ARCHIVED REPORT

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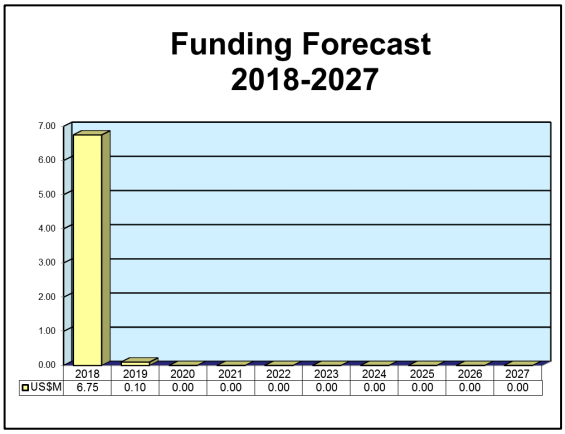
JLENS

Outlook

- JLENS program to completely shut down by end of 2018
- U.S. DoD lost faith in program after blimp incident
- Property owners will have to go to court to seek damages from runaway blimp



Orientation

Description. The U.S. Army's Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) system would consist of an unmanned elevated balloon (aerostat) that would carry radar and other surveillance systems to detect and track low-flying cruise missiles.

Sponsor

U.S. North American Aerospace Defense Command (NORAD)
250 Vandenberg, Ste B-016
Peterson AFB, CO 80914-3808

Status. JLENS will be shut down by the end of 2018.

Application. The JLENS consists of a fire control radar and a surveillance radar. The surveillance radar tracks missiles, while the fire control radar provides data to interceptors.

Contractors

Prime

Raytheon Integrated Defense Systems	http://www.raytheon.com, 50 Apple Hill Dr, Tewksbury, MA 01876 United States, Tel: + 1 (978) 858-5000, Fax: + 1 (978) 858-9414, Email: ids@raytheon.com, Prime (System Development & Demonstration)

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

JLENS

Technical Data

The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor system would include a tethered aerostat with sensors that would provide long-range, long-endurance surveillance for defense against cruise missiles. The JLENS would comprise multiple systems (a system of systems), including a fire control radar, a surveillance radar, an aerostat platform, a mobile mooring station, and a processing station. The fire control radar was apparently based on the TPY-2.

The system was being developed in three spirals. The JLENS Spiral 1 system consists of two 38-meter tethered aerostat platforms, each with a single sensor, communications payload, and portable processing station. The JLENS Spiral 2 equips a single larger aerostat with both a long-range surveillance radar and a fire control radar.

The JLENS Spiral 3 system measures up to 70 meters (230 ft) and carries its payload at altitudes up to 15,000 feet. Like the Spiral 2, a single Spiral 3 aerostat carries both precision track and surveillance radars. The U.S. Army reports that the Spiral 3 is untethered. The Spiral 3 would provide the Army and joint forces with the ability to employ interceptor weapons against sophisticated cruise missile and aircraft threats at long ranges.

The JLENS consists of an aerostat equipped with advanced radar systems.

Source: U.S. Department of Defense

Program Review

Development of the JLENS began in 1996 when the U.S. Department of Defense and the Joint Chiefs of Staff directed the Army to establish an Aerostat Joint Program Office in Huntsville, Alabama. The program was inspired by the increasing availability and sophistication of cruise missiles. Additional funding was added to the program in 2001 to accelerate development of a fire control radar and surveillance radar.

To refine the JLENS concept, the U.S. Army's JLENS project office created the Rapid Aerostat Initial Deployment system. The RAID system comprises an aerostat that carries a sensor/communications suite for area surveillance and force protection against small arms, mortar, and rocket attacks. In April 2003, the JLENS project office announced that for the first time, it had deployed the RAID system to Southwest Asia in support of Central Command activities in Operation Enduring Freedom. The RAID system has since been deployed in Iraq and Afghanistan to help protect U.S. armed forces by detecting enemy activities on the ground.

Raytheon Receives JLENS Contract

In December 2004, the U.S. Army awarded Raytheon a contract for two complete JLENS systems, less

surveillance radar. Six months later, in June 2005, the Army modified this contract to require Raytheon to produce two complete JLENS systems *with* surveillance radar.

In March 2005, Raytheon delivered the JLENS Spiral 1 system to McGregor Range, New Mexico, for elevated testing at Roving Sands – a joint Army/Air Force training exercise that is held every two years. During the Roving Sands 2005 exercises, which took place in March and April, the JLENS Spiral 1 system demonstrated an ability to see small targets at long distances, as well as a communications-relay capability.

