

Net-Centric Warfare Is Changing the Battlefield Environment

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U.S. military forces today are creating and executing plans using capabilities that were not available as recently as Operation Desert Storm. This is due to net-centric warfare and the information transfer and sharing that is made available by the Internet. Today, the nation's armed forces, armed with superior technology, gain power from information, access, and speed. This article presents these new capabilities and outlines how the Defense Information Systems Agency's contributions to net-centric warfare span across all areas of the Department of Defense.

Net-centric warfare is not just about technology; it is an emerging theory of war and the next art and science of warfare to be exploited. Net-centric warfare involves a cultural change in relationships that includes networking over the Internet among large groups of people. America's armed forces are now creating and executing plans using capabilities that were not available 12 years ago during Operation Desert Storm in Iraq when the military advantage still came from numbers of platforms and people in the battlespace. Today, our nation's military forces, armed with superior technology, gain power from information, access, and speed.

Air Force Gen. Dick Myers, chairman of the Joint Chiefs of Staff, identified "the application of force, using forces in an integrated way, and having the eyes, ears, and command and control to carry it off" as the most important factors in Operation Iraqi Freedom (OIF). This is also the core of net-centric operations.

Net-centric warfare combines a powerful military force with information superiority, giving American service men and women greater awareness of our own forces, the enemy, and the battlefield environment. America now has a smaller, more lethal deployed military force. Net-centric operations permit forces to focus on specific targets, protecting the lives of American and coalition forces, as well as countless non-combatants.

"With less than half of the ground forces and two-thirds of the air assets used 12 years ago in Desert Storm, we have achieved a far more difficult objective ... In Desert Storm, it usually took up to two days for target planners to get a photo of a target, confirm its coordinates, plan the mission, and deliver it to the bomber crew. Now we have near real-time imaging of targets with photos and coordinates transmitted by e-mail to aircraft already in flight. In Desert Storm, battalion, brigade, and division commanders

had to rely on maps, grease pencils, and radio reports to track the movements of our forces. Today, our commanders have a real-time display of our armed forces on their computer screens," said Vice President Richard Cheney.

Much of the United States' success during OIF is due to tremendous advancements in the world of informa-

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tion sharing and situational awareness, for both U.S. and coalition forces. This enables essential command, control, communications, and intelligence components. Such technology advancements, many of which the Defense Information Systems Agency (DISA) developed and/or supported, include the following:

- The DISA-operated Defense Information System Network (DISN) carries the vast majority of the Department of Defense (DoD) telecommunications. As such, the DISN provides global classified and unclassified voice, data, video, and transmission services through predominantly commercial assets supple-

mented with military value-added features. Those military features provide greater global reach, security and encryption options, interoperability, and high levels of reliability. These features ensure that U.S. forces are not denied access to critical information, geography, or battle space. In Operation Enduring Freedom (OEF) in Afghanistan in 2001 and OIF, there was a literal explosion in the demand for bandwidth by deployed forces. More than 50 times more bandwidth was used per person in OIF than in Desert Storm. Greatly expanded bandwidth, voice, and data capacity combined with an impressive set of early net-centric capabilities allowed Army Gen. Tommy Franks and his battle staff to collaborate, plan, and execute their mission with a smaller footprint forward with virtual support from rear assets. When full-up hostilities began in the U.S. Central Command (USCENTCOM) area of operations, deployed forces had what they needed to support the myriad of systems military commanders used to control forces on land, sea, and air. Through advanced planning, U.S. forces also had the requisite bandwidth for voice, data, and imagery.

- The Global Command and Control System (GCCS) provided a Common Operational Picture (COP) across military service lines for near-instantaneous command. Since the global war on terrorism started, and has continued through OIF, DISA has successfully upgraded the GCCS software 27 times. Those upgrades were accomplished while the system remained fully operational, serving the needs of all nine combatant commanders. In response to a request from the commander, USCENTCOM, DISA also accelerated the delivery of a key intelligence capability several months early. In OIF, the improved intelligence and

Operation Iraqi Freedom Successes

- First installation of fiber optics into Southwest Asia – 138x increase to 555 Mbps.
- Ubiquitous commercial satellite communications (SATCOM) to supplement military SATCOM – 10x increase to 3200 Mbps.
- Data network expansion – 6x increase to SIPRNET and NIPRNET to 130 Mbps.
- First all-service, Special Operations Forces, red, blue, and intelligence-fused picture.
- Extensive coordinated use of unmanned aerial vehicles to include supporting Command, Control, Communications, Computers and Intelligence networks.
- First real-time in-transit visibility plus logistics queries in minutes instead of hours.
- First use of interoperable desktop collaboration tools for C2.
- First widespread use of VTC as a C2 system in wartime – 22x increase in conferences since 9-11.
- Extensive coalition information sharing.
- First use of record copy traffic with attachments.
- 39x increase in voice (Defense Switched Network) and 5x increase in Defense Red Switch Network.

