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

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Abstract. Programs for implementing network-centric warfare (NCW) in the Navy include the Cooperative Engagement Capability (CEC) and Naval Integrated Fire Control- Counter Air (NIFC-CA) systems, the IT-21 program, and FORCEnet. A related program is the Navy-Marine Corps Intranet (NMCI). Congress has expressed concern for some of these programs, particularly NMCI.

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

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Summary

Programs for implementing network-centric warfare (NCW) in the Navy include the Cooperative Engagement Capability (CEC) and Naval Integrated Fire Control-Counter Air (NIFC-CA) systems, the IT-21 program, and FORCEnet. A related program is the Navy-Marine Corps Intranet (NMCI). Congress has expressed concern for some of these programs, particularly NMCI. This report will be updated as events warrant.

Network-Centric Warfare

Network-centric warfare (NCW), also known as network-centric operations (NCO), is a key element of defense transformation. NCW focuses on using computers, high-speed data links, and networking software to link military personnel, platforms, and formations into highly integrated local and wide-area networks. Within these networks, personnel are to share large amounts of information on a rapid and continuous basis. The Department of Defense (DOD) and the Navy view NCW as a key element of defense transformation that will dramatically improve combat capability and efficiency.¹

Examples of Navy NCW Programs

CEC And NIFC-CA. The **Cooperative Engagement Capability (CEC)** system links 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. Units in the network share a common, composite, real-time air-defense picture. CEC will permit a ship to

¹ For more on NCW, see CRS Report RL32411, *Network Centric Warfare: Background and Oversight Issues for Congress*, by Clay Wilson. For more on defense transformation and naval transformation, see CRS Report RL32238, *Defense Transformation: Background and Oversight Issues for Congress*; and CRS Report RS20851, *Naval Transformation: Background and Issues for Congress*, both by Ronald O'Rourke.

shoot air-defense missiles at incoming anti-ship missiles that the ship itself cannot see, using radar targeting data gathered by other units in the network. It will also permit air-defense missiles fired by one ship to be guided by other ships or aircraft. The Navy wants to install the system on aircraft carriers, Aegis-equipped cruisers and destroyers, selected amphibious ships, and E-2C Hawkeye carrier-based airborne early warning aircraft over the next several years. The system has potential for being extended to include Army and Air Force systems.

Tests of CEC aboard Navy ships in 1998 revealed significant interoperability (i.e., compatibility) problems between CEC's software and the software of the air-defense systems on some ships. In response, the Navy undertook a major effort 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.

In 2002, the primary CEC contractor, Raytheon, faced potential competition from two firms — Lockheed and a small firm called Solipsys — for developing the next version of CEC, called CEC Block II. Solipsys had devised an alternative technical approach to CEC, called the Tactical Component Network (TCN). Solipsys entered into a teaming arrangement with Lockheed to offer TCN to the Navy as the technical approach for Block II. In late-December 2002, Raytheon announced that it had agreed to purchase Solipsys. In early-February 2003, Raytheon and Lockheed announced that they had formed a team to compete for the development of Block II. Some observers expressed concern that these developments would reduce the Navy's ability to use competition in its acquisition strategy for Block II. As an apparent means of preserving competition, the Navy in mid-2003 announced that it would incorporate open-architecture standards into Block II divide the Block II development effort into a series of smaller contracts for which various firms might be able to submit bids. In December 2003, however, the Navy canceled plans for developing Block II in favor of a new plan for developing a joint-service successor to Block I.

The conference report (H.Rept. 108-283, page 290) on the FY2004 defense appropriations act (H.R. 2658/P.L. 108-87) directed the Navy to keep the Appropriations committees informed on potential changes to the CEC Block II acquisition strategy and stated that, if the Navy adopts a new acquisition strategy, "the additional funds provided in this act for CEC Block 2 may be merged with and be available for purposes similar to the purposes for which appropriated." The House and Senate Armed Services Committees, in their reports (H.Rept. 109-89, page 178, and S.Rept. 109-69, pages 108-109, respectively) on the FY2006 defense authorization bill (H.R. 1815/S. 1042), expressed satisfaction with the Navy's efforts to improve interoperability between the CEC system and other combat direction systems and ended a requirement established in the conference report (H.Rept. 105-736) on the FY1999 defense authorization act (P.L. 105-261) for the Navy to report to Congress on these efforts on a quarterly basis.