JLENS Enters SDD

In August 2005, the U.S. undersecretary of defense for acquisition, technology, and logistics (AT&L) gave the go-ahead for Increment 1 of the JLENS Spiral 2 system to enter the System Development and Demonstration (SDD) phase. Separately, the undersecretary approved low-rate initial production of two JLENS systems.

In September 2005, Raytheon completed a successful System Functional Review of the JLENS system. According to Raytheon, the primary objective of the SFR was to ensure complete allocation of system-level requirements to the system prime items. The two-day technical review included an overview of the JLENS system and in-depth reviews of each of the prime items, including the fire control radar, surveillance radar, processing station, communication system, and aerostat platform.

SDD Contract Worth $1.4 Billion

On November 15, 2006, the U.S. Army awarded Raytheon a $1.3 billion contract modification for SDD of the JLENS system. When negotiations concluded in January 2007, the modification was worth some $1.4 billion over five years.

In March 2007, the JLENS program completed a successful SFR. The three-day technical review evaluated system requirements and functions for each of the prime items, as identified above. Successful completion allowed the program to progress to the preliminary design phase.

The Critical Design Review of the fire control radar was completed in June 2007, and the Preliminary Design Readiness Review of the entire system was successfully completed in January 2008. The CDR for the full system was completed in December 2008.

The JLENS system successfully completed its Orbit Preliminary Design Review in March 2008. The four-day Orbit PDR thoroughly reviewed all aspects of the system's design maturity. The PDR was a key milestone in the $1.4 billion SDD contract, under which two JLENS orbits were to be delivered.

JLENS Demonstrates First Flight

The JLENS performed its first flight demonstration on August 25, 2009, during a ceremony at Elizabeth City, North Carolina. Although the radars were not included on the aerostat, the flight demonstration marked the first time a JLENS aerostat was elevated to an altitude of 3,000 feet. System integration and testing began in 2010.

JLENS Achieves Critical Milestone

In February 2011, the JLENS successfully demonstrated the ability to transmit from an elevated aerostat. The JLENS demonstration was conducted at the Utah Test and Training Range, near Salt Lake City. The aerostat deployed to an altitude of 10,000 feet mean sea level, and the surveillance radar began emitting radio frequency radiation into free space for the first time.

JLENS Successfully Completes Endurance Test

By July 2011, the JLENS had completed a successful endurance test. Raytheon conducted JLENS flight tests at the Utah Test and Training Range. The ability to provide reliable, persistent surveillance – staying aloft and operational for up to 30 days at a time – would be an important feature of the system.

JLENS Proves Tracking Capabilities during Test

The JLENS completed Demonstration Test 1 by the end of December 2011, proving its ability to track targets and integrate with fire control and tactical datalink systems. A series of demonstration tests was conducted at the Utah Test and Training Range from early November to mid-December 2011. The tests included tracking moving ground and surface water targets.

Program Reductions Result in Nunn-McCurdy Cost Breaches

The U.S. DoD's April 2012 Selected Acquisition Report identified three military programs that had suffered critical Nunn-McCurdy cost breaches, though all three breaches were the result of scaling back acquisition objectives. A critical breach occurs when unit costs increase by 25 percent or more over the current acquisition program baseline, or 50 percent or more over the original APB. Unit costs for the JLENS increased by nearly 216 percent because program quantities were reduced from 16 to two orbits (an orbit consists of a surveillance radar and a fire control radar

integrated into separate aerostats). The two orbits were part of the engineering and manufacturing development (EMD) phase, and the DoD suspended 14 production orbits.

U.S. Army Qualifies for JLENS

In June 2012, Army soldiers completed mission operator training on Raytheon's JLENS system for the first time. The soldiers learned to use the JLENS to detect and target incoming cruise missiles and track ships, cars, trucks, and boats. They also practiced setting up the system and communicating information gleaned from JLENS sensors to Army, Navy, and Air Force counterparts.

Uncertainty Surrounds JLENS Program

Defense News reported in August 2012 that the U.S. Army had trained around 100 soldiers to operate the JLENS, despite questions over whether and how the system would ultimately be fielded. Although the system had performed well in recent tests, the Army said in a June 2012 reprogramming request to Congress that it would delay deployment until after the JLENS completed the EMD phase in FY14. (Various test environments and scenarios are scheduled for FY18.) Meanwhile, the $40 million initially requested for JLENS deployment would be used for other requirements.

