

PAPER TITLE: **Optimized Spatial Query Functions for the Digital
Nautical Chart**

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The United States Navy has an Electronic Chart Display & Information System (ECDIS) currently in full scale development. This system is called the Navigation Sensor System Interface or NAVSSI (AN/SSN-6). The NAVSSI will utilize the Digital Nautical Chart (DNC) database for operation. The DNC is a global marine charting database being developed by the United States Defense Mapping Agency (DMA). The DNC has been designed specifically for use with Marine Geographic Information Systems (GIS). Use of the DNC with NAVSSI will replace the use of paper nautical charts for safe ownship navigation of U.S. Navy vessels.

The DNC is under development by the U.S. Defense Mapping Agency (DMA). Due to the high feature content of nautical charts, there is extensive feature attribution required within the database. In addition, there are unique characteristics associated with paper nautical charts, such as mariner notes and warnings, which must be efficiently handled for electronic display on demand by the user. This paper will primarily discuss the implementation of an optimal two-level spatial query function associated with electronic displays utilizing the DNC.

In addition, this paper will present a background on the NAVSSI project and cover the design of the system hardware and software. There will be detail presented on the software design and the electronic navigation tools now available to the navigator and bridge crew. NAVSSI compliance with the International Maritime Organization (IMO) ECDIS performance standards will be discussed as well as some unique Navy missions satisfied by the NAVSSI. The NAVSSI accepts navigation inputs from the GPS, DGPS, OMEGA, SATNAV and Inertial navigation systems and these inputs are filtered to provide the best available position, attitude and time data.