

Networks Afloat

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NAVY CANES PROGRAM TO CONSOLIDATE SHIP NETWORKS THROUGH THE USE OF MATURE CROSS-DOMAIN TECHNOLOGIES AND A COMMON INFRASTRUCTURE.

Plotting a course toward increased information capabilities across afloat network enclaves, the Navy has released a draft request for proposal for a major new program called the Consolidated Afloat Networks and Enterprise Services (CANES).

A major goal of the program, according to the draft document released by the Space and Naval Warfare Systems Command (SPAWAR) in support of the Program Executive Office-Command, Control, Communications, Computers, and Intelligence (PEO-C4I), Tactical Networks Program Office (PMW 160), is to consolidate and reduce the number of afloat networks through the use of mature cross-domain technologies and a common computing environment infrastructure.

CANES is also aimed at reducing the infrastructure footprint and associated costs for hardware afloat and providing increased reliability, application hosting, and other capabilities to meet current and projected warfighter requirements. In addition, it seeks to federate Net-Centric Enterprise Services service-oriented architecture (SOA) core services to the tactical edge to support overall Department of Defense C4ISR application migration to an SOA environment.

While industry teaming arrangements had not been announced as this issue went to press, the expectation is that most or all major U.S. defense network developers, including BAE Systems, Boeing, General Dynamics C4 Systems, Lockheed Martin, Northrop Grumman and Raytheon, will target some level of program participation.

As the process was going forward, representatives of several potential contenders for the project spoke about their perspectives on this vital IT effort. Given competitive sensitivities, however, several of the interested parties focused on broader topics of joint service and Navy networking, with subsequent comments noting that applicability to the CANES program.

Bill Rau, director of emerging business in the Communications Networks Division at General Dynamics C4 Systems, pointed to that company's background as the prime contractor for the Army's large integrating contract, the Warfighter Information Network-Tactical (WIN-T).

"WIN-T really covers everything from the Global Information Grid [GIG] down close to the edge, for the Army," he explained. "It provides connection to the edge, so once it comes down out of the GIG and gets into the command post and such, the final connection to the soldier comes either through Future Combat System or the Joint Tactical Radio System Handheld, Manpack, small form fit programs. But WIN-T really controls all that access."

"That's the Army side of this thing," he observed. "And what we've done is to leverage that technology into the Navy, and we're also pursuing work in the Air Force. "The Navy has a similar situation to the Army's, but instead of one big program, it's got a series of programs," he said. "They've got the Automated Digital

Networking System (ADNS), which is the program we have. On ships, CANES will be the program. CANES is the LAN on the ship, while ADNS manages the connectivity of the LAN on the ship to the WAN, to get that information back through the GIG and back to shore where it needs to go, or to the next ship over.”

The Navy’s tactical edge network was called ForceNET until recently, but now is known as Naval Networking Enterprise 2016.

UNIQUE ENVIRONMENT

The company’s experience with ADNS has provided a grasp of the unique challenges stemming from an afloat environment, Rau said. “The afloat environment, first of all, is a different environment physically. It’s a demanding environment. Secondly, there are differences to what the Army does in Land- WarNet, in that the Army deals with a bunch of individual users.

“The Navy is more of a backhaul challenge in that a ship at sea is a lot like an office building, where you’ve got a lot of users on a network or series of networks. And if you think of it as a building, you’ve got to connect that entire building back to the telephone system and back through to the Internet. And it’s the same problem with a ship at sea. We’re doing a lot of backhaul work for lots of users on the other side of what we’re doing,” he continued.

“A carrier, for example, will have some 3,000 LAN drops on it, each one with a user on it doing various things at various security levels. And we need to gather all that data up in the ADNS system, properly prioritize that traffic, and then get it back where it needs to go, based on the particular policy that’s been imposed,” Rau said.

“Certainly more satellites and more data pipes are good,” he acknowledged. “But, in the near term, using the pipes they have a lot more efficiently is where the emphasis is. And that’s where ADNS comes in: Allowing multiple users to share that same pipe efficiently with the proper priorities on traffic is a near-term way to achieve more bandwidth to the individual user.”

General Dynamics C4 Systems takes a broad enterprise approach to the undertaking, added Tom Fredette, business development manager in the Communications Networks Division. “It’s not just about the network program. It’s not just about ADNS. We look at the whole connection—from the user and the application on a ship back to the GIG ashore. That includes the network on the ship, which will be CANES.

“It includes ADNS, which not only provides that connectivity to shore but also provides the prioritization, routing and the efficient use of that bandwidth,” Fredette said. “We also work on the radio programs. We provide radio equipment and SATCOM terminals to facilitate traffic for ADNS and back to the shore. We also participate in programs like MUOS, where we’re providing the shore stations for the Mobile User Objective System, which is the new UHF SATCOM system.”

Fredette pointed to company strengths in several areas, including total cost of ownership. “We believe that one of the driving factors behind the Navy’s initiation of the CANES program is the cost of maintaining legacy networks aboard ship. Acquisition costs [including both initial procurement and development costs] for a DoD system are typically only 15 percent of total ownership cost, so the Navy must look beyond acquisition cost and consider total life cycle costs.

“The cost to maintain shipboard network systems has grown exponentially for the Navy,” he pointed out. “Commercial computer network technology advances at a rapid pace, quickly making it expensive or impossible to buy spare parts to maintain existing networks on ships. Legacy systems lacking open-architecture designs and rife with interdependencies between unique or proprietary hardware and software implementations quickly become very expensive to upgrade with newer technology.”

To combat this, the Navy is applying the ARCI model, named for the Acoustic Rapid COTS Insertion program on which the model was originally used.

