RCS: DD-A&T(Q&A)823-261

# Advanced Extremely High Frequency Satellite (AEHF)

As of FY 2021 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

## Table of Contents

## 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**

Advanced Extremely High Frequency Satellite (AEHF)

**DoD Component**

Air Force

**Joint Participants**

The Netherlands; Australia; Canada; United Kingdom

This is a United States Space Force program.

## Responsible Office

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## References

| SAR Baseline (Production Estimate) |
| --- |
| Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated October 23, 2012 |

| Approved APB |
| --- |
| Defense Acquisition Executive (DAE) Approved Acquisition Program Baseline (APB) dated October 23, 2012 |

## Mission and Description

Advanced Extremely High Frequency Satellite (AEHF) is a joint service satellite communications system that provides global, survivable, secure, protected, and jam-resistant communications for high priority military ground, sea, and air assets. The system consists of four operational satellites in Geosynchronous Earth Orbit that provide 10 times the capacity of the 1990s-era Military Strategic and Tactical Relay Block II satellites. The system provides continuous 24-hour Extremely High Frequency Extended Data Rate coverage between 65 degrees north and 65 degrees south latitude. AEHF allows the National Security Council and Combatant Commanders to control their tactical and strategic forces at all levels of conflict up to and including general nuclear war, and it supports the attainment of information superiority.

The AEHF operational system is composed of three segments: space, terminals, and mission control. The space segment consists of a cross-linked constellation of satellites to provide worldwide coverage. The terminal segment includes fixed and mobile ground terminals, ship and submarine terminals, and airborne terminals. The mission control segment controls satellites on orbit, monitors satellite health, and provides communication system planning and monitoring. This segment is also survivable, with both fixed and mobile control stations.

International Cooperative Program – The four countries that have signed Memoranda of Understanding are as follows: Canada, November 16, 1999; the Netherlands, November 8, 2002; the United Kingdom, September 9, 2003; and Australia, July 9, 2019. These bilateral agreements allocate a portion of protected communication resources in exchange for financial participation in development. The Netherlands, Canada, United Kingdom, and Australia signed Memoranda of Understanding in preparation for entering into a Foreign Military Sales case to purchase International Partnership variants of AEHF terminals.

On December 20, 2019, the President of the United States established the United States Space Force which assumed the responsibility for all major space acquisition programs. This program is now a United States Space Force program.

# Executive Summary

## Program Highlights Since Last Report

Pursuant to section 2432 of title 10, United States Code, this is the final SAR submission for AEHF SV 5/6 because the program is 90% or more expended.

AEHF 1-4 are fully integrated into the Military Strategic and Tactical Relay AEHF constellation and are performing well, with AEHF-1 operating from 4 degrees East (covering Europe, the Middle East, and Western Asia), AEHF-2 operating from 68 degrees West (covering Eastern United States and the Atlantic Ocean), AEHF-3 operating from 152 degrees East (covering the Pacific Ocean), and AEHF-4 operating from 150 degrees West (covering the Pacific Ocean).

AEHF-4 successfully launched from Cape Canaveral Air Force Station (CCAFS), Florida, on October 17, 2018. AEHF-4 completed on-orbit testing in April 2019 and Satellite Control Authority was transferred to the end user on May 3, 2019.

AEHF-5 shipped to the launch base April 20, 2019, and completed payload encapsulation on June 13, 2019. AEHF-5 successfully launched from CCAFS, Florida, on August 8, 2019. AEHF-5 completed orbit-raising on November 22, 2019. AEHF-5 On-Orbit Testing completed December 23, 2019.

AEHF 5/6 production steadily progressed since contract definitization on October 31, 2013, with a value of $2.2B. The Lockheed Martin satellite buses for the combined 5/6 effort are 98.2% complete and the Northrop Grumman payloads for the combined 5/6 effort are 98.3% complete. AEHF-6 completed the Final Integrated System Test and the Interim Break of Configuration in July 2019. AEHF-6 solar arrays were flight installed and tested in October 2019. AEHF-6 final installations and alignments completed November 26, 2019. AEHF-6 completed factory work and met its final APB milestone on December 4, 2019. AEHF-6 shipped to the launch base on January 11, 2020.

AEHF-6 available for launch is projected in March 2020.

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

## History of Significant Developments Since Program Initiation

| History of Significant Developments Since Program Initiation | |
|---|---|
| **Date** | **Significant Development Description** |
| May 1999 | The DAE signed the Milestone I ADM approving entry into Phase I, System Definition. |
| August 1999 | Two competitive System Definition contracts were awarded to Lockheed/Thompson Ramo Wooldridge (now Northrop Grumman) and Hughes (now Boeing Satellite Systems) teams. Following the System Requirements Review and the Military Strategic and Tactical Relay (Milstar) flight 3 launch failure, the AEHF competition was re-established into a National Team consisting of all three contractors with Lockheed as the prime integration contractor. A "pathfinder" concept was put into effect to mitigate the loss of Milstar 3 capability. This concept included the acceleration of a Milstar II capable AEHF satellite followed by delivery of four additional fully capable AEHF satellites. |
| May 2000 | An ADM was approved by USD(AT&L) that authorized a sole source Firm Fixed Price pathfinder concept award to a team of contractors. |
| May 2002 | Due to fiscal constraints the program was initially broken into two production cycles. The first cycle consisted of AEHF 1-2 and the Mission Control Segment (MCS) development for an FY 2008 IOC. The second cycle included AEHF 3-5 production for a FOC in FY 2012. After FY 2002, Congressional reductions and the initiation of the Transformational Communications Satellite (TSAT) program, the Deputy Secretary of Defense directed a change to the acquisition strategy in December 2002 removing AEHF 4-5 from the baseline. |
| December 2002 | The contract launch dates for AEHF 1-2 were December 2006 and December 2007, and AEHF-3 was projected to be launched in April 2009. The definitized contract breached the APB IOC schedule threshold and overall program cost. An updated APB incorporating the new August 2009 IOC and revised strategy was signed in December 2002. |
| March 2005 | A revised APB to include the launch slip and approval of AEHF-3 procurement was signed. Due to funding constraints, the FY 2004 PB introduced a one-year production gap between AEHF-2 and AEHF-3. In addition to the cost of delaying AEHF-3 production, other subsequent cost drivers, including payload hardware testing, information assurance product delivery delays and replacement of critical electronic parts, drove a one-year launch delay. A Nunn-McCurdy significant unit cost breach was sent to Congress on December 2, 2004. |
| May 2007 | The AEHF 1-2 and MCS developments were well underway. The program successfully completed run-for-record intersegment tests for AEHF/Milstar compatibility. Lockheed Martin successfully demonstrated the ability of the AEHF Satellite Mission Control Subsystem (ASMCS) to command and control the AEHF payload engineering model and the Interim Command and Control (C2) Terminal for Milstar. |
| September 2008 | A Nunn-McCurdy critical unit cost breach notification occurred on September 5, 2008 due to the addition of AEHF-4 to the program and the AEHF 1-2 launch slips' cascading cost and schedule impacts on AEHF-3. The Government had concluded the production gap of four years for AEHF-4 would cause significant cost impacts to obsolescence issues such as Monolithic Microwave Integrated Circuits. The Nunn-McCurdy breach was caused by additional funding required for obsolescence, a seven month schedule delay due to AEHF-1 hardware issues, additional Thermal Vacuum tests, greater than expected AEHF 1-2 integration costs, and an overall IOC schedule slip. The USD(AT&L) signed an ADM on December 29, 2008 certifying the AEHF program to proceed with a fully-funded four-satellite baseline. The ADM established new launch dates of September 2010, 2011, 2012, and 2016. |
| June 2009 | After the cancellation of the TSAT program, the DoD directed the procurement of additional AEHF satellites. The AEHF-4 contract was awarded for $1.4B in December 2010 and the MDA approved the AEHF 1-4 APB in June 2011. In December 2011, the MDA approved the AEHF 5/6 |