JLENS Detects and Tracks Swarming Boats

In September 2012, a series of tests demonstrated that the JLENS was capable of detecting and tracking swarming boats from hundreds of miles away. During the tests, the JLENS simultaneously detected and tracked multiple speedboats on the Great Salt Lake. The boats, similar to swarming boats in the inventories of hostile navies in high-threat regions, simulated a real-world scenario with a series of tactical maneuvers at low and high speeds. The U.S. Army's JLENS project office reported that the cost of operating large, fixed-wing surveillance aircraft was five to seven times greater than the cost of operating the JLENS.

U.S. Army and Navy Demonstrate JLENS's Anti-Ship, Missile-Defeating Ability

Another Army and Navy test, reported in September 2012 by Raytheon, proved that the JLENS could integrate with defensive systems currently in the Navy's inventory to provide, for the first time, overland cruise missile defense from the sea. During the test, a JLENS fire control radar acquired and tracked a surrogate anti-ship cruise missile target. The track information was passed to sailors via the Raytheon-made Cooperative Engagement Capability (CEC) sensor netting system. The sailors then fired a Raytheon Standard Missile-6 at the target. Initial SM-6 guidance used targeting information provided by the JLENS via CEC to the AEGIS Weapon System (AWS) until the SM-6's onboard radar was able to acquire and track the target.

U.S. Army Soldiers Test JLENS in Real-World Scenarios

The Army completed Early User Testing of the JLENS in July 2013. During the six-week-long EUT, soldiers tested the JLENS's ability to operate in a number of complex scenarios that replicated an operational environment. The soldiers also tested the JLENS's endurance by operating the system continually for 20 days.

Cruise Missile Intercepted for First Time with JLENS-Guided AMRAAM

During testing in 2013, the U.S. Army and Air Force, for the first time, intercepted an anti-ship cruise missile surrogate using Raytheon's Advanced Medium-Range Air-to-Air Missile (AMRAAM) cued by the JLENS.

During the July 17 test, the Army's JLENS acquired and tracked an anti-ship cruise missile surrogate and passed targeting data to an Air Force F-15E via Link 16, enabling the fighter pilot to fire an AIM-120C7 AMRAAM and culminating in the weapon intercepting the target and meeting all test objectives.

The AMRAAM is a combat-proven missile that has demonstrated operational flexibility in both air-to-air and surface-launch engagement scenarios. Procured by 36 countries, the AMRAAM has been integrated on the F-16, F-15, F/A-18, F-22, Typhoon, Gripen, Tornado, Harrier, and F-4. Integration is ongoing for the Joint Strike Fighter. The AMRAAM is also the baseline missile for the NATO-approved National Advanced Surface-to-Air Missile System.

TCOM Deploys Ultra-Durable Hull Material for JLENS Requirements

TCOM LP announced in August 2013 that it had successfully deployed its ultra-durable aerostat hull material, enabling the operation of surveillance aerostats in extreme weather conditions for long durations and thus meeting the most demanding requirements of the U.S. Army's JLENS program.

TCOM said it had developed a new aerostat hull material that offers improved overall strength, strength-to-weight ratio, and environmental resistance against temperature and humidity, as well as better helium retention. Together, these attributes enable TCOM aerostats to fly longer at high altitudes, in

greater wind, and with heavier payloads than any previous generation, the company said.

TCOM applied the material to its new 71M Block II heavy-lift aerostats in order to meet the military requirements of the Army's JLENS program. According to TCOM, this next generation of laminated aerostat material is stronger and lighter than all previous designs, allowing the construction of aerostats capable of lifting over 7,000 pounds. The strength is supplied by a unique structural layer that is coated with polyurethane adhesive, which provides bonding to a laminated film system that includes DuPont Tedlar film on the outside. The DuPont Tedlar film layer provides weather protection and reduced helium permeance, enabling longer surveillance missions at higher altitudes. TCOM's new hull enables aerostats to operate continuously in winds of up to 100 knots with blowing sand and snow, and extreme temperatures of up to 130°F.

To date, the 71M Block II systems equipped with the new hull material have accumulated over 100,000 hours of use during deployments that included the JLENS.

JLENS Set for Contingency Deployment

As of June 2014, the U.S. Army had procured two JLENS systems. In addition to keeping one system in strategic reserve, the Army scheduled a second system for participation in an operational evaluation at Aberdeen Proving Ground, Maryland, in fall 2014. SDD concluded in the fourth quarter of 2013.

Soldiers Certified to Protect Metro DC with JLENS

In September 2014, soldiers from the U.S. Army's A Battery, 3rd Air Defense Artillery, were certified to operate the JLENS to protect the National Capital Region (NCR) from cruise missiles and drone threats.

Raytheon employees trained U.S. Northern Command and the soldiers on using the JLENS as part of the NCR's Integrated Air Defense System (IADS). Raytheon also helped prepare the soldiers for the Army's independent certification process by training them on a variety of key tasks.

