

SATCOM For Net-Centric Warfare

October 2012

MilsatMagazine



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Theresa Beech is responsible for overseeing all aspects of GMV USA's business development and contractual agreements, as well as coordinating GMV's business strategy worldwide.

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Dr. John Paffett is chief executive officer for Surrey Satellite Technology US LLC (SST-US), the United States subsidiary of world-leading small satellite manufacturer Surrey Satellite Technology Limited (SSTL).

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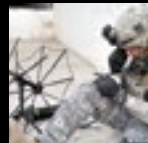
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ULA'S DELTA TAKES U.S.A.F.'S GPS TO NEW HEIGHTS

A United Launch Alliance's Delta IV rocket launched from Cape Canaveral early on October 4th, carrying a Global Positioning System (GPS) satellite for the United States Air Force.

The launch was on schedule at the start of a 19-minute window that opened at 12:10 UTC (08:10 local time).

"Congratulations to the entire team on today's successful launch of the GPS IIF-3 satellite," said Jim Spornick, ULA vice president, Mission Operations. "ULA and our mission partners have a rich heritage with the GPS program and we are proud to have served alongside the government and contractor teams over the last two decades to provide important Global Positioning System capabilities for our national defense and for millions of civilian and commercial users around the world."

This mission was launched aboard a Delta IV Medium-plus configuration vehicle using a ULA single common booster core powered by a Pratt & Whitney Rocketdyne RS-68 main engine, along with two Alliant Techsystems GEM 60 solid rocket motors. The payload was encapsulated by a composite payload fairing and powered by the four-meter diameter upper stage using the PWR RL10B-2 engine. The GPS IIF-3 launch marked the ninth flight of the Delta IV medium+ (4,2) configuration and the 21st flight of the Delta IV family of launch vehicles.

"We are honored to be the primary launch provider for our nation. Reliability, quality, and on-time performance are ULA's hallmarks," said Spornick. "Our nation's soldiers, sailors, airmen, and Marines rely on our performance in accurately placing

our customer's critical payloads in their required orbits."

The Navstar GPS is a constellation of satellites that provides navigation data to military and civilian users worldwide. The system is operated and controlled by the 50th Space Wing, located at Schriever Air Force Base, Colorado.

Addendum from United Launch Alliance

During the successfully launch and deployment of the GPS IIF-3 satellite on Thursday, during the launch, an unexpected data signature with the upper stage engine throughout a portion of the flight was observed. The Delta IV's system design, flight software, vehicle margins and propellant reserves enabled the successful outcome for this mission.

The unexpected signature was seen during second stage performance, as evidenced by a reduced thrust level of the RL10 engine. The onboard inertial guidance and flight control systems compensated for the lower thrust conditions and the Delta second stage delivered the satellite to the proper orbit.

Per standard processes when a flight data item such as this has been identified, ULA and Pratt & Whitney Rocketdyne have formed an investigation team with oversight from major customers. The investigation will thoroughly assess all flight and operational data to determine direct and root causes, and identify/implement appropriate corrective action prior to future flights.

"Though the GPS IIF-3 mission was a complete success, ULA fully understands the challenges of launch and



will thoroughly investigate and implement appropriate actions to reliably deliver our customer's critical capabilities to the orbital positions required," said Jim Spornick, ULA's vice president of Missions Operations.

Statement from Los Angeles Air