| | |
|---|---|
| | Acquisition Strategy as a DoD Efficient Space Procurement and the APB designating AEHF 5/6 as a subprogram was approved by MDA on October 23, 2012. On October 31, 2013 the Fixed Price Incentive Fee contract was definitized for the block buy of AEHF 5/6. |
| May 2010 | The AEHF program office completed the C2 transition of the five-satellite Milstar constellation from a legacy C2 system to the new AEHF C2 system. In December 2011 an Interim Contractor Support contract was awarded to Lockheed Martin to provide sustainment of the space and ground segments until IOC is achieved. |
| August 2010 | AEHF-1 was successfully launched from Cape Canaveral Air Force Station (CCAFS) on August 14, 2010. AEHF-1 experienced an anomaly that resulted in the failure of a Liquid Apogee Engine. Orbit raising was completed using the Reaction Engine Assemblies on October 24, 2011 after a 14-months effort. Satellite Control Authority (SCA) was transferred on March 12, 2012. |
| May 2012 | AEHF-2 was successfully launched from CCAFS on May 4, 2012 and the space vehicle successfully completed on-orbit testing on September 24, 2012. SCA was transferred on November 7, 2012. |
| September 2013 | AEHF-3 was successfully launched from CCAFS on September 18, 2013. |
| October 2013 | AEHF 5/6 contract definitized with a value of $2.2B on October 31, 2013. |
| March 2014 | AEHF-3 completed on-orbit testing on January 6, 2014. SCA was completed on March 21, 2014. |
| May 2014 | U.S. Strategic Command declared early operational use of AEHF 1-3 on May 12, 2014. All three satellites fully integrated into the Milstar constellation. |
| October 2014 | On October 16, 2014, the program received PEO certification for the systems (ground and space vehicle) to enter Air Force Operational Test and Evaluation Center System Dedicated Operational Test which began November 3, 2014 and ran through mid-January 2015. |
| January 2015 | Multi-service Operational Test and Evaluation (MOT&E) completed on January 16, 2015 and AEHF-3 began repositioning from its interim MOT&E location of 155 degrees West on January 21, 2015. |
| March 2015 | AEHF-3 arrived at its new operating location of 152 degrees East (covering the Western Pacific Ocean) on March 18, 2015. |
| July 2015 | Air Force Space Command Commander declared AEHF IOC on July 28, 2015. |
| September 2015 | USD(AT&L) redesignated AEHF as an ACAT IC on September 11, 2015. |
| October 2015 | AEHF-2 arrived at its new operating location of 19 degrees East (covering Western Europe and Africa) on October 21, 2015. |
| January 2016 | MCS Increment 7.6 software was operationally accepted. |
| July 2016 | Awarded the Mission Planning Element (MPE) Increment 8.1 development contract. |
| September 2016 | Delivered and installed the AEHF-5 Configurable On-Board Router. Awarded the AEHF 5/6 contract modification to add acoustic testing. |
| October 2016 | Delivered the new AEHF-5 Lithium-Ion batteries and Battery Isolation Switch Unit. Completed AEHF-5 Payload mate. Completed Critical Design Review for Operational Resiliency on AEHF-6 in November 2016. |
| March 2017 | The Military Satellite Communications program office accepted delivery of the MPE Increment 8.0 development software and delivered it to the 4th Space Operations Squadron. |
| June 2017 | Air Force Space Command (AFSPC)/PEO directed Lockheed Martin to fix the AEHF 4-6 Scaleable Power Regulator Unit (SPRU) following a Space and Missile Systems Center Enterprise issue and investigation with the SPRU. |
| October 2017 | The Assistant Secretary of the Air Force for Acquisition, Technology and Logistics approved the AEHF APB Program Deviation Report. The Lockheed Martin Ground Technology Refresh is operational. |

| | |
|---|---|
| December 2017 | AFSPC operationally accepted MPE Increment 8.0. |
| October 2018 | AEHF-4 successfully launched from CCAFS, Florida, on October 17, 2018. |
| December 2018 | All AEHF 5/6 SPRU issues are closed and AFSPC operationally accepted MPE Increment 8.1. |
| April 2019 | Program office accepted delivery of the MPE Increment 8.2 development software for testing by the Lead Development Test Organization. |
| May 2019 | On May 3, 2019 SCA of AEHF-4 was transferred from SMC to 14 Air Force (AF) for operational activities. 14 AF further delegated SCA to 50 SW/50 OG/4 SOPS. |
| May 2019 | Program office awarded the WEB-T Plus Contract to Lockheed Martin. |
| August 2019 | AEHF-5 successfully launched from CCAFS, Florida, on August 8, 2019. |
| December 2019 | AEHF-6 met its final APB milestone on December 4, 2019. |
| December 2019 | The Air Force operationally accepted MPE Increment 8.2 Software, indicating readiness for installation on warfighter terminal equipment. |
| December 2019 | Program Office released the Request for Proposal to Lockheed Martin for the Combined Orbital Operations, Logistics, and Resiliency contract, which provides sustainment support. |
| December 2019 | Program Office completed the fifth of five planned installments for the AEHF Capabilities Augmentation effort. |

## Threshold Breaches

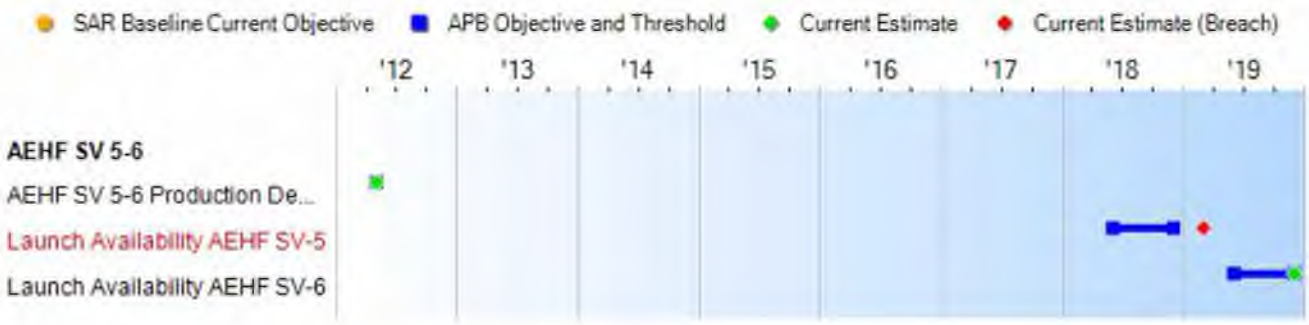
| APB Breaches | | |
|---|---|---|
| **Schedule** | | ☑ |
| **Performance** | | ☐ |
| **Cost** | RDT&E | ☐ |
| | Procurement | ☐ |
| | MILCON | ☐ |
| | Acq O&M | ☐ |
| **O&S Cost** | | ☐ |
| **Unit Cost** | PAUC | ☐ |
| | APUC | ☐ |

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

**Explanation of Breach**

The schedule breach was previously reported in the December 2017 SAR.

