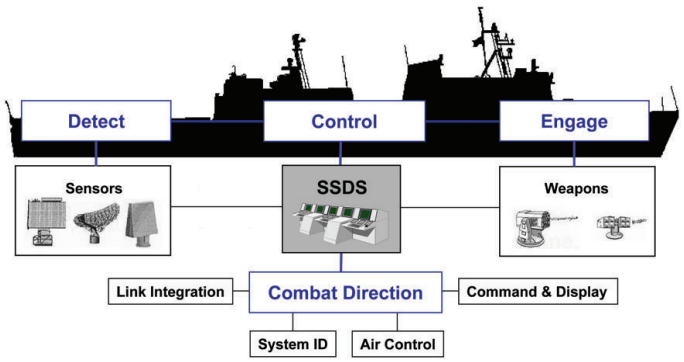
Ship Self-Defense System (SSDS)

Executive Summary

The Ship Self-Defense System (SSDS) Mark 2 integration of sensor and weapons systems enhances ship self-defense and battle force command/control. However, the Navy must correct significant deficiencies with sensor coverage, multi-ship interoperability (command and control), weapon integration, weapon engagement scheduling, hardware reliability, and training before the system is operationally effective and suitable. Ships with SSDS Mark 2 variants deployed three times in FY08 prior to the Navy completing all planned operational tests or correcting identified deficiencies.



System

SSDS is a fiber-optic local area network that uses open computer architecture and standard Navy displays to integrate a surface ship's sensors and weapon systems and automate the detect-track-engage sequence for air defense.

- SSDS Mark 1 is the combat system for LSD 41/49 class ships.
- SSDS Mark 2 has four variants:
  - The Mod 1 is in development for CVN 68 class aircraft carriers.
  - The Mod 2 is in development for LPD-17 class amphibious ships.
  - The Mod 3 is in development for LHD-1 class amphibious ships.
  - The Mod 4 is in development for LHA replacement amphibious ships.

Mission

Navy surface forces use the SSDS to provide automated engagement capabilities for faster and more effective accomplishment of self-defense missions. Maritime Commanders intend to use:

- Mark 1 and Mark 2 to provide automated and integrated detect-to-engage capability against anti-ship cruise missiles (ASCM)
- Mark 2 to provide faster and more effective command and control for air and surface warfare areas

Prime Contractor

- Raytheon

Activity

- Commander, Operational Test and Evaluation Force (COTF) began FOT&E of the SSDS Mark 2 Mod 1 in February 2008 on USS *Ronald Reagan* (CVN 76) in accordance with a DOT&E-approved test plan. Reduced availability of Fleet and test assets, and problems with SSDS-based combat system elements is delaying completion of this test. USS *Ronald Reagan* deployed in May 2008.
- COTF conducted FOT&E of the SSDS Mark 2 Mod 1 on the Self-Defense Test Ship (SDTS) in December 2007 in accordance with a DOT&E-approved test plan. COTF has not issued a report on this testing.
- COTF continued FOT&E of the SSDS Mark 2 Mod 2 in conjunction with the IOT&E of the USS *San Antonio* (LPD-17) Amphibious Assault Ship. COTF conducted testing on USS *San Antonio*, USS *New Orleans* (LPD-18), and the SDTS. Reduced availability of Fleet assets, problems with SSDS-based combat system elements, and lack of adequate supersonic, sea-skimming targets, open-loop seeker subsonic targets, and supersonic, high-diving ASCM targets is delaying completion of SSDS Mark 2 Mod 2 operational tests. USS *Mesa Verde* (LPD-19) deployed in March 2008. USS *San Antonio* deployed in September 2008.

Assessment

- Initial indications from completed SSDS Mark 2 Mod 1 tests show that the system remains neither operationally effective nor suitable due to continued significant deficiencies with sensor coverage, multi-ship interoperability (command and control), weapon integration, hardware reliability, and training. Testing demonstrated that the SSDS Mark 2 Mod 1 software reliability is improved.
- Completed SSDS Mark 2 Mod 2 tests highlighted deficiencies regarding sensor performance in the LPD-17 Advanced Enclosed Mast Structure, vulnerabilities to certain ASCM threats, and weapon performance in scenarios that include potential fratricide.
- The major elements of both the SSDS Mark 2 Mod 1 and Mod 2 combat systems collectively have a large number of high severity software trouble reports (STR). Taken

separately, the probability of occurrence is low in most instances. However, the large number of high severity STRs increases the probability that one or more may occur in an operational situation.
- Testing identified end-to-end system engineering deficiencies and inadequate preparatory tests of SSDS-based combat system elements that are not part of the SSDS program leading to poor weapon system performance during operational testing.

Recommendations
- Status of Previous Recommendations. The Navy has not completed any of the FY06 or FY07 recommendations.
- FY08 Recommendations. The Navy should:
  1. Assign a high priority to correct and demonstrate with adequate operational testing identified SSDS Mark 2 Mod 1 sensor coverage, multi-ship interoperability (command and control), weapon integration, hardware reliability, training, and weapon engagement scheduling problems to preclude further CVN deployments with ineffective and unsuitable SSDS Mark 2 Mod 1 systems.
  2. Assign a high priority to correct and demonstrate with adequate operational testing identified SSDS Mark 2 Mod 2 sensor performance and weapon performance problems to preclude further LPD-17 class deployments with deficient SSDS Mark 2 Mod 2 systems.
  3. Develop a plan for more robust, end-to-end systems engineering and associated developmental/operational testing of SSDS-based combat system elements.
  4. Ensure availability of adequate supersonic sea-skimming, supersonic high-diving, open-loop seeker subsonic, and Threat D ASCM targets for planned SSDS operational tests.
  5. Ensure availability of Fleet assets for all planned SSDS Mark 2 operational tests.
  6. Assign a high priority to correct identified high severity STRs in major SSDS Mark 2 Mod 1 and Mod 2 combat system elements.