U.S. Tests Tethered Airships over Baltimore

In December 2014, the United States began testing an airship over Baltimore as part of the JLENS program. In early 2015, two helium-filled airships were tethered to concrete pads four miles apart. Each airship carried a radar unit and was positioned at an altitude of 10,000 feet. (At that altitude, the radars scan a 340-mile radius, roughly from Norfolk, Virginia, to upstate New York.) The airships did not carry weapons, and the test was to run for three years.

Following a series of additional tests, the airships were to be turned over to the U.S. Army for additional exercises.

Runaway Aircraft Takes Out Power Lines, Crash-Lands

On October 28, 2015, a JLENS aero-surveillance system blimp went on the offense when it broke from its moorings and created a destructive path of downed powerlines before finally crash-landing miles away. Thanks to the blimp's joyride, the U.S. DoD suspended the program's three-year operational trial exercise.

Additionally, the DoD reduced the number of JLENS "orbits" to be produced from 16 to two, triggering a Nunn-McCurdy cost breach. An orbit consists of a fire control radar system and a wide area surveillance system connected to a ground control station.

Later, in early 2016, the U.S. Army reported that the blimp had broken free due to a malfunction of the pressure sensor that caused a loss of air pressure in the tail fins, leading to a loss of aerodynamics. This led to a chain of events that ended with the blimp finally being captured in a pasture like a runaway cow.

Take Your Blimp and Go Home

Operational Control of JLENS for the NORAD-USNORTHCOM National Capital Region IADS Operational Exercise (OPEX) was transferred to the NORAD/NORTHCOM Joint Air Defense Operations Center (JADOC) on October 15, 2015. Due to the tether break accident in late October 2015, the NORAD/NORTHCOM commander suspended JLENS participation in the OPEX pending results from accident investigations and the recommendations of the Failure Review Board.

JLENS participation in the OPEX was then terminated per a decision memorandum from the under secretary for defense policy dated June 15, 2016.

As directed by the Army Acquisition Executive (AAE), JLENS equipment supporting the OPEX was packed and stored at Aberdeen Proving Ground effective June 21, 2016, pending a high-level decision on the future of the JLENS program.

Courses of action under consideration are staging JLENS equipment in indefinite storage to meet potential contingency requirements, and termination of the JLENS program and the disposition/demilitarization of JLENS equipment.

JLENS

During 2018 and 2019, the JLENS program will be shut down and its equipment and facilities disposed of.

U.S. Army Denies Damage Claims from Blimp

The Baltimore Sun reported on February 10, 2017, that the U.S. Army had declined to pay people damages caused by the runaway JLENS blimp back in fall 2015. Property owners were reportedly told that they could either sue the U.S. Army in federal court or file a lawsuit in state court against JLENS manufacturer Raytheon.

Funding

U.S. FUNDING

	FY17 QTY	FY17 AMT	FY18 QTY	FY18 AMT	FY19 QTY	FY19 AMT	FY20 QTY	FY20 AMT
RDT&E (U.S. Army)								
PE#0202429A								
Aerostat Joint Project – COCOM Exercise Project EP8	-	6.178	-	6.749	-	0.001	-	0

	FY21 QTY	FY21 AMT	FY22 QTY	FY22 AMT	FY23 QTY	FY23 AMT	FY24 QTY	FY24 AMT
RDT&E (U.S. Army)								
PE#0202429A								
Aerostat Joint Project – COCOM Exercise Project EP8	-	0	-	0	-	0	-	0

All $ are in millions.

Source: FY19 U.S. Army Exhibit R-2, RDT&E Budget Item Justification

In FY18, the focus is on the disposition of classified material and starting the disposition of unclassified material. The remaining unclassified material will be disposed of in FY19.

Contracts/Orders & Options

Contractor	Award ($ millions)	Date/Description
Raytheon	769.8	Dec 2004 – Increment as part of a $1,302,232,024 cost-plus-incentive-fee contract for two complete JLENS systems, less surveillance radar. Work was completed by Jul 2010. The U.S. Army Space and Missile Defense Command, Huntsville, AL, was the contracting activity. (DASG60-98-C-0001)
FLIR Systems	32.9	Jun 2005 – Delivery order as part of a firm-fixed-price (FFP) contract of the same value for FLIR Star SAFIRE sensors for the JLENS. Work was completed by Mar 2006. The U.S. Army Space and Missile Defense Command was the contracting activity. (W9113M-05-D-0002)
Raytheon	79.5	Jun 2005 – Modification to a cost-plus-incentive-fee contract for the JLENS with surveillance radar. Work was completed by Jul 31, 2010. This was a sole-source contract initiated on Dec 29, 2004. The U.S. Army Space and Missile Defense Command was the contracting activity. (DASG60-98-C-0001)
Raytheon	1,400.0	Nov 2006 – Contract modification for SDD of the JLENS system.
Raytheon	144.3	Jan 2007 – Increment to $1.4 billion cost-plus-incentive-fee contract for the JLENS SDD program. Work was completed by Mar 2012. (DASG60-98-C-0001)

Contractor	Award ($ millions)	Date/Description
Raytheon	16.9	Jun 2014 – Modification P00004 to contract W9113M-15-C-0001 from the U.S. Army to exercise an option for continued field maintenance of one JLENS orbit deployed at Aberdeen Proving Ground, MD. These services would support the employment of a JLENS orbit as part of Operation Noble Eagle. The original completion date was Dec 31, 2015 (before the runaway blimp incident, after which the program was placed on indefinite hold). Work was performed at Aberdeen Proving Ground (88 percent) and Elizabeth City, NC (12 percent). The U.S. Army Space and Missile Defense Command was the contracting activity.
Raytheon	12.0	Dec 2014 – A firm-fixed-price contract for field and sustainment level maintenance supporting one JLENS orbit during an operational exercise. Work was performed at Aberdeen Proving Ground, with a completion date of Jun 2015. Bids were solicited via the Internet, with one received. Fiscal 2014 RDT&E funds in the amount of $9,001,256 were obligated at time of award. The U.S. Army Space and Missile Defense Command, Huntsville, AL, was the contracting activity. (W9113M-15-C-0001)
Raytheon	16.9	Jun 2015 – A modification (P00004) to contract W9113M-15-C-0001 to provide continued field and sustainment level maintenance supporting one JLENS orbit during an operational exercise. Fiscal 2015 RDT&E funds in the amount of $16,999,000 were obligated at time of award. The completion date was Dec 31, 2015. Work was performed at Aberdeen Proving Ground, MD (88 percent) and Elizabeth City, NC (12 percent). The U.S. Army Space and Missile Defense Command, Huntsville, AL, was the contracting activity.

Timetable

Month	Year	Major Development
Jan	1996	U.S. Army directed to establish JLENS project office
Jan	1998	Raytheon awarded JLENS development and risk-reduction contract
Mar	1999	JLENS designated Acquisition Category II program
Aug	2001	JLENS passes CDR
Jan	2003	U.S. Army approves plan to accelerate and restructure JLENS program
Dec	2004	Raytheon awarded increment for two JLENS systems, less surveillance radar
Jun	2005	Raytheon awarded contract modification for two JLENS systems with surveillance radar
Aug	2005	U.S. undersecretary of defense for AT&L grants approval for Increment 1 of JLENS Spiral 2 to enter SDD phase
Aug	2005	U.S. undersecretary approves initial production of two JLENS systems
Dec	2006	$1.4 billion SDD contract finalized
Mar	2007	System Functional Review completed
Jun	2007	Fire control radar CDR completed
Mar	2008	PDR completed
Nov	2008	CDR of surveillance radar and communications systems
Dec	2008	CDR of entire system completed
	2011	System testing begins
2Q	2014	Initial operational test and evaluation
Jun	2016	JLENS program halted and equipment placed in storage following blimp accident in 2015 during OPEX testing
4Q	2018	Program being shut down and assets being disposed of

Worldwide Distribution/Inventories

JLENS is a **U.S. DoD** program.

JLENS

Forecast Rationale

For centuries, both the military and civilian sectors have been trying to harness the potential of the airship, usually with limited success. It appears that nearly everyone fails to keep in mind that airships, no matter how advanced they are technologically, will in the end always be at the mercy of the weather.

With no production contract in sight and only two engineering development models built, the U.S. Army's multibillion-dollar Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) system development program has been declared dead by the U.S. DoD. Even if the mothballed prototypes were to be pressed back into service, the $1 billion cost per blimp is not the mark of a successful effort. The program is officially scheduled to be over by the end of 2018, with a few funding dollars to be budgeted in 2019 to clean up any scraps.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR RDT&E FUNDING (in millions US$)												
Designation or Program		High Confidence				Good Confidence			Speculative			
	Thru 2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Raytheon Integrated Defense Systems (Prime)												
JLENS <> United States <> Army												
	2,789.39	6.75	.10	.00	.00	.00	.00	.00	.00	.00	.00	6.85
Total	2,789.39	6.75	.10	.00	.00	.00	.00	.00	.00	.00	.00	6.85