Navy Network-Centric Warfare Concept: Key Programs and Issues for Congress

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Summary

Network-centric warfare (NCW) is the Navy’s central concept for organizing its efforts to transform itself for military operations in the 21st Century. NCW focuses on using information technology (IT) to link together Navy ships, aircraft, and shore installations into highly integrated networks. It could significantly improve U.S. naval capabilities and lead to substantial changes in naval tactics, doctrine, and organization. Key programs for implementing NCW include the Cooperative Engagement Capability (CEC), the IT-21 program, and the Navy-Marine Corps Intranet (NMCI). Congress has closely followed and expressed concern for some NCW programs, particularly NMCI. This report may be updated if developments warrant.

Network-Centric Warfare

The concept of network-centric warfare (NCW) emerged in 1997 and has become the Navy’s central concept for organizing its efforts to change and transform itself for 21st Century military operations. NCW focuses on using advanced information technology (IT) – computers, high-speed data links, and networking software – to link together Navy ships, aircraft, and shore installations into highly integrated computer/telecommunications networks. Within these networks, ships, aircraft, and shore installations will share large amounts of critical information on a rapid and continuous basis. The Navy believes that NCW will dramatically improve Navy combat capability and efficiency by helping the fleet to achieve "speed of command" (an ability to generate and execute commands at much higher speeds), which will permit U.S. naval forces to outpace adversary decisionmaking and thereby "lock-out" (i.e., foreclose) potential adversary strategies:

Reliance on NCW is at the heart of the current C4I [command, control, communications, computers, and intelligence] efforts in the Department of the Navy.... Network Centric Warfare increases the speed, precision, and effectiveness of Naval
forces. NCW enables the Navy to attain information superiority, mass effects instead of forces, and disrupt the enemy’s ability to carry out its strategy.¹

**Key NCW Programs**

The Navy’s effort to implement NCW involves several IT procurement efforts. Key among these are the Cooperative Engagement Capability (CEC) program, the IT-21 investment strategy, and the Navy-Marine Corps Intranet (NMCI). Each of these is discussed below.

**CEC.** The Cooperative Engagement Capability (CEC) system links U.S. Navy ships and aircraft operating in a particular area into a single, integrated air-defense network in which radar data collected by each platform is transmitted on a real-time (i.e., instantaneous) basis to the other units in the network.² Each unit in the CEC network fuses its own radar data with data received from the other units. As a result, units in the network share a common, composite, real-time air-defense picture. CEC will permit a ship to shoot air-defense missiles at incoming anti-ship missiles that the ship itself cannot see, using radar targeting data gathered by other ships and aircraft. It will also permit air-defense missiles fired by one ship to be guided by other ships or aircraft. The Navy has stated that CEC is a "central element" of NCW that "provides a revolutionary improvement in battle group air and missile defense capability.... CEC also has promising potential for Joint Service application with systems such as [the] Army Patriot [surface-to-air missile system] and the Air Force Airborne Warning and Control System (AWACS)."³

Then-Secretary of Defense William Perry strongly endorsed the system in 1994 and told the Navy to accelerate it. The system achieved further impressive results in early 1996 in a test known as Mountain Top and was granted certification for initial operational capability (IOC) at the end of FY1996. The Navy wants to install the system on its aircraft

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² In very simplified form, a CEC installation on a ship or aircraft includes an antenna for receiving and transmitting radar data and a computer processor (with CEC software) for processing received radar data and fusing it with radar data collected by the ship’s or aircraft’s own radars. Procuring and installing a CEC system costs a few to several million dollars per ship or aircraft.

³ Statement of The Honorable John W. Douglass, Assistant Secretary of the Navy (Research, Development and Acquisition), *et al.*, op. cit., p. 20.
carriers, Aegis-equipped cruisers and destroyers, selected amphibious ships, and E-2C Hawkeye carrier-based airborne early warning aircraft over the next several years.  

Tests of CEC aboard Navy ships in 1998 revealed significant interoperability (i.e., compatibility) problems between the CEC system’s software and the software of the air-defense systems on some ships, particularly surface combatants equipped with the Baseline 6 version (the most recent version) of the Navy’s Aegis air defense system. In response to these problems, the Navy restructured its CEC testing and implementation schedule and undertook a major two-year effort, now completed, to identify, understand, and fix the problems. The CEC system, with the new fixes, passed its technical evaluation (TECHEVAL) testing in February and March 2001 and final operational evaluation (OPEVAL) testing in April and May 2001.

Navy officials have acknowledged that the CEC system (and NCW in general) will place strains on the limited data-transmission bandwidth capability currently available to the Navy. One contractor has proposed modifying CEC with a capability called the Tactical Component Network (TCN). Advocates of TCN argue that incorporating it into CEC will reduce the bandwidth required by CEC without reducing CEC effectiveness.

**IT-21.** IT-21, which stands for IT for the 21st Century, is the Navy’s investment strategy for procuring the desktop computers, data links, and networking software needed to establish an intranet for transmitting tactical and administrative data within and between Navy ships. The IT-21 network uses commercial, off-the-shelf (COTS) desktop computers, data links, and networking software in the Navy’s ships.

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6 Bandwidth capability can be compared to the diameter of a water pipe or the number of lanes on a highway: The greater the bandwidth (i.e., the greater the pipe diameter of the larger the number of lanes), the larger the amount of data that can be transmitted.

computers and networking software and will provide a multimedia (text, data, graphics, images, voice, and video) organizational intranet similar to the Capitol Hill intranet or corporate intranets. The Navy has testified that “This IT infrastructure is essential to realizing the Department’s shift” to NCW. The IT-21 concept originated in the Pacific Fleet in 1995-1996. The Navy plans to link most of the fleet into the IT-21 intranet within the next few years. The Navy believes IT-21 will significantly improve U.S. naval warfighting capability and achieve substantial cost reductions by significantly reducing the time and number of people required to carry out various tactical and administrative functions.