## Schedule




| Schedule Events | | | | |
|---|---|---|---|---|
| Events | SAR Baseline Production Estimate | Current APB Production Objective/Threshold | | Current Estimate |
| AEHF SV 5-6 Production Decision | May 2012 | May 2012 | May 2012 | May 2012 |
| Launch Availability AEHF SV-5 | Jun 2018 | Jun 2018 | Dec 2018 | **Mar 2019**[1] |
| Launch Availability AEHF SV-6 | Jun 2019 | Jun 2019 | Dec 2019 | Dec 2019 |

[1] *APB Breach*

### Change Explanations

None

### Notes

The schedule breach was previously reported in the December 2017 SAR.

Per APB, Launch Availability is defined as "all factory work has been completed and satellite can be readied for shipment to the launch base."

### Acronyms and Abbreviations

SV - Space Vehicle

## Performance

| Performance Characteristics | | | | |
|---|---|---|---|---|
| **SAR Baseline Production Estimate** | **Current APB Production Objective/Threshold** | | **Demonstrated Performance** | **Current Estimate** |
| **Capacity** | | | | |
| 1.2 Gbps CMTW, 600 Mbps Strategic | 1.2 Gbps CMTW, 600 Mbps Strategic | Support at least 500 Mbps for CMTW Scenario and at least 350 Mbps for Strategic Scenario | 1.0 Gbps CMTW Scenario, 600 Mbps Strategic Scenario - verified required capability as part of system requirement sell-off prior to AEHF-1 launch. | 1.2 Gbps CMTW, 600 Mbps Strategic |
| **Nuclear Protection** | | | | |
| Provide assured communications to survivable nuclear forces exposed to the environment specified in NCGS-89-06, and for those critical networks that support the following critical functions: situation monitoring, decision making, force direction, force management, and planning | Provide assured communications to survivable nuclear forces exposed to the environment specified in NCGS-89-06, and for those critical networks that support the following critical functions: situation monitoring, decision making, force direction, force management, and planning | Provide assured communications to survivable nuclear forces exposed to the environment specified in NCGS-89-06, and for those critical networks that support the following critical functions: situation monitoring, decision making, force direction, force management, and planning | Verified required capability as part of system requirement sell-off prior to AEHF-2 launch. | Provide assured communications to survivable nuclear forces exposed to the environment specified in NCGS-89-06, and for those critical networks that support the following critical functions: situation monitoring, decision making, force direction, force management, and planning. |
| **Access and Control** | | | | |
| Provide users ability to plan, control, & reconfigure their apportioned resources; critical functions such as situation monitoring, decision making, force direction, force management, & planning shall not be disrupted by communications configuration changes to noncritical functions | Provide users ability to plan, control, & reconfigure their apportioned resources; critical functions such as situation monitoring, decision making, force direction, force management, & planning shall not be disrupted by communications configuration changes to noncritical functions | Provide users ability to plan, control, & reconfigure their apportioned resources; critical functions such as situation monitoring, decision making, force direction, force management, & planning shall not be disrupted by communications configuration changes to noncritical functions | Verified required capability as part of system requirement sell-off prior to AEHF-2 launch. Demonstrated LDR operationally ready capability in AEHF-1 on-orbit test. | Provide users ability to plan, control, & reconfigure their apportioned resources; critical functions such as situation monitoring, decision making, force direction, force management, & planning shall not be disrupted by communications configuration changes to noncritical functions. |

| AEHF Interoperability | | | | |
|---|---|---|---|---|
| Support joint interoperable war-fighter communications among all military branches EHF terminals | Support joint interoperable war-fighter communications among all military branches EHF terminals | Support joint interoperable war-fighter communications among all military branches EHF terminals | Verified required capability as part of system requirement sell-off prior to AEHF-2 launch. Demonstrated operationally ready capability in AEHF-1 on-orbit test. | Support joint interoperable war-fighter communications among all military branches EHF terminals |
| **Milstar Backward Compatible** | | | | |
| Operate with the Milstar system, at all LDR and MDR terminal supported data rates, throughout the Milstar transition to the AEHF system | Operate with the Milstar system, at all LDR and MDR terminal supported data rates, throughout the Milstar transition to the AEHF system | Operate with the Milstar system, at all LDR and MDR terminal supported data rates, throughout the Milstar transition to the AEHF system | Verified required capability as part of system requirement sell-off prior to AEHF-1 launch. Demonstrated operationally ready capability in AEHF-1 on-orbit test. | Operate with the Milstar system, at all LDR and MDR terminal supported data rates, throughout the Milstar transition to the AEHF system |

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

## Requirements Reference

Operational Requirements Document (ORD), dated October 1, 2000

## Change Explanations

None

## Acronyms and Abbreviations

CMTW - Combined Major Theater Warfare
EHF - Extremely High Frequency
Gbps - Gigabits per second
LDR - Low Data Rate
Mbps - Megabits per second
MDR - Medium Data Rate
Milstar - Military Strategic and Tactical Relay
NCGS - Nuclear Criteria Group Secretariat

# Track to Budget

## General Notes

In December 2014, the Office of Management and Budget directed the DoD to establish a new space procurement appropriation. Beginning in FY 2016, Air Force major procurement funding formerly under 3020F (Missile Procurement, Air Force) Budget Activity (BA) 05 will now be under 3021F (Space Procurement, Air Force) BA 01, a three-year procurement account.

In December 2019, the Office of Management and Budget directed the DoD to establish new Space Force RDT&E and procurement appropriations. Beginning in FY 2021, space-related RDT&E funding, formerly under 3600F (RDT&E, Air Force) is contained in 3620SF (RDT&E, Space Force) and space procurement funding formerly under 3021F (Space Procurement, Air Force) is contained in 3022SF (Procurement, Space Force).

## RDT&E

| Appn | BA | PE |
|---|---|---|
| Air Force | 3600 04 | 0603430F |

| Project | Name | |
|---|---|---|
| 644050 | AEHF MILSATCOM (Space) | (Sunk) |
| **Notes:** | FY 2011 only | |
| 64A030 | Evolved AEHF MILSATCOM (EAM) | (Sunk) |
| **Notes:** | FY 2013 only | |

| Appn | BA | PE |
|---|---|---|
| Air Force | 3600 05 | 0605431F |

| Project | Name | |
|---|---|---|
| 657104 | Evolved AEHF MILSATCOM (EAM) | (Sunk) |
| **Notes:** | FY 2014 - 2015 only | |

## Notes

Projects 64A030 and 657104 also fund the Military Satellite Communications (MILSATCOM) Space Modernization Initiative. AEHF RDT&E funding is for the AEHF SV 6 KI-54D cryptographic device. Project 644050 is FY 2011 only. Project 64A030 is FY 2013 only. Project 657104 is for FY 2014 - 2015 only.