Summarizing the overall approach, Fredette observed, “We look across that spectrum, from the LAN on the ship, to the ADNS router on the ship, through the radio equipment, back to the network operations center

ashore, and back to the GIG.”

“You’ve got to reach beyond individual programs and look at it as an entire system,” Rau agreed.

BATTLESPACE NETWORKING

Ann Karagines, Network and Information Systems business development director at Boeing, was also able to point to her company’s extensive experience in joint service and Navy battlespace networking.

“Boeing has a multitude of battlespace networking experience and has made several advances with its network-enabled solutions such as Future Combat Systems and Groundbased Missile Defense,” she noted. “Additionally, Boeing achieved several space and ground communications milestones critical for network-centric operations on its Wideband Global SATCOM, Joint Tactical Radio Systems Ground Mobile Radio, and Family of Advanced Beyond-line-of-sight Terminals programs.”

“Boeing has also been network-enabling aircraft, improving situational awareness for the warfighter by adding network-centric communications capabilities to aircraft such as the AH-64D Apache helicopter and the Navy EA-18G Growler, and adding networkcentric capabilities into two operational Air Karagines also pointed to Boeing’s recent addition of a new experimentation center in Suffolk, Va., crediting it with “bringing its full modeling, simulation, analysis and experimentation capability to government customers in the high-tech Hampton Roads, Va., area, in addition to Boeing’s network of experimentation centers in the United States, United Kingdom and Australia.

“Boeing’s approach leverages capabilities and technologies across the company, as well as the best of commercial and defense industries,” she said. “This offer ensures delivery of a CANES solution that emphasizes reduced life cycle costs, greater speed to deployed capability, and the prospect of users being able to reconfigure systems and capabilities to support changing missions. This system solution also enables the Navy to meet its objectives of commonality, reduced costs, collapsed networks and an innovative cross-domain solution. Additionally, the Boeing team will leverage joint service investments in C4I technologies from DoD programs currently in development.

“Boeing is committed to the CANES vision,” Karagines added. “We stand ready to bring together our unique expertise with the best of industry to provide the best value solution.”

BAE Systems, meanwhile, recently broke ground on its own maritime development center for C4I systems at its Liberty Station complex in Point Loma, Calif. With it, the company hopes to establish a strong presence to focus on the research, development, testing and integration of large-scale C4I network systems to help solve current, emerging and future customer mission requirements.

Jon Dorn, director, business development and enterprise best practices for BAE Systems, Network Systems, combined his networking background discussions with a bit of history. “The core group of BAE Systems that is leading the CANES effort really cut its teeth by doing about 15 years of Navy C4I applications,” he said. “The most recent one that we have been working is the Distributed Common Ground System-Navy, which is the ISR suite for the Navy.”

SERVICE PROVIDER LAYER

After reviewing a myriad of BAE Systems program activities and accomplishments during that period, Dorn explained, “All of these things that were individual organizations have now been put under one [BAE Systems] organizational umbrella. So what we now bring to the Navy and to our other customers is roughly 15-plus years of advanced networking technology for switching, understanding how to build with COTS, and all of the modeling and simulation that’s needed, as well as the multilevel security solutions.

“What makes CANES very interesting to us is that they are trying to put a common infrastructure service provider [ISP] layer onboard ship,” Dorn said. “And that’s something we have actually delivered to other customers outside of the Navy, although I can’t go into those customers because of security reasons. “So if you team the networking play and the communications play that is now integrated under one umbrella organization, combined with the fact that we have actually delivered production ISP solutions—data centers

and those kinds of things—makes CANES a ‘wow,’” he said. Additional BAE Systems resources and corporate experience applicable to the CANES afloat environment include BAE Systems Technology Services Sector in Charleston, S.C., which “does all C4I installation, integration and testing for all non-nuclear ships.

“The Navy needs CANES,” he observed. “And I am very happy to say that in the midst of changing administrations and changing different leaders and decision-makers within the Navy, everybody—the fleet, SPAWAR and Naval Network Warfare Command—understands the value of CANES and is pushing forward with the program.”

“SPAWAR has really done a good job of focusing on the value proposition of consolidation, virtualization, commonality and modularity, and doing that by applying what they call ‘cross-domain solution technology,’” Dorn said. “The other thing that I have to applaud the PMW 160 team on is that they separated the SOA system component from the core system developer project. By doing that, they really brought down the risk of the CANES ISP layer. So what they’re telling industry is that through virtualization and through security, and through the integration of the right type of SOA components, you can achieve this ‘Internet on a ship.’ “SPAWAR has done an excellent job of doing their homework before putting the draft RFP on the streets,” he concluded. “They have really done their homework on specifications, sizing and other topics. Our engineering team has nothing but good things to say about the SPAWAR team’s preliminary work on this.”

The PEO-C4I vision provides a compelling paradigm shift for future C4ISR systems and networks, said Michael Twyman, vice president for integrated command and control systems at Northrop Grumman. “The vision in the draft RFP indicates a focus on affordable capability, ability to scale or expand, and the criticality of cross-domain solutions to support future joint operations. The CANES solution will require an approach that goes well beyond network or computing environment consolidation to minimize total life-cycle cost, exceed operational thresholds, and counter emerging threats.

“Our systems-engineering strategy focuses on minimizing life-cycle cost and optimizing the tradeoffs among C4ISR, networking, shipboard installation, maintenance, and administration, technology insertion, and cyber-security threat requirements,” said Twyman, whose company is the largest U.S. shipbuilder and provider of command-and-control systems to the U.S. Navy.

Current industry expectations project release of the actual RFP in early 2009, with a possible 45-day turnaround for proposals. □

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