imagery capability and availability of Army ground force information on the network provided truly joint situational awareness for the first time that included all military services, red, blue, Special Operations Forces, and intelligence information for the warfighter. These COP and Common-Intelligence Picture capabilities provided a crucial enhancement to the sensor-to-decision-maker-to-shooter requirements. GCCS Version 4.0 is on track for delivery in 2004. About 25 percent of GCCS is Web-enabled today. That will increase to about 50 percent with the GCCS 4.0 upgrade. DISA is also partnering with U.S. Joint Forces Command to transform the joint deployment process.

- DISA's Joint Staff Support Center installed GCCS terminals for both the secretary of defense and the chairman of the Joint Chiefs of Staff. Both the secretary and the chairman used GCCS reports to brief the president on oper-

ations and force locations in and around Iraq. This marked the first time a common operational picture was available at all levels from the president down to the task force commanders.

- The Global Combat Support System (GCSS) is another success story. A DoD public key infrastructure-enabled service and portal environment, GCSS provided feeds from a variety of logistics systems and was integrated with GCCS. USCENTCOM directed that all materiel resources flowing to the theater be monitored through the In-Transit Visibility (ITV) system. In support of OIF, DISA installed a network guard that moved unclassified information to the Secret Internet Protocol Router Network (SIPRNET). Queries that had previously taken hours were available in minutes – including ITV information – on the command and control network. GCSS queries increased more than 17 times from about 175 queries per month in September 2001 to more than 3,100 queries per month during OIF.
- Extensive collaboration was another huge new global war on terrorism initiative. DISA supported USCENTCOM's major command and control business process reengineering effort with a variety of collaboration capabilities. The USCENTCOM commander and his staff used DISA-provided secure video teleconferencing (VTC), as well as desktop collaboration with the Defense Collaboration Tool Suite (DCTS) at unprecedented levels and on a 7 x 24 basis. VTC, a huge consumer of bandwidth, proved to be a significant driver behind theater bandwidth upgrades in support of OEF and OIF. Deployed forces used the whiteboard, chat, and shared file capability in DCTS extensively. USCENTCOM discouraged desktop VTC, however, to reduce the impact on limited SIPRNET bandwidth.
- The Enhanced Mobile Satellite Service (EMSS) experienced exponential growth during the global war on terrorism and OIF. EMSS provides 7x24 global satellite phone and data coverage. Since Sept. 11, 2001, the number of users increased by 344 percent and usage increased by 4,800 percent to more than 2.57 million call minutes per month. This system allowed Special Operations Forces to call in air strikes from horseback in Afghanistan by permitting instantaneous communications in areas without any infrastructure whatsoever.

Net-centric warfare's effectiveness has greatly improved in 12 years. Desert Storm forces, involving more than 500,000 troops, were supported with 100 megabits per second (Mbps) of bandwidth. Today, OIF forces, with about 350,000 warfighters, had more than 3,000 Mbps of satellite bandwidth, which is 30 times more bandwidth for a force 45 percent smaller. U.S. troops essentially used the same weapon platforms used in Operation Desert Storm with significantly increased effectiveness.

DISA's contributions to net-centric warfare span across all areas of the DoD. When the president needs to talk with anyone in the world, at any security level, the White House Communications Agency is with him at all times every day of the year. When someone searches the Web for information on a particular piece of military equipment, chances are they are looking at a page from the Defense Technical Information Center. If a non-commissioned officer deconflicts frequency spectrum issues in Iraq or Afghanistan among the military services and their equipment, that officer probably works at DISA's Joint Spectrum Center. When a Navy F-14 flies up to an Air Force KC-10 and talks to the boom operator, DISA's Joint Interoperability Test Command already ironed out any wrinkles associated with multi-service communications connections. Obviously, these DISA organizations have a unique and essential role in America's defense.

Although DISA's focus remains the warfighter, it has received taskings to facilitate command, control, and coordination between DoD and non-DoD elements. The Defense Red Switch Network (DSRN), a secure voice capability, was established more than 10 years ago to support the White House, Joint Staff, combatant commanders, and other critical command and control (C2) users. It is now being expanded to include 18 additional federal government agencies in support of numerous homeland defense security initiatives. During the space shuttle Columbia recovery operations, U.S. Northern Command required immediate VTC to coordinate actions between 23 sites on a Saturday morning. Team DISA was able to respond to the situation and provided needed service during the emergency operation.