**NMCI.** The Navy-Marine Corps Intranet (NMCI) is a corporate-style intranet that will link together Navy and Marine Corps shore installations in much the same way that the IT-21 effort will link together Navy ships. When completed in 2003, the NMCI will include a total of about 360,000 computer work stations, or “seats,” at scores of Navy and Marine Corps installations in the continental United States, Hawaii, Guam, Puerto Rico, Guantanamo Bay (Cuba), and Iceland. In October 2000, the Navy announced that it had awarded an industry team led by Electronic Data Systems (EDS) Corporation a $6.9 billion contract for installing, supporting, and periodically upgrading the NMCI over the next 8 years. The first 42,000 NMCI seats at 29 sites have been installed, and the system is scheduled to be fully implemented over the next year or two. Navy officials are considering whether to eventually merge the IT-21 and NMCI efforts.

The 106th Congress expressed concern over the difficulty of identifying the total cost of the NMCI effort in Navy budget documents, the Navy’s ability to finance NMCI effort

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8 Statement of The Honorable John W. Douglass, Assistant Secretary of the Navy (Research, Development and Acquisition), et al, op. cit., p. 20.


without disrupting other important Navy programs,\textsuperscript{14} the pace at which the Navy planned to implement NMCI,\textsuperscript{15} the Navy’s ability to properly structure and manage the huge NMCI contract (the largest networking-services IT contract undertaken by a federal agency),\textsuperscript{16} the potential impact of NMCI implementation on employees of current naval networking and telecommunications systems,\textsuperscript{17} and whether the network should be extended to cover installations in the Marine Corps, which already has its own service-wide network.

In response, the Navy took actions to improve the visibility of NMCI costs in its budget, stated that the NMCI would be financed to a large degree using funds programmed for older IT procurement programs that the NMCI will supercede, stated that implementing NMCI would have only a small net employment impact, and argued that implementing NMCI in the Marine Corps as well as the Navy would result in greater efficiencies and lower overall costs for the two services. At Congress’ direction, the plan for implementing NMCI was restructured to begin with a smaller number of initial installations, so that the success of the NMCI effort could be more carefully assessed before the program is expanded to cover larger parts of the Navy and the Marine Corps.

### Issues for Congress

Potential issues for the 107\textsuperscript{th} Congress pertaining to NCW include the following:

**Tracking implementation of NMCI.** Potential NMCI issues concern the success of the initial NMCI installation efforts, whether funding requirements for the program are displacing other high-priority Navy or Marine Corps efforts, and whether installations using NMCI are achieving the kinds of improvements in operational efficiency that NMCI advocates have projected. The conference report (H.Rept. 107-333 of December 12, 2001) on the FY2002 defense authorization act (S. 1438/P.L. 107-107) contains a provision (Section 362) that permits the Navy to proceed with the NMCI project after meeting certain testing requirements. The provision also requires the Navy to submit to Congress a report on the scope and status of NMCI testing and the implementation of the NMCI network, and to identify a single individual whose sole responsibility will be to direct and oversee the NMCI program. The provision also requires GAO to study the


\textsuperscript{15} See, for example, Bohmfalk. Navy Still Working Through Intranet Issues With OSD, Congress. *Inside the Navy*, August 14, 2000.


\textsuperscript{17} See, for example, Bohmfalk, Christian. Hundreds of Naval Employees Change Jobs Because of NMCI. *Inside the Navy*, May 14, 2001.
impact of NMCI implementation on the rate structure of naval shipyards and other repair depots. The conferees expressed concern about delays in implementing the program and the resulting shortage of data about the viability and performance of NMCI. (See pages 55-57 and 641-642 of the conference report.)

Resolving implementation issues with CEC. Issues include whether the interoperability problems have been fully resolved, whether the Navy’s restructured installation schedule is appropriate,\(^{18}\) and what, if anything, CEC implementation problems reveal about the challenges of incorporating advanced IT into complex weapon systems.

Adequacy of transmission bandwidth for CEC. Another issue is whether TCN should be incorporated into CEC as part of the effort to manage limits on available bandwidth, and what implications TCN would have for the evolution of, and acquisition strategy for, the CEC system.

Questions concerning NCW in general.\(^ {19}\) Congress may consider other potential issues relating to NCW in general, including the following:

- **Tactics, doctrine and organization:** The Navy recognizes that it needs to develop new tactics, doctrine, and organizations to take full advantage of NCW; this could significantly alter current practices, if not the leadership culture itself, and pose challenges for retraining Navy personnel.
- **Overall fleet design:** The Navy is currently adding NCW to an overall fleet architecture that has evolved in a gradual fashion over the last several decades. The issue is whether the Navy has taken the relatively new concept of NCW adequately into account in its thinking and planning for future ship and aircraft designs and the future overall architecture of the fleet.
- **Allied interoperability:** If NATO and other allied navies invest in NCW-enabling technologies, U.S.-allied naval interoperability (the ability to operate together effectively in multinational efforts) could be significantly increased; if they do not, maintaining naval interoperability could become increasingly difficult.
- **Information security:** The Navy acknowledges that it needs to work on measures for preventing, detecting, and responding to attempts by outsiders to illegally enter the computer networks being created to implement NCW.\(^ {20}\)

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