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Headquarters,
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FA24

MANAGING AND DEFENDING THE GLOBAL NETWORK

FA 24 TELECOMMUNICATIONS SYSTEMS ENGINEER
U.S. ARMY SIGNAL REGIMENT

ALSO:
Chief of Signal comments on the Signal Regiment Campaign Plan

Chief of Signal's Comments

Newly published Signal Regiment Campaign Plan highlights three major areas

Fellow members of the Signal Regiment:

Greetings from your Chief of Signal. I am extremely proud of the tremendous contributions the Signal Regiment is making to the Global War on Terrorism and Army Transformation during these challenging times. Your continuing sacrifices, hard work, and professionalism have positioned our Regiment to be a key enabler and integrator for the warfighter and the service provider of choice. I thank you for your dedication and selfless service.

I'm going to depart from the norm of addressing the theme of this *Army Communicator* and focus my comments on the *Signal Regiment Campaign Plan* which we published in January 2007. A link to the SRCP is available on the LandWarNet-eUniversity website at https://lwn.army.mil. The SRCP highlights some of the Regiment's major accomplishments and outlines the way ahead. It's a living document that we plan to publish about every 18 months. We will update you on our accomplishments and initiatives in future editions of the *Army Communicator.* Our vision, mission, goals, and priorities have an enduring quality and will remain relatively constant over time.

The Signal Regiment's top five priorities are to support the war on terrorism; modernize our Signal equipment; transform the School House, restructure the Signal Force, and lead Signal personnel changes. To support these priorities, the Regiment deploys LandWarNet capabilities and operationalized the Signal Center by providing training support to the Warfighter during all phases of the Army Force Generation cycle; deploying mobile training teams, incorporating distributed learning, and providing rapidly deployable technical support teams where needed. The Regiment is continuing to modernize and transform itself to meet the needs of the operational force as we move from a switch-based architecture to everything over Internet Protocol technologies integrating Joint Network Node and the Warfighter Information Network-Tactical and incorporating a single integrated transport system. Our most valuable asset remains our people — dedicated Soldiers, leaders, government civilians, and contractors. As the Army transforms, we continue to develop new specialities, eliminate old and shape new career paths and opportunies to meet the needs of the Army, and inspire a lifetime of service.

BG Randolph P. Strong
Chief of Signal

The SRCP highlights our goals, initiatives, and accomplishments in three major areas. The "Soldiers and Leaders" portion identifies changes and updates regarding specialties, professional development and career management. The "LWN-U" section describes how the Regiment trains and educates Signal Soldiers and leaders on LWN. Technology is quickly changing. The Regiment plays a key role as the developer and integrator of LWN. Section three, "Future Capabilities", describes initiatives based on technological advances and lessons learned from previous and current military operations. This plan outlines the way ahead for the Regiment in the areas of Soldiers and Leaders, LWN-U, and future capabilities. I encourage

Chief of Signal Comments Continued on the Inside Back Cover

The *Signal Regiment Campaign Plan* highlights some of the Regiment's major accomplishments and outlines the way ahead. It's a living document that we plan to publish sbout every 18 months.

U.S. ARMY SIGNAL CENTER AND FORT GORDON

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Voice of the Signal Regiment

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By Order of the Secretary of the Army:

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General, United States Army
Chief of Staff

What's an FA24?

Telecommunications Systems Engineering

Editor's Note: *Functional Area 24 officer career field, Telecommunications Systems Engineering, provides the Army with a core of professional telecommunication systems engineers to support the nation's full spectrum dominance strategy. Telecommunications Systems Engineering officers engineer, design, develop, install, implement, integrate, test, accept, and upgrade telecommunication systems and networks in support of the Army, Joint, Combined, and Department of Defense operations worldwide. FA 24 is a functional area within the Information Operations Career Field.*

How do you become an FA24?

By LTC C.P. Watkins

Each year the Army conducts Functional Designation boards to allow officers to transfer out of their basic branch into a functional area. These boards consider officers in their fourth and seventh year of service. The two boards are conducted concurrently but they are distinct and separate boards with different rules.

Officers are notified through their Army Knowledge Online email addresses about the pending board, how to submit preferences, and how to download the board message.

The preference window is usually open from late July to early August. The board meets in September and Human Resources Command announces the results by December. This September officers from cohort year groups 2000 and 2004 will be considered for functional designation.

The early FD board considers officers in their fourth year of service from certain basic branches. Some branches do not have the population to support letting officers transfer to a functional area, so officers from these branches are ineligible for consideration.

The list of ineligible branches could change each year, so reading the board message should determine if your branch is eligible.

Only certain functional areas (the ones with sizable requirements for captains) participate in the early FD board but FA24 has participated in every early FD board to date. Another unique aspect of the early FD board is that only officers who submit a preference are considered and officers can only be designated into the functional areas they prefer or they are left in their basic branch.

When submitting preferences, an officer may submit one, two, or three functional areas in order of preference.

This way, you will always either get what you ask for or get your basic branch. Officers in the four-year board are never involuntarily designated. After the board, if not satisfied with the results, you have to wait until the seven-year mark to try again or you can appeal the results to go back to your basic branch.

At this time HRC is not accepting appeals or branch transfer requests for officers before they have their seven-year FD board. So far, the Army has conducted two early FD boards. About 200 officers submitted preferences each year (210 from YG2002 and 148 from YG2003) and a little more than 100 officers were designated each year as a result of these boards. FA24 received seven officers from year group 2002 and six officers from year group 2003.

The seven-year FD board considers all officers from all Army competitive category branches. Officer preference is a consideration, but Army requirements could result in some officers being involuntarily designated out of their basic branch into something they did not request.

Officers who submit a preference must submit three preferences, but one of the preferences can be their basic branch. Officers who do not submit a preference are considered "needs of the Army" candidates.

If not satisfied with the outcome of the FD board, you may submit an appeal any time up to 180 days after the results are released. Appeals go directly from the officer to the appeals board. On the 181st day after the results are released, the

appeal window closes and officers must request a branch transfer in order to effect a change.

The paperwork for this branch transfer is essentially the same but the transfer is routed through both the losing and gaining branches at HRC for comment and vote. Decision authority on appeals and branch transfers is the Army G1. You can find more information about how to submit your appeal or branch transfer request on this website: https://www.hrc.army.mil/site/protect/active/opfamdd/appeals.htm

The Army used to allow officers to "dual-track". This meant that officers could stay in their basic branch but go to training and do some assignments in a functional area. This system was replaced with OPMS 21 in 1998 when officers were formally designated into functional areas or their branch as a single track.

Although this official program has ended, certain branches continue to allow their officers to take a functional area assignment. If interested in going to the FA24 course and to an FA24 assignment, check with your assignment officer to see if he/she can support it. If they say yes, contact the FA24 assignment officer at HRC to request a seat in the next class: DSN 221-2759, COMM 703-325-2759. Check the FA24/FA53 page on AKO (https://www.us.army.mil/suite/page/177996) to see a list of all the FA24 captain jobs in the Army. Check out the forums on this page for tips on preparing your file for the FD board.

LTC Watkins is currently the FA24 Career manager at Army Human Resources Command. His previous FA24 assignments include FA24 course instructor, systems engineer for the Network Command Pentagon Operations Cell, and chief of current operations at the Army Global Network Operations and Security Center. Watkins has a bachelor's degree in Civil Engineering from the University of North Carolina-Charlotte and a master's degree in telecommunications from the University of Colorado. He is a graduate of the Engineer Officer Basic Course, the Infantry Officer Advance Course, Command and General Staff College, and the Telecom Systems Engineering Course.

Acronym QuickScan

AKO – Army Knowledge Online
FA – Functional Area
FD – Functional Designation
HRC – Human Resources Command
OPMS – Officer Personnel Management System
YG – Year Group

FA24 career patterns

By LTC C.P. Watkins

Department of the Army Pamphlet 600-3 describes each officer branch and offers a good start to understanding what being an FA24 officer is about. Chapter 39 describes unique characteristics of Telecommunication Systems Engineering officers along with a suggested career developmental timeline.

But where does this timeline come from? And what does it mean? If you were to map out the careers of several officers in a basic branch, listing the duty positions, locations, and durations of each position, you would see several paths; some sections of the paths would be common across several careers and some sections would be unique.

The common parts of each path would jump out at you. These jobs may be the ones that every officer in the branch should have at some point and may include jobs like platoon leader, company commander, battalion S3/executive officer, battalion commander, etc.

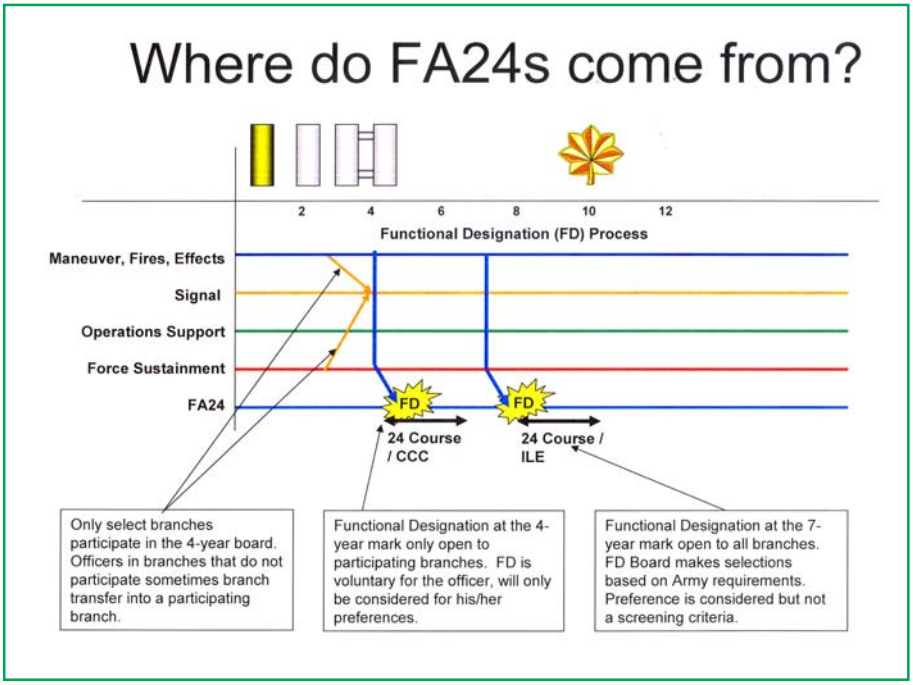


Figure 1. Function Designation

FA24 - TELECOMMUNICATIONS SYSTEMS ENGINEERING
INFORMATION OPERATIONS CAREER FIELD
OFFICE CHIEF OF SIGNAL POSTURE SHEET
APRIL 2007

ATRRS COURSES (SCHOOL CODE: 113)
7E-F70 Information Systems Operations Leveler Course (10 WEEKS)
4C-24A Telecommunications Systems Engineering Course (20 WEEKS)

AC TOPMIS STRENGTH DETAIL REPORT						AC PMAD PROJECTIONS			AC PYRAMID ANALYSIS					
As of: 04/26/07				Proj: 5/31/2007		200702 UAD (AUTHS)				TARGETS				
	AUTH	ASG	%FILL	PASG	P%FILL		FY07	FY08		ARMY	SIGCEN	CURR	PROJ	DELTA
COL	11	14	127%	13	118%	COL	12	13	COL	15	17	11	13	-4
LTC	35	33	94%	27	77%	LTC	31	39	LTC	45	43	35	31	-12
MAJ	106	61	58%	62	58%	MAJ	93	105	MAJ	91	78	106	105	27
CPT	57	7	12%	18	32%	CPT	57	57						
TOTAL	209	115	55%	120	57%	TOTAL	193	214						

FUNCTIONAL DESIGNATION			POPULATION ANALYSIS As of: 04/26/2007											
YG	BOARD	FA24	CURRENT		SERVING AS				BY BRANCH			TOP 5 CONTRIBUTORS		
75-95	FY99-03	127			FA24	TTHS	01/02A	OTHER						
96	FY04	18	COL	12	11	0	0	1	CA	46	23.2%	SC	108	54.5%
97	FY05	9	LTC	46	32	8	2	4	CS	135	68.2%	AV	10	5.1%
98	FY06	12	MAJ	99	59	22	4	14	CSS	17	8.6%	EN	13	6.6%
99-03	FY07	32	CPT	41	4	12	2	23				IN	12	6.1%
												FA	11	5.6%
	TOTAL	198	TOTAL	198	106	42	8	42						

Signal Posture sheet for FA24 career field as of April 2007.

DA PAM 600-3 calls these common jobs key developmental positions and these are the jobs that officers should have at a particular rank in order to give the skills and experiences necessary to successfully discharge his/her duties at the next higher level.

If you were to strip these jobs out of the paths and study the picture, you would notice that some parts would be more unique, but could still be generalized (battalion-level staff, brigade-level staff, recruiting, Reserve Officer Training Corps, Active Components/Reserve Components, etc.). Some parts would be entirely unique for each officer (aide-de camp, instructor, project officer, joint duty, duty with non-Department of Defense agencies, advance civil schooling, training with industry, fellowships, etc.) In most branches, officers can easily recite the key developmental jobs at each rank necessary to be competitive for promotion to the next rank. But most functional areas, FA24 included, do not work this way.

The purpose of the functional area officer is to provide a depth of knowledge in a particular area at all levels of organization.

FA24s have opportunities to receive an exceptional education at the FA24 course, civilian academic institutions, or commercial industry. Their assignments range from Army divisions and corps to Army theater commands, combatant commands, joint units and defense or other governmental organizations. But the theme of the duty is usually common: provide expert engineering and technical communications advice and services to the command. No jobs have been designated more key developmental than others, however by looking at all the authorizations some jobs stand out.

FA24 captains must attend a Captains Career Course and the FA24 course before taking an assignment. Officers are not authorized to take an FA24 assignment before attending CCC and only under the most extreme circumstances will an officer be permitted to take an assignment before attending the FA24 course. Officers may attend any CCC depending on availability of seats.

Probably the best place for a captain to develop FA24 skills early and quickly is a corps/division G6 shop or a signal battalion. These jobs give captains new to the Signal Regiment their first interaction with signal warrants; and this truly should be a captain's goal.

Get to a place where you can learn from a more senior FA24 and some good signal warrants. Put what you learned at the school into practice and get involved with the Telecomm Systems Engineering Course curriculum working group to keep the course current and relevant.

After a captain has one of these two jobs, they are better prepared for the other FA24 captain jobs. A captain with one assignment under his belt may decide to request to be an instructor at Training and Doctrine Command or the Military Academy. This senior captain may go to be an observer/controller at one of the combat training centers or perhaps go to a research and development organization like Army Test and Evaluation Command or Information Systems Engineering Command.

FA24 captains do not typically go to branch immaterial jobs, like ROTC or recruiting but we do have

opportunities with AC/RC. Advance Civil Schooling or Training with Industry are also options. When you study the authorizations, these seem like the kind of opportunities available to captains after their first FA24 assignment.

FA24 captains should develop competencies in the following FA24 critical tasks:

- **Engineer telecom systems into an integrated network**
- **Engineer a network security architecture**
- **Assess a telecom network or network design plan**
- **Conduct current network operations**
- **Plan future network operations**
- **Prepare technical specifications documentation**
- **Evaluate telecommunications technologies**

Company command is something that is typically does not develop the FA24 core competencies. However, all FA24 officers should strive to command. As an FA24 captain in your first assignment you may find that senior officers are very interested in you because of your unique skills. Do whatever it takes to get a command if this is something you'd like to do. Work with branch to get a backfill to the FA24 captain position you're vacating. Under most circumstances, Human Resources Command will support officers who are offered a company command for up to 12 months. And remember, command is not something that's required or something that will give you a leg up on anyone else. It's just something that's fun and personally rewarding.

FA24 officers should complete intermediate level education as soon as possible around the time they are selected for promotion to major. This 14-week temporary duty (there's also a non-resident version) course is offered to officers as soon as they become promotable or even earlier depending on the published ILE slating guidance for that calendar year. ILE is a good course, but more importantly it is the gateway to transforming yourself into a field grade officer. Completing ILE and becoming Military Education Level IV qualified means completing the ILE Core (that's the 14-week course) and the FA24 course. Although an advanced degree or training with industry qualify you as an FA24 officer, only completing the FA24 course counts towards complete MEL IV qualification.

As a FA 24 captain, Network Operations is an integral part of competency development.

The best place for an FA24 major to develop the skills and competencies required of a field grade telecom engineer is either at a corps/division G6 shop, a Theater Network Operations and Security Center, or the Army Global NOSC. FA24 majors can also be assigned to a variety of joint or inter-agency positions once they have completed ILE. FA24 majors should continue to develop and improve the competencies they were introduced to as captains and should seek increased competence in the following additional tasks:

- **Validate a telecommunications network or network design plan**
- **Manage a network and services design project**

Besides ILE, majors should also be looking for other educational opportunities. Joint Professional Military Education Level II is required for joint qualification and is available for any MEL IV-qualified FA24. Advance Civil Schooling and Training with Industry are also ways to broaden your viewpoint beyond the Army into commercial industry and academia.

FA24 lieutenant colonels are eligible to be considered for TNOSC directors or to work in a variety of computer network defense or senior technical advisor positions in joint organizations. At the captain level, FA24s will have experienced tactical-level network engineering and fast-paced current network operations. As majors, FA24s may earn an advanced degree or work a research and development assignment.

As lieutenant colonels, FA24s defend of the Army's LandWarNet in a theater of operations or perhaps across the global information grid. Lieutenant colonel FA24s may be project officers, senior technical advisors, or engineers on higher-level staffs. They use their knowledge and experiences to lead people and manage resources. In some

Acronym QuickScan

AC – Active Component
AGNOSC – Army Global NOSC
ATEC – Army Test and Evaluation Command
CCC – Captains Career Course
HRC – Human Resources Command
ILE – Intermediate Level Education
ISEC – Information Systems Engineering Command
JPME II – Joint Professional Military Education Level II
MEL IV – Military Education Level IV
NETCOM – Network Enterprise Technology Command
NETOPS – network operations
RC – Reserve Component
ROTC – Reserve Officer Training Corps
TNOSC – Theater Network Operations and Security Center
TSEC – Telecom Systems Engineering Course

assignments they may use the competencies they have honed to maneuver on the network to close with and engage adversaries. They understand capabilities and the key terrain in this emerging dimension of conflict.

FA24 lieutenant colonels should continue to develop and improve the competencies they sharpened as majors and should become knowledgeable with the following additional task:

❖ **Manage Information Technology Contracts**

Besides the TNOSC directors, FA24 LTCs may complete joint qualification and continue to gain network operations skills and experiences. FA24 lieutenant colonels may work at U.S. Strategic Command, Defense Information Systems Agency, or at Combatant Command or Army Major Command staffs.