## Procurement

| Appn | BA | PE |
|---|---|---|
| Air Force | 3020 05 | 0303604F |

| Line Item | Name | |
|---|---|---|
| ADV555 | Advanced EHF | (Sunk) |

| Appn | BA | PE |
|---|---|---|
| Air Force | 3021 01 | 0303604F |

| Line Item | Name | |
|---|---|---|
| ADV555 | Advanced EHF | (Sunk) |
| **Notes:** | Ends in FY 2017 | |

Air Force 3021 01 1203604F

| Line Item | Name |
|---|---|
| ADV555 | Advanced EHF |

(Sunk)

**Notes:** FY 2018 - FY 2020

Air Force 3022 01 1203604SF

| Line Item | Name |
|---|---|
| ADV555 | Advanced EHF |

**Notes:** FY 2021

**Notes**

Due to the creation of a new appropriation for Space Procurement (3021), satellite vehicle quantities are accounted for under 3020 annual funding section.

## Cost and Funding

## Cost Summary

| Total Acquisition Cost | | | | | | | |
|---|---|---|---|---|---|---|---|
| Appropriation | BY 2002 $M | | | BY 2002 $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 | 59.1 | 59.1 | 65.0 | 50.3 | 73.8 | 73.8 | 63.2 |
| Procurement | 2656.0 | 2656.0 | 2921.6 | 1989.8 | 3414.4 | 3414.4 | 2579.3 |
| Flyaway | -- | -- | -- | 1989.8 | -- | -- | 2579.3 |
| Recurring | -- | -- | -- | 1989.8 | -- | -- | 2579.3 |
| Non Recurring | -- | -- | -- | 0.0 | -- | -- | 0.0 |
| Support | -- | -- | -- | 0.0 | -- | -- | 0.0 |
| Other Support | -- | -- | -- | 0.0 | -- | -- | 0.0 |
| 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 | 2715.1 | 2715.1 | N/A | 2040.1 | 3488.2 | 3488.2 | 2642.5 |

**Cost Notes**

No cost estimate for the program has been completed in the previous year.

Each month a Government Estimate at Complete (EAC) is produced based on actual data collected through Earned Value Management reporting. The Government EAC considers threats and opportunities associated with the contract and the likelihood of occurrence. As of October 2019 month end data, the most likely technical risk is $0.02M while the worst case is $0.06M. The largest cost associated with our program risk is a delay in launch from the current government forecast; however, this is low probability.

| 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 |

## Cost and Funding

## Funding Summary

| Appropriation Summary | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| FY 2021 President's Budget / December 2019 SAR (TY$ M) | | | | | | | | | |
| Appropriation | Prior | FY 2020 | FY 2021 | FY 2022 | FY 2023 | FY 2024 | FY 2025 | To Complete | Total |
| RDT&E | 63.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 63.2 |
| Procurement | 2542.6 | 21.9 | 14.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2579.3 |
| 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 2021 Total | 2605.8 | 21.9 | 14.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2642.5 |
| PB 2020 Total | 2616.9 | 31.9 | 17.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2666.0 |
| Delta | -11.1 | -10.0 | -2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -23.5 |

| Quantity Summary | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| FY 2021 President's Budget / December 2019 SAR (TY$ M) | | | | | | | | | | |
| Quantity | Undistributed | Prior | FY 2020 | FY 2021 | FY 2022 | FY 2023 | FY 2024 | FY 2025 | 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 2021 Total | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| PB 2020 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<br>3600 \| RDT&E \| Research, Development, Test, and Evaluation, 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 | -- | -- | -- | -- | -- | -- | 13.8 |
| 2012 | -- | -- | -- | -- | -- | -- | -- |
| 2013 | -- | -- | -- | -- | -- | -- | 15.0 |
| 2014 | -- | -- | -- | -- | -- | -- | 14.4 |
| 2015 | -- | -- | -- | -- | -- | -- | 20.0 |
| Subtotal | -- | -- | -- | -- | -- | -- | 63.2 |

| Annual Funding<br>3600 \| RDT&E \| Research, Development, Test, and Evaluation, Air Force | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fiscal Year | Quantity | BY 2002 $M | | | | | |
| | | End Item Recurring Flyaway | Non End Item Recurring Flyaway | Non Recurring Flyaway | Total Flyaway | Total Support | Total Program |
| 2011 | -- | -- | -- | -- | -- | -- | 11.4 |
| 2012 | -- | -- | -- | -- | -- | -- | -- |
| 2013 | -- | -- | -- | -- | -- | -- | 12.0 |
| 2014 | -- | -- | -- | -- | -- | -- | 11.3 |
| 2015 | -- | -- | -- | -- | -- | -- | 15.6 |
| Subtotal | -- | -- | -- | -- | -- | -- | 50.3 |

| Annual Funding<br>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 | -- | 227.2 | -- | -- | 227.2 | -- | 227.2 |
| 2012 | 2 | 524.1 | -- | -- | 524.1 | -- | 524.1 |
| 2013 | -- | 408.0 | -- | -- | 408.0 | -- | 408.0 |
| 2014 | -- | 268.4 | -- | -- | 268.4 | -- | 268.4 |
| 2015 | -- | 233.2 | -- | -- | 233.2 | -- | 233.2 |
| Subtotal | 2 | 1660.9 | -- | -- | 1660.9 | -- | 1660.9 |

| Annual Funding<br>3020 \| Procurement \| Missile Procurement, Air Force | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | BY 2002 $M | | | | | |
| Fiscal Year | Quantity | End Item Recurring Flyaway | Non End Item Recurring Flyaway | Non Recurring Flyaway | Total Flyaway | Total Support | Total Program |
| 2011 | -- | 185.6 | -- | -- | 185.6 | -- | 185.6 |
| 2012 | 2 | 421.2 | -- | -- | 421.2 | -- | 421.2 |
| 2013 | -- | 320.5 | -- | -- | 320.5 | -- | 320.5 |
| 2014 | -- | 207.8 | -- | -- | 207.8 | -- | 207.8 |
| 2015 | -- | 178.4 | -- | -- | 178.4 | -- | 178.4 |
| Subtotal | 2 | 1313.5 | -- | -- | 1313.5 | -- | 1313.5 |

| Cost Quantity Information<br>3020 \| Procurement \| Missile Procurement, Air Force | | |
|---|---|---|
| **Fiscal Year** | **Quantity** | **End Item Recurring Flyaway (Aligned With Quantity) BY 2002 $M** |
| 2011 | -- | -- |
| 2012 | 2 | 1313.5 |
| 2013 | -- | -- |
| 2014 | -- | -- |
| 2015 | -- | -- |
| Subtotal | 2 | 1313.5 |