The **Naval Integrated Fire Control-Counter Air (NIFC-CA)** system is to combine the CEC system with the E-2D Advanced Hawkeye carrier-based airborne radar and control system (AWACS) aircraft and the SM-6 version of the ship-based Standard air defense missile (both now in development) to expand the Navy's networked air-defense capabilities out to the full range of the SM-6 missile. Among other things, NIFC-CA will enable Navy forces at sea to provide overland defense against enemy cruise missiles.

Current Navy plans call for NIFC-CA to be partially deployed in FY2011 and fully deployed in 2014.²

IT-21. IT-21, which stands for Information Technology 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 and networking software that provide a multimedia organizational intranet. The Navy believes IT-21 will 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. FY2008 funding requested for IT-21 "continues to provide Integrated Shipboard Network Systems (Increment 1) procurement and installation to achieve a Full Operational Capability (FOC) for all platforms by FY2011."³

FORCenet. FORCenet is the Navy's overall approach for linking various networks that contribute to naval NCW into a single capstone information network for U.S. naval forces. The Navy has highlighted FORCenet as being at the center of Sea Power 21, the Navy's vision statement for the future. The Navy states that "Undersea FORCenet Satellite Communications (SATCOM) FY2008 funding provides the Internet Protocol (IP) connectivity between Anti-Submarine Warfare (ASW) platforms to conduct collaborative ASW. Connecting the platforms for collaborative ASW enables sharing of time critical queuing, classification, and targeting data, provides a means for precluding blue-on-blue engagement, and ensures rapid positioning of ASW platforms into the best attack posture to prosecute the threat submarine."⁴

Some observers have criticized FORCenet for being insufficiently defined.⁵ The Naval Network Warfare Command issued a functional concept document for FORCenet in February 2005, but Navy officials acknowledged at the time that the concept was not yet adequately defined and stated that an improved version of the document would be published in 2006.⁶

The conference report (H.Rept. 107-732) on the FY2003 defense appropriations bill (H.R. 5010/P.L. 107-248) expressed concern about "the lack of specificity and

² For discussions of NIFC-CA, see Amy Klamper, "Fire Control," *Sea Power*, March 2006, available online at [http://www.navyleague.org/sea_power/mar06-19.php], and John Ailes, presentation entitled "Introduction to Naval Integrated Fire Control-Counter Air (NIFC-CA)," available online at [<http://enterprise.spawar.navy.mil/getfile.cfm?contentId=359&type=C>]

³ U.S. Department of the Navy, *Highlights of the Department of the Navy FY 2008 Budget*, p. 3-15 (i.e., Section 3, page 15).

⁴ U.S. Department of the Navy, *Highlights of the Department of the Navy FY 2008 Budget*, p. 3-15 (i.e., Section 3, page 15).

⁵ See, for example, Malina Brown, "Van Riper: Navy's ForceNet Too Broad, Mysterious To Be Meaningful," *Inside the Navy*, Apr. 7, 2003. See also Malina Brown, "Mullen Acknowledges ForceNet Concept Not Clearly Understood," *Inside the Navy*, July 5, 2004.

⁶ Jason Ma, "Naval Network Warfare Command Issues FORCenet Concept Document," *Inside the Navy*, Feb. 14, 2005.

documentation on the program,” and directed the Navy to submit a detailed report on it by May 1, 2003 (page 279). The Senate Appropriations Committee, in its report (S.Rept. 108-87, page 156) on the FY2004 defense appropriations bill (S. 1382), expressed support for the FORCENet program but also said it “is concerned that no requirements have been approved or implemented and that there is duplication of effort, especially in the areas of experimentation and demonstrations. The Committee directs that the FORCENet program establish these requirements, test them within the Navy Warfighting Experimentations and Demonstrations line (PE0603758N), and release the approved requirements changes as quickly as possible.”

NMCI. A significant program related to NCW is the Navy-Marine Corps Intranet (NMCI), which is a corporate-style intranet linking more than 300 Navy and Marine Corps shore installations. NMCI is to include a total 344,000 computer work stations, or “seats.” As of January 2006, the Navy had ordered 341,000 seats and fully implemented about 264,000. The Navy planned to achieve steady-state operation of all NMCI seats during FY2007. In October 2000, the Navy awarded an industry team led by Electronic Data Systems (EDS) Corporation an \$6.9-billion, five-year contract for installing, supporting, and periodically upgrading the NMCI. In October 2002, Congress, through P.L. 107-254, authorized a two-year extension to this contract, which is now worth \$8.9 billion. Congress has closely followed the program for several years.