Although there is no yellow brick road of standard key developmental positions for the FA24 officer you can see how certain jobs stand out as important developmental experiences for the FA24 officer. For more information you can see the draft version of the new DA Pam 600-3 on the FA24-Who We Are page on AKO: https://www.us.army.mil/suite/page/363812.

LTC Watkins is currently the FA24 career manager at Army Human Resources Command. His previous FA24 assignments include FA24 course instructor, systems engineer for the NETCOM Pentagon Operations Cell, and Chief of Current Operations at the Army Global Network Operations and Security Center. Watkins has a bachelor's degree in Civil Engineering from the University of North Carolina-Charlotte and a master's degree in telecommunications from the University of Colorado. He is a graduate of the Engineer Officer Basic Course, the Infantry Officer Advance Course, Command and General Staff College, and the Telecom Systems Engineering Course.

FA24 charged with operating/ defending networks

By LTC Mark Merrell and LTC Daniel Matchette

Functional Area 24s are engaged in network battles all over the world. This is particularly true in the Continental United States Theater. The CONUS Theater Network Operations and Security Center is charged with operating and defending the networks in this large, complex, diverse environment.

The C-TNOSC has responsibility for nearly twice as many network devices and users as all the other theaters combined. In addition, the C-TNOSC has several global missions supporting Army operations.

The C-TNOSC, based at Fort Huachuca, Ariz., is responsible for the network security of all U.S. Army installations within the Continental United States. In addition to the security mission, we also monitor and manage systems that support or enable Army operations.

The C-TNOSC is currently undergoing a transformation to become compliant with the Information Technology Infrastructure Library. ITIL is a framework of best business practices for the delivery of high quality information technology services. As part of that transformation, we have developed a Service Catalog that defines functions we perform. These functions, or service areas, are: Communication Services, Computing Services, LandWarNet Operations, and Internal Services.

Communication Services are basic network services. On NIPRNET, those services include: Network Operations; Domain Name Service; reverse Web Proxy and Public Key Infrastructure device registration. C-TNOSC is also responsible for managing telephony firewalls, TSACS (Terminal Server Access Controller System) and SIPRNET DNS.

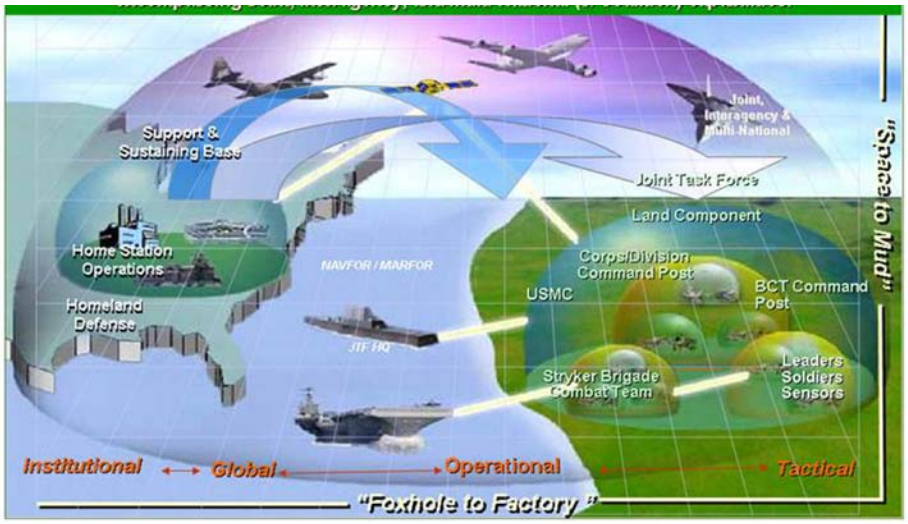
Network Operation services consist predominantly of operating the Top Level Architecture, the primary security interface to an installation. We operate, manage and maintain a TLA at close to 200 locations. Each TLA stack includes, at a minimum, an Army Security Router and an Intrusion Detection System or Intrusion Protection System. The IDS/IPS scans traffic for known signatures of malicious traffic.

In addition to these devices, a TLA stack may include a DNS, a reverse web proxy, and a firewall. Each of these devices provides a layer of security to the installation it is protecting.

We manage ACLs (Access Control Lists) on the ASR to block known malicious IPs and ports used by worms, viruses, or other network attack vectors. We are capable of blocking malicious traffic within minutes of detection on the network. We average about 1.5 million events a week, which generate close to 500 trouble tickets that require human intervention.

One common network attack is to convince a user to open an email with a malicious attachment or visit a web site that surreptitiously downloads malicious files. In conjunction with the Regional Computer Emergency Response Team – CONUS we identify and block these web sites.

The TNOSC is the single authority to operate, manage, and defend the Army enterprise infostructure in order to deliver seamless common user services in support of all Army entities.



The reverse web proxies protect Army installation web pages by allowing web surfers to only receive the proxied page. A "hacked" web page will be refreshed with a "clean" page when that page expires in the cache.

We are in the process of applying a DAPE (Deny All, Permit by Exception) configuration to the network in the CONUS Theater. Due to the complexity of this theater, this process is very laborious and has taken more than a year to get the major CONUS sites DAPEed. None-the-less, this effort will pay off, as DAPE allows only that traffic we specifically permit to enter an installation. All other traffic is banned. DAPE permits very granular (tight) controls, greatly improving our ability to only allow traffic from known, approved sources.

Computing services are our automation-oriented enterprise level services. We manage and maintain several active directory structures, including seven domains on NIPR, one domain on SIPR. We also operate an Exchange Hub, the CONUS Enterprise Exchange e-mail system, and Enterprise Directory Services.

We have a several global missions. We manage eleven PEO-EIS applications which have users in every theater. Those applications include in/out processing, range management, CIF, and the new web based modernized ISM application. Other global missions we perform are managing the Army's IP space and the Army's Tier 0 DNS.

A CONUS Enterprise Service that is just coming on-line is the Area Processing Centers. The purpose of the APC is to allow many of the services common to installations to be housed at a central location. This allows the services to be more centrally monitored and managed. The CONUS plan is to initially stand up two APCs, one in Oklahoma City and one in Columbus, Ohio. Rock Island Arsenal, Ill., is the first installation to have its enterprise services migrated to an APC; Fort Riley, Kan., will be second. The APCs are co-located with DISA Defense Enterprise Computing Centers to give them redundant, high-bandwidth connectivity.

LandWarNet Operations are primarily composed of our external facing activities. Some of these services include: sensor operations; event analysis and response; network common relevant operational picture; the operations bridge; and service desk.

We work closely with our RCERT counterparts to accomplish our Computer Network Defense mission. We take IDS/IPS signatures and analyze them prior to placing them on our network sensors. We also create new signatures or modify published ones to meet our specific needs.

Our help desk receives phone calls from all over the world with issues concerning the network or one of the applications we manage. This is the area that is probably the most affected by our ITIL transformation. Previously, the main function of the Help Desk was to answer the phone and create a trouble ticket for the caller. As we transform to an ITIL Service Desk, the goal is to resolve over 40 percent of the incidents during that initial call.

This capability will be accomplished through the use of Remedy Information Technology Service Management. One of the databases in ITSM is called a Solutions Database. After it is populated by senior technicians, it will allow the Service Desk personnel to follow a script which will permit them to solve incidents that previously had to be resolved by senior analysts.

The LandWarNet operations provides the interface to the Army Global Network Operations and Security Center, Network Enterprise Technology Command staff, DISA, and other service centers. They are responsible for receiving, tracking and responding to task orders from the A GNOSC and NETCOM. They are also responsible for generating the many reports that are requested by higher headquarters.

Internal services are those services which are needed to sustain the organization. These services include running our internal networks and work stations, providing internal physical and network security, managing contracts, performing financial management, and guiding our ITIL transformation.

An organization with such a

critical mission must be relatively self-sufficient in order to remain responsive to the network. Most of the services within this category fall under this service area. One critical internal organization is the ITIL transformation team. It is their mission to train every C-TNOSC employee to the basic level of understanding of ITIL and to guide the organization towards ITIL compliancy.

The C-TNOSC operates in a complex environment. In most other theaters, the TNOSC reports directly to a Theater Signal Command and/or a combatant commander. There is also a command relationship with the DOIMs at the installation level, most of which are manned by signal battalions which fall under the TSC which allows the TNOSC to be more directive in nature to manage the network.

However, this is not the case in CONUS, where there is no TSC. The C-TNOSC takes its direction from the A GNOSC. The C-TNOSC does not have a command relationship with the DOIMs. Instead, we must rely on technical channels. The DOIMs are organized under the control of the Installation Management Command (IMCOM), but are responsive to their individual Garrison Commanders. Additionally, in CONUS, we have four Regional Chief Information Officers (RCIOs) who act as the communication staff planning element in the IMCOM regions, though the RCIOs are assigned to the Enterprise Systems Technology Activity, which is part of NETCOM/9th SC(A).

To add to that complex reporting chain, we also manage several interfaces between the Army's NIPRNET and external networks. Some of those networks include DREN (Defense Research and Engineering Network), GuardNet (the National Guard's network), and the Army Reserve Network.

To help ease some of that complexity, NETCOM and Army Strategic Command are looking to create a Network Service Center in CONUS.

The NSC is to be an operational organization that more proactively plans, engineers, and operates enterprise services, but with the additional goal of making tactical unit transition through all six phases of operations into a seamless event. Tactical organizations struggle mightily with the network connectivity aspects of movement off garrison to training areas, moving to staging bases and then into combat operations, and finally moving back to garrison locations.

The NSC concept will improve support to the Warfighter and better enable modular and joint operations in all phases of deployment.

Because of the complexity of the missions in the CONUS TNOSC, we are always looking for good people who want a challenging assignment. If that is you, contact the FA24 branch manager and request an assignment to the CONUS TNOSC.

LTC Merrell is the chief of the Operations Division for the 2nd Signal Center (C-TNOSC). His previous assignments FA 24 assignments include chief of the Systems Support Division at the Battle Command Battle Lab, Huachuca, information system security engineer at the National Security Agency, and as the transmission network engineer for the 335th TSC. He has been an FA 24 since 1999 and prior to that he was a 15A, 14D, and 12B.

LTC Matchette is currently serving as the director of the 2nd Signal Center. Previous assignments include senior fellow with SymbolTechnologies, Inc, as part of the Secretary of Defense Corporate FellowsProgram; chief of engineering, National Reconnaissance Office, and chief technology officer, for the Joint Staff. He has been an FA 24 since 1999 and prior to that he was a 25D and 27A.

Acronym QuickScan

ACL - Access Control List
A-GNOSC – Army-Global Network Operations and Security Center
APC – Area Processing Center
ARNET – Army Reserve Network
ARSTRAT – Army Strategic Command
ASR – Army Security Router
CIF – Central Issue Facility
CND – Computer Network Defense
COCOM – Combatant Commander
CONUS – Continental United States
C-TNOSC – CONUS Theater Network Operations and Security Center
DAPE – Deny All, Permit by Exception
DECC – Defense Enterprise Computing Centers
DISA – Defense Information Systems Agency
DNS – Domain Name Service
DOIM – Directorate of Information Management
DREN – Defense Research and Engineering Network
ESTA – Enterprise Systems Technology Activity
GuardNet – National Guard Networks
IDS - Intrusion Detection System
IMCOM - Installation Management Command
IP – Internet Protocol
IPS - Intrusion Protection System
ISM – Installation Support Modules
ITIL - Information Technology Infrastructure Library
ITSM - Information Technology Service Management
NETCOM/9th SC(A) – Network Enterprise Technology Command and 9th Signal Command (Army)
NETCROP - Network Common Relevant Operational Picture
NIPR – Non-secure Internet Protocol Router
NIPRNET – unclassified Internet Protocol Router Network
NSC - Network Service Center
PEO-EIS – Program Executive Office – Enterprise Information Systems
RCERT-C - Regional Computer Emergency Response Team – CONUS
RCIO - Regional Chief Information Officers
SIPRNET – Secret Internet Protocol Router Network
TECHCON - Technical Control
TLA - Top Level Architecture
TSACS - Terminal Server Access Controller System
TSC - Theater Signal Command

FA24s at West Point

By LTC William J. (Joe) Adams

Located at West Point, N.Y., the Department of Electrical Engineering and Computer Science at the United States Military Academy has one of the highest concentrations of Functional Area 24 Telecommunications Engineering officers in the Army. A smaller number of FA24 positions also exist within the USMA's other departments. A West Point assignment offers the unique opportunity to educate future Army officers and conduct research and outreach work on cutting edge topics. Some faculty use their education, experience, and advanced technical knowledge to directly benefit Army, Department of Defense, and national level projects. Others make contributions to the body of basic science and engineering knowledge, where the payoff is longer-term and more theoretical in nature.

FA24s comprise a significant portion of the EE&CS faculty. Authorizations are in the grades of captain through lieutenant colonel, with fully funded Master of Science or Doctor of Philosophy studies in computer science, electrical engineering, or a closely-related discipline available upon selection. Officers contribute in all three of the department's academic majors (computer science, electrical engineering, and information technology) and the research centers associated with EE&CS — one each in information technology and operations and photonics.

The USMA is the Army's university. With small class sizes, faculty members are closely involved with their cadet students in all areas of development — academic, physical, military, and moral-ethical. Officers spend the first summer learning how to teach at the college level. While military training and leadership are great preparation for this, education is very different from training. Discovering this difference is a deeply rewarding and enriching process. Most arriving FA24s start by teaching the freshman level course in IT. This course is part of every cadet's core curriculum and is taken by 1,300 cadets each year. After a year, most instructors take on responsibilities in upper level courses for electrical engineering, computer science, and IT majors, while others remain with the core program.

While teaching is the primary mission at West Point, faculty members are fully engaged in a wide range of other cadet-related work. They support cadets in all possible settings: additional academic instruction, military training, sports teams, clubs, honor and ethics training … everything it takes to build leaders of character who can also effectively employ technology to ensure Army victory on the battlefield.

EE&CS is particularly well suited for FA24s who enjoy the challenge of experimenting with emerging technologies. In addition to teaching cadets about networks, information systems, and associated hardware devices, the department supports projects in disciplines ranging from photonics to robotics to network security. Many faculty members create new projects based on their interests. Contemporary examples include flying network routers, strike warning devices for dismounted infantry, and autonomous robots that distribute and collect sensors. Two dedicated research centers — the Information Technology and Operations Center and Photonics Research Center — exist to obtain resources and other support for faculty and cadet projects. In this respect, EE&CS is the opposite of most college faculties, who are required to spend much of their time writing proposals to compete for research funding. At EE&CS, the research centers organize projects and obtain support so that faculty members can focus on doing the research work itself.

Recent successes of research and outreach programs include software systems and hardware devices deployed in the field Army. Some faculty members are serving as consultants on Improvised Explosive Device counter-measure systems or guiding military and peer academic institutions to create top quality information assurance education

programs. Others have received patents for original inventions and won awards for high quality scholarly papers on educational techniques.

Supporting this wide range of creative work requires an equally broad platform of resources. Faculty have total access to extensive teaching and research facilities. These include laboratories dedicated to telecommunications, analog and digital circuits, power, microprocessor, signal processing, controls, laser, and wireless communications for electrical engineering studies. For computer science and information technology, there are more than 400 computing nodes running multiple operating systems and an extensive collection of industrial and research-oriented software connected at gigabit speeds. Specialized environments include several web development frameworks and an information warfare "live fire" lab, which is air-gapped from the Army enterprise network. More theoretical work is done on the department's parallel-distributed computing cluster and its new Internet Protocol version 6 network. Most important, a first rate technical staff is on-hand to create new capabilities as required. It is a point of pride for the department that tough Army configuration management problems have been solved by EE&CS technicians. The department also operates a "mini-factory" — a machine, printed circuit board, and electronics fabrication facility — to build cadet projects and equipment for faculty teaching and research purposes.

The USMA IW live-fire range is particularly well-known for its role in the Cyber-defense Exercise, an annual event created by department faculty. Cadets at all five national service academies compete by designing and implementing an enterprise network and its associated network services to specifications. They then defend it from an attacking "red team" of professionals from the National Security Agency, Army, Air Force, Navy, and other high-tech organizations. The network that best sustains operations in spite of the red team's efforts over a three-day period wins the competition.

Successful candidates for a tour at USMA have completed appropriate key developmental assignments (company command or equivalent), are good students, and find the idea of graduate school and teaching the Army's future leaders to be exciting and rewarding. Some Reserve Officer Training Cadets, Officer Candidate School, and directly commissioned officers have the impression a teaching assignment at West Point is not available to them. This is just plain wrong. The military academy deliberately looks for faculty diversity of all kinds, to include diversity of the commissioning source. West Point needs officers with a wide range of experiences to provide cadets with the best preparation for the Army.

Since FA24 officers teach and do research, a graduate degree — MS or Ph.D. — is required. Selection for a USMA position includes fully funded graduate schooling. Those already possessing an appropriate degree can be assigned directly. Selected officers have great latitude in choosing the graduate school they will attend. Schools all over the U.S. and many foreign countries are possible. Current and recent faculty have studied in Puerto Rico and France, as well as Stanford, Cornell, Carnegie Mellon, University of California-Berkeley, Georgia Tech, Virginia Tech, and numerous other top schools throughout the country.

In addition to the outstanding educational development of cadets, EE&CS prides itself on preparing rotating faculty to make an impact back in the field Army. This preparation occurs in two ways. First, the state-of-the-art curriculum challenges instructors to stay current in their discipline. Leveraging the facilities in the department, officers leave West Point with both theoretical understanding and experience in practical application. Additionally, the department's outreach programs enable officers to stay abreast of the Army's requirements by interacting with operational units. Over the past few years, numerous department officers have deployed to design and build infrastructure in Iraq, create facilities and curriculum for the National Military Academy of Afghanistan, and other purposes. The result is experienced officers who know how things work, but also why they work and how to improve them.

While there are occasional rumors that a faculty tour hurts a professional development profile because it is not "with troops," the evidence does not support this. Military faculty members, including FA24 officers, are promoted through colonel at well above the Army average rate. Outstanding follow-on assignments are the norm. West Point looks at departing faculty as the "second graduating class." The leadership, technical skills, and networks of formal and informal contacts gained while at West Point commonly result in former faculty members being recognized as high-impact Army resources.

An assignment with EE&CS is unlike any other in the Army. The department offers the unique chance to work with the very best of America's young men and women, employ emerging technologies, and develop new skills. Faculty members find themselves challenged every day to broaden their horizons and capabilities in order to meet the mission.

NOTE: To learn more, check out the EE&CS web site, http://www.eecs.usma.edu. For other departments, see the Dean of the Academic Board site at http://www.dean.usma.edu.

LTC Adams did not graduate from USMA. He went to Syracuse University and the University of Arkansas before receiving a direct fill assignment to EE&CS in 1995. After follow on tours as a signal battalion S3 and as an FA24 at SHAPE, Belgium, he earned a Ph.D. at Virginia Tech and is now back in EE&CS as a research scientist in the information and technology center.