| Annual Funding<br>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 |
| 2012 | -- | -- | -- | -- | -- | -- | -- |
| 2013 | -- | -- | -- | -- | -- | -- | -- |
| 2014 | -- | -- | -- | -- | -- | -- | -- |
| 2015 | -- | -- | -- | -- | -- | -- | -- |
| 2016 | -- | 230.7 | -- | -- | 230.7 | -- | 230.7 |
| 2017 | -- | 569.0 | -- | -- | 569.0 | -- | 569.0 |
| 2018 | -- | 53.7 | -- | -- | 53.7 | -- | 53.7 |
| 2019 | -- | 28.3 | -- | -- | 28.3 | -- | 28.3 |
| 2020 | -- | 21.9 | -- | -- | 21.9 | -- | 21.9 |
| Subtotal | -- | 903.6 | -- | -- | 903.6 | -- | 903.6 |

| Annual Funding<br>3021 \| Procurement \| Space Procurement, Air Force | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fiscal Year | Quantity | BY 2002 $M | | | | | |
| | | End Item Recurring Flyaway | Non End Item Recurring Flyaway | Non Recurring Flyaway | Total Flyaway | Total Support | Total Program |
| 2012 | -- | -- | -- | -- | -- | -- | -- |
| 2013 | -- | -- | -- | -- | -- | -- | -- |
| 2014 | -- | -- | -- | -- | -- | -- | -- |
| 2015 | -- | -- | -- | -- | -- | -- | -- |
| 2016 | -- | 173.5 | -- | -- | 173.5 | -- | 173.5 |
| 2017 | -- | 419.1 | -- | -- | 419.1 | -- | 419.1 |
| 2018 | -- | 38.6 | -- | -- | 38.6 | -- | 38.6 |
| 2019 | -- | 20.0 | -- | -- | 20.0 | -- | 20.0 |
| 2020 | -- | 15.1 | -- | -- | 15.1 | -- | 15.1 |
| Subtotal | -- | 666.3 | -- | -- | 666.3 | -- | 666.3 |

APPN 3021 and 3022 are a continuation of our APPN 3020 funding that ended in 2015. There is no quantity to align with this funding due to the subprograms between AEHF 1-4 and AEHF 5/6. The quantity is captured under APPN 3020 and in FY 2012. All funding is aligned to support quantities in FY 2012 for amounts in APPN 3020, 3021, and APPN 3022.

| Cost Quantity Information<br>3021 \| Procurement \| Space Procurement, Air Force | | |
|---|---|---|
| **Fiscal Year** | **Quantity** | **End Item Recurring Flyaway (Aligned With Quantity) BY 2002 $M** |
| 2012 | -- | 676.3 |
| 2013 | -- | -- |
| 2014 | -- | -- |
| 2015 | -- | -- |
| 2016 | -- | -- |
| 2017 | -- | -- |
| 2018 | -- | -- |
| 2019 | -- | -- |
| 2020 | -- | -- |
| Subtotal | -- | 676.3 |

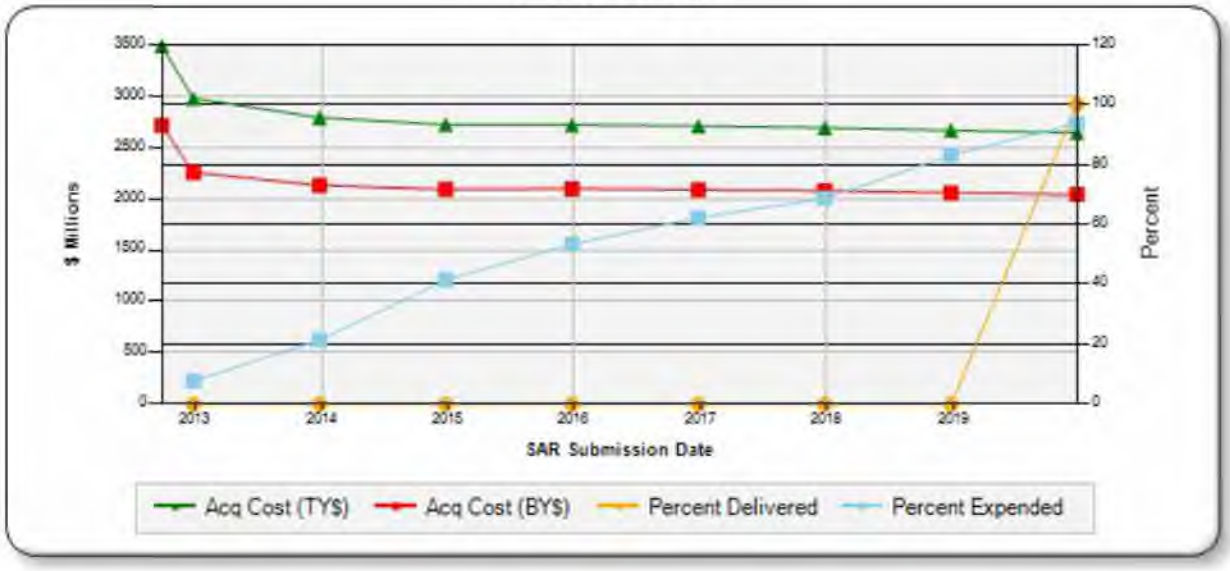
| Annual Funding<br>3022 \| Procurement \| Procurement, Space Force, Air Force | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fiscal Year | Quantity | TY $M | | | | | |
| | | End Item Recurring Flyaway | Non End Item Recurring Flyaway | Non Recurring Flyaway | Total Flyaway | Total Support | Total Program |
| 2021 | -- | 14.8 | -- | -- | 14.8 | -- | 14.8 |
| Subtotal | -- | 14.8 | -- | -- | 14.8 | -- | 14.8 |

| Annual Funding<br>3022 \| Procurement \| Procurement, Space Force, Air Force | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fiscal Year | Quantity | BY 2002 $M | | | | | |
| | | End Item Recurring Flyaway | Non End Item Recurring Flyaway | Non Recurring Flyaway | Total Flyaway | Total Support | Total Program |
| 2021 | -- | 10.0 | -- | -- | 10.0 | -- | 10.0 |
| Subtotal | -- | 10.0 | -- | -- | 10.0 | -- | 10.0 |