The NMCI implementation effort has experienced a number of challenges and delays. A 2005 report from DOD’s weapons-testing office identified problems found with the program in 2003.⁷ On September 30, 2004, the Navy and EDS restructured the terms of the NMCI contract to consolidate the number of performance measures and focus on measuring results rather than implementation steps. User reaction to the system reportedly has been mixed.⁸ A December 2006 Government Accountability office (GAO) report on NMCI stated:

NMCI has not met its two strategic goals — to provide information superiority and to foster innovation via interoperability and shared services. Navy developed a performance plan in 2000 to measure and report progress towards these goals, but did not implement it because the program was more focused on deploying seats and measuring contractor performance against contractually specified incentives than determining whether the strategic mission outcomes used to justify the program were met. GAO’s analysis of available performance data, however, showed that the Navy had met only 3 of 20 performance targets (15 percent) associated with the program’s goals and nine related performance categories. By not implementing its performance plan, the Navy has invested, and risks continuing to invest heavily, in a program that is not subject to effective performance management and has yet to produce expected results.

⁷ Jason Ma, “DOT&E Report Identifies NMCI Problem Areas Found During 2003 Test,” *Inside the Navy*, Feb. 7, 2005.

⁸ Navy Marine Corps Intranet Public Affairs, “Eight Percent of Customers Surveyed Satisfied With NMCI,” *Navy Newsstand*, Mar. 6, 2007; John Hoellwarth, “After Five Years, NMCI Still Frustrates,” *Defense News*, July 17, 2006: 48; John Hoellwarth, “NMCI ‘Unfriendly’ — And Running Late,” *Navy Times*, Mar. 27, 2006: 24; Christopher J. Castelli, “Lawmaker With Reserve Experience Rips ‘Customer Unfriendly’ NMCI,” *Inside the Navy*, Mar. 20, 2006.

GAO's analysis also showed that the contractor's satisfaction of NMCI service level agreements (contractually specified performance expectations) has been mixed. Since September 2004, while a significant percentage of agreements have been met for all types of seats, others have not consistently been met, and still others have generally not been met. Navy measurement of agreement satisfaction shows that performance needed to receive contractual incentive payments for the most recent 5-month period was attained for about 55 to 59 percent of all eligible seats, which represents a significant drop from the previous 9-month period. GAO's analysis and the Navy's measurement of agreement satisfaction illustrate the need for effective performance management, to include examining agreement satisfaction from multiple perspectives to target needed corrective actions and program changes.

GAO analysis further showed that NMCI's three customer groups (end users, commanders, and network operators) vary in their satisfaction with the program. More specifically, end user satisfaction surveys indicated that the percent of end users that met the Navy's definition of a satisfied user has remained consistently below the target of 85 percent (latest survey results categorize 74 percent as satisfied). Given that the Navy's definition of the term "satisfied" includes many marginally satisfied and arguably somewhat dissatisfied users, this percentage represents the best case depiction of end user satisfaction. Survey responses from the other two customer groups show that both were not satisfied. GAO interviews with customers at shipyards and air depots also revealed dissatisfaction with NMCI. Without satisfied customers, the Navy will be challenged in meeting program goals.

To improve customer satisfaction, the Navy identified various initiatives that it described as completed, under way, or planned. However, the initiatives are not being guided by a documented plan(s), thus limiting their potential effectiveness. This means that after investing about 6 years and \$3.7 billion, NMCI has yet to meet expectations, and whether it will is still unclear.⁹

Department of Defense officials conceded problems with the implementation of NMCI at a March 28, 2007, hearing before the Terrorism and Unconventional Threats and Capabilities subcommittee of the House Armed Services Committee.¹⁰

Issues for Congress

Potential issues for Congress include the following:

- Is the Navy's implementation of NMCI adequate? To what degree is the system achieving its goals?
- Does the Navy have a clear and adequate acquisition strategy for developing a successor to CEC Block I?
- Is the FORCEnet concept adequately defined?

⁹ Government Accountability Office, *Information Technology[:] DOD Needs to Ensure That Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers*, GAO-07-051, Dec. 8, 2006.

¹⁰ See Mark A. Kellner, "Top DoD Officials Concede NMCI Woes On Hill," *NavyTimes.com*, Mar. 28, 2007.

- Is the Navy taking sufficient actions for preventing, detecting, and responding to attacks on NCW computer networks?
- Is the Navy taking sufficient steps to provide adequate satellite bandwidth capacity to support NCW?
- Are Navy efforts to develop new tactics, doctrine, and organizations to take full advantage of NCW sufficient?
- Has the Navy taken the concept of NCW adequately into account in planning its future fleet architecture?¹¹
- What effect will implementation of NCW in U.S. and allied navies have on U.S.-allied naval interoperability?

¹¹ For additional discussion of Navy force-structure planning, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.