S. Marine Corps forces operating in Afghanistan rely on two related tactical communications systems to maintain connectivity with rear echelon forces. These two pieces of equipment are a manportable switching module designed to manage voice, data and video transmissions, and a vehicle-mounted system for on-the-move communications. The equipment is now undergoing upgrades to support

Marine forces more efficiently in the field.

The Joint Enhanced

Core Communica-

tions System (JECCS)

By Henry S. Kenyon

and the Transition Switch Module (TSM) are key elements of the Marine Corps' tactical networking capability. JECCS is a high mobility multipurpose wheeled vehicle (HMMWV)mounted system housed in a shelter in the back of the vehicle. The Marine Corps inventory comprises 14 JECCS units, with one attached to each Marine expeditionary unit, according to Master Gunnery Sgt. Darryl Dyson, USMC, JECCS project officer.

JECCS is designed to support Marine expeditionary units by providing a firstin communications capability. Vehicle mounted and generator powered, it provides voice, data, non-secure and secure Internet communications for headquarters and command posts. An integrated processor-controlled communications and network management system, JECCS supports long haul, tactical communications and secure/nonsecure voice services that allow connectivity to a standardized tactical entry point via a wideband satellite communications link. The system also facilitates command and control portions of the Joint Task Force Enabler (JTFE) package within a mobile, vehicular platform. The JTFE provides Marine units with first-in backbone connectivity to Defense Information Systems Network, or DISN, services.

JECCS mainly supports Marine headquarters at the expeditionary unit, expeditionary brigade or the expeditionary force forward headquarters levels. JECCS also can support and seamlessly connect with the Digital Technical

Expeditionary Communications Systems Support Marine Forces

Commercially based technologies keep expeditionary units connected.





The Joint Enhanced **Core Communications** System (JECCS) is a vehicle-based mobile communications configuration designed to support command posts and headquarters at the tactical edge. Capable of providing Internet protocol network and voice communications links to theater commands. JECCS is a first-in capability used to support advanced units during a deployment.

Control, TSM, Tactical Data Network Gateway and other systems to support larger follow-on forces. Master Gunnery Sgt. Dyson notes that, besides being attached to Marine expeditionary units, several JECCS units are part of "jump packages"—readily deployable communications and command and control systems—designed to support an expeditionary unit's general in the field.

But the primary role for JECCS is to assist forward units, says Maj. Edelen Parker, USMC, TSM project officer at U.S. Marine Corps Systems Command. He explains that once a forward headquarters is established and begins to grow with additional services and capabilities, the role of JECCS is handed off to the TSM while JECCS moves forward to support units close to the tactical edge.

The TSM consists of three major components, the deployable end office suite (DEOS), which replaces legacy Tri-Service Tactical (TRI-TAC) switches that originally were deployed in the early 1980s; the remote subscriber access module (RSAM); and the deployable integrated transport suite (DITS). The DEOS provides voice circuit switching, subscriber access and call service attendant capabilities. The RSAM can extend telephone and dialup data services to remote subscribers, and the DITS is used with a DEOS to provide bandwidth management, multiplexing and technical control functions. Scott Chafin, a senior engineer with ITT, explains that the new system is more cost effective, replacing a \$300,000 voice switch with a smaller, less expensive unit. ITT developed both JECCS and the TSM.

The TSM supports deployed forces by providing local and remote subscriber access, circuit switching and multiplexing, a call service attendant, transmission multiplexing, transmission security and a manual patching capability. Primarily used for voice communications, the TSM's DEOS component provides a digital switching capability based on commercial technology. Maj. Parker notes that one of the difficulties with TRI-TAC equipment is that it is proprietary technology that does not interface readily with other systems. By comparison, the



Transition Switch Module (TSM) is a transportable modular system engineered to manage and support voice communications in the field. The TSM usually replaces JECCS in a headquarters environment when additional capabilities become available. Based on commercial telecommunications hardware and software, the TSM also replaces legacy proprietary and analog switches and multiplexers.

TSM can be upgraded quickly to meet new standards, and it can interoperate easily with other commercially based communications systems.