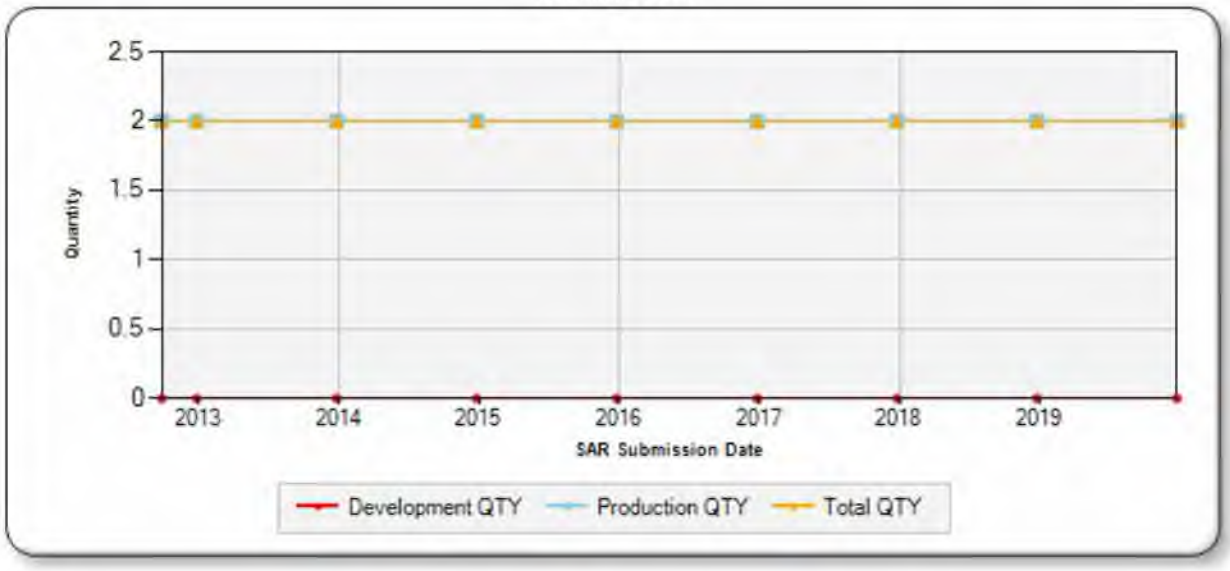
## Charts

**AEHF first began SAR reporting in September 1999**

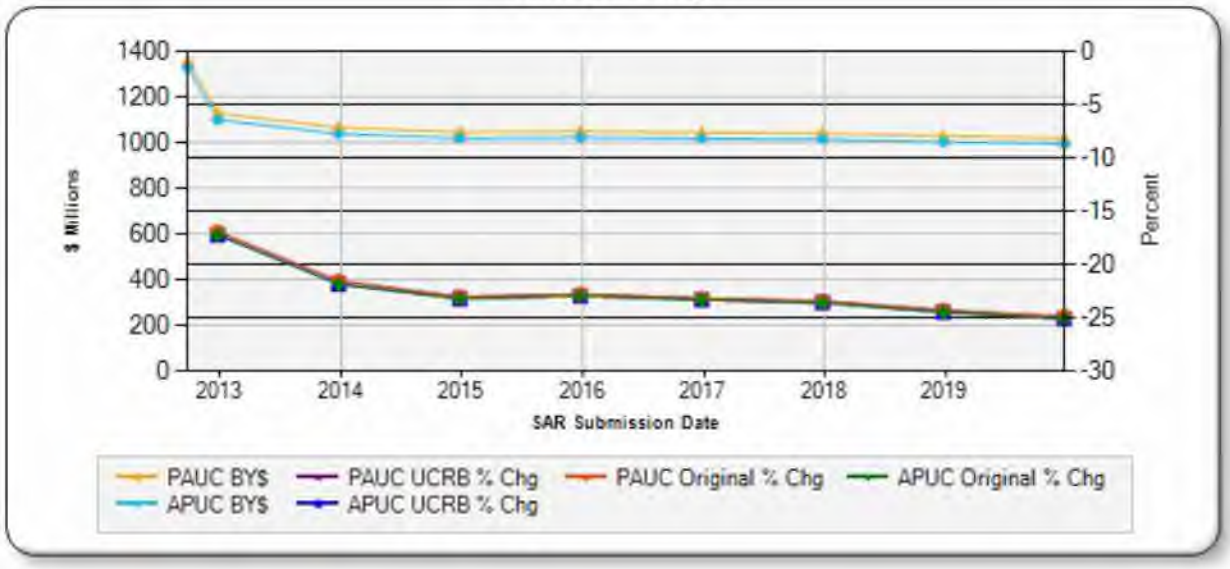
**Program Acquisition Cost - AEHF**
**Base Year 2002 $M**




**Quantity - AEHF**



**Unit Cost - AEHF**
**Base Year 2002 $M**



## Risks

## Significant Schedule and Technical Risks

| Significant Schedule and Technical Risks | |
|---|---|
| **AEHF 5-6 Block Buy Decision (December 2011)** | |
| 1. | An operational Military Strategic and Tactical Relay ID is needed for AEHF 6 integrated system test |
| **Current Estimate (December 2019)** | |
| 1. | No risks at this time. |

## Risks

## Risk and Sensitivity Analysis

| Risks and Sensitivity Analysis | |
|---|---|
| **Current Baseline Estimate (March 2014)** | |
| 1. | The resolution of multiple major technical issues, which have required re-work and testing, have significantly eroded the cost margin on this contract. Noteworthy as AEHF 5/6 are both still in production. |
| **Original Baseline Estimate (March 2014)** | |
| 1. | N/A |
| **Revised Original Estimate (N/A)** | |
| 1. | None. |
| **Current Procurement Cost (December 2019)** | |
| 1. | No risks at this time. |

## Low Rate Initial Production

There is no LRIP for this program.

## Foreign Military Sales

None

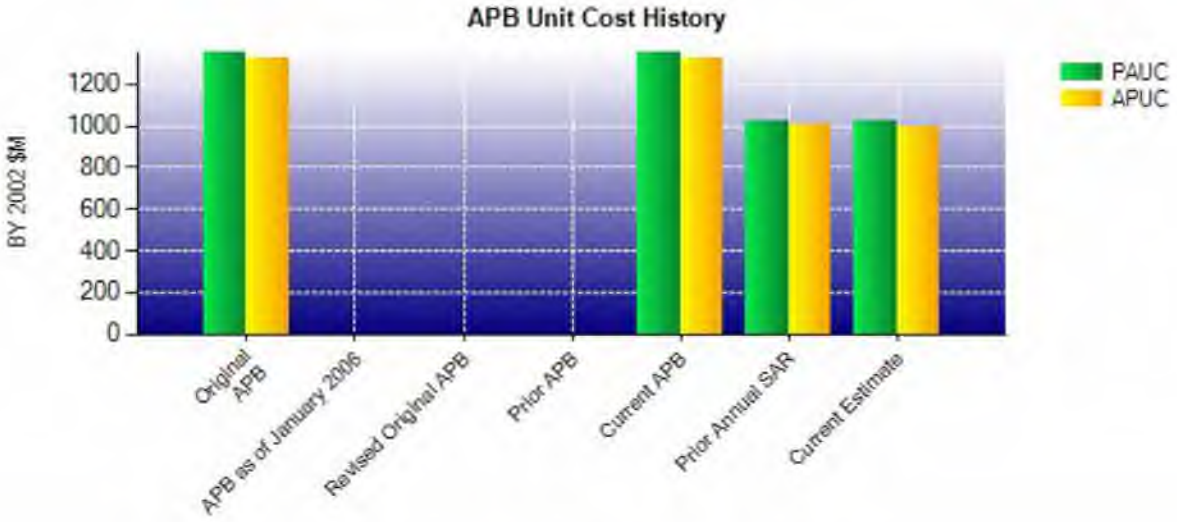
## Nuclear Costs

None

## Unit Cost

| Current UCR Baseline and Current Estimate (Base-Year Dollars) | | | |
|---|---|---|---|
| Item | BY 2002 $M<br>Current UCR Baseline (Oct 2012 APB) | BY 2002 $M<br>Current Estimate (Dec 2019 SAR) | % Change |
| Program Acquisition Unit Cost | | | |
| Cost | 2715.1 | 2040.1 | |
| Quantity | 2 | 2 | |
| Unit Cost | 1357.550 | 1020.050 | -24.86 |
| Average Procurement Unit Cost | | | |
| Cost | 2656.0 | 1989.8 | |
| Quantity | 2 | 2 | |
| Unit Cost | 1328.000 | 994.900 | -25.08 |