Acronym QuickScan

EE&CS – Electrical Engineering and Computer Science
FA24 – Functional Article 24
IED – Improvised Explosive Device
IPv6 – Internet Protocol version 6
ITOC – Information Technology and Operations Center
IW – Information Warfare
MS – Master of Science
OCS – Officer Candidate School
PhD – Doctor of Philosophy
PRC – Photonics Research Center
ROTC – Reserve Officer Training Corps
USMA – United States Military Academy

FA24 Army Legislative Liaison representing the Army on Capitol Hill

By LTC Claire Steele

As I reflect back on my three years in the Army Office of the Chief of Legislative Liaison, I realize it has been a period of incredible personal and professional growth. It is more relevant to being an Functional Area 24 and an Army officer than I previously thought.

In 2005, I served a one year fellowship on Capitol Hill in the office of Senator Jack Reed from Rhode Island. My payback tour is two years in the Pentagon working in legislative liaison. I am responsible for the logistics portfolio, so not only am I working outside of FA24, I am also working outside of signal. Everyone on the hill cares about logistics and Reset, particularly if there is a depot, arsenal, or ammunition plant in their district or a National Guard unit that is short of equipment. That covers just about every state in the union.

It is an interesting civics lesson to watch Congressional oversight of the military, especially when you are deeply involved in the issues. Last year, the Army was short $10.9B for Reset, which is a series of actions to restore units' equipment destroyed, damaged, stressed, or worn out beyond economic repair due to combat operations to a desired level of combat capability. These actions include the repair of equipment, the replacement of equipment lost during operations, and the recapitalization of equipment where feasible and necessary. The reset program ensures forward commanders have reliable and capable equipment, Army Prepositioned Stocks equipment is at a high state of readiness, and the Army has a long-term program to restore the operational readiness of all critical systems.

I went through an entire legislative cycle (calendar year 2006) with Reset as my main focus. Early in the year, I visited the hill multiple times with a team of G3, G4, G8, and

COL Bob Ferrell, Rep Solomon Ortiz, LTC Claire Steele, and Rep Silvestre Reyes on a trip to Anniston Army Depot, Ala., Feb. 12, 2007.

The Army Materiel Command provides superior technology, acquisition support, and logistics to ensure dominant land force capability for Soldiers, the United States and our Allies.

Army Materiel Command personnel to discuss Reset requirements. I made several trips to Iraq and Kuwait with Members of Congress and staffers to give them a firsthand look at Army logistics and repair facilities in Central Command. I also escorted members and staffers to the Army depots so they could physically see the war-torn equipment piling up outside the gate. Seeing all that equipment made quite an impression on congressional delegations and they resolved to help the Army fix its shortfall.

In June 2006, I helped prepare the Chief of Staff of the Army for a Reset Hearing in front of the House Armed Services Committee. GEN Peter J. Schoomaker brought the impending readiness crisis to the attention of Congress and asked for immediate supplemental funding to counter the shortfall. Another highlight of the summer was visiting Red River Army Depot and Fort Hood with Senator James Inhofe of Oklahoma in August 2006. Senator Inhofe wanted to meet with III Corps and 1st Cavalry Division before their deployment. The Corps staff and the BCT commanders were very frank and there was free flowing discussion about current readiness issues with the Senator. One comment that resonated with the Senator came from a frustrated battalion commander who said three battalions were sharing one set of equipment in preparation for deployment to war, while all of his unit's equipment sits outside the depot.

The Army's collective efforts over the year were successful, thanks to the hard work and attention of our senior leaders and many other officers, noncommissioned officers, and civilians in the Pentagon and AMC, at the depots, and in theater. Also important to recognize are the unsung heroes-the Professional Staff Members of the HASC and Senate Armed Service Committee, who dug deep into the issues and provided the proper guidance and information to the members. At the last moment, Congress added $10.9B to the fiscal year 2007 Appropriations Bill for Reset for a total of $17.1B. This was a huge success-it was the entire amount the Army asked for-and an amazing opportunity to see Congress in its government oversight role.

How is this relevant to being an FA24 and an Army officer? The personal access you have to the Army senior leadership and Congress is unparalleled. Additionally, you have to understand what they are thinking and why, so you can communicate the message back and forth-that's what being a liaison is all about. As I write this article, I'm sitting in the distinguished visitor cabin of a Gulfstream airplane with the Chairman of the Armed Services Committee, Congressman Ike Skelton of Missouri, enroute to Fort Riley, Kans. I am in the DV cabin, not because I am important, but because there is a bench seat and nobody else wants to sit in it. The only other people in the cabin are another congressman and one staffer (also in the bench seat). I am happy to sit here and converse with one of the most influential men in America for three hours.

Thanks to the Army G8 and the Army G4, I now understand how the budget cycle works, when to submit budget requests, who I need to convince, and how to package information to ensure the best chance of approval both in the Pentagon and on Capitol Hill. These skills will help an officer in any job, but particularly in information technology where budget cuts are always looming.

FA24 officers are not usually considered for 01A branch immaterial assignments. Opportunities such as fellowships, training with industry, or advanced civil schooling are ways to do something a little different and broaden your Army experience. Check the 24 homepage to learn about these and other opportunities.

LTC Steele is an FA24 officer currently working as a congressional liaison officer. She is a graduate of the Georgetown University, Government Affairs Institute Capitol Hill Fellowship Program. Steele is a 1989 graduate of Siena College with a Bachelor of Science in Computer Science.

Acronym QuickScan

APS – Army Prepositioned Stocks
AMC – Army Material Command
BCT – Brigade Combat Team
CENTCOM - Central Command
DV – Distinguished Visitor
FA – Functional Area
HASC – House Armed Services Committee
NCO – Noncommissioned Officer
OCLL – Office, Chief of Legislative Liaison
PSM – Professional Staff Member
SASC – Senate Armed Services Committee

TCM Engineering requires skilled leaders

By LTC Tony Roper

As the Army transitions to an Internet Protocol-based communication system, it is imperative that the Training and Doctrine Command Capability Managers with required skill sets are in the key areas to help with this transition. Inside the capability manager offices the FA 24 engineers must be the skilled leaders with complete knowledge of all tactics, techniques, and procedures, along with the understanding of joint planning, operations, and execution to provide an operational perspective to developers. Along with the operational knowledge, the FA24 must master the following:

1. Engineering theories, concepts, and capabilities of telecommunication media, protocols, and policies.

2. Integration of commercial, government, and Department of Defense communication systems.

3. Interoperability of Army, Joint, Interagency, Intergovernmental, and Multinational, and commercial telecommunication systems and the acceptable operational risk from a user perspective.

4. Secure command and control communications for national, DoD, and Army systems.
5. Concepts and theory to manage the radio frequency spectrum and its importance in respect to all emitters and country policy.

The core of the FA24 is to engineer, assess, validate, secure, and manage current and future networks, as well as evaluate technologies, create technical specifications for integrating technologies, and perform project management functions in order to acquire, implement, and operate technologies.

Inside the TCM, FA24s assist and lead in the management of legacy capabilities such as Single-Channel Ground Airborne Radio System, Enhanced Position Location Reporting System, Integrated System Control, Secure Mobile Anti-Jam Reliable Tactical-Terminal, PSC-5; current capabilities EPLRS, Joint Network Node-Network, High-Capacity Line-of-Sight; and future capabilities such as Joint Tactical Radio System and Warfighter Information Network-Tactical, armed with the regiment's core competencies of:

- **Enterprise Systems Management/Network Management**
- **Information Assurance/Computer Network Defense**
- **Information Dissemination Management/Content Staging**
- **Electromagnetic Spectrum Operations**

FA 24 Soldier studies the Net on the monitor.

FA24s in the TCMs use the LandWarNet construct to grow capabilities incrementally for the force.

LTC Roper serves as the TRADOC Capability Manager for Network and Services, Fort Gordon, Ga.

Acronym QuickScan

EPLRS – Enhanced Position Location Reporting System
DoD – Department of Defense
TCM – TRADOC Capabilities Manager
TRADOC – Training and Doctrine Command

UPDATE Telecommunications Systems Engineering

By MAJ Mark Thomson

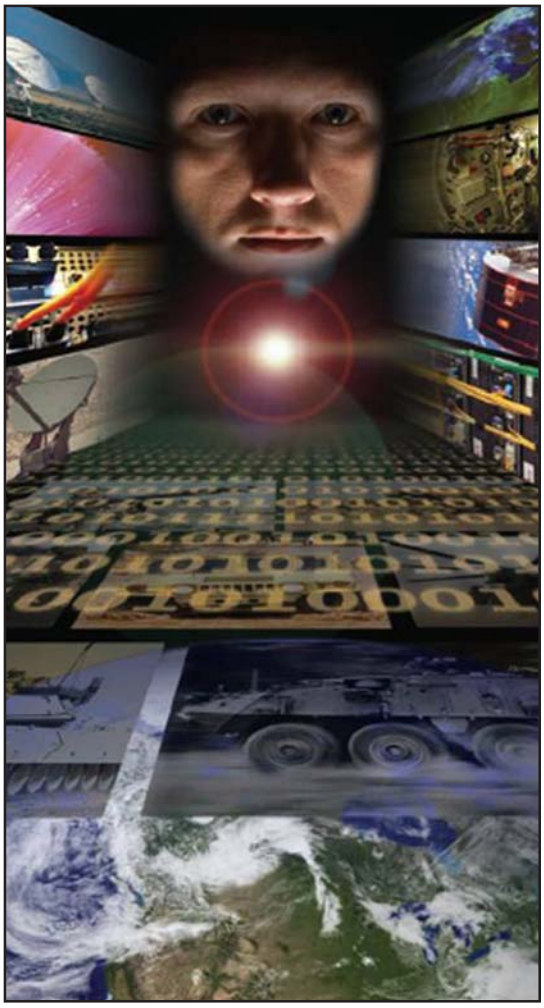
Functional Area 24 was created in 1998 during the Army's restructuring of the Officer Personnel Management System into OPMS XXI. The intent was to merge the previous signal officer specialties of 25D and 25E (Communications-Electronics Engineering and Communications-Electronics Networking, respectively) and allow network engineers from non-signal branches to come into the Signal Regiment.

This resulted in technically focused FA24 officers in network operations and engineering. It also allowed Signal Corps officers to concentrate on troop-leading and command responsibilities. It had the added benefit of attracting engineering- and science-oriented officers into a technically complex field.

The 30-week telecommunications systems curriculum consists of two courses: a 10-week Information Systems Officer Preparation Course, immediately followed by a 20-week Telecommunications Systems Engineer Course. The two courses together are commonly referred to as TSEC. Almost all courses in Army telecommunications systems are conducted at Fort Gordon, Ga.

TSEC qualifies an FA24 to work in their field. It is a primary functional area qualification course in the School of Information Technology, a subordinate activity in the Leader College for Information Technology.

TSEC was created in 2001 to deliver the essentials of a graduate-level telecommunications education to officers selected to become FA24s: telecommunications systems, data communications, switching, information assurance, and other selected topics relevant to complex communications and network engineering. The course was designed and delivered through the efforts of a dedicated team of Army instructors, Department of the Army civilians, and contractor instructors.



Graduate topics were selected for their immediate relevance to FA24 duties, and the course was carefully constructed to have a blend of theoretical communications and network engineering combined with hands-on labs to reinforce the theoretical concepts. The initial course design and subsequent updates were highly successful in preparing FA24s for their initial assignments. The course was considered so challenging that it actually qualified for 30 graduate credit hours from the American Council on Education in its 2001 credit recommendations.

As LandWarNet and the Global Information Grid became critical enablers of warfighting, the skills demanded of FA24s became increasingly technical in nature. In order to ensure that the content delivered to TSEC students was completely up to date and relevant to today's networking environment, the TSEC staff began to arrange for visiting college professors from top universities - University of Pittsburgh, Georgia Southern University, and Georgia Institute of Technology, among others - to teach selected modules.

The professor-led classes brought in a fresh perspective from industry and academia and continued to build on the challenging nature of the course.

Based on input from the field, it became obvious that the professor-led classes were a superior method of keeping course content fresh and relevant. These courses helped the Army leverage the time and resources graduate programs spent keeping their telecommunications-related curriculum current.

Based on this experience, LCIT recently undertook an initiative to expand the number of professor-led classes. In conjunction with an instructor contract renewal negotiation conducted in 2006, the number of professor-led modules was expanded from approximately three to eight (out of a total of 12 mod-

ules).

Professors hired to teach in these modules have doctorates of philosophy in telecommunications, electrical engineering, computer science, or related fields, and five years of experience teaching in an accredited university. Some minor waivers may be granted, but are usually based on compelling skills and experience-such as a PhD candidate who has significant teaching experience, or a terminal Master of Science degree holder with unusual knowledge of a specific area. At least 70 percent of the course must be taught by individuals with a PhD or MS degrees.

Although course module titles have remained relatively static, content that constituted a module has continued to evolve. Like any information technology field, change continued to occur at an incredibly fast pace and technology that was relevant one year became less important or outmoded the next year. These changes have required continual lesson and lab redesign. Current modules consist of:

Introduction to the Signal Regiment
Cisco Academy 1-4 (CCNA)
Engineering Math
Basic Electronics/Digital Logic (replaced C Programming)
Telecommunications Systems
Data Communications
Switching
Voice over IP
Information Assurance and Network Security
Network Management
Network Design
Current/Future Communications Systems
Capstone Research Project

Current ACE credit recommendations consist of:

Credit Recommendation: In the lower-division baccalaureate/associate degree category, three semester hours in C programming. In the upper-division baccalaureate category, three semester hours in applied mathematics or mathematics for data communication and networking. In the graduate degree category, no more than a total of nine semester hours from the following credit: Up to three semester hours in telecommunications systems; up to six in data communications I and II; up to three in digital transmission or methods of telecommunications; up to three in network switching and switching systems; up to three in network security; up to three in network management or network operations and management; up to six in network design; and up to three in future developments in telecommunications systems (3/05).

The first TSEC taught under this improved model is approaching graduation (October 2006-June 2007). Many valuable lessons have been captured in how to staff and resource this program for maximum benefit to the Army and the student and are being incorporated into the next class, which runs from May-November 2007. Particular emphasis has been placed by the LCIT and SIT leadership on ensuring hands-on reinforcement of technical concepts will be provided by labs given to both the FA24s and their Warrant Officer partners, the 250N Network Management Technicians, allowing leveraging of the significant infrastructure investment in SIT laboratory facilities.

As the program continues to grow and evolve, LCIT will continue to support it with appropriate resources and leadership emphasis. Networks and their engineering and maintenance continue to grow in complexity. The future is bright for FA24s, and TSEC is growing and changing to continue to provide the world's best military telecommunications engineering education.

Note: The FA24 program owes an incredible debt of gratitude to the individuals who selflessly served over the years in designing and implementing this program. Particular thanks to Horace Carney, John Overton, Amy Tuschen, Paul Kotas, and COL Kenneth Gainous.

MAJ Thomson is currently serving as the chief, Network Management Division, School of Information Technology at Fort Gordon, Ga. He is the FA24 Course director. His previous assignments include various quartermaster and logistical assignments in Hawaii, Korea, Fort Lee, and Fort Lewis. He holds a bachelor's in business (information systems) from Oregon State University and a master's in telecommunications from the University of Colorado-Boulder.

Acronym QuickScan

ACE – American Council on Education
CCNA – Cisco Certified Network Associate
FA24 – Functional Area 24
GIG – Global Information Grid
IP – Internet Protocol
ISOP – Information Systems Officer Preparation Course
LCIT – Leader College for Information Technology
MS – Master of Science
OPMS – Officer Personnel Management System
PhD – Doctor of Philosophy
TSEC – Telecommunications Systems Engineer Course
SIT – School of Information Technology

The Paradigm shift in enabling combat commanders during the operational phase

By LTC Keith L. June

The information revolution

"Modern warfare is immensely complex and requires interoperability, synchronization, and synergy of all systems to achieve full spectrum dominance. Never before has the Signal Regiment been so critical to the success of our Army."

— Army CIO/G-6
Fight the Network White Paper

Over the last 20 years, information and access to information have driven dynamic changes in our society. Perhaps the greatest challenge in the Information Age is staying current with technology. To a great extent, modern warfighting is driven by technology but meeting the challenges of modern warfighting involves more than technology; the solution set must include revising, updating, and where necessary, developing new operational concepts. Part of this process must be a candid and realistic examination of how we conduct operations and how we'll conduct operations in the future. It is impossible to predict the future; however, the direction we take should be driven by a deliberate and careful analysis of where we need to go. Throughout its long and proud history, the Signal Corps has chosen its own path and been a leader in technology and innovation for the Army, the nation, and indeed the world. However, over the last decade, the Signal Corps has been driven more by outside factors than by its own innovations, initiatives, and decisions.

The information revolution of the last 20 years has fundamentally altered world history. Recently, for the first time in human history, more than half of the world's population has access to some form of modern communications. The "dot-com bubble" of the late '90s and the rapid expansion of technology have forever changed the landscape of telecommunications worldwide. Even in failed states like Haiti, without even a functioning government, users have access to mobile phones and the Internet. Technology now enables users to access services previously only found in areas with high bandwidth or well developed infrastructures. Furthermore, the information infrastructure is quickly transitioning to Internet Protocol, or IP.

Changes have occurred at all levels and in all areas. Both the demand for bandwidth and the actual amount of bandwidth available have increased dramatically. Fifteen years ago, dial-up modems operating at 4800 Baud were the rage of the day. The Mobile Subscriber Equipment, fielded 20 years ago provided 256 kbs and this was the largest amount of bandwidth available. Today, we think nothing of 256 and 512 kbs digital subscriber lines to the home. The recently fielded Joint Network Node equipment has increased the bandwidth and services available to deployed warfighters tenfold.

In the net-centric environment of which we live and fight, data, and voice systems have merged to become one. The telecommunications industry struggles with defining telecommunications services as the traditional lines between telecommunications companies and cable companies become less clear. Technology in the information age has advanced faster than our ability to define and articulate change. This is much more than semantics. Understanding and articulating change are critical in developing concepts of operations and doctrine.

54th Signal Battalion Soldiers install fiber optic cable in Iraq.

Voice systems illustrate the complexity and change in today's information environment. Voice systems in the past have been separate parts of the architecture to include separate circuits and analog termination equipment. Older switching systems in the past (and still today) were defined by large switches such as the SL-100 or much smaller systems like ISDN Gateway Exchange, or IGX. Telephones were analog systems at the desk. Voice service is increasingly provided through Voice over Internet Protocol technology, or VoIP, and call managers are replacing SL-100s and other switches. And again, changes are occurring at all levels down to maneuver battalions and below. Termination equipment today includes VoIP telephones in tactical operating centers or on desktops. Users may answer telephones and use computers as they always have but the infrastructure behind the telephone and the computer has seen fundamental change.

