

Small Surface Combatant (SSC) Modification to the Littoral Combat Ship (LCS)

Executive Summary

- In December 2014, the SECDEF approved the Navy's recommendation to limit the Small Surface Combatant (SSC) requirements to what could be accomplished within cost constraints using a modification to the existing Littoral Combat Ship (LCS) Flight 0+ baseline configurations.
- In August and October 2015, the Navy delivered two drafts of the Capability Design Documents (CDD) that relegate all mission performance measures, other than the two measures for force protection against surface and air threats, to Key System Attributes rather than Key Performance Parameters (KPPs), which permits the combat capabilities desired in these follow-on ships to be traded away as needed to remain within the cost constraints. As a result, the new SSC could, in the extreme, be delivered with less mission capability than desired and with limited improvements to the survivability of the ship in a combat environment. In fact, the SSC could meet all its KPPs without having any mission capability.

System

- In 2014, the SECDEF authorized the Navy to restructure the LCS program to build the final 20 ships in the program (ships 33 through 52) to a revised version of the LCS Flight 0+ baseline design. The revised design, potentially starting in FY19, is designated the SSC; the Navy is now also calling it a Fast Frigate. Some SSC components and design changes yet to be identified may also be incorporated into LCS hulls 25 through 32 (FY16 – FY18).
- The revised design that the Navy wants to use for the SSC includes additional or improved built-in equipment for Surface Warfare (SUW), Anti-Submarine Warfare (ASW), and Anti-Air Warfare. These ships are expected to be heavier than the Flight 0+ baseline LCS design and have a lower maximum sustained speed and un-refueled range. They would retain some modularity to enable them to be configured for either full SUW or ASW missions by swapping portions of the mission modules:
 - From the SUW mission package, the following would be removed to convert to full ASW mission capability:
 - 30 mm guns
 - Ship-launched (Longbow) HELLFIRE Missile
 - 11 m boats
 - From the ASW mission package, the following would be removed to convert to full SUW mission capability:
 - Variable Depth Sonar (active transmitter)
 - ASW Engagement Weapons for helicopter
- The SSC will not be able to perform the mine countermeasure mission.



- While the Navy has not released a final design, it is considering the following modifications to the LCS Flight 0+ baseline:
 - An improved three-dimensional air surveillance radar
 - An upgrade of the ship's air defense capability to include Sea Rolling Airframe Missile Anti-Ship Missile Defense System (already part of the *Independence* variant seaframe)
 - An over-the-horizon SUW anti-ship missile
 - An improved electronic warfare capability
 - Improved decoy systems for air defense
 - A multifunction towed-array passive sonar system
 - Torpedo defense and countermeasures equipment
 - Increased magazine armor
 - 25 mm guns
- The Navy has not made a decision on the SSC seaframe. Currently, two variants are produced:
 - The *Freedom* variant is a semi-planing monohull design constructed of steel (hull) and aluminum (deckhouse) with two steerable and two fixed-boost water jets driven by a combined diesel and gas turbine main propulsion system.
 - The *Independence* variant is an aluminum trimaran design with two steerable water jets driven by diesel engines and two steerable water jets driven by gas turbine engines.

Mission

- The Maritime Component Commander will employ SSC to conduct ASW or SUW tasks depending on the mission components fitted into the seaframe. Commanders can employ LCS in a maritime presence role in any configuration to build and strengthen maritime partnerships by training and operating with smaller, regional navies.
- The Navy has not yet published a Concept of Operations for the SSC, but the Navy reported in its 2014 SSC assessment

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report that the SSC would operate as an ASW or SUW escort for high-value units, in a surface action group focused on ASW or SUW, or operate independently ahead of the strike group preparing the operational environment for joint force assured access to critical littoral regions. The level of Probability of Raid Annihilation requirement indicated in the draft CDD implies the SSC is likely to operate under an air defense umbrella provided by other units as determined necessary by the operational commander.

Major Contractors

An acquisition strategy for the 20 SSC has not been approved and no contracts have been authorized. The current LCS production lines are:

- *Freedom* class variant (mono-hull design)
 - Prime: Lockheed Martin Maritime Systems and Sensors – Washington, District of Columbia
 - Shipbuilder: Marinette Marine – Marinette, Wisconsin
- *Independence* class variant (trimaran design)
 - Prime: Austal USA – Mobile, Alabama
 - Shipbuilder: Austal USA – Mobile, Alabama
- Mission Packages
 - Future Mission Package Integration contract awarded to Northrop Grumman – Los Angeles, California

Activity

- In November 2014, in response to the SECDEF's February 2014 memorandum tasking the Navy to examine the needs of the fleet and propose alternate designs to procure a small combatant with capabilities consistent with modern frigates, the Navy recommended a SSC design based on minor modification to the LCS.
- In December 2014, the SECDEF directed the Navy to move forward with a multi-mission SSC based on the existing LCS Flight 0+ baseline configurations.
- The Navy is still in the process of developing the SSC acquisition strategy, the detailed ship designs, and selecting the systems and components for this modification.
- During 2-4QFY15, the Navy developed a draft CDD, which is currently under review but expected to be approved in FY16.
- In August and October 2015, DOT&E reviewed two versions of the draft CDD and provided critical comments on the document to the Joint Staff and the Navy.

Assessment

- The latest draft SSC CDD requires that the modified LCS be multi-mission capable, more lethal, and more survivable. The SSC is required to have mission system components from the LCS SUW and ASW mission modules to allow the ships to conduct some degree of the SUW and ASW missions simultaneously. Additionally, the draft SSC CDD cites that based on cost, schedule, and performance, components of an LCS mission package may be installed on a full time basis for space, weight, power, and cooling (SWaP-C) savings. However, because of SWaP-C limitations inherent in the current LCS design, the SSC most likely will not meet all of the requirements specified in the draft CDD simultaneously. It will most likely require swapping mission modules to provide either the full mission capability for SUW or ASW as directed by the Force Commander.
- The latest draft CDD relegates all mission performance measures, other than the two measures for force protection against surface and air threats, to Key System Attributes rather than KPPs, which permits the combat capabilities desired in

- these follow-on ships to be traded away as needed to remain within the cost constraints. As a result, the new SSC could, in the extreme, be delivered with less mission capability than desired and with limited improvements to the survivability of the ship in a combat environment. In fact, the SSC could meet all its KPPs without having any mission capability.
- The vulnerability reduction features proposed for the SSC provide no significant improvement in the ship's survivability. Notwithstanding potential reductions to its susceptibility due to improved electronic warfare system and torpedo defense, minor modifications to LCS (e.g., magazine armoring) will not yield a ship that is significantly more survivable than LCS when engaged with threat missiles, torpedoes, and mines expected in major combat operations.
- The current LCS seaframes do not have sufficient separation and redundancy in their vital systems to recover damaged capability. Because the SSC design is not substantially different from the LCS Flight 0+ baseline and will not add much more redundancy or greater separation of critical equipment or additional compartmentation, it will likely be less survivable than the Navy's previous frigate class.
- While the Navy is examining methods to reduce weight, it is anticipated the SSC will be heavier than the existing LCS resulting in a lower maximum sprint speed and less fuel endurance.

Recommendations

- Status of Previous Recommendations. This is the first annual report for this program.
- FY15 Recommendations. The Navy should:
 1. Improve the final CDD by developing clearly-defined mission-focused requirements for SUW, ASW, and Air Warfare, and specifying them as KPPs for each focused mission configuration.
 2. Consider implementing additional survivability improvement measures (e.g., shock hardening, redundancy of vital systems, etc.) to make SSC more survivable in combat.