| Original UCR Baseline and Current Estimate (Base-Year Dollars) | | | |
|---|---|---|---|
| Item | BY 2002 $M<br>Revised Original UCR Baseline (Oct 2012 APB) | BY 2002 $M<br>Current Estimate (Dec 2019 SAR) | % Change |
| Program Acquisition Unit Cost | | | |
| Cost | 2715.1 | 2040.1 | |
| Quantity | 2 | 2 | |
| Unit Cost | 1357.550 | 1020.050 | -24.86 |
| Average Procurement Unit Cost | | | |
| Cost | 2656.0 | 1989.8 | |
| Quantity | 2 | 2 | |
| Unit Cost | 1328.000 | 994.900 | -25.08 |




| APB Unit Cost History | | | | | |
|---|---|---|---|---|---|
| Item | Date | BY 2002 $M | | TY $M | |
| | | PAUC | APUC | PAUC | APUC |
| Original APB | Mar 2014 | 1357.550 | 1328.000 | 1744.100 | 1707.200 |
| 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 | N/A | N/A | N/A | N/A | N/A |
| Current APB | Mar 2014 | 1357.550 | 1328.000 | 1744.100 | 1707.200 |
| Prior Annual SAR | Dec 2018 | 1028.200 | 1003.050 | 1333.000 | 1301.400 |
| Current Estimate | Dec 2019 | 1020.050 | 994.900 | 1321.250 | 1289.650 |

## 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 | |
| 1744.100 | 28.950 | 0.000 | 0.000 | 0.000 | -451.800 | 0.000 | 0.000 | -422.850 | 1321.250 |

| Current SAR Baseline to Current Estimate (TY $M) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Initial APUC Production Estimate | Changes | | | | | | | | APUC Current Estimate |
| | Econ | Qty | Sch | Eng | Est | Oth | Spt | Total | |
| 1707.200 | 28.600 | 0.000 | 0.000 | 0.000 | -446.150 | 0.000 | 0.000 | -417.550 | 1289.650 |

| 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 | 3488.2 | 2642.5 |
| Total Quantity | N/A | N/A | 2 | 2 |
| PAUC | N/A | N/A | 1744.100 | 1321.250 |

## Cost Variance

| Summary TY $M | | | | |
|---|---|---|---|---|
| Item | RDT&E | Procurement | MILCON | Total |
| SAR Baseline (Production Estimate) | 73.8 | 3414.4 | -- | 3488.2 |
| Previous Changes | | | | |
| Economic | +0.7 | +57.9 | -- | +58.6 |
| Quantity | -- | -- | -- | -- |
| Schedule | -- | -- | -- | -- |
| Engineering | -- | -- | -- | -- |
| Estimating | -11.3 | -869.5 | -- | -880.8 |
| Other | -- | -- | -- | -- |
| Support | -- | -- | -- | -- |
| Subtotal | -10.6 | -811.6 | -- | -822.2 |
| Current Changes | | | | |
| Economic | -- | -0.7 | -- | -0.7 |
| Quantity | -- | -- | -- | -- |
| Schedule | -- | -- | -- | -- |
| Engineering | -- | -- | -- | -- |
| Estimating | -- | -22.8 | -- | -22.8 |
| Other | -- | -- | -- | -- |
| Support | -- | -- | -- | -- |
| Subtotal | -- | -23.5 | -- | -23.5 |
| Total Changes | -10.6 | -835.1 | -- | -845.7 |
| Current Estimate | 63.2 | 2579.3 | -- | 2642.5 |

| Summary BY 2002 $M | | | | |
|---|---|---|---|---|
| Item | RDT&E | Procurement | MILCON | Total |
| SAR Baseline (Production Estimate) | 59.1 | 2656.0 | -- | 2715.1 |
| Previous Changes | | | | |
| Economic | -- | -- | -- | -- |
| Quantity | -- | -- | -- | -- |
| Schedule | -- | -- | -- | -- |
| Engineering | -- | -- | -- | -- |
| Estimating | -8.8 | -649.9 | -- | -658.7 |
| Other | -- | -- | -- | -- |
| Support | -- | -- | -- | -- |
| Subtotal | -8.8 | -649.9 | -- | -658.7 |
| Current Changes | | | | |
| Economic | -- | -- | -- | -- |
| Quantity | -- | -- | -- | -- |
| Schedule | -- | -- | -- | -- |
| Engineering | -- | -- | -- | -- |
| Estimating | -- | -16.3 | -- | -16.3 |
| Other | -- | -- | -- | -- |
| Support | -- | -- | -- | -- |
| Subtotal | -- | -16.3 | -- | -16.3 |
| Total Changes | -8.8 | -666.2 | -- | -675.0 |
| Current Estimate | 50.3 | 1989.8 | -- | 2040.1 |

Previous Estimate: December 2018

| Procurement | $M | |
|---|---|---|
| Current Change Explanations | Base Year | Then Year |
| Revised escalation indices. (Economic) | N/A | -0.7 |
| Revised estimate due to Below Threshold Reprogramming in FY 2017. (Estimating) | -20.3 | -27.5 |
| Revised estimate due to realignment of funds from SV 1-4 subprogram to SV 5-6 subprogram in FY 2017 and 2018. (Estimating) | +13.1 | +17.9 |
| Revised estimate due to Congressional reduction in FY 2020. (Estimating) | -7.0 | -10.0 |
| Revised estimate in FY 2021 due to AF-wide funding adjustments. (Estimating) | -1.6 | -2.4 |
| Adjustment for current and prior escalation. (Estimating) | +0.6 | +0.7 |
| Funds transferred within program from Space Procurement, Air Force Procurement appropriation to newly added Space Force, Air Force Procurement Appropriation. (Estimating) | -10.1 | -14.8 |
| Funds transferred within program from Space Procurement, Air Force Procurement appropriation to newly added Space Force, Air Force Procurement Appropriation. (Estimating) | +10.0 | +14.8 |
| Removal of funding in FY 2019 due to Below Threshold Reprogramming for higher priority Air Force programs. (Estimating) | -1.0 | -1.5 |
| Procurement Subtotal | -16.3 | -23.5 |

# Contracts

## Contract Identification

**Appropriation:** Procurement
**Contract Name:** AEHF 5-6 Production and Launch
**Contractor:** Lockheed Martin
**Contractor Location:** 1111 Lockheed Martin Way
Sunnyvale, CA 94089
**Contract Number:** FA8808-12-C-0010/1
**Contract Type:** Fixed Price Incentive(Firm Target) (FPIF)
**Award Date:** May 12, 2012
**Definitization Date:** October 31, 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 |
| 1914.4 | 2001.6 | 2 | 2059.9 | 2139.2 | 2 | 1953.1 | 1838.1 |

## Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the addition of the AEHF 5/6 acoustic test study (CLIN 4000) for $2.2M, the AEHF-5 Lithium-Ion (LiIon) battery test study (CLIN 0410) for $0.5M, the addition of the AEHF-6 Li-Ion battery test study (CLIN 0410) for $0.4M, the addition of AEHF 5/6 acoustic testing for $95.1M, the addition of the OR2/Atlas 551 contract for $21.9M, the Request for Equitable Adjustment (REA) for Liquid Apogee Engine 4 corners testing of $12.1M, Payload Adapter Harnesses Procurement for $0.5M, negotiated Atlas V 551 Configuration for $1.2M, the addition of the Space Vehicle (SV)5 Inclination Angles and Payload Operations study $0.2M, the addition of the System Test Trade Study for SV5/6 $1.0M, the addition of the H101 Study to Evaluate SV6 Inclination Angles and Payload Operations $0.2M, an increase of $3.3M due to SV5 launch delay and added scope for Operational Support for SV5/6 between On-Orbit Testing and Satellite Control Authority, an increase of $0.3M due to receiving REA for the implementation of Atlas V-551 Configuration, and an increase of $6.6M due to below reportable threshold contract mods and fact of life changes throughout the program.

| Contract Variance | | |
|---|---|---|
| Item | Cost Variance | Schedule Variance |
| Cumulative Variances To Date (12/22/2019) | +153.7 | -2.7 |
| Previous Cumulative Variances | +110.9 | -12.5 |
| Net Change | +42.8 | +9.8 |

## Cost and Schedule Variance Explanations

The favorable net change in the cost variance is due to resource sharing and experienced teams sharing efficiencies to other AEHF SVs.

The favorable net change in the schedule variance is due to resource sharing and experienced teams sharing efficiencies to other AEHF SVs.

## Deliveries and Expenditures

| Deliveries | | | | |
|---|---|---|---|---|
| Delivered to Date | Planned to Date | Actual to Date | Total Quantity | Percent Delivered |
| Development | 0 | 0 | 0 | -- |
| Production | 2 | 2 | 2 | 100.00% |
| Total Program Quantity Delivered | 2 | 2 | 2 | 100.00% |

| Expended and Appropriated (TY $M) | | | |
|---|---|---|---|
| Total Acquisition Cost | 2642.5 | Years Appropriated | 10 |
| Expended to Date | 2476.8 | Percent Years Appropriated | 90.91% |
| Percent Expended | 93.73% | Appropriated to Date | 2627.7 |
| Total Funding Years | 11 | Percent Appropriated | 99.44% |

The above data is current as of February 10, 2020.

# Operating and Support Cost

## Cost Estimate Details

| | |
|---|---|
| **Date of Estimate:** | January 24, 2019 |
| **Source of Estimate:** | POE |
| **Quantity to Sustain:** | 1 |
| **Unit of Measure:** | System |
| **Service Life per Unit:** | 14.00 Years |
| **Fiscal Years in Service:** | FY 2015 - FY 2030 |

Current estimate updated to reflect changes based on actual costs and content of the Combined Orbital Operations Logistics Sustainment (COOLS) contracts. The AEHF system being sustained consists of a six satellite (four operational satellites (AEHF 1-4) and two on-orbit spares (AEHF 5/6)) constellation and associated ground segment.

## Sustainment Strategy

The O&S costs supports a six satellite (four operational satellites (AEHF 1-4) and two on-orbit spares (AEHF 5/6)) constellation and associated ground segment from FY 2015 through FY 2030. There is a study under way to expand the constellation and include SVs 5 and 6 in the active constellation. The estimates assume that the 4th Space Operations Squadron at Schriever Space Force Base (AFB) will operate AEHF and Milstar in parallel. Due to its proprietary nature of the AEHF Space Satellite (on-orbit) Segment is not core and the Depot Source of Repair is Contractor Logistics Support for the life of the satellites. Sustainment of the AEHF Space Satellite (on-orbit) Segment transferred to the COOLS contract post-IOC. All other AEHF workloads are core. Tobyhanna Army Depot is the selected depot for hardware with formal stand up of depot support scheduled for June 2019. Ogden Air Logistics Center, Hill AFB UT is the selected depot for software. A Public Private Partnership is in place under COOLS and will continue to ramp up ground software capability over the life of the contract.

## Antecedent Information

The antecedent system for AEHF is Milstar which consists of a five satellite constellation and associated ground segment. The cost estimate is based on validated requirements in the Air Force Space Command Logistics Support Requirements Brochures built for the FY 2004 President's Budget. The Milstar O&S costs cover all operational activities for both the space and ground segment for FY 2009 - FY 2018. The antecedent Milstar program office estimate is from April 2003.

| Annual O&S Costs BY2002 $M | | |
|---|---|---|
| **Cost Element** | **AEHF SV 5-6 Average Annual Cost Per System** | **Milstar (Antecedent) Average Annual Cost Per System** |
| Unit-Level Manpower | 17.901 | 16.900 |
| Unit Operations | 2.040 | 13.200 |
| Maintenance | 3.354 | 3.900 |
| Sustaining Support | 40.464 | 39.000 |
| Continuing System Improvements | 66.458 | 0.000 |
| Indirect Support | 5.785 | 7.200 |
| Other | 0.000 | 0.000 |
| Total | 136.002 | 80.200 |

AEHF Average Annual Cost Per System numbers above reflect costs for planning usage and monitoring health of the AEHF constellation.

| Item | Total O&S Cost $M | | | |
|---|---|---|---|---|
| | AEHF SV 5-6 | | | Milstar (Antecedent) |
| | Current Production APB Objective/Threshold | | Current Estimate | |
| **Base Year** | 881.3 | 969.4 | 947.0 | 801.5 |
| **Then Year** | 1453.8 | N/A | 1400.3 | N/A |

**Equation to Translate Annual Cost to Total Cost**

(AEHF SV1-4 Total O&S Cost + AEHF 5-6 Total O&S Cost)/16 years = Average Annual O&S cost
($1,228.8M+ $946.9M)/16 = $136.0M

The O&S estimate covers the 14 year design life of the AEHF system (4 active satellite constellation, two spares, and associated ground segment) starting in FY 2017 and going through FY 2030. The 16 year divisor in the equation is based on the O&S start date in FY 2015 carrying through FY 2030. Sustainment of the system executed under the RDT&E Interim Contractor Support contract when the first AEHF satellite launched in FY 2010 and transitioned to O&S funding once IOC was declared on July 28, 2015.

| O&S Cost Variance | | |
|---|---|---|
| **Category** | **BY 2002 $M** | **Change Explanations** |
| Prior SAR Total O&S Estimates - Dec 2018 SAR | 947.0 | |
| Programmatic/Planning Factors | 0.0 | |
| Cost Estimating Methodology | 0.0 | |
| Cost Data Update | 0.0 | |
| Labor Rate | 0.0 | |
| Energy Rate | 0.0 | |

| | |
|---|---|
| Technical Input | 0.0 |
| Other | 0.0 |
| Total Changes | 0.0 |
| Current Estimate | 947.0 |

## Disposal Estimate Details

**Date of Estimate:** January 24, 2019
**Source of Estimate:** POE
**Disposal/Demilitarization Total Cost (BY 2002 $M):** 0.9

Total costs for disposal of all System are $0.9M.