

## Space Fence (SF)

### Executive Summary

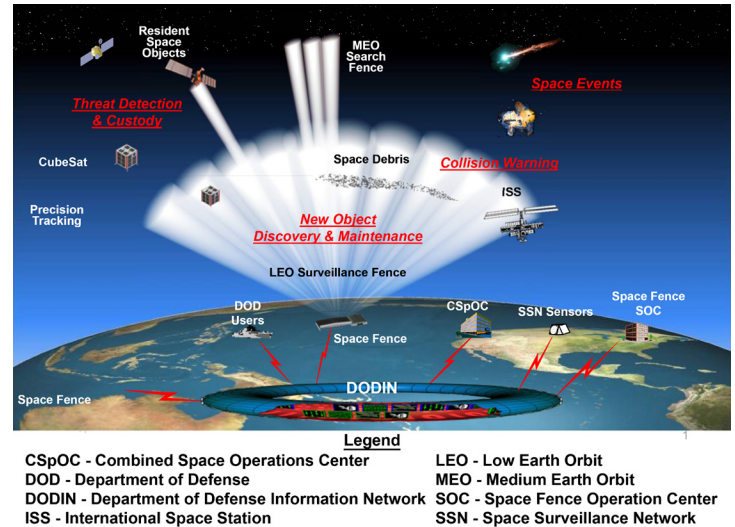
- The Air Force Operational Test and Evaluation Center (AFOTEC) conducted an IOT&E of Space Fence (SF) Increment 1 from August 6 through November 1, 2019.
- Data analysis from operational testing is ongoing and DOT&E will determine SF operational effectiveness, suitability, and survivability with the release of SF Increment 1 IOT&E report in early CY20.

### System

- SF is a space surveillance S-Band radar system integrated into the Space Surveillance Network (SSN). It detects, tracks, identifies, and characterizes both man-made and naturally occurring Earth-orbiting objects in space.
- The SF primary capability is un-cued detection and tracking of objects (satellites, space debris, etc.) in Low Earth Orbit (LEO), with additional inherent capability to detect and track objects in Medium Earth Orbit (MEO) and Geostationary Equatorial Orbit (GEO).
- SF is currently deploying Increment 1, which consists of a radar site at Kwajalein Atoll and an Operations Center co-located with the Reagan Test Site Operations Center in Huntsville, Alabama. Increment 2, which is not yet funded, plans to deliver a second radar site in Australia.

### Mission

The Combined Space Operation Center will use SF to maintain a constant surveillance of man-made and naturally occurring objects in space to support the Space Situational Awareness (SSA) mission. SF supports the SSA mission by providing high



fidelity un-cued, and cued radar observations from LEO, MEO, and GEO to the SSN. SF data supports the Combined Space Operation Center satellite catalog maintenance and processing of space events (e.g. satellite maneuvers and breakup events).

### Major Contractors

- Lockheed Martin Rotary and Mission Systems – Moorestown, New Jersey
- Wood Group – Nashville, Tennessee
- General Dynamics Mission Systems – Plano, Texas

### Activity

- The Air Force began the SF program in 2009 and DOT&E put it on oversight that same year. This is the first time DOT&E included this program in its annual report.
- The Air Force conducted developmental test and evaluation (DT&E) from April to August 2019, in preparation for operational testing.
- AFOTEC conducted cybersecurity testing from January 28 to February 8, 2019, August 19 – 28, 2019, and September 9 – 19, 2019, to determine the cyber survivability of the system.
- AFOTEC and the Joint Navigational Warfare Center conducted GPS-resilience testing of the system in August 2019.
- AFOTEC conducted an IOT&E in accordance with the DOT&E-approved test plan from August 6 to November 1, 2019.
- During DT&E and IOT&E, the Joint Interoperability Test Command (JITC) conducted an evaluation of the SF Net-Ready Key Performance Parameters.
- AFOTEC and JITC also plan to use data from the Air Force-conducted operational trial period from November through December 2019 to support the IOT&E report.
- DOT&E developed an Early Results Briefing in January 2020 and plans to publish an IOT&E report in early CY20.

### Assessment

- DOT&E observed SF testing and made the following preliminary findings:
  - SF demonstrated the capability to find many small objects that had not previously been tracked or cataloged. Once SF becomes operational, the number of tracked

objects confirmed orbiting the earth is expected to grow significantly. However, with only one sensor site, SF does not have the power or coverage to be able to continuously track and maintain awareness of these small objects.

- SF meets accuracy requirements for LEO objects. However, SF is not demonstrating similar accuracy results for some objects in MEO and GEO.
- SF operators are able to input taskings into the SF system. However, the system did not initially consistently plan, schedule, or conduct tasks correctly, leading to an increase in operator workload to monitor automatic taskings and missed observations. Software patches installed prior to regression testing largely addressed this problem, making the tasking process more streamlined for the user.
- Network latency is affecting system performance between the SF Operation Center and the Sensor Site causing

queries and tasks to time out, often forcing a reset of the system client interface.

- User training prior to operational testing does not appear to be adequate for some system tasks.
- Available system and user documentation lacked final corrections, processes, and procedures prior to operational testing. Incomplete documentation resulted in operators being unable to complete some tasks in a timely manner without subject matter expert involvement.
- The Air Force anticipates declaring SF Initial Operational Capability in January/February 2020.

## **Recommendations**

None.