. Comparisons of O&S costs for UFO are not provided. Although the MUOS system continues to support UHF capabilities, the infrastructure of MUOS and its sustainment are not comparable to UFO.

Unitized O&S Costs BY2004 \$M			
Cost Element	MUOS Cost Per Satellite Per Year	UFO (Antecedent) Cost Per Satellite Per Year	
Unit-Level Manpower	0.000		0.000
Unit Operations	0.000		0.000
Maintenance	0.463		0.000
Sustaining Support	3.158		0.000
Continuing System Improvements	0.000		0.000
Indirect Support	0.178		0.000
Other	0.000		0.000
Total	3.799		--

Unitized Cost Comments:

O&S costs include maintenance and sustainment of the entire MUOS system, including the space and ground segments. The unitized annual costs reflect the total O&S cost divided by six satellites and 17 years (FY 2011 - FY 2027).

	Total O&S Cost \$M			
	Current Production APB Objective/Threshold		Current Estimate	
	MUOS		MUOS	UFO (Antecedent)
Base Year	379.9	417.9	387.5	N/A
Then Year	508.2	N/A	535.9	N/A

Total O&S Costs Comments:

The total O&S estimate increased from \$368.4M BY 2004 in the 2012 SAR to \$387.5M BY 2004 in the 2013 SAR due to the addition of FY 2027 in the sustainment strategy.

O&S Cost Variance		
Category	Base Year 2004 \$M	Change Explanation
Prior SAR Total O&S Estimate December 2012	368.340	
Cost Estimating Methodology	0.000	
Cost Data Update	0.000	
Labor Rate	0.000	
Energy Rate	0.000	
Technical Input	0.000	
Programmatic/Planning Factors	+19.213	Due to the extension of operations to FY 2027.
Other	0.000	
Total Changes	+19.213	
Current Estimate	387.553	

Disposal Costs:

Disposal costs are excluded from the O&S estimate. Satellites will be disposed on-orbit using on-board fuel paid for during the procurement phase of the program.