The U.S. Army and indeed all the services have seen tremendous advances in information technology. These changes have included who provides the service, what services are provided, how the services are provided and who receives the service. These changes have had a direct impact on warfighting. Digitization has merged services and we live with the digitization lessons of the last ten years. The move to a total IP world will again create significant changes in the information environment and warfighting.

The strategic enterprise, and all the challenges associated with providing it, is now available to maneuver units. Though not new to the Army, commercial-off-the-shelf, or COTS, equipment is in use everywhere.

First, given the pace of technological advances, we must define strategic communications. Strategic communications in the past have referred to fixed and sustaining base communications systems. These strategic and sustaining base communications systems were normally found on fixed installations. These services included direct access to the Defense Switched Network, large bandwidth, and access to the Defense Red Switch Network, among other services. In the past and to some extent still today, the Signal Corps has met the requirement for DISN services to tactical users with data packages. Perhaps the best split of where the magical line existed between tactical and strategic systems was in who were actually receiving the service. The lexicon of the past included terms such as "EAC", or echelons above corps, and division-and-below communications. However, as we will see, strategic services are now being extended to lower levels. As stated earlier, information technology has seen incredible advances over the last 20 years. Most importantly warfighers demand these services. The bandwidth requirements for modern operations, intelligence, and Combat Service Support have seen explosive growth. We have moved from a voice-centric environment to a net-centric world. Notice this statement is past tense. The change has already occurred.

Soldiers of the 54th Signal Battalion install communications at Camp Victory in 2005.

Quite frankly, the terms, strategic and tactical, have become very difficult to define and are increasingly meaningless. Strategic services are now provided to maneuver battalions and below. Smart multiplexers are in use on strategic systems and tactical systems. The recently fielded JNN system includes Voice over Internet Protocol systems and smart multiplexers. In our effort to understand and define, we increasingly speak in "tiers". Our tiered world consists of Tiers 0, 1, and 2. Tier 0 involves large nodes and connectivity outside the DISN cloud. Tier 0 nodes are controlled by DISA. Tier 1 connects military and other DoD users with Tier 0 nodes and Tier 2 nodes directly support users. (There are other tiers depending on how this is defined.) This helps to better define the complexity of information systems and services but even this definition leaves a great deal unclear. We find ourselves in a world where strategic users operate Tier 2 nodes and tactical units operating or having access to Tier 0 nodes as part of their responsibility.

In the past, the strategic workforce included Soldiers, Department of the Army civilians, and contractors. The tactical force was

composed almost entirely of Soldiers. Today, contractors constitute the bulk of the telecommunications workforce in theater. Contractors can be found everywhere, from strategic units to tactical units.

And strategic systems are far from permanent or "fixed". Given the pace of modern warfare, strategic units are forced to quickly adapt to rapidly changing requirements, installing strategic nodes where tactical nodes were once found. Technology, tactics and the requirements of modern warfare have created a convergence of communications at the operational base.

The Operational Base

operational phases:

phase-0-day-to-day operations
phase-1-planning x-hour
phase-2-alert/ mobilize
phase-3-deploy/ enroute
phase-4-initial entry
phase-5-decisive ops
phase-6-stability and sustain ment operations
phase-7-stability Operations

The U.S. Army has invested heavily in planning and developing solutions to address the communications challenges during operational phases 0-5; however, communications during phases 6-7 have proven especially problematic and less defined. FM 3-0, *Operations*, defines the Operational Level of War, "as the level at which the campaigns and major operations are conducted and sustained to accomplish Strategic objectives within theaters or areas of operation".

Providing information support in the ongoing Global War on Terrorism has been extremely challenging. The march to Baghdad was measured in days but the combat that followed has been marked by years. Units involved in these operations function from large Contingency Operating Bases and Forward Operating Bases. At a glance, one might think these installations are similar to installations in the United States and Europe. And to some degree, they are similar. However, they are neither fish nor fowl. These bases operate somewhere between the strategic and tactical environments. In the current conflicts and arguably in future conflicts, the operational base provides the bulk of telecommunications services to large headquarters, intelligence users and combat support systems users.

A ditchwitch installing communications infrastructure in Iraq.

Operational base communications

These operational bases support a host of users including the Army, Marine Corps, Air Force, State Department officials, and possibly non-governmental organizations. Operational bases form the nucleus of warfighting and support platforms in Iraq, Afghanistan, and Kuwait. These bases have unique requirements and unique challenges. The bases provide maneuver commanders with the security, critical intelligence, logistics, and the operational support necessary for combat operations. These installations have become integral to conducting combat and support operations.

However, operational communications are very distinct from the Directorate of Information Management environments found in continental United States or Europe. Obviously, the most glaring difference is that these installations operate in combat zones. These installations also have far less capability or infrastructure than CONUS or outside the U.S. installations. DOIMs are associated with Installation Management Agencies and come with a formal structure. This is not the case for operational bases. Satellite communications provide the bulk of bandwidth for these bases. Additionally, these bases have evolved over time, in many cases "reacting" to immediate warfighter requirements. It is only recently that long-term planning and resourcing have gone into these installations. Power, transportation, spectrum management, physical security, and maintenance still present major challenges.

And operational bases provide services to all levels of command. Whether we admit it or not, operational communications have become a "defacto" standard for communications in the Southwest Asia theater.

Operational base communications are defined by high bandwidth requirements, large number of users, limited infrastructure, COTS equipment and rapidly changing require-

ments. Most of these installations have undergone some level of commercialization. However, the term commercialization has come to mean many things. Over the past five years, numerous units have flowed through operational bases. Each rotation brings different units, personalities, and requirements. In this ever changing environment, Signaleers have done what good signaleers have always done, "gotten the message through" by whatever means necessary.

Given the ever changing uncertainty of the global war on terrorism, where and how long U.S. and Coalition forces will operate in Iraq is unknown. The U.S. and its Coalition allies have invested heavily in improving the communications infrastructure at these installations. The problem lies in determining what is good enough.

These operational bases pose significant command and control issues as well. For instance, the NETOPS structure is unclear. The command and control of communications on an installation become problematic as many units and several communications units may operate on a given installation. These communications units may come from different services. The CENTCOM directed, Communications Integrator or COMM-I program, has resulted in more deliberate and synchronized planning and better re-sourcing for operational bases. (Recently in Kuwait, the Army and Air Force partnered to transfer responsibility from communications support on a joint or shared installation to the Air Force.)

Over the past three years, the 54th Signal Battalion and its sister battalion, the 25th Signal Battalion have filled unique and challenging roles; providing operational communications in the South West Asia AOR. Both battalions belong to the 160th Signal Brigade. The 25th and the 54th are unique battalions in that they are comprised of Soldiers, civilians and contractors from ITT and General Dynamics Information Technology. The brigade has responsibility for providing strategic communications in the South West Asia AOR. The brigade was stood up in 2003 in the early stages of Operational Iraqi Freedom. The 54th Signal Battalion was reactivated in the early '90s. During its most recent history, the battalion has operated in Saudi Arabia, Iraq and Kuwait. Prior to the establishing of the 160th Signal Brigade, the 54th alone provided Strategic communications in the SWA AOR. One can almost trace U.S. actions in the SWA region by examining the footprint of the 54th.

The battalions use primarily COTS equipment though as we have previously noted, COTS equipment is currently in use in tactical, and Strategic units. These operational battalions have filled the critical void between tactical systems and Strategic systems. These *stra-tac-ti-cal* units have provided battle command and other critical services to warfighters, previously identified as strategic services, in austere combat environments.

Over the past three years, the Soldiers of the "Voice of The Desert" battalion have moved four times and had responsibility for strategic communications in Iraq, Kuwait and portions of both. In December of 2005, the 54th Signal Battalion conducted two relief's-in-place over the course of two weeks. The RIPs were conducted with tactical battalions in Iraq and Kuwait.

As the information world becomes flatter and the Global Information Grid provides services across the battlefield, fundamental challenges emerge. Operational base communications raise a host of issues and challenges. Perhaps the most immediate issue is that there is no existing concept of operations for operational base communications. The 25th and the 54th Signal Battalions and its parent, the 160th Signal Brigade, have essentially made up the rules along the way. Army doctrine addresses strategic communications and tactical communications but fails to address the broad middle, but absolutely critical area of operational base communications. The list of questions is endless; what services should be provided by the operational battalion? Should operational battalions be responsible for installing infrastructure? Where is the logical break between operational battalions and tactical battalions? And to what level should infrastructure be installed? Should the infrastructure be installed at the costly and lengthy **Installation Information Infrastructure Modernization Program (I3MP)** level? Is the current contracting mechanism agile enough to handle quickly changing requirements? How should requirements be vetted? What skill tests are required in these unique organizations? The Army has invested a great deal in fixed facilities across the Central Command area of responsibility; however, should the Army look for some other model(s) for building and operating communications facilities in theater?

The operational bases provide enable combat operations and the heart of the operational battalion lies in the Technical Control Facility, or TCF. These facilities come in all shapes and sizes, and the Army has invested a great deal in designing and building fixed structures to service operational bases. However, given the instability and dynamic nature of the region and operational bases in general, one must ask if it makes sense to invest heavily in facilities where the timetable is unknown.

Infrastructure installation, including the laying of fiber and copper, has also been challenging. The planning, engineering and executing of cable and wire missions requires extensive experience and expertise. The expertise required to execute these missions is not organic to operational battalions. The Army has but a limited number of cable and wire assets to execute infrastructure missions.

Equipment becomes another critical area. The operational battalions of the 160th have used a host of equipment from tactical systems to state-of-the-art COTS equipment. This arrangement creates numerous problems with maintenance, repair, training, and operator proficiency. Contractors and contracting have

become a critical and vital element of the operational base. The "Soldiers in slacks" of ITT have been an essential element of the 160th Signal Brigade. Contract management has become a critical skill in operational base communications (and arguably across the Signal Corps in general). The use of COTS equipment places a tremendous demand on the contracting system. The contracting vehicle can at times be extremely slow at meeting new requirements. Putting in place items like Indefinite Delivery Indefinite Quantity contracts might expedite and streamline the process of meeting rapidly changing requirements. Intra-post communications pose challenges as well. The operational base may be extremely large with units located at disparate locations. Commanders may not always go where communications are readily available. Large infrastructure projects require manpower, materials, planning and time. None of which may be readily available in a dynamic theater. The use of fiber for applications such as VoIP, in place of copper, may save time and materials but may create technical as well as other issues.

The 160th Signal Brigade and the 54th and the 25th are filling a critical void; however, the units have significant shortcomings. Foremost is structure. The 54th has been able to accomplish its mission to a great extent because of attachments from other units. These attachments have come from the National Guard, the Reserves, and other active units. Though not designed to do so, the 54th has executed a great many "install" missions. Should these battalions be structured with the ability to execute some limited infrastructure projects? Again, there is no end to the list of questions and no easy answers.

These are but a few, a very few, of the numerous issues associated with operational base communications.

The future

How the future will look is anyone's guess. However, as the United States defends itself against terrorism, it seems likely that operational bases will continue to provide commanders with the critical logistical and communications support necessary to execute both combat and support operations.

Future operations will no doubt require the ability to provide platforms that support combat, stability and support operations. Operations in the future will focus, not only on combat but humanitarian and support missions as well. The recently created Africa Command, for example, will require greater use of operational bases and operational base communications. Future missions will no doubt function in the loosely defined operational phase and communications will continue to be the key enabler. Operations in the past, such as Bosnia and Kosovo, well illustrate the criticality of communications in low intensity and post-conflict operations. The period after the Iraqi invasion has been heavily criticized for the lack of planning that went into the Phases VI and VII. The Army and the Signal Corps have undergone significant transformation. The pool of available Signal battalions for area coverage has been reduced. Could operational battalions allow the Army more flexibility for ITSBs? The future is now.

There is an old saying in the Signal Corps that two things are always changing: technology and requirements. This is especially true of operational base communications.

Developing a concept of operations for operational base communications would allow some degree of planning and re-sourcing for now as well as future operations. And this is not simply an Army issue, it is truly a Joint issue. As previously discussed, the Army recently transferred control of an installation, an operational base, to the Air Force. The COMM-I program identified three services as integrators on different installations. Given the current pace of operations with units and personnel constantly rotating through, a CONOPS might begin to address some of the persistent and critical issues facing operational bases and operational base communications. This initiative might also address systemic manning and re-sourcing of operational battalions. Operational battalions may help the Signal Regiment address some of the future challenges in providing battle command during the operational phase.

The direction the Army and the Signal Corps take will depend on carefully examining how we conduct operations, how we'll support future operations, and asking the hard

Acronym QuickScan

25th Signal Battalion
54th Signal Battalion
160th Signal Brigade
AOR – area of operations
CENTCOM – Central Command
COB – Contingency Operating Base
COMM–1 – Communications Integrator
CONOPS – Concept of Operations
CONUS – Continental United States
COTS – commercial-off-the-shelf
CSS- Combat Support Systems
DISA- Defense Information Systems Agency
DoD – Department of Defense
DOIM – Directorate of Information Management
DSL – Digital Subscriber Line
DSN – Defense Switch Network
DRSN- Defense Red Switch Network
EAC – Echelon Above Corps
FOB – Forward Operating Base
GIG – Global Information Grid
IDIQ – Indefinite Delivery Indefinite Quantity
IGX – ISDN Gateway Exchange
IP – Internet Protocol
IMA – Installation Management Agencies
ISDN – Integrated Services Digital Network
ITSB – Integrated Theater Signal Battalion
JNN – Joint Network Node
MSE – Mobile Subscriber Equipment
NETOPS – Network Operations
RIP – relief-in-place
SWA - South West Asia
TOC – Tactical Operations Center
TCF - Technical Control Facility
U.S. – United States
VoIP - Voice over Internet Protocol

fundamental questions about who we are and where we want to go.

LTC June is a 1986 graduate of the University of South Carolina. He holds Advanced Degrees from Webster University, the Command and General Staff College and an M.A. in telecommunications from the George Washington University. He has served on both the Army staff and the Joint Staff. June currently commands the 54th Signal battalion. This article is dedicated to the Soldiers, civilians and unit members of the "Voice of the Desert" battalion who have helped to make operational bases a reality.

Digitizing the current force -- *the future is now*

By Bohdan "Buzz" Kowaluk and Tim Strobel

MicroLight equipped Soldiers stay connected as they deploy in a recent training exercise in Fort Lewis, Wash.

Network Centric Warfare

Simply put, a network enabled force is a more capable force. It is joint, lethal, and agile; much more than an analog force. To realize these benefits, the force requires a network that is secure, reliable, bandwidth capable, automatically adaptive, and responsive to changing conditions. Ideally the network is software defined so that advances in technology can be readily downloaded.

The Enhanced Position Location and Reporting System possess all of these qualities and is the most widely used tactical wireless network ever deployed. In fact, it is the only true networking radio available in today's inventory.

It employs MANET and Ad Hoc networking techniques. Effectively defying the laws of physics, the EPLRS waveform allows subscribers to communicate around corners, through urban canyons and into tunnels. EPLRS offers subscribers a unique ability to 'see one, see all' on the network; making communications possible where line-of-sight does not exist. User requirements for software updates are made in a joint service controlled environment and synchronized for release in accordance with Army Force Generation scheduling. EPLRS now has a 1 Megabyte throughput and at roughly $20K a radio.

Nearly 13,000 radios are now fielded in the U.S. Army. They serve as the data backbone for the tactical internet in digitized divisions and Stryker brigades. EPLRS is also the system of choice for Army Air Defense Artillery for engagement operations and sensor-to-shooter nets.

Another 5,000 radios are fielded with the other services and coalition partners. Referred to as the Situation Awareness Data Link in the U.S. Air Force, EPLRS equipped F-16 and A-10 aircraft employ the system for the exchange of weapons data and for close air support applications. EPLRS is used for command and control communications, chat services and video streaming applications at the U.S. Marine Corps Regimental and battalion level. The Navy supports the USMC with EPLRS equipped landing craft for amphibious warfare operations.

Digitizing the force

Since the mid-1990s, vast amounts of time and effort have gone into what we know as 'digitizing the force'. Beginning with the First Digital Division in 1996 and continuing today, the emphasis is on force protection and lethality through networking. The idea is fairly simple. A digital force can move faster, bring more lethality to bear and remain safer than an analog force. Where am I? Where are my friends? Where are my enemies? Answers to these critical questions and more can be obtained over what is known as the Tactical Internet, a tactical component of the Global

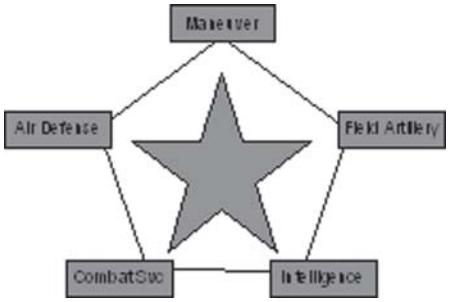
Information Grid.

Though the idea of a Tactical Internet is fairly simple, putting one into practice presents some challenges. First, today's force is large, joint, and very often multi-national. Communications that service such a diverse set of subscribers must be flexible enough to support multiple missions and provide enough bandwidth for each subscriber to make it worthwhile. Second, wireless communications is a rapidly advancing area of commercial technology. Military gear should be software defined so that incorporating the latest advances in commercial technology is as easy as downloading new software.

The EPLRS waveform enables this Soldier to simultaneously receive situational awareness, transmit and receive data, and communicate using Voice over IP.

The early days of tactical wireless

EPLRS was originally developed in the 1980s as an upgrade to a pre-GPS, time of flight based position location reporting system. The upgrade added the ability to carry small amounts of digital data to tie together the original five battlefield functional areas: Field Artillery,



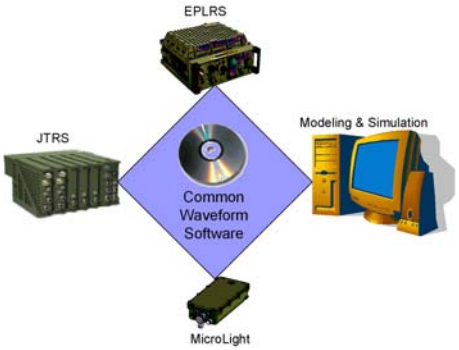
Combat Service Support, Air Defense Artillery, Intelligence and Maneuver Control. Early versions of EPLRS radios were based strictly on military technology, weighed 25 pounds, could transmit only 19.2 kilobits per second and cost in the neighborhood of $60,000. Today's throughput is a stout 486 kilobits per second (1 megabit per second on some hardware suites) at a cost of less than $20,000.

Time for change

In the mid-1990s EPLRS manufacturer Raytheon and the U.S. Army's Project Manager for Tactical Radios and Communication Systems teamed up for an innovative partnership aimed at product improvement and cost reduction. Known as value engineering, the concept gives sole-source contractors incentive to reduce costs and improve their products. Under a value engineering change proposal the contractor agrees to invest in the product and the government agrees to buy a pre-determined quantity at a negotiated price. The VECP arrangement has worked marvelously three times, unleashing powerful new networking capability and twice winning annual awards as the top VECP for the U.S. Army and Department of Defense.

Change is good

What has this dramatic change meant to the users? Over the years EPLRS radio technology has morphed from heavy reliance on military specified technology to a new design consisting of mostly commercial-off-the-shelf technology. The inner-workings of the radio have been completely re-structured into a software defined waveform which can be run on a number of different platforms such as EPLRS vehicular radios, pocket-sized Land Warrior radios, JTRS Ground Mobile Radio and JTRS Handheld,/



Manpack,/Small Form-Fit radios. The portability of the waveform software is a direct result of strict adherence to an industry standard, layered open architecture. The benefits of which are enormous.

Adherence to industry stan-

dards dramatically reduces software development timelines and associated costs, making it possible to bring new capabilities to the warfighter much faster and more affordable than ever before. This is due in large part to increased software re-use and the off-the-shelf availability of software modules such as Internet Protocol stacks, real time operating systems, and routing protocols. In 2003 the Department of Defense recognized the EPLRS program with a "Top 5" award. EPLRS was singled out among all DoD programs for software quality, excellence, and innovation.

These remarkable advancements in technology ushered forth dramatically increased capability. Today's EPLRS supports 486 kilobits per second (up to one megabit per second on some hardware suites), Mobile Ad-Hoc Networking, standard IP interfaces and is completely software upgradeable. Also, implementing the latest technological advancements has reduced the radio cost by 300 percent to less than $20,000 per vehicular radio (far less for the MicroLight™ hand-held variant). EPLRS enabled radios essentially form up into a secure, mobile wireless internet. An industry standard IP interface makes attaching to the network as simple as attaching a laptop computer to a local area network port. The embedded MANET protocols give every radio in the network the ability to act as a store and forward relay node when necessary. This allows the network to automatically and continually adapt to changing conditions, automatically routing traffic from where it originates to where it needs to be without user intervention. Traditional MANET techniques concern themselves with routing solely at the IP layer.

As a result they are bandwidth inefficient and do not scale well to large networks. EPLRS MANET uses an advanced combination of IP routing and radio level retransmission. With this technique network overhead is sufficiently small that the network not only scales to very large (several hundreds of nodes) but performance actually improves when more radios are added to the network. A typical brigade combat team network consists of nearly 1,000 nodes, all interoperating in a contention-free environment.

A network for today

Designed from the ground up as a tactical wireless warfighting network, Nearly 18,000 copies of the EPLRS waveform have been fielded

to the U.S. Army, Marine Corps, Air Force, and Navy. Radios running EPLRS waveform software are deployed on troops, tanks and armored personnel carriers, infantry fighting vehicles, close air support aircraft, and surface vessels. One of the big advantages to a networked system such as EPLRS is ease of deployment. Because radios automatically form up into a network and automatically store and forward network traffic, there is no need for additional infrastructure. The radios themselves form their own infrastructure. At the present time the EPLRS waveform is in widespread use outside continental United States to transmit Blue Force Situation Awareness, command and control data, air defense tracks, voice, video, chat, email, and real time targeting data.

One particularly compelling application of EPLRS was reported in *Aviation Week* (Oct. 27, 2003). The article, entitled *"Netting the Enemy"* recounted a secretive part of the war in Iraq where U.S. special operations troops on the ground were able to communicate with strike aircraft via EPLRS (note that the USAF calls their use of EPLRS the Situation Awareness Data Link, or SADL). The troops on the ground were able to accurately, securely, and efficiently lead strike aircraft onto mobile rocket launch sites. The combined arms team, called the most networked force in the war, was singled out for being both deadly and safe.

The combat effectiveness and wide spread use of the EPLRS waveform has prompted interest in recent years on the part of our coalition partners. The two most recent additions to the EPLRS user community are the Armies of Australia and Canada. Both seeking capability and U.S. interoperability, each nation has already procured a moderate number of EPLRS-capable radios to support field trials. Recently selected from a field of four competitors, the waveform is now undergoing field trials in the United Kingdom as part of the Future Soldier Integrated Technology program.

Near Term enhancements

Originally fielded in the early 1990s, the EPLRS waveform has undergone significant changes over the past twelve years. The government has been able to afford greater quantities than originally anticipated as cost has been reduced and the capabilities are increased. The truest example of a win/win arrangement, with government-industry partnership has brought needed capability to the warfighter.

Today's EPLRS offers state-of-the-art networking in a flexible software defined form factor. It is the most widely used, most capable

networking waveform in service today anywhere in the world.

Several enhancements are currently in work. These include updated cryptographic software to bring it in line with emerging standards, an enhanced ability to merge disparate networks, automatic router discovery, quality of service optimizations to better support voice and video in restricted propagation environments, as well as others. These and future capability improvements will allow one network to better serve the needs of disparate subscribers (e.g., mounted, dismounted, fast-moving aircraft) well into the future, enabling them to fulfill their independent missions while working closely together.

Mr. Kowaluk entered government service in 1980. In 1987, he became the principal government engineer on the EPLRS program. Kowaluk has supervised the technical growth of the program, for 20 years and is responsible for major government awards for value engineering and the continued modernization of EPLRS, to include technical changes allowing adoption of all military branches of DoD. Kowaluk has an undergraduate degree in physics from Fairfield University in Connecticut.

Mr. Strobel is the technical director for Raytheon's the Tactical Communications Systems group in Fullerton, Calf. He holds a Bachelor's Degree in mathematics and a Master's Degree in business administration from California State University. Over the past 22 years he has worked on the EPLRS waveform as a software programmer, system architect and chief engineer.

Acronym QuickScan

ADA – Air Defense Artillery
ARFORGEN – Army Force Generation
BFSA – Blue Force Situational Awareness
C2 – Command and Control
CAS – Close Air Support
COTS – Commercial Off The Shelf
DoD – Department of Defense
EPLRS – Enhanced Position Location Reporting System
FDD – First Digitized Division
FIST – Future Soldier Integrated Technology
GIG – Global Information Grid
GMR – Ground Mobile Radio
HMS – Handheld,/Manpack,/Small Form Fit
IP – Internet Protocol
JTRS – Joint Tactical Radio System
JTRS GMR – Joint Tactical Radio System Ground Mobile Radio
JTRS HMS – Joint Tactical Radio System Handheld/Manpack/Small Form Fit
MANET – Mobile Ad Hoc Network
OCONUS – Outside Continental United States
PLRS – Position Location Reporting System
PM-TRCS – Project Manager for Tactical Radio Communication Systems
SADL – Situational Awareness Data Link
TI – Tactical Internet
US – United States
USMC – United States Marine Corps
USAF – United States Air Force
VECP – Value Engineering Change Proposal

TCM update

Updates from Training and Doctrine Command capabilities managers for networks and services including satellite communications, tactical radio and Warfighter Information Network-Tactical

TCM-WIN -T

WIN-T Update

By Rod Roeber

The Warfighter Information Network-Tactical program is progressing through the actions needed to satisfy Nunn-McCurdy Act requirements. Through this process, validating WIN-T requirements and rebaselining the cost and schedule will be finalized.

The Training and Doctrine Command Capabilities Manager, Networks and Services is reevaluating network capability gaps between current and required capabilities. This exercise contributes to the program rebaselining process by placing in priority the gaps that are in most urgent need of solutions so that funding resources can be properly applied. In coordination with the capability analysis, the Capabilities Production Document for the first phase of the WIN-T evolutionary process is being coordinated with TRADOC headquarters. Upon TRADOC approval this document will proceed toward Army Requirements Oversight Council approval in accordance with the Joint Capabilities Integration and Development System.

The Joint Network Node will continue to play a crucial role in bridging network transport capability gaps. In addition to fielding JNN equipment, proposals for augmentation are being evaluated. These upgrades are intended to provide both greater JNN capability as well as WIN-T compatibility. Among the WIN-T technologies that may augment JNN are improved network operations, wireless local area networks and an improved security architecture.

The end state of this process it to provide one network for the tactical Army that provides reliable network transport at the required quality of service for units while on-the-move, at-the-halt and at-the-quick-halt.

This information is provided by Rod Roeber, Ph.D. EE. Dr. Roeber can be contacted in the TCM NS office at 706-791-2677 (DSN 780) or by email at roeberr@gordon.army.mil.

Dr. Roeber is a Senior Systems Engineer with Engineering Solutions and Products, Inc. and supports the TCM NS in the WIN-T Program of Record. Dr. Roeber has been working WIN-T since 2002.

Acronym QuickScan

JNN – Joint Network Node
TRADOC – Training and Doctrine
WIN-T – Warfighter Information Network-Tactical

TCM-NS

TCM-NS update

Network operations and associated common LAN manager and network services initialization capability development

By Ed Duffy

The organization of the Army's tactical network operations environment has created a gap between Current Force and Future Force management needs for the tactical network and its NetOps. The tactical network and services capabilities demanded by the modularized force and required to support Net Centric Warfare concepts are greatly impaired by proliferation of Network Management tools and the current operational database management process. As outlined in a previous *Army Communicator* article, in order to address the NM gap and create a tailored, integrated system to simplify, streamline, and consolidate tactical NM and associated NetOps, the Common Local Area Network Manager Capability Production Document was initiated.

The CLM's goal is to encapsulate existing G6/S6 tools and improve their Modular Force capabilities by concentrating on NM solutions that serve to eliminate current equipment operations that are more complex than needed, often cause NM operational workarounds, and at times lead to not only confusing but sometimes duplicative Soldier training. The CLM CPD presents a set of tactical NM capabilities and interoperability requirements needed to evolve and adapt to support the changed modular field operations environment and generally smooth out tactical NetOps.

The TCM N&S is in final coordination with the Product Manager NetOps – Current Force for release of the CPD into the formal staffing process. The general timeline for integrating, testing and fielding the CLM is aligned with the Army's Software Blocking development. CLM is targeted to be part of the SWB Block 3 development associated with Operation Iraqi Freedom 10-12 train-up and rotation. SWB Block 3 has a tentative Intra-Army Interoperability Certification event scheduled for third quarter fiscal year 2009 with a follow-on Operational Evaluation window of the fourth quarter fiscal year 2009.

Additionally within the NetOps area, TCM N&S participated as a member of the Simulation to Command, Control, Communica-

tions, Computers, and intelligence Interoperability Overarching Integrated Product Team for standardizing systems initialization across the Army. This is the only body formally chartered to look across both the battle command and simulation communities to identify and develop integrating technologies. During 2006 SIMCI OIPT conferences, and most recently at the October 2006 Army Initialization Workshop, the focus was on shortcomings and problems concerning the Army's warfighting system of systems Network Initialization Capability. The structure of the AIW discussions was to try and get a general understanding by the OIPT of what is initialization as a broad definition that includes modeling & simulation, BC and Future Combat System. As a result of the AIW, TCM N&S will develop and staff a CPD to document systems initialization capability to provide network services under the IC definition that supports the notion that it is a Battle Command Initialization System SoS process to enable synchronized operations, training, test, and experimentation activities. This is separate from the network objective initialization capability requirement stated in the CLM CPD describing configuring network access and system interdependencies consisting of network communications.

Mr. Duffy is a retired Army Signal Corps Major and provides technical support for Wireless Facilities Inc, Government Services Division contracts at Fort Gordon, Ga. His focus is on the definition of systems requirements and testing of automated communications network management for the Modular Force's battlefield information transport architecture. He is currently in direct support of the TRADOC Capability Manager Network & Services in the area of Network Operations supporting development of the LandWarNet information environment.

Acronym QuickScan

AIW – Army Initialization Workshop
BC – battle command
BCIS – Battle Command Initialization System
C4I – Command, Control, Communications, Computers, & Intelligence
CF – Current Force
CLM – Common Local Area Network Manager
CPD – Capability Production Document
FCS – Future Combat System
FF – Future Force
FY – fiscal year
IAIC – Intra-Army Interoperability Certification
LAN – Local Area Network
M&S – modeling & simulation
NetOps – network operations
NIC – Network Initialization Capability
NM – network management
OE – Operational Evaluation
OIC – objective initialization capability
OIF – Operation Iraqi Freedom
OIPT – Overarching Integrated Product Team
PM NetOps-CF – Product Manager NetOps – Current Force
SIC – systems initialization capability
SIMCI – Simulation to C4I Interoperability
SOS – system of systems
SWB – Software Blocking
TCM-NS – TRADOC Capability Manager Network & Services
WFI – Wireless Facilities Inc.

RADOME maintenance team effort at 333rd

By CPT Scott Baker

FORT BUCKNER, Okinawa, Japan – Although the 58th Signal Battalion motto has changed to "Connecting the Warfighter," those of us at 333rd Signal Company know that we are still the hub of the Pacific.

The 333rd Signal Company continually provides critical communications capabilities to all branches of the military on Okinawa and to many external units. Through its unique location and a wide variety of satellite communications equipment, the 333rd SATCOM team provides all Defense Information Systems Network services to countless real-world and Ground Mobile Forces training missions around the globe.

Supporting land and sea operations, to include large-scale theater exercises, the SATCOM terminals must remain operational at all times. This in itself presents a challenge, due to being on a tiny island of rapidly changing and often harsh weather conditions.

Elements ranging from high winds, humidity, and salt take their toll on communications equipment. Maintenance is a major part of being able to accomplish the unit's wartime mission in providing a wide array of communications capabilities.

Typhoons are one of the most significant threats to reliable communications. In order for the satellite terminals to remain operational and survive the high winds, they are equipped with sheltering structures called RADOMES. These mostly rigid fiberglass shells resemble a large golf ball or "Epcot" and are designed to withstand wind gusts of over 180 mph.

Over time these structures must be refurbished, due to metal parts being corroded by salt, bolts vibrating loose due to the wind, and deterioration of the silicone caulking that seals the numerous panels. Refurbishment projects such as the RADOME maintenance that is being conducted at Fort Buckner to protect the 333rd Signal Company's AN/GSC-39C satellite terminals and the satellite terminal next door at E Company, 53rd Signal Battalion of Space Command, is a costly undertaking.

Scaffeling for maintenance of the interior of the 333rd Signal Company's RADOME reaches the top of the 50-foot structure.

The maintenance itself is a somewhat lengthy and a carefully planned process, involving various elements and agencies ranging from personnel from 58th Signal Battalion, U.S. Army Information Systems

Scaffolding is prepared for interior maintenance of the 333rd Signal Company's RADOME.

Tobyhanna Army Depot personnel refurbish the exterior of the 333rd Signal Company's RADOME.

The 333rd Signal Company's RADOME resembles a large golf ball or "Epcot."

Engineering Command, and Tobyhanna Army Depot to local Okinawan contractors, as well as others.

The definitive goal is to complete the necessary work in the shortest amount of time and to minimize interruption of DISN services being provided to our customers. To help in the re-routing of communications traffic and to support the satellite control mission of E Company, ISEC provided a mobile restoral terminal and a technician. The restoral terminal provides the same capabilities as a medium fixed satellite terminal.

TYAD supplied a team of eight to conduct the actual RADOME refurbishment. They are responsible for removing the old caulking (by hand with a carpenter's knife), replacing corroded metal hardware, tightening all the bolts that hold the dome panels together and for resealing all dome seams with new caulking.

The entire process, depending on the weather, can consume 10 to 15 days, working 10 to 12 hours-a-day. To pressure wash and strip caulking off the domes, TYAD personnel form two-man teams and use four bucket trucks that are able to easily reach over the 50-foot summit of the domes.

Next, the Okinawa contractors undertake the task of assembling a myriad of scaffolding inside the RADOME that will enable TYAD personnel to reach the entire interior surface of the dome and tighten or replace the bolts that hold the dome together.

The Okinawa contractors assemble the scaffolding at an astonishing pace relying on no more than eight but no less than four persons in only two days, filling the cavernous dome from floor-to-roof all while constructing around the antenna and its 38 ft dish.

Once all the bolts are tightened the TYAD personnel move back to bucket trucks and begin the multi-day task of resealing the RADOME and making its many seams water tight before beginning work on the next RADOME.

Maintenance endeavors of this nature ensure that 333rd Signal Company SATCOM and the 58th Signal Battalion will still be "Connecting the Warfighter," even under the most extreme conditions.

CPT Baker is the commander of the 333rd Signal Company,58th Signal Battalion, Fort Buckner, Okinawa.

ACRONYM QUICKSCAN

DISN – Defense Information Systems Network
SATCOM – satellite communications
TYAD – Tobyhanna Army Depot

PM team provides Army's first

Strategic shelterized tech control facility *in Iraq*

By Stephen Larsen

FORT MONMOUTH, N.J. – Project managers will tell you that in any given project you can have two-out-of-three when choosing between the variables of cost, schedule, and performance. If you implement your project quickly and want high performance, you can't have it cheap. Or if you want it cheap and still want high performance, it will take some time. And so on. Three-out-of-three? Fuhgeddaboudit, it can't be done.

Yet the Product Manager, Defense Wide Transmission Systems – part of the Army's Program Executive Office, Enterprise Information Systems' Project Manager, Defense Communications and Army Transmission Systems – achieved three-out-of-three when it lead a multi-organization government and industry team in providing a strategic shelterized technical control facility for the Army at Contingency Operating Base Speicher, Iraq, in less than six months and implemented the project so cost-effectively that there was money left over from the $12.1 million funded for the effort. This is amazing when you consider that officials estimate that to construct a building with the same capabilities would have cost $30 million-plus and taken more than a year and-a-half.

The tech control facility comprises four 30-ft transportable shelters – three housing communications equipment and one housing a backup generator and uninterruptible power supply – and provides Tier 1 Internet protocol connectivity to the Nonsecure Internet Protocol Router Network, the Secret Internet Protocol Router Network and the Combined Enterprise Regional Information Exchange System, with transmission connectivity through Deployable Ku-Band Earth Terminals.

In preparation for initial operational capability, Jason Hardy, a systems engineer with General Dynamics C4 Systems, tests the Combined Enterprise Regional Information Exchange System in one of the shelters that make up the Tech Control Facility at Contingency Operating Base Speicher, Iraq.

LTC Clyde Richards, the PM DWTS, said the new facility significantly increases the C4 (command, control, communications and computers) capability for warfighters at COB Speicher, relieves the use of tactical units from performing signal functions and is an "innovative solution" in that it is transportable and reusable at other locations – the first time an Army project manager has provided a shelterized strategic tech control facility.

"The Air Force has done this before (provided shelterized tech control facilities)," said Richards, "but they were unable to provide a shelterized configuration in time for Speicher's IOC (initial operational capability) date of Dec. 31, 2006, because there was a six-month lead-time just to order and deliver the ISO (International Organization for Standardization) shelters" – not to mention the additional six or more months it would have taken to install and integrate the communications equipment in the shelters.

Failure is not an option

After being tasked in late June 2006, PM DWTS simultaneously worked with the 335th Theater Signal Command to validate the requirements and called together a team of government organizations and industry partners, asking them how they could meet the requirements in less than six months – Richards impressing upon them that there was no time to underplay

Workers stand ready as one of the Tech Control Facility shelters is lowered by a Terex crane onto a concrete pad at COB Speicher.

At COB Speicher, Ben Bertrand (right), Project Leader- Forward with the Product Manager, Defense Wide Transmission Systems, and an Air Force officer check one of the Tech Control Facility shelters as it's removed from a C17 aircraft after the long flight from the U.S.

problem issues and assume they could fix them later – the Dec. 31 IOC date allowed no time for that.

"I told them this is real-world, supporting the war effort," said Richards. "I said 'Tell me the real issues *now* – don't tell me mid-stream. We have got to succeed – failure is not an option. Period." In fact, team members agree that Richards stressed that so much that "Failure is not an option" became their mantra throughout the project.

Richards personally took this message all the way up the leadership chains of industry partners Computer Sciences Corporation, General Dynamics C4 Systems and Protean Shelter Solutions and the U.S. Army Information Systems Engineering Command, which would provide engineering support and quality control.

"It was crucial that we got buy-in up-front for what was expected," said Richards. "To succeed, everybody had to believe in what we were doing and do their part."

And the industry partners did indeed buy in to what they needed to accomplish and to the idea that "Failure Is Not an Option." "In our first meeting, if LTC Richard said that once, he said it 15 times," said Gordon Thomas, prime contractor CSC's project manager for the effort. "I got the message and took it back to our folks, and 'Failure is not an option' became our mantra or motto, too."

Richards credits CSC for proposing and devising the innovative shelterized tech control facility solution, using non-ISO commercial-off-the-shelf shelters, that would not only meet the Dec. 31 IOC date, but that also cost some $2 million less than the only other alternative, retrofitting rooms in an old, worn-down confiscated Iraqi building at COB Speicher. Thomas called the solution the "brainchild" of Harry Aderton, CSC's project leader.

Senior Army leadership was concerned about using other than ISO-certified shelters, Richards added, but said that they understood the need to improvise given the time constraint and the potential for cost avoidance. Richards also stressed that since these shelters were supporting a strategic, rather than tactical requirement, there really wasn't a need to meet all of the specifications for a tactically-deployable ISO shelter. "There are some minor tradeoffs in transportability and durability, but the non-ISO shelters can be transported on common military aircraft (such as C130s and C5s) and handled using standard military lift, such as Terex and cranes," he said.

Richards said Linda Bartosik, PM DWTS' Iraq team leader did a superb job in assembling and leading an integrated product team including members from ISEC, CSC, GDC4S, Protean Shelter Solutions, Piril Insaat Ticaret Ve Bilgis, the Multi-National Force – Iraq, the 335th Theater Signal Command, the 160th Signal Brigade, the 72nd Signal Battalion, the 67th Signal Battalion, the 136th Signal Battalion, COB Speicher's Department of Public Works and Mayor cell and, very importantly, PM DWTS' sister-PM within PEO EIS – the Product Manager, Defense Communications Systems-Southwest Asia – which provided outside plant, inside plant, data and voice networks and even

trailers for living quarters.

"Formulating that integrated product team from the outset – that really was the key," said Richards. "We had all the key players up-front, they understood their roles, knew the constraints, that there was very little slack and that almost every task was on the critical path. Linda did a great job getting all those people together and getting them to understand their roles."

Richards also stressed that the effort was a dual-PM project between PM DWTS and PM DCS-SWA.

"Despite both PMs having our own set of contractors, engineers and disparate business processes, we worked seamlessly," said Richards, "fully synchronizing the schedule and reporting and presenting a single face to the customer."

Richards said that an important job of his was to fight against "requirements creep."

"After we helped the customer define what their requirements actually were, we had to fight to stick to those requirements," said Richards. "Anything additional could be addressed post-IOC or for FOC (full operational capability), or we had no chance to meet IOC."

A condition of the project, Richards said, was that PM DWTS use some government-furnished equipment, stored at a General Dynamics facility in Taunton, Mass., that was originally procured for a facility at Camp Victory, Iraq, but was not used when requirements changed there. But this condition was an asset rather than a liability, according to Bartosik.

"There was absolutely no way to get this done in time without using the GFE, there wasn't time to procure all the routers, servers and so on that we needed," said Bartosik. "Using the GFE was both a cost-advantage to the taxpayer and a schedule advantage."

The power shelter, she said, was fabricated in England and the three communications shelters were fabricated in Virginia and Pennsylvania and then were shipped to Taunton where they were "racked and stacked" with the communications equipment and tested. By mid-November, the shelters were ready to be shipped to Iraq for installation.

A worker watches the digging for the grounding ring outside one of the four 30-ft transportable shelters that make up the Tech Control Facility at COB Speicher.

"Getting the shelters to the theater on time, without impacting the critical path, was the long pole in the tent," said Richards – noting that they had to do it during a period when units were transitioning in and out of theater so there weren't a lot of MILAIR (military aircraft) flights available. That's where SFC Arthur Lee, PM DWTS' project leader, and MSG Ronald Reese, of the 335th Theater Signal Command teamed to coordinate a special air mission (SAM) request leveraging the signature of two general officers. They sent one communications shelter to England, where it was joined up with the power shelter on a MILAIR flight, while the other two shelters went directly to Iraq on two MILAR flights.

"We micro-managed the shipment of the shelters," said Richards. "SFC Lee and MSG Reese were all over that."

The shelters reached COB Speicher on Dec. 5, where the team worked the on-site installation and testing around the clock to meet the Dec. 31 IOC date.

Teaming is everything

You can't prove the adage "Success has many fathers but failure is an orphan" by this project, though, because when you ask the team members who was the key to its success, each points to someone other than themselves. Richards points to Bartosik, who points to Lee, who points to Reese, and so on.

Perhaps Bartosik explained the success best by pointing to a briefing chart she uses that includes the names of more than 50 IPT members from more than a dozen organizations.

"Look at this chart, we put together a team that couldn't fail," said Bartosik. "When it comes to being successful, teaming is everything. You've got to be in this mindset or you don't succeed."

Bartosik gave kudos to Lee, who she said was "devoted to this project 24 hours-a-day."

"I depend on SFC Lee to take care of the daily details and iron out the daily issues," she said. "He was like a bloodhound, tracking down issues and coordinating with the Air Force, Army and CSC to get the shelters to Speicher on time. Last night, he was at CRC (the Continental United States Replacement Center at Fort Benning, Ga., where personnel train for deployment redeployment to theaters of opera-

Some of the team who, in less than six months, provided the shelterized tech control facility at COB Speicher. (Front row, kneeling left to right): MAJ Jake Crawford, the Southwest Asia operations officer for the Product Manager, Defense Wide Transmission Systems; Linda Bartosik, PM DWTS' SWA team leader; and Omer Gokce, and engineer with Piril Insaat Ticaret Ve Bilgis. (Back row, standing left to right): Robert Griffiths, project leader with General Dynamics C4 Systems; Rick Lindholm, deputy site leader with Computer Sciences Corporation; LTC Clyde Richards, the PM DWTS; Ben Bertrand, PM DWTS' project leader-forward; Mike Megley, deputy project leader with GDC4S; Tom Gutman, site leader with CSC; Ahmet Lulecioglu, site leader with Piril Insaat Ticaret Ve Bilgis; and Ragip Tilki, engineer with Piril Insaat Ticaret Ve Bilgis.

tions), and he was talking to me on the phone working issues for two hours. Working with him – that's an inspiration. Where do you find that kind of dedication?"

She also gave high marks to Ben Bertrand, PM DWTS' forward project leader; ISEC personnel Alan Wentrcek, Cory Hanes, David Short, and Ernest Baker; and CSC personnel Thomas and Aderton.

"Ben Bertand was our (PM DWTS') eyes and ears on the ground and Cory Hanes was ISEC's man on the ground at Speicher," said Bartosik. "Then there were CSC's Gordon Thomas and Harry Aderton, who were also working on this 24 hours-a-day, just like SFC Lee and I were."

Richards concurs that CSC deserves credit. "CSC managed this meticulously, closely – in all my years of project management, I've never seen a project go totally according to schedule, with nothing slipping, until now," he said.

"'Failure is not an option' was our mantra throughout the project," said Aderton, "We knew we had to adhere to the schedule throughout and we made sure we did."

Bartosik and Lee credit Richards with keeping the team focused and providing top cover against requirements creep and other issues.

"In a war zone, you're dealing with colonels and generals," said Bartosik. "When it looked like something was in trouble, we briefed LTC Richards and he took action – that support from the PM-level is crucial to us."

Noting the eight-hour time difference between Iraq and the U.S., Richards said another key decision that led to success was the placement of a forward assistant product manger to run interference and provide top cover for the team on the ground. "My APM-forward, MAJ Jake Crawford, was pivotal to our success," noted Richards. "He was able to make decisions and take action in real time, as potential distracters threatened the project momentum."

But the most important kudo came from the customer in an e-mail from MG Dennis Lutz, commander of the 335th TSC, who wrote to Richards: "Congratulations. I didn't give you any wiggle room on this and you came through. Great work by you and your team."

To Richards, maybe the most significant aspect of the project was that PM DWTS successfully applied the Army's acquisition model to a commercialized strategic communications implementation in war zone environment.

"The acquisition model is not designed to work in that type of environment," said Richards. "It was designed for developing weapon systems in a safe, industrial environment. We took that model – used our expertise and knowledge of the acquisition business process, contracting methods and laws, how the bureaucracy works, how to get through red tape and a little ingenuity – applied it to the battlefield environment, and developed a modified process that worked."

Bartosik cautions, though that the team can't rest on the laurels of its IOC success, as it needs to work post-IOC issues, such as finishing the grounding around the DKET pads, providing a ballistic shield over the shelters and putting a fence around COB Speicher's land mobile radio site – Speicher's land mobile radio system is being provided by another PM DCATS PM, the Assistant Project Manager, Land Mobile Radio. Plus, there will be FOC issues to address, which will involve cutover and migration of end users to the networks.

"We are not done yet," Bartosik said. "We have to supply the same amount of dedication to post-IOC issues and to achieving final opera-

tional capability that we did to IOC – managing the contracts, cost, and schedule. So that's a concern of mine to keep the diligence going."

Mr. Larsen is a public affairs officer with Program Executive Executive Office, Enterprise Information Systems at Fort Monmouth, N.J.

Acronym QuickScan

APM – assistant product manger
APM LMR – Assistant Project Manager, Land Mobile Radio
C4 – command, control, communications and computers
CENTRIXS – Combined Enterprise Regional Information Exchange System
COB – Contingency Operating Base
CSC – Computer Sciences Corporation
DKETS – Deployable Ku-Band Earth Terminals
FOC – full operational capability
GDC4S – General Dynamics C4 Systems
GFE – government-furnished equipment
IOC – Intercept Operations Center
IPT – integrated product team
ISEC – Information Systems Engineering Command
NIPRNET – Nonsecure Internet Protocol Router Network
PEO EIS – Program Executive Office, Enterprise Information Systems
PM DCATS – Defense Communications and Army Transmission Systems
PM DCS-SWA — Product Manager, Defense Communications Systems-Southwest Asia
PM DWTS – Product Manager, Defense Wide Transmission Systems
SAM – special air mission
SIPRNET – Secret Internet Protocol Router Network
SWA – Southwest Asia
TSC – Theater Signal Command
UPS – uninterruptible power supply

Demo proves little chip can boost satellite terminal performance

By Stephen Larsen

FORT MONMOUTH, N.J. – To make a satellite link work better, you have to increase the satellite terminal's G/T – the ratio of the antenna's gain, G, to the system's thermal noise temperature, T. Simple, right?

In current Defense Satellite Communications System satellite terminals, T is basically a given, set in stone by the temperature of the low noise amplifier, which is generally ambient air temperature, about 70 degrees Fahrenheit. So that leaves G to play with if system engineers want to up the G/T ratio.

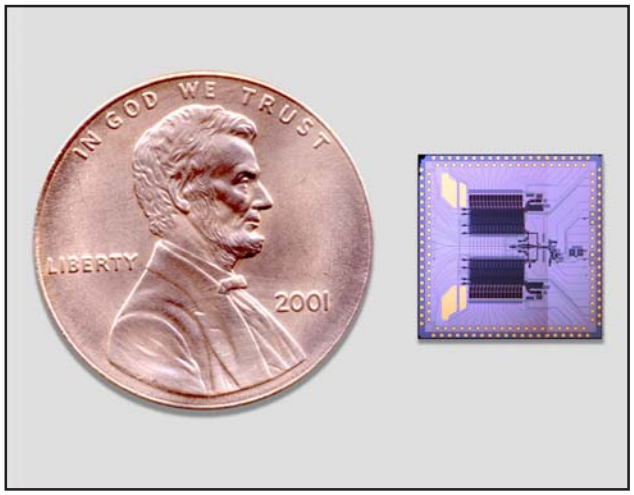
"In a traditional RF (radio frequency) architecture, the most effective way to increase G is to increase the size of the dish," said Richard Hitt, the president and chief executive officer of Hypres, Inc. "That's why you see 34-foot and 60-foot parabolic dishes in huge geodesic domes – the bigger the antenna, the higher the G/T."

But bigger is not better when it comes to military satellite terminals, according to John Deewall, head of the Advanced Technology office of the Product Director, Satellite Communications Systems, part of the Project Manager, Defense Communications and Army Transmission Systems, which acquires and installs satellite terminals worldwide for the U.S. military.

"Real estate at many terminal sites around the world is scarce," said Deewall. "We've gotten the word to scale down the size of these 18 meter (about 60-foot) 'dinosaurs.'"

Which is where Hypres comes into the picture. The Elmsford, N.Y., firm, in the vanguard of the emerging technology of superconducting microelectronics, is currently developing the world's first X-Band All-Digital Receiver for PM DCATS under a small business innovation research contract. Using the X-Band ADR, said Hitt, will enable PM DCATS to eliminate analog components that degrade a satellite terminal's signal – such as low noise amplifiers, down converters and associated cabling – thus allowing for smaller antennas while increasing the system's G/T.

"The analog processing equipment is the most expensive part of the terminal to buy and install and sets the system's performance," said Hitt, explaining that down convert-



At the heart of the X-Band All-Digital Receiver is a one-centimeter superconducting niobium chip (right) – less than half the size of a penny – that contains about 11,000 Josephson's junctions layed out to form superconducting Rapid Single Flux Quantum (RSFQ) circuits that move picosecond-duration magnetic pulses.

ing and splitting the signal 56 times to go into each of the modems degrades and distorts the signal to the point that it's a struggle process the link.

But Hitt said he expects the X-Band ADR will be able to take the signal right off the antenna or the right after the low noise amplifier, do the analog-to-digital conversion – programmable in a wide range of frequencies and bandwidth – and then send the signal directly into a single modem.

"Then we can let the modem do what it does best, which is digital processing," said Hitt, adding that he "conservatively" expects the G/T to be 3 dB higher. "In the SATCOM (satellite communications) world, a 3 dB increase is huge," said Hitt, "it can double the throughput" – the amount of digital data the terminal can deliver per time unit.

Hitt said that the X-Band ADR could also slash the cost of acquiring a military satellite terminal in half, from about $5 million to about $2.5 million, by eliminating up to seven racks of analog processing equipment and one 40-foot trailer.

"Plus, there would be a huge ripple effect in system logistics," said Hitt, a former Air Force officer who worked space operations issues in at the Pentagon. With fewer, more reliable components, fewer racks of equipment, and fewer trailers, Hitt feels the costs to maintain and airlift systems will be reduced.

Art Reiff, the deputy PM DCATS, said that his organization first became interested in the possibility of an X-band ADR when Hypres briefed him and other DCATS officials about the concept in July 2003.

"They (Hypres) gave me figures on how the X-Band ADR could improve G/T," said Reiff. "It made sense to me that if you removed the analog components and went all-digital you would improve performance."

Super-cooled niobium chip

At the heart of the system is a one-centimeter chip – less than half the size of a penny – made of niobium, which becomes a superconductor with zero resistance at 4 degrees Kelvin (-452 F) – nearly absolute zero, the coldest theoretical temperature attainable possible, at which no heat energy or kinetic energy remains in a substance.

"Niobium is to superconducting microelectronics what silicon is to semiconductors," said Oleg Mukhanov, Hypres' program manager for the X-Band ADR project, who co-invented Rapid Single Flux Quantum logic, the cornerstone of digital superconductor electronics, when he was a doctoral student at Moscow State University, Russia, in 1985.

Instead of transistors, Mukhanov said, the basic building block in superconducting microelectronics is called a Josephson's junction – two layers of niobium linked by a very thin non-conducting oxide barrier. These Josephson's junctions can be laid out in different arrays to form superconducting RSFQ circuits that move picosecond-duration magnetic pulses. There are about 11,000 Josephson's junctions on the X-Band ADR chip, said Mukhanov.

When cryogenically cooled to their operational temperature, superconducting circuits are about 1 million times more sensitive to radio frequency signals than conventional semiconductor devices. "Our niobium analog-to-digital converter can sample at clocks speeds of 20 gigahertz to 40 gigahertz," said Mukhanov. "By comparison, the semiconductor ADCs typically sample at clock speeds of one to two orders of magnitude lower."

Hypres does use a substrate of silicon upon which it lays out the niobium circuitry. "The silicon substrate is like a plate and the circuits are like the food on the plate," said Saad Sarwana, Hypres' test lab manager. "Once we cook the food, we take the plate away."

Developing the X-Band ADR is part of a three-part Hypres project to develop an All-Digital Transceiver – the other two parts include developing an all-digital transmitter and then integrating the receiver and transmitter to make the All-Digital Transceiver. Hypres' clients for the three projects is an alphabet soup of government agencies, including the Office of Naval Research, the Communications-Electronics Research, Development and Engineering Center, PM DCATS, the Naval Air Systems Command, the Office of the Secretary of Defense, the Space and Naval Warfare Systems Command, and the Missile Defense Agency. Hitt said Hypres expects to complete all of these projects by the end of calendar year 2008.

X-Band ADR demonstrated in a 'relevant environment'

As of June 2006, the X-Band ADR project was, according to the measuring scheme used by U.S. agencies to assess the maturity of evolving technologies, at Technology Readiness Level 4 – validated as a breadboard in a laboratory environment – but needed to move to TRL 6 – demonstrated as a model or prototype in the 'relevant environment' in which it would be used, to move ahead for further funding.

"We've proven it works in a lab environment, in a flask of helium," said Rick Dunnegan, a telecommunications specialist who is the CERDEC Joint SATCOM Engineering Center's lead for the project. "The next step is to do it in a fielded environment, with a cryocooler."

Towards that end, Hypres, PM DCATS and the CERDEC tested the X-Band ADR at Fort Monmouth's JSEC on Feb. 15, 2007, by transmitting a signal containing fist data, and then a video clip, from an AN/GSC-52 satellite terminal up to an X-Star satellite and then back down to earth where it was received by an AN/FSC-39 terminal, processed by the X-Band ADR and then sent to an L3 Communications model 3501-01 modem – used because it is the only modem currently available with a digital interface.

They did not have access to eliminate the low noise amplifier for the test, so they connected it after the low noise amplifier, eliminating the downconverters. All involved in the test seemed quite happy with the

results.

"It worked better than expected," said Dunnegan, "integrated in a satellite system at Fort Monmouth in a stand-alone implementation scheme showing the capability to operate with a much-higher handicapped terminal than a DoD (Department of Defense) enterprise terminal. The big news is the X-Band ADR could acquire the signal at the downlink frequency (7.676 GHz) and we were able to digitize, process data directly at X-Band – direct demodulation at X-Band," said Dunnegan. "This is a big first step."

Deep Gupta, Hypres' principal investigator for the project, said the test proved three important points: First, that they can eliminate analog components – in this case the downconverters, although he is confident they will also be able to eliminate the low noise amplifier; second, that they can increase spectrum efficiency – the data rate per bandwidth – by reducing receiver noise, the T part of the G/T equation; and third, that they can make it possible to reduce the transmit power or pass more data in the same amount of bandwidth.

"We can have higher spectrum efficiency, lower transmit power or reduced dish size – each of these can be achieved, or a combination – it's up to the link design," said Gupta.

To supercool the niobium chip in the X-Band ADR for the test, Hypres used a commercial-off-the-shelf Sumitomo cryocooler, which takes up less than half of a standard 19-inch rack. Hitt said that the final X-Band ADR will use a compact cryocooler that Hypres is developing with Lockheed Martin. The compact cryocooler project is currently nearing the end of phase 1, at which time the unit will be 19-inches by 20-inches by 22-inches – about half the size of the Sumitomo unit. By the end of phase 2, the compact cryocooler will be a svelte 7-inches by 9-inches by 11-inches.

Hitt explained that when they started developing the X-Band ADR, readily-available coolers went down to only 10 degrees K. "The big decision that Hypres made years ago was to use niobium and work at 4 o K," said Hitt. "This was based on our prediction that the cryocooler technology would catch up – and it has."

Hitt said that the "black box," or electronics package, that Hypres is using for the X-Band ADR could be easily adapted to make receivers at other frequencies by simply swapping out the chip, which he said would be relatively easy thanks to their modular design.

"The same black box concept can be easily adapted for mobile SATCOM, tactical radio communications, SIGINT (signals intelligence), radar of all types, Ka band, Cu band, multi-function avionics – anything that does analog-to-digital or digital-to-analog conversion," said Hitt.

Part of what is driving the X-Band ADR project is the upcoming launch of the Wideband Global Satellite, slated for June of this year.

"A WGS satellite will provide more than 10 times the throughput of one of the current DSCS satellites," said Deewall. "In fact, the first WGS satellite alone will provide more throughput than the entire constellation of nine DSCS satellites."

"A 3 dB higher G/T ratio will be critical for achieving the throughput requirement of WGS," added Hitt. "They'll (the U.S. military) either have to do it with conventional RF technology, which will be quite expensive, or by doing something like what we're developing."

With four additional WGS satellites scheduled for launch between 2007 and 2013, the WGS system will first augment and eventually replace the old DSCS birds. Likewise, the U.S. military will need to replace the DSCS satellite earth terminals to not only handle the increased throughput that WGS boasts, but also because WGS will provide both X-band and Ka-band satellite communications – DSCS provides only X-band service.

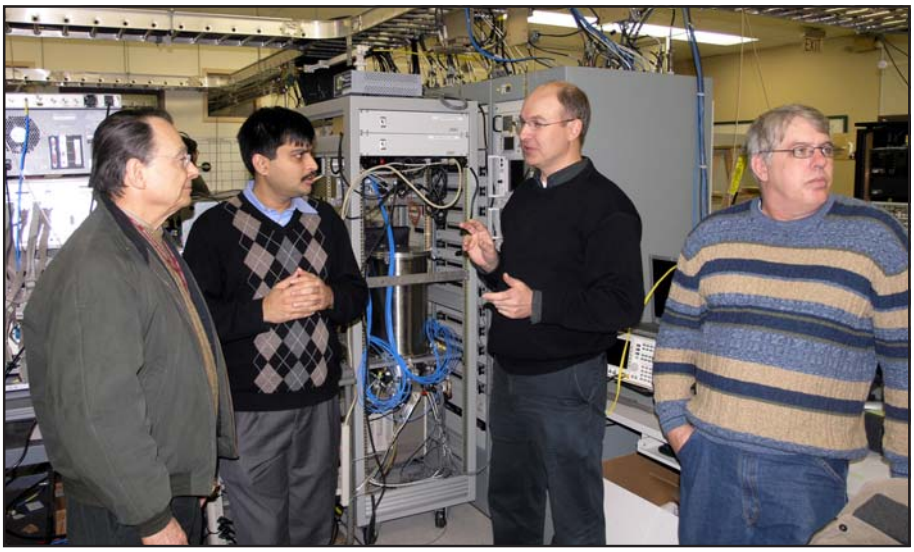
To augment the current inventory of DSCS terminals, Reiff said that PM DCATS will be fielding 15 Ka-Stars terminals between 2006 and 2011. "But the real answer to taking advantage of the greater throughput of WGS will be the 80 MET (Modernization of Enterprise Terminals) terminals we'll be fielding between 2011 and 2025," said Reiff. "The MET terminals will handle both X-band and Ka-band."

Disruptive technology

Deewall said the successful test of the X-Band ADR and the potential use of superconducting microelectronics in building satellite terminals represents a "sea change." But it's that change that makes the technology hard to swallow for the traditionally conservative overall SATCOM community.

"Superconducting microelectronics is a 'disruptive technology,'" said Hitt, using a term coined by Harvard Business School professor Clayton Christensen to describe a new technology that unexpectedly displaces an established technology and thus is resisted by large corporations because it threatens the status quo and their market shares. "Deploying disruptive technology is a unique challenge because even good change represents risk and can be upsetting in any industry" added Hitt, who said he joined Hypres because he saw the limits inherent in the state-of-the-art of RF technology and was excited about the potential he saw in superconducting microelectronics technology.

"If you went to the 2006 Applied Superconductivity Conference, Oleg (Mukhanov) was one of three plenary speakers – a big honor, especially considering that digital superconducting is only a small piece of what's being done in the field," said Hitt. "The point Oleg made in his presentation is that semiconductors are fast approaching the limits of Moore's Law (the 1965 prediction of Intel co-founder Gordon Moore that the number of transistors on a chip would double about every two years), they're up against the basic equations of heat vs. speed – while digital superconductors are just entering the beginning of their own 'Moore's Law' era."



Hypres, Inc., the Project Manager, Defense Communications and Army Transmission Systems and the Communications -Electronics Research, Development and Engineering Center successfully tested the X-Band All-Digital Receiver at Fort Monmouth's Joint SATCOM Engineering Center on Feb. 15, 2007, by transmitting a signal containing first data, and then a video clip, from an AN/GSC-52 satellite terminal up to an X-Star satellite and then back down to earth where it was received by an AN/FSC-39 terminal and digitally processed by the X-Band ADR. Shown here, discussing the results of the test, are (left to right) John Deewall of PM DCATS and Deep Gupta and Oleg Mukhanov of Hypres as Rick Dunnegan (far right) of the CERDEC ponders the next step in the process. The canister in the middle of the rack at the center of the photo is the cryocooler that supercooled the X-Band ADR niobium chip, in the box below the cryocooler, to its operational temperature of 4 degrees Kelvin (-452 F) – nearly absolute zero.

"Future military and commercial radio frequency systems will demand better utilization of the RF spectrum, moving towards higher frequency, greater bandwidth, and greater flexibility to accommodate diverse modalities, such as voice, data, video, detection and ranging, and electronic countermeasures," said Mukhanov. "Conventional analog radio frequency technology not only fails to meet, but also fails to show a credible development path for meeting these demands in the future, while rapid single flux quantum technology enables direct conversion between analog and digital domains at multi-gigahertz radio frequencies."

Or, as Hitt puts it, "Continuing to pursue semiconductor electronics vs. superconducting microelectronics for military communications is like bringing a knife to a gun fight."

So now the race is on to see if Hypres can prove an X-Band and Ka-Band Transceiver works and can have it ready for production in time for that first round of MET terminal procurements in 2011.

"They (Hypres) haven't done multi-channel yet, they haven't done Ka-band," cautioned Reiff. "Also, we don't know the risks involved and we don't know the costs."

Still, Reiff concedes that if Hypres can develop a legitimate production version of an X-Band/Ka-Band Transceiver that improves a terminal's G/T, it could impact the MET acquisition. "Our strategy is to possibly solicit a new contract for MET terminals every five to seven years," said Reiff, "so if it's (an X-Band/Ka-Band Transceiver) not ready for the first round, maybe it can be ready by the second contract."

Meanwhile, Deewall and Dunnegan are true believers, doing all they can to make the X-Band Transceiver a reality – starting with the X-Band ADR.

"Reliability is a great factor of improvement," said Dunnegan, who, for 23 years in the military and as a civilian, has been a SATCOM technician keeping DSCS sites up-and-running around the world. "Digital RF distribution is much more reliable. You've got more precision in the system."

"This year is the year of the receiver," said Hitt. "But it also has to be the year of the transmitter."

"If we can get the receiver in there, the transmitter will follow," said Deewall. *

Mr. Larsen is a public affairs officer with Program Executive Office, Enterprise Information Systems, Fort Monmouth, N.J.

Acronym QuickScan

ADC – analog-to-digital converter
ADR – All-Digital Receiver
CERDC – Communications-Electronics Research, Development and Engineering Center
DSCS – Defense Satellite Communications System
JSEC – Joint SATCOM Engineering Center
MDA – Missile Defense Agency
MET – Modernization of Enterprise Terminals
NAVAIR – Naval Air Systems Command
ONR – Office of Naval Research
OSD – Office of the Secretary of Defense
PD SCS – Product Director, Satellite Communications Systems
PM DCATS – Project Manager, Defense Communications and Army Transmission Systems
RF – radio frequency
RSFQ – Rapid Single Flux Quantum
SATCOM – satellite communications
SBIR – small business innovation research
SIGINT – signals intelligence
SME – superconducting microelectronics
SPAWAR – Space and Naval Warfare Systems Command
TRL – Technology Readiness Level
WGS – Wideband Global Satellite

Command center technology changes focus of US forces in Korea

By Stephen Larsen and Andy Treland

COL Gale Harrington (center), the Project Manager, Defense Communications and Army Transmission Systems and LTC Bob Moore, C4 Operations Chief for the Eighth Army G6, listen as a Soldier points out landmarks in North Korea at the Demilitarized Zone between North and South Korea on Dec. 11, 2006.

SEOUL, South Korea – U.S. military communicators in Korea are looking at the battlespace in a new way and what's changing their focus is technology.

"We're evolving our thinking in the communications and information field based upon the evolution of technology," said COL Gregory Edwards, J6 of the United States Forces Korea.

Edwards said that communicators in Korea have shifted their focus from data – such as reports and forms – and even from concepts such as information, systems, and capabilities and now instead are focusing on effects-based operations – meaning they're planning, executing, and assessing military activities with an eye the effects produced rather than merely attacking targets or simply dealing with objectives.

"Our basic operating domains remain the same: Space, air, land and naval," said Edwards. "However; it is technology that is enabling us to change how we operate within those domains."

A case in point is the array of technology bristling in the new Combatant Commander's Operations Center at Command Post TANGO (Theater Air Naval Ground Operations), thanks to a project completed in July 2006 by the Command Center Upgrades/Special Projects Office of the Project Manager, Defense Communications and Army Transmission Systems of Fort Monmouth, N.J. , part of the Army's Program Executive Office, Enterprise Information Systems. The new CCOC was successfully used during the annual Ulchi Focus Lens exercise with the Republic of Korea, which was conducted from Aug. 21 to Sept. 1, 2006.

The CCOC includes a high-resolution command information display system, the ability to conduct briefings within the bridge up to the Secret – U.S. Only level, connectivity to a one gigabit backbone, a video teleconferencing capability, a multi-classification capability in accessing the Secret Internet Protocol Router Network/ Combined Enterprise Regional Information Exchange System-Korea and Non-secure Internet Protocol Router Network at five workstations that allows users to control multiple computers from the "hot seats."

"The new bridge will enable improved parallel planning for the staff during a very congested 24 hour planning, decision and execution cycle," said Edwards. "The commander's intent is that his subordinate commanders will be using their C4I (command, control, communications, computers and intelligence) systems to collaboratively plan and execute various missions they've been assigned either as a supporting or supported command. Due to C4I enhancement provided via this battle cab, our command is being transformed to literally think beyond systems and is effectively integrating capabilities into the operational framework of our forces."

Edwards added that "netcentricity" is just a further extension of the same thinking brought on by technological advances.

"Our network-centric warfare vision has two major focal points – improve horizontal integration of various functional and mission areas and achieve a fundamental shift to a web-enabled, mission-oriented paradigm," he said. "This battle cab provides a virtual meeting space to discuss and

plan military operations within a rich information sharing environment and leverages network capabilities 'netcentricity' to shape the operational framework of our forces."

CIDS technology deals 2ID an ACE in the hole

Up at Camp Red Cloud, Uijeongbu, headquarters of the 2nd Infantry Division, in May 2006 PM DCATS completed the fourth of five modernization phases within the G2's Sensitive Compartmented Information Facility, comprising the G2 Analysis and Control Element in the ACE Operations room, the ACE Imagery Intelligence room, the Multidiscipline Counterintelligence room, and the Collection Management and Dissemination room.

What does this ACE modernization mean to personnel at the Camp Red Cloud Command Post? They can view on their screens images and information from the Army Battle Command System, the Automated Deep Operations Coordination System, the Advanced Field Artillery Targeting and Direction System, the Global Command and Control System – Korea, the All Source Analysis System, the Maneuver Control System, the common operating picture, and at least two live video feeds from Unmanned Aerial Vehicles – and, in the future, from Unattended Ground Sensors. ACE personnel can project these images and information on centrally-located screens that can be viewed by personnel anywhere in the operations room.

"The upgrades within the ACE drastically improved the video, visualization, and collaboration capabilities within the functional areas," said LTC Bob Moore, C4 Operations Chief for the Eighth Army G6. "The upgrades enhanced 2ID ACE systems to be tactically mobile, maximizing functionality and space, and have optimized the intelligence system networks to be interoperable with (networks of) USFK/CFC (U.S. Forces, Korea/ Combined Forces Command), component commands and national

In the balcony of the 2nd Infantry Division command center at Camp Red Cloud, Uijeongbu, South Korea, Andrew Lamb (center) of the Project Manager, Defense Communications and Army Transmission Systems' Command Center Upgrades/Special Projects Office (CCU/SPO), briefs COL Gale Harrington (center), the PM DCATS, and LTC Bob Moore, C4 Operations Chief for the Eighth Army G6, about command center systems PM DCATS provided.

John Thomson (foreground) and Fred Partridge remotely monitor the status of Eighth Army command center systems at Project Manager, Defense Communications and Army Transmission Systems' Eighth Army Strategic Command Center System Help Desk.

Andy Treland (right) of the Project Manager, Defense Communications and Army Transmission Systems' Command Center Upgrades/Special Projects Office, receives the U.S. Army Signal Corps Regimental Association's prestigious Bronze Order of Mercury in Seoul on May 12, 2006 in Seoul, South Korea.

intelligence systems and agencies." Each of the user workstations will have the flexibility to communicate via the Defense Switched Network and voice over internet protocol phone and will have access to the Joint Worldwide Intelligence Communications System, SIPRNET, the ROK (Republic of Korea)/US SIPRNET, the tactical web and NIPRNET.

CIDS gives Eighth Army a clear common operating picture at CP Oscar

In June 2006, InSeon Lim, PM DCATS' Assistant Project Manager, Theater Systems Integration-Pacific and his team conducted an Analysis of Alternatives, looking at reducing CIDS life-cycle costs via a commercial-off-the-shelf solution using Bridgit image resizing software. Lim said that the analysis clearly demonstrated the proposed solution was more cost-efficient and easier to operate and maintain than previous video wall solutions and also met the USFK Commander's Common Operating Picture, collaborative planning and situational awareness requirements.

With Eighth Army concurrence and USFK J36 endorsement, the team implemented the lower-cost COTS solution in August 2006 in command center system upgrades at CP Oscar, the warfighting headquarters for Eighth Army. In addition to upgrading CIDS and VTC capabilities for Eighth Army G2, G3, G4, G5 and engineering staff elements, PM DCATS extended the NIPRNET, SIPRNET, and coalition networks throughout the CP Oscar compound, in time to support Ulchi Focus Lens 2006.

"Our findings were that viewing quality was mostly a subjective measure without an identified requirement for minimum object/pixel size," said Lim, "given that all other parameters – contrast, ambient lighting, luminosity, simultaneous display capability, etc. – are equal." Therefore, the team's goal was to provide a CIDS design that would give the best bang for the buck in simultaneously displaying multiple intelligence and battlefield operating systems. The key driver of the CIDS design they implemented, said Lim, is its ability to clearly display the common operating picture at viewing distances equal to or greater than current video wall solutions.

"The CIDS upgrade at CP Oscar has significantly improved visualization of the Army Battle Command Systems we use for situational awareness and collaborative planning," said MAJ Chris Fland, the Eighth Army USA G2 Intelligence Systems Architecture chief.

The culmination of the numerous upgrades that PM DCATS has provided to support the Eighth Army during the past five years was the opening of the Eight Army Strategic Command Center System Help Desk on Dec. 14, 2006. Through the Help Desk, said Lim, PM DCATS will provide 24-7 command center system technical and maintenance support for the Eight Army and its major subordinate commands.

"We look forward to getting through RSO&I (reception, staging, onward movement, and integration) without a hitch because we have this," said COL John Graham, Eight Army Deputy G6, at the Help Desk opening.

Requirements, requirements, requirements

Lim said his project leaders in PM DCATS' APM TSI-P field office have worked diligently to maintain a close daily working relationship with the USFK and Eighth Army, virtually embedding themselves in those staffs – and, indeed, the USFK and Eight Army view Lim and his group as members of the team.

"I really like working with PM

DCATS," said Moore. "They're very professional and courteous, while at the same time they help me they help with issues when I have requirements that aren't definitized."

Moore, who is a network engineer by training, said that dealing with PM DCATS has taught him to focus on clearly defining what the Eight Army needs and let PM DCATS figure out how to fill those needs. "When I came here, I thought I had to design the solution," said Moore. "They (PM DCATS personnel) taught me: Requirements, requirements, requirements."

"We ourselves have to thoroughly understand the requirements," added Andrew Lamb of PM DCATS TSI-P, "and we often help the customer in defining their requirements. Then, we determine the most cost-effective way to accomplish the requirements. For instance – if there is a government entity already doing the function, then why pay a contractor?"

Moore said his experience with PM DCATS has helped him even with projects in which PM DCATS is not involved – such as when he was acquiring a protected distribution system.

"A contractor bid a whole lot of money," said Moore. "I asked PM DCATS to review the bid and they said it could be done for two-thirds less than what the contractor was bidding – and they were right, we got it for two-thirds less than the original bid."

USFK leadership have expressed their appreciation for the PM DCATS TSI-P field office by successfully nominating two of its members for the U.S. Army Signal Corps Regimental Association's prestigious Bronze Order of Mercury, with Lim receiving the award in May 2005 and Andy Treland receiving the award in May 2006.

Meanwhile, Lim said his PM DCATS is striving to come up with a baseline for just what capabilities and systems should be in a 21st century command center to maintain a common architecture for ease of use and supportability.

"A general officer may see another command center and say 'Why is mine not as nice, or different?'" said Lim. "What we're trying to do is get the maximum bang for the buck in meeting the warfighter's requirements. Everyone's putting in nice 'eye-candy' systems, but you also have to consider system complexity, commonality, and follow-on operational and maintenance costs."

Mr. Larsen is a public affairs officer with Program Executive Office, Enterprise Information Systems, Fort Monmouth, N.J.

Acronym QuickScan

2ID – 2nd Infantry Division
ABCS – Army Battle Command System
ACE – Analysis and Control Element
ADOCS – Automated Deep Operations Coordination System
AFATADS – Advanced Field Artillery Targeting and Direction System
AoA – Analysis of Alternatives
APM TSI-P – Assistant Project Manager, Theater Systems Integration-Pacific
ASAS – All Source Analysis System
C4I – command, control, communications, computers, and intelligence
CCOC – Combatant Commander's Operations Center
CCU/SPO – Command Center Upgrades/Special Projects Office
CENTRIXS-K – Combined Enterprise Regional Information Exchange System-Korea
CIDS – command information display system
COP – Common Operating Picture
COTS – commercial-off-the-shelf
DSN – Defense Switched Network
GCCS-K – Global Command and Control System – Korea
JWICS – Joint Worldwide Intelligence Communications System
MCS – Maneuver Control System
NCW – network-centric warfare
NIPRNET – Non-secure Internet Protocol Router Network
PEO EIS – Program Executive Office, Enterprise Information Systems
PM DCATS – Project Manager, Defense Communications and Army Transmission Systems
RSO&I – reception, staging, onward movement, and integration
ROK – Republic of Korea
SCIF – Sensitive Compartmented Information Facility
SIPRNET – Secret Internet Protocol Router Network
TACWEB – tactical web
TANGO – Theater Air Naval Ground Operations
TSI-P – Theater Systems Integration-Pacific
UAV – Unmanned Aerial Vehicles
UGS – Unattended Ground Sensors
UFL – Ulchi Focus Lens
USFK – United States Forces Korea
VoIP – Voice over Internet Protocol
VTC – video teleconferencing

Circuit check

News and trends of interest to the Signal Regiment

Leader Transitions

Pentagon announces new Chief of Signal at Fort Gordon

BG Jeffrey Foley

The Pentagon announced on April 12 that the Army Chief of Staff, GEN George W. Casey Jr., has assigned BG Jeffrey W. Foley to be the next commanding general and Chief of Signal, U.S. Army Signal Center and Fort Gordon.

Foley replaces BG Randolph P. Strong, who served as Chief of Signal and commanding general of Fort Gordon since July 15, 2005. Strong will replace Foley as the director of Architecture, Operations, Networks and Space, G-6, Office of the Chief Information Officer/G-6, U.S. Army, in Washington, D.C.

BG Randolph P. Strong

Foley served at Fort Gordon several times in his career including the chief of staff at the U.S. Army Signal Center and Fort Gordon under retired MG Janet Hicks, from September 2001 to May 2003. He also served as combat development project officer for Concepts and Studies Division and later as Tactical Automations Systems Branch, Materiel Systems Division Directorate of Combat Development, 1986 to 1989. He was promoted to brigadier general in August 2004.

The official change of command is set for July 17.

News & Updates

From 93rd to the 35th Signal Brigade re-flags in historic ceremony

By SGT Christopher Selmek

The 93rd Signal Brigade officially deactivated in a ceremony on Barton Parade Field April 23, allowing it to immediately re-flag as the 35th Signal Brigade.

COL David E. Dodd, commander of the 93rd Signal Brigade, and also the 35th following the ceremony, furled and unfurled brigade colors along with Brigade CSM Rudolph Johns, BG Carroll F. Pollett, Network Enterprise Technology Command commander, who was on hand to give the order.

"Today is a historic day for two of the Signal Corps' most decorated brigades," said Dodd. "This ceremony represents a chapter in the rich history of the 35th Signal Brigade."

Prior to the reflagging ceremony, the 35th Signal Brigade had provided corps support to the 18th Airborne Corps at Fort Bragg, N.C.

When the plan for total Army transformation called for the brigade's deactivation on April 12, their history and lineage was too strong to relegate to the Center of Military History, and was symbolically brought to Fort Gordon in the 35th Signal Brigade (Airborne) final airborne operation on April 13.

"We are re-shaping our signal forces in support of the Army's transformation to a modular force with increased capabilities to defeat our enemy," said Dodd. This restructure streamlines our signal

35th Signal Brigade commander COL David E. Dodd and CSM Rudolph Johns case-up the old 93rd Signal Brigade colors for retirement, paving the way for the unit to reflag as the 35th Signal Brigade April 23, Barton Field, Fort Gordon, Ga.

35th Signal Brigade commander COL David E. Dodd and CSM Rudolph Johns unfurl the 35th Signal Brigade colors, which replace the retired 93rd Signal Brigade colors April 23, Barton Field, Fort Gordon, Ga.

forces and allows used to reduce the number of signal brigades."

"We're always ready to follow any orders the Army gives us, and I do believe the Army will come out stronger because of it," said Johns. "Still, no one likes to loose a part of their history, and the 93rd Signal Brigade had a fine history."

The 93rd Signal Brigade colors will retire to the Center of Military History until such time as they are needed in Army history yet-to-be-written.

"History proves that we fight an ever changing, adaptive enemy," said Dodd. "One day, these colors and this great unit will come out of retirement and once again fight to defend America."

All battalions of the brigade were represented on the parade field, including the Army Signal Activity from Miami, Fla., and the 50th Signal Battalion, which will remain based in Fort Bragg though it falls under the command of the 35th.

Also on hand were many former officers of the 93rd Signal Brigade and prominent citizens of Augusta, Ga., to view and take part in the ceremony.

"Our success, and quite possibly our survival, as a nation is contingent on the support of the American people and on their will to preserve," said Dodd. "My prayer, and my hope, is that one day every American will resolve themselves to support the men and women of the Armed Forces just as the citizens of Augusta, Ga., have supported the Soldiers and families of the flagged 35th Signal Brigade."

The mission of the 35th Signal Brigade remains the same as the mission of the 93rd, which is to provide outstanding signal support for military operations throughout the world.

"Your organizational name, your unit patch, the color of your headgear and your equipment all change as we transform," said Dodd. "However, you remain the centerpiece of the Army. You honor us all here today, and we thank you for your mission success, your hard work, and your personal sacrifices."

"The Soldiers out on this parade field, who exemplify selfless service and dedication to duty, bring their combat experience with them after the reflagging," said Pollett. "Seeing you now, I have little doubt you will continue to be technically strong, Signal strong and Army Strong."

SGT Selmek is a staff writer for the 93rd Signal Brigade Public Affairs Office, Fort Gordon, Ga.

Bravo Company, 2nd BSTB, 1CD JNN fielding to combat

By CPT David J. Price

The transition of a company in the old brigade concept to a modular brigade concept was a difficult one. Now consider the transition is a signal company leaving 13th Signal Battalion and moving to a newly formed Special Troops Battalion. Then add the transition from a mobile subscriber equipment company to a Joint Network Node company and there is a series of transitions that to explain what Bravo Company, 13th Signal Battalion, 1st Cavalry Division accomplished as it transitioned to Bravo Company, 2nd Brigade Special Troops Battalion, 2nd Brigade "Black Jack" Combat Team, 1st Cavalry Division.

The transition began in July 2005 with the deactivation of 13th Signal Battalion and the formation of the Special Troops Battalion. The newly formed "Spartan" battalion had to learn to come together as a team. For the signal company, this meant learning a new way of receiving missions from the battalion and executing missions. In September 2005, the Black Jack Brigade deployed to New Orleans for Hurricane Katrina support. This was the signal company's first chance to support the brigade under the new structure.

What the company found and executed for Hurricane Katrina is a liaison officer concept in the BCT S6 during the planning phase. A close relationship between the BCT S6 and the signal company is needed. This way the BCT S6 understands the capabilities and limitations of the signal company and the signal

company takes the plan, as the plan is happening, and treats the plan like a warning order. This WARNO provides the necessary information to the company so that it can begin to conduct its own military decision-making process on the potential mission.

The MDMP that Bravo Company, 2nd BSTB, 1CD executed was extremely important in the success of the support provided to the BCT while deployed to New Orleans. The signal company worked with General Dynamics to finish the RESET of one small extension node and coordinate with the division G6 to get a SMART-T team from 3rd Signal Brigade.

While deployed to New Orleans, the Black Jack Brigade used non-secure Internet Protocol router, secure Internet Protocol router, tactical phones, and use two command post of the future terminals. The signal company accomplished its mission, but the battalions supported were unable to have any connectivity and therefore had to rely on the old analog systems passing required information from the brigade down to the lowest level.

JNN NET begins

In October 2005, JNN new equipment training began on Fort Hood. For the next six months, Soldiers of Bravo Company, 2nd BSTB, 1CD attended the demanding operators or network operations NET resulting with the company trained and ready to receive the new equipment. The NET training provided Soldiers and the leaders a chance to look at what JNN would provide and not provide.

One mission essential task that the JNN did not provide was the high speed line-of-sight to the battalions with battalion command post nodes. 1st Cavalry Division decided and requested that all LOS V1s remain, even though they were not on the modified table of equipment. Department of the Army approved the plan, but there was not a plan to train the Soldiers at the battalion S6 level to work the equipment. The signal company developed a LOS University with the purpose of training two Soldiers at each battalion to install, operate, and maintain a LOS V1.

The Black Jack Brigade planned and conducted a LOS University for 25U and 25Bs in the battalion S6 shops to train them on the operations of a LOS V1 from January 2006 to February 2006. The brigade spent five weeks on the course resulting with all battalions having two trained operators on the LOS V1 capable of IOM a LOS V1 under normal conditions. Each Soldier had to validate his or her ability on the LOS V1 with a simulated JNN to CPN link with a SEN van and a node center operated by the signal company 25Fs. Finally, the signal company transferred the LOS V1s to each battalion S6 shop projected to receive a battalion command post node.

Fielding of JNN

At the end of February 2006 and into March 2006, the Black Jack Brigade began to receive the long awaited JNTC equipment. This equipment would be the final step in the transition for the signal company from a MSE signal company in a signal battalion to a JNN company in a modular brigade combat team.

After the validation portion, the BCT set out to conduct collective training on the new equipment. The BCT conducted several weeks of brigade communication exercises and tactical operations center exercises resulting in the brigade having confidence to not only employ the new equipment, but to incorporate the new JNTC equipment with the new TOC systems issued to the brigade elements. These exercises also served to validate the LOS University by actually incorporating the LOS V1s with the Time-Division Multiple Access links from the CPN to the JNN.

Deployment to NTC

In May 2006, the brigade deployed to the National Training Center. A rotation to the National Training Center is a difficult task under normal circumstances. This time the brigade would finally take the new command and control backbone called JNN to the field for the first time. This was not the only objective of the deployment to the National Training Center.

The Black Jack Brigade's new Joint Network Transport Capability equipment would be a part of the Army's test of the JNN equipment. The Soldiers of Bravo Company and the battalion S6 shops not only supported the brigade, but they also answered questions, completed surveys, and tested the equipment under near combat conditions while deployed to the National Training Center. The signal company finished the deployment to the National Training Center with a JNN company that maintained 100 percent reliability for the brigade tactical operations center. This made the command and control of the brigade almost seamless.

In addition, the brigade used the latest version of CPOF (version 3.0) with some links as satellite only links. With previous versions of CPOF, the latency that TDMA links experience were intolerable. With CPOF version 3.0, the Black Jack Brigade was able to conduct nightly CPOF updates to all battalions with little or no issues.

Deployment to Iraq

Now that the BCT is deployed to Iraq, the training and the equipment is working. To date, the signal company's JNNs have provided 100 percent connectivity to the BCT TOC and its elements. Currently the Signal Company is supporting two FOBs in Iraq with its two JNN platoons. These platoons are going beyond the direct support relationship and providing area support to all elements on their FOBs. The JNN is supporting over 25,000 phone calls each week and 740 computers. The JNNs are maintaining at least three LOS V3 links in addition to the Frequency Divisio-Mulitiple Access and TDMA connectivity. All equipment is working in an outstanding manner.

JNN has far exceeded the

capabilities and reliability of MSE. The contingency that JNN has with the TDMA and FDMA satellite links with the additional LOS V3 links for the backbone provide a system that allows the brigade to command and control with little or no outages. Because of JNN, the BCT and its battalions are able to employ all the highly digital systems that maximize the situational awareness of all leaders in a tactical environment that they would have only otherwise seen in a garrison environment.

Recommendations

The only changes noted in the signal company concern the way the Army employs the equipment. First, the Black Jack Brigade has moved the network operations from the signal company to the BCT S6 shop. Due to the battalions owning and operating their own BN CPNs, the tasking authority to maintain the network must be the BCT S6. By attaching the NETOPS to the BCT S6, they become an integral part of the staff section at the brigade responsible for the C2 plan and management for the BCT.

As already noted, the 1st Cavalry Division has kept the LOS V1s and each JNN Platoon has two LOS V3s instead of one each. The extra high speed line-of-sight capability provides the additional bandwidth required to meet the mission requirements in theater to support all the different digital systems currently used. The recommendation is to adjust the MTOE to match the practices used in the field by the units deployed to Iraq.

Based on observations from fielding and employing this system in Iraq, the final recommendation is to relocate all BN CPNs to the signal company. This would require a change to equipment and personnel strength in the signal company. The other move is to move the NETOPS to the STB or back into the company.

This would then create a situation where the STB and its signal company would have the mission to IOM the JNTC network. This would provide a unity of command for all signal assets that make up the wide area network and would provide for more training opportunities from JNN to CPN operators.

The battalions would deploy with a CPN attached just as 13th Signal Battalion, 1st Cavalry Division did during their last deployment during OIF II. This concept would set the conditions for the brigade commander being able to focus his subordinate commanders into the key tasks needed to be successful on the battlefield. This concept would provide a situation where the brigade commander would be able to look at one battalion for the essential mission of providing the communication support to meet the needs of the digital battlefield the Army fights on today.

The only way the STB can succeed at this is to provide that commander the staff required to manage it. The NETOPS is the staff required to provide the expertise to manage the brigade's network on behalf of the brigade commander.

Summary

JNN is a successful system that provides C2 from the division headquarters to the battalions executing the missions. The equipment and the Soldiers trained to work it are performing in a stellar manner. JNTC with the additional LOS is exactly what the Army needs to provide all elements in a tactical environment with the C2 asset down to the battalion level.

CPT Price has been the Bravo Company, 2nd BSTB, 1CD commander from July 12, 2005 until present. Price finished his command on Feb. 22, 2007. Price originally took command of Bravo Company, 13th Signal Battalion, and was responsible for reorganizing the company into the Army's new modular concept. His expertise is in the transfer of a MSE company to a JNN company.

Previous assignments included battalion S6 for 2nd Battalion, 18th Field Artillery at Fort Sill, Okla., and the battalion S6 for 2nd Battalion, 12th Cavalry at Fort Hood, Texas. Finally, Price is a prior service officer with an enlisted MOS of what was 31R (now 25Q) where he served in 307th Signal Battalion at Camp Carroll, Korea, and 40th Signal Battalion, 11th Signal Brigade at Fort Huachuca, Ariz.

Acronym QuickScan

BCT – Brigade Combat Team
BN CPN – Battalion Command Post Node
BSTB – Brigade Special Troops Battalion
C2 – command and control
CD – Cavalry Division
COMEX – Communications Exercise
CPN – command post node
CPOF – Command Post of the Future
FDMA – Frequency-Division Multiple Access
IOM - Install, Operate and Maintain
JNN – Joint Network Node
JNTC – Joint Network Transport Capability
LOS – line-of-sight
LNO – liaison officer
MDMP – Military Decision-Making Process
MSE – mobile subscriber network
MTOE – Modified Table of Organization & Equipment
NET – New Equipment Training
NETOPS – network operations
NIPR – Non-secure Internet Protocol Router
OIF – Operation Iraqi Freedom
SEN – small extension node
SIPR – Secure Internet Protocol Router
SMART-T – Secure Mobile Anti-Jam Reliable Tactical Terminal
STB – Special Troops Battalion
TDMA – Time-Division Multiple Access
TOC – Tactical Operations Center
TOCEX – Tactical Operations Center Exercise
WAN – wide area network
WARNO – Warning Order

Chief of Signal Comments Continued from the Inside Front Cover

you to read and share it with others. An SRCP brief can be downloaded from the same site and used for professional development sessions.

We are living in times of incredible change. Never before has the Regiment experienced a transformation so dramatic and to make it more challenging, we are undertaking these changes while at war with a ruthless and formidable enemy. Change is the only constant as we move ahead with military information technology in an environment dominated by an increasingly complex geo-political climate and confrontation in multiple, extraordinarily dangerous, theaters of operation.

Army Strong! Let there be no doubt that we are up to the task. We have the will and the ability to meet the challenges that lie ahead and welcome the opportunity to serve our country in spreading freedom around the globe. Each member of the Regiment continues to make significant contributions to the transformation of the Army and supporting the war on terrorism. Our goals and initiatives enable the Regiment to meet the warfighter's needs and permit us to continue to build upon the proud heritage of our Regiment and support our vision…"A Regiment of LandWarNet Professionals providing communications and information capabilities that enable knowledge dominance throughout the battle space".

PRO PATRIA
VIGILANCE!

BG Randolph P. Strong
Chief of Signal

Acronym QuickScan

ARFORGEN – Army Force Generation
EoIP – everything over Internet Protocol
IP – Internet Protocol
JNN – Joint Network Node
LWN – LandWarNet
LWN-eU – LandWarNet-eUniversity
MTT – mobile training teams
SCRP – Signal Regiment Campaign Plan
WIN-T – Warfighter Information Network-Tactical

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For more information contact: SFC Corey Daniels at 1-800-221-9398 ext 5403 E-mail: corey.daniels@usar.army.mil

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Warrant Officer (W2-W4): 250N, 251A, 420A, 922A, and 948B

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