At DISA, we take our warfighter support job very seriously. We recognize we cannot rest on past successes so we are also preparing for the future – integrated information *on demand*. Products and services provided by DISA in support of OIF and OEF demonstrate that we clearly understand that we must be able to surge

the backbone and deliver joint and interoperable services globally and on demand. We are focused on that path of support. We recognize the significant challenges we face in information networking and providing power to the edge. We have developed a strategy to continue transforming DISA to meet the transformational demands of revolutionizing warfare. Air Force Gen. Ralph E. Eberhart, commander of NORTHCOM, has noted those challenges. He recently said, "We are usually pretty good at sharing information vertically. But we need technology that can share information horizontally."

The stove-piped systems of today with limited interoperability must be replaced with a secure, robust, intelligent, and interconnected nodal network of tomorrow. *Power*, in the form of *quality information* for individual warfighters on the front lines – wherever they are – must be made available to provide a synchronized, real-time vision of the battlespace with lightweight Web-based tools to facilitate planning and execution.

A representative sample of some of our efforts include support of the Transformational Communications Study (TCS), the Standardized Tactical Entry Point (STEP) migration to DoD Teleports, Global Information Grid Bandwidth Expansion (GIG-BE), GIG Enterprise Services (GIG-ES), and Joint C2.

A robust, integrated telecommunications infrastructure is a must for future warfare. The TCS seeks to architect the future communications satellite constellation by removing bandwidth as a consideration and moving to a seamless, end-to-end network information sharing environment supported by high-speed, high capacity, and interoperable communications. DISA has had and will continue to have a major role in the TCS effort. In addition to providing requirements analysis and architectural engineering support, DISA also performs the challenging task of transition analysis.

STEPs were used extensively during OIF. Tomorrow's DoD Teleports will far exceed today's STEP capabilities.

The DoD Teleport program, an initiative to increase DISN capability, allows deployed forces to connect through teleports to a multitude of commercial satellite frequencies. DoD teleports will be telecommunications collection, access, and distribution points that provide deployed warfighters with multi-band, multimedia, and worldwide reach-back that far exceed current capabilities. To meet today's combatant commanders' immediate needs, DISA has accelerated

the fielding of DoD teleports with IOC being reached last summer.

The GIG-BE will create a trusted ubiquitous *bandwidth-available* environment to improve national security intelligence, surveillance, reconnaissance, and command and control information sharing. The GIG-BE initiative brings high-speed bandwidth to numerous key locations globally, and will connect approximately 102 key intelligence, command, and operational locations with a state-of-the-art optical mesh network. DISA is currently working with the military services, combatant commands, and agencies to ensure that the resources provided by GIG-BE are optimized.

GIG-ES is an exciting new arena for DISA. It is envisioned as the virtual place where information can be integrated to make net-centric warfare possible. GIG-

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ES will provide us with a new way of thinking about and providing transformational C2 services to joint forces. GIG-ES will replace *legacy* platform-centric systems with net-centric concepts using a web-enabled, data centric *power-to-the-edge* construct. It builds upon the Defense Information Infrastructure Common Operating Environment (DII COE) to provide a tailorable services approach built upon a robust communications capability.

Just as the DII COE is morphing to GIG-ES, we expect a similar transformation for GCCS to Joint Command and Control (JC2) transformation. JC2 will employ a secure, collaborative, Web-enabled and tailorable command-and-control architecture and *capability packages* that provide decision superiority as well as vertical and horizontal interoperability. We expect JC2 to take advantage of GIG-ES services as they mature. Users will access fused information sources through common IP-based network services, common data representations, and common catalogs/directories using intelligent, thin, and

ubiquitous (e.g., wireless, personal decision assistant-type) clients. The JC2 Operational Requirements Document made its way through the Joint Requirements Oversight Council last year. We anticipate heavy DISA involvement in the JC2 Analysis of Alternatives.

The DISA team is very proud of its warfighter support over the past two years. But that will never be good enough. There are many challenges ahead: new technology, new business processes, and expanded partnerships. With a foot firmly in the present to sustain and improve operational capability, we have put our transformation foot forward as we move to net-centric warfare developments of the future. ♦

About the Author



Lt. Gen. Harry D. Raduege Jr. is director, Defense Information Systems Agency, Arlington, Va. As director, he leads a worldwide organization of more than 8,200 military and civilian personnel. This organization engineers, develops, acquires, and provides integrated command and control and information networks to serve the needs of the president, secretary of defense, joint chiefs of staff, the combatant commanders, and other Department of Defense components under all conditions ranging from peace through war. Raduege is also responsible for operating the most complex and far-reaching military information networks in the world. He entered the Air Force in 1970 through the Air Force Reserve Officer Training Corps program at Capital University, Columbus, OH. Prior to assuming his current position, he was the director of command control systems, Headquarters North American Aerospace Defense Command and United States Space Command, and director of communications and information, Headquarters Air Force Space Command. He also served as the chief information officer for all three commands.

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