Chafin notes that all of the TSM units requested by the Marine Corps now are operating in Afghanistan. He adds that the DITS is used in the field to connect satellite systems to command elements. These combined communications capabilities then are extended to lower echelon units.

Technology is helping the Marine Corps gain more capability for its money. Chafin explains that in the past, additional bandwidth for front line users was considered expensive. TRI-TAC systems provide voice communications at speeds of 16 kilobytes per second (Kbps) to 32 Kbps. He notes that the Corps originally viewed lower bandwidth voice communications as a means to cut operating costs. However, new technologies used in the TSM and JECCS offer similar savings while providing dramatically higher bandwidth. Chafin says that systems are available that can provide the equivalent of a T-1 line, offering 24 channels compressed to 188 Kbps.

For the TSM program, ITT engineers modified commercial components for use in rugged tactical environments. Chafin says that the company approached vendors and asked them to modify their own equipment for tactical operations. A key part of this modification was replacing any proprietary components with commercially available parts that could be procured in the field. He notes that Marine Corps units in Afghanistan now can purchase replacement parts from local suppliers.

One of the program's developmental challenges was locating vendors willing to modify their own equipment. But the TSM has been so successful that the service has issued its own U.S. Marine Corps part number and designation that is used across the entire Corps, Chafin says. For example, he notes that fiber optic light compressors used in the TSM now are being included in other Marine Corps programs.

John Ledbetter, ITT's TSM program manager, notes that the TSM and JECCS equipment have served in Afghanistan for nearly three years. One of the main challenges in deploying the systems was training. He explains that Marine support personnel were trained in the old TRI-TAC system and adds that deployed troops have not been able to retrain on the new equipment, which uses commercial switching technology. A class has been established at the Twentynine Palms Marine Corps Base in California to train new personnel, but he notes that a gap exists between troops trained on the old TRI-TAC systems and those who have learned to operate the new equipment. He says that ITT service centers supporting deployed forces have fielded a number of calls from deployed Marines unfamiliar with the new systems who

are requesting assistance in setting up networks. However, Ledbetter states that the TSM and JECCS systems can be accessed remotely and repaired by trained staff within seconds, adding that system down time is less than five percent.

The TSM originated from an urgent operational request issued by the Marine Corps in 2005. To meet the order, ITT designed, built and deployed the system within 20 months. Ledbetter says the current program has met the initial number of units requested and now is working to increase the number of units delivered to the force. The systems also are approaching a technology refresh cycle, and the upcoming goal is to field modified models, he says.

Among the desired modifications is modernizing the cryptographic system. Chafin explains that the Marine Corps revisits its hardware and software every two years for technology refreshment because commercial systems are being upgraded constantly. He cites the example of a fiber optic line driver that originally had a bandwidth of 8 megabytes per second, but within 18 months that capability had doubled to 16 megabytes per second.

Maj. Parker shares that his upgrade concerns are focused on keeping up with new commercially based multiplexing and software standards and technologies. He states that his other responsibility is to follow requirements from the U.S. Defense Information Systems Agency, which is responsible for managing and operating all of the Defense Department's computer and communications networks. However, the major notes that because TSM is not as data centric as JECCS, it is less prone to continuous changes because of new standards.

Technological developments also have reduced the size and weight of switching and networking equipment. Chafin notes that the Marine Corps wants more systems with flexible plug and play capabilities such as the JECCS and TSM. He adds that the program's future goals are to extend coverage to echelons below the regimental level.

As both programs mature, their technology will be upgraded. Ledbetter explains that ITT and Marine engineers meet on a quarterly basis to review the program's technology and potential areas for modernization and upgrades. One recent example is the JECCS fiber optics system, which is being upgraded. He notes that the Marine Corps recently updated the fiber optics in most of its equipment, but because of the deployment process, it was unable to do so for JECCS. Upgrading the fiber optics is a key priority for the next technology refresh cycle, he says.

WEB RESOURCES

U.S. Marine Corps Systems Command: www.marcorsyscom.usmc.mil ITT: www.itt.com

The JECCS and TSM communications systems featured in this article use REDCOM® HDX & SLICE® equipment.



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