

## Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS)

### Executive Summary

- The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) program experienced a critical Nunn-McCurdy cost breach due to an FY12 budget decision to eliminate procurement of all production systems. USD(AT&L) directed the Army to continue with a limited development program through 2013, using the two existing JLENS orbits. The Army executed a reduced JLENS test program to evaluate JLENS technologies and capabilities as directed by USD(AT&L).
- In 1QFY13 and 3QFY13, the Army Test and Evaluation Command (ATEC) conducted two Early User Tests (EUTs) of JLENS operational capabilities. The tests assessed JLENS orbit-level performance during missions involving fighters, rotary-wing aircraft, unmanned aerial vehicles, drones (cruise missile surrogates), and land-based surface moving targets. Soldier operators conducted missions with extensive contractor support.
- To date, there have been four developmental test events that demonstrated a potential capability to perform Integrated Fire Control (IFC).
  - In April 2012, JLENS supported an IFC live missile flight test that resulted in a successful intercept of a fixed-wing target drone aircraft in a controlled test environment.
  - In September 2012, the Army and Navy conducted a joint JLENS Navy Integrated Fire Control-Counter Air (NIFC-CA) missile flight test event. JLENS provided IFC targeting information to a Navy Aegis-based missile system using Cooperative Engagement Capability datalinks in a controlled test environment.
  - In July 2013, JLENS supported an IFC test with an Air Force F-15 targeting a drone in a controlled test environment.
  - In August 2013, JLENS supported a Weapons System Evaluation Program event. JLENS provided IFC targeting information to Air Force fighters and operational Army air defense missile systems during multiple live missile flight tests in a controlled test environment.
- Testing has been limited in scope, leading to a restricted demonstration of JLENS's capabilities. Interoperability has been minimally tested and demonstrated. Test range restrictions (to include target profile limits due to safety and Federal Aviation Administration restrictions) have limited the target tracking/detection range demonstration and target profiles, resulting in an incomplete demonstration of requirements and performance in an operational environment. All testing occurred in remote, mid-country locations; therefore, no testing occurred in an operationally



- realistic over-water environment or in its intended Electronic Environmental Effects environment.
- Testing showed that the fire control radar consistently provided fire control quality tracking data that were sufficient to support air defense missile engagements. The system also demonstrated a limited target identification capability that partially met requirements and basic interoperability with other air defense systems.
- Based on data collected during developmental testing, JLENS system-level reliability is not meeting program reliability growth goals. Both software and hardware reliability problems contribute to low system reliability.
- Based on limited data collected during two EUTs, JLENS has not demonstrated the ability to survive in the domains of Electronic Environment Effects; Information Assurance; electronic attack; and chemical, biological, radiological, and nuclear effects.
- The Joint Staff directed the JLENS program to deploy an orbit to Aberdeen Proving Grounds, Maryland, to participate in a three-year Northern Command (NORTHCOM) homeland defense exercise from FY15-FY17.

### System

- A JLENS orbit consists of surveillance and fire control radar systems. Each radar system is mounted separately on 74-meter tethered aerostat balloons that operate at altitudes up to 10,000 feet above mean sea level.
- An 180,000-pound mobile mooring station and tether system is used to launch, recover, and secure each aerostat system. The aerostat tether system provides radar control and data transfer links to supporting ground control and data processing

# ARMY PROGRAMS

stations. JLENS is deployable to pre-planned operational sites that have been prepared to support mobile mooring station operations. Five days are required to transition between fully operational status and a transportable configuration. Operators control the radar, process data, and transmit radar track information from mobile communication and control stations co-located with the mobile mooring stations. A mobile power generation and distribution system and associated ground equipment support each JLENS orbit.

## Mission

- Army air defense units equipped with the JLENS provide persistent air and missile threat warning to friendly forces,

target identification, target cueing for airborne interceptor aircraft, and precision targeting information to ground-based air defense weapons systems.

- Primary JLENS air-breathing targets include all fixed- and rotary-wing aircraft, unmanned aerial vehicles, and land attack cruise missiles. Secondary targets include surface moving targets, large rockets, and tactical ballistic missiles.

## Major Contractor

Raytheon Integrated Defense Systems – Andover, Massachusetts

## Activity

- The JLENS program experienced a critical Nunn-McCurdy cost breach due to an FY12 budget decision to eliminate procurement of all production systems. Following a Nunn-McCurdy review, USD(AT&L) rescinded the JLENS Acquisition Program Baseline and directed the Army to continue with a reduced JLENS test program using the two existing JLENS developmental orbits. The focus of the reduced test program is to improve airborne and surface moving target capabilities in advance of JLENS participation in an FY15-17 NORTHCOM Combatant Commander exercise. USD(AT&L) did not authorize the program to complete the previously planned system development program or to proceed to a Milestone C or production decision.
- Based on the USD(AT&L) direction, the Army revised the JLENS operational test strategy, transitioning from the previously planned Milestone C operational assessment to two EUTs (EUT1 and EUT2) in FY13. The purpose of the EUT events was to assess JLENS operational capabilities and limitations in advance of the FY15 Combatant Commander exercise. During these limited assessments, Soldier operators conducted missions with significant contractor support. Contractor personnel provided the vast majority of system maintenance support.
- The timing of the second EUT was delayed three months due to difficulties integrating the JLENS Stimulator (JSTM). JSTM was a modeling and simulation tool that was planned to enable testing of robust threat scenarios that could not be replicated through live target testing. Ultimately, the Program Office was not able to successfully integrate JSTM, so EUT2 proceeded without these scenarios.
- ATEC conducted EUT1 and EUT2 (occurring in 1QFY13 and 3QFY13, respectively) at the Utah Test and Training Range. ATEC assessed JLENS orbit-level performance during missions involving fighters, rotary-wing aircraft, unmanned aerial vehicles, drones, and land-based surface moving targets. Test range restrictions (to include target profile limits due to safety and Federal Aviation Administration restrictions) limited identification friend or foe testing, tracking/detection

ranges, and target flight profiles. These test restrictions limited both operational realism and requirements demonstration.

- There have been four live missile flight tests in which JLENS has provided integrated fire support to different platforms.
  - During the developmental IFC test phase in April 2012, an integrated JLENS orbit supported a series of simulated missile flight test engagements of airborne targets with an operational Army air defense missile system. This phase concluded with an IFC live missile flight test that resulted in a successful intercept of a fixed-wing target drone aircraft in a controlled test environment.
  - The Army and Navy conducted a joint JLENS Navy NIFC-CA missile flight test event at White Sands Missile Range, New Mexico, in late September 2012. The JLENS provided IFC targeting information to a Navy Aegis-based missile system using Cooperative Engagement Capability datalinks to engage and destroy a surrogate cruise missile aerial target.
  - During July 2013, JLENS supported an IFC test with an Air Force F-15 targeting a drone.
  - In August 2013, JLENS supported a Weapons System Evaluation Program event. JLENS provided IFC targeting information to Air Force fighters and operational Army air defense missile systems during multiple live missile flight tests in a controlled test environment. Since no further JLENS production is currently authorized, a JLENS IOT&E event will not be required. However, DOT&E will remain involved throughout the Combatant Commander exercise (FY15-FY17) in order to facilitate the NORTHCOM assessment of JLENS.

## Assessment

- Since the Nunn-McCurdy breach, testing has been limited in scope, leading to restricted demonstration of JLENS's capabilities. Interoperability has been minimally tested and demonstrated. Test range restrictions have limited the target tracking/detection range demonstration and target profiles, resulting in an incomplete demonstration of requirements

# ARMY PROGRAMS

and performance in an operational environment. All testing occurred in remote, mid-country locations; therefore, no testing occurred in an operationally realistic over-water environment or in its intended Electronic Environmental Effects testing environment.

- Testing showed that the fire control radar consistently provided fire control quality tracking data that were sufficient to support air defense missile engagements. The system also demonstrated a limited target identification capability that partially met requirements and basic interoperability with other air defense systems. Testing included a successful demonstration of the fully-deployed aerostat tether system, including power and fiber-optic data transmission paths. Testing also identified critical performance areas for improvement to include: non-cooperative target recognition, friendly aircraft identification capabilities, and target track consistency.
- During four flight tests, JLENS demonstrated a potential capability to perform over-land IFC. The four demonstrations occurred during developmental testing and involved target flight-path restrictions and an operationally unrealistic test environment. Test equipment that is not part of the JLENS system was required during the IFC demonstrations.
- Based on data collected during developmental testing, JLENS system-level reliability is not meeting program growth goals. The system does not meet the requirements for Operational

Availability, Mean Time to Repair, or Mean Time Between System Abort. Both software and hardware reliability problems contribute to low system reliability and availability.

- While JLENS is intended to provide 24-hour coverage, weather can limit system availability and performance. Poor weather may reduce radar detection performance or require the aerostats be returned to the surface.
- JLENS did not demonstrate the ability to survive in its intended operational environment. Electronic Environmental Effects testing was limited and revealed several anomalies affecting mission critical systems. Information Assurance testing was limited to a vulnerability assessment and resulted in the system being deemed not ready for a Red Team assessment. Testing against electronic attack was very limited and did not include most techniques the system would likely encounter.

## Recommendations

- Status of Previous Recommendations. The Army has addressed one of the two previous recommendations. However, while system-level reliability has improved, it does not meet system requirements; therefore, the Army should still develop a reliability improvement plan.
- FY13 Recommendation.
  1. The Army should ensure Soldiers are properly trained to support the NORTHCOM Homeland Defense Exercise.

# ARMY PROGRAMS