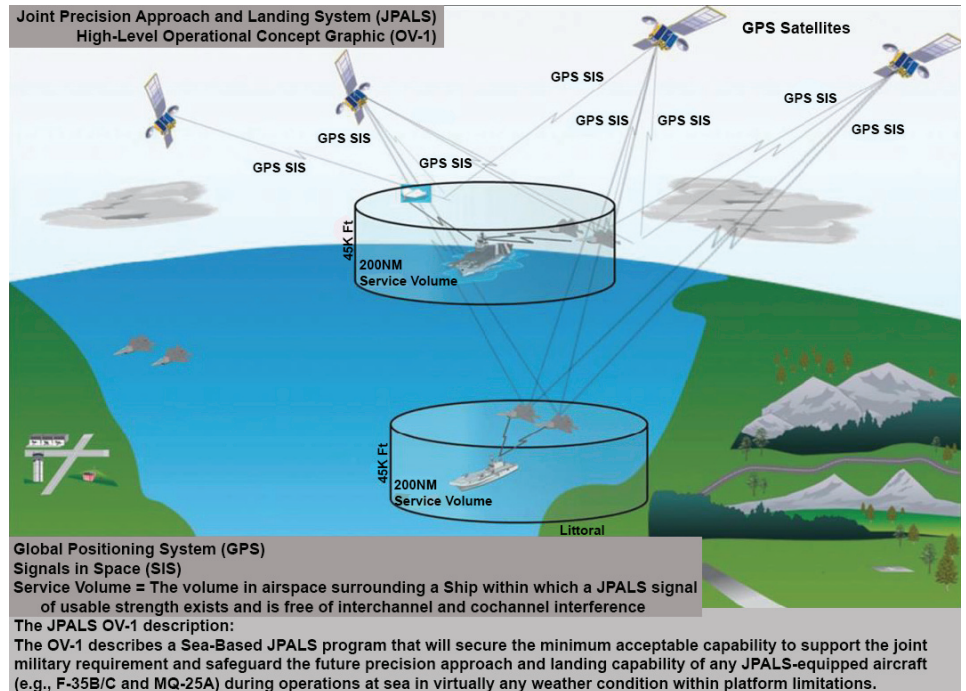# Joint Precision Approach and Landing System (JPALS)

Executive Summary

- As of the end of FY18, DOT&E's analysis of the data and results for the Joint Precision Approach and Landing System (JPALS) Block 0 is ongoing; however, preliminary observations from the Navy's IOT&E period indicate JPALS Block 0 will meet the Program Office's objectives to support an Early Operational Capability decision.
- The Navy's Operational Test and Evaluation Force (OPTEVFOR) conducted the JPALS Block 0 IOT&E. This consisted of an at-sea period with an F-35B, an at-sea period with an F-35C, and one pier-side test period.
- The Navy will conduct an operational assessment of the JPALS Block 1 Full Operational Capability in 3QFY19.

System

- JPALS is composed of modular open-system hardware and software components integrated with shipboard Air Traffic Control and landing system architectures for JPALS data display and functional operation.
- JPALS major subsystems include the following: GPS sensor, navigation processing, datalink, ship motion sensor, maintenance, and ship interface subsystems.
- JPALS Block 0 is an interim solution/Early Operational Capability of JPALS, specifically to support the F-35B. Block 0 uses an ultrahigh frequency data broadcast to transmit a subset of the JPALS precision approach data and on-deck Inertial Navigation System alignment from ship to aircraft.
- JPALS Block 1 will further support the F-35B/C and MQ-25A with a two-way datalink capability by providing the accuracy, integrity, and continuity required for future F-35C and MQ-25A autoland capability on CVN-type ships and F-35B coupled flight capability on LH-type ships.

Joint Precision Approach and Landing System (JPALS) High-Level Operational Concept Graphic (OV-1)

Global Positioning System (GPS) Signals in Space (SIS)
Service Volume = The volume in airspace surrounding a Ship within which a JPALS signal of usable strength exists and is free of interchannel and cochannel interference
The JPALS OV-1 description:
The OV-1 describes a Sea-Based JPALS program that will secure the minimum acceptable capability to support the joint military requirement and safeguard the future precision approach and landing capability of any JPALS-equipped aircraft (e.g., F-35B/C and MQ-25A) during operations at sea in virtually any weather condition within platform limitations.

Mission

- The Navy will use JPALS to address precision approach and landing as an enabling capability for F-35B/C and MQ-25A to conduct their missions with minimal impact from conditions at point of departure or landing.
- The Navy will use JPALS to provide joint operational capability for F-35B/C and MQ-25A to perform missions for stand-alone or close-proximity air operations from CVN- and LH-type ships throughout the world.

Major Contractor

Raytheon Network Centric Systems – Fullerton, California

Activity

- JPALS Block 0 IOT&E consisted of one pier-side test period and two at-sea test periods.
- OPTEVFOR conducted pier-side testing on USS *Essex* (LHD 2) from September 9 – 24, 2017, at Naval Base San Diego, California, and focused on cybersecurity and system maintainability.
  - The OPTEVFOR Cyber Test Team (CTT) conducted a Cooperative Vulnerability and Penetration Assessment (CVPA) followed by an Adversarial Assessment (AA).

- OPTEVFOR, with Navy and Raytheon contractors, performed operational maintenance tasks to assess system maintainability.
- OPTEVFOR conducted the following at-sea test periods of JPALS operational usage on CVN and LHD ships to support the Navy's Early Operational Capability decision:
  - JPALS with F-35B aircraft tested at-sea onboard USS *Wasp* (LHD 1) in May 2018

- JPALS with F-35C aircraft tested at-sea onboard USS *Lincoln* (CVN 72) in August 2018
- The Navy will conduct an operational assessment of the JPALS Block 1 Full Operational Capability in 3QFY19.
- OPTEVFOR conducted all testing in accordance with a DOT&E-approved Test and Evaluation Master Plan and test plan.

Assessment
- As of the end of FY18, DOT&E's analysis of the data and results from the IOT&E, CVPA, and system maintainability tests for JPALS Block 0 are ongoing.

- Preliminary observations from the IOT&E period indicate JPALS Block 0 will meet the Program Office's objectives to support an Early Operational Capability decision.

Recommendation
1. The JPALS Program Office should continue to coordinate with the F-35 and MQ-25 Program Offices to ensure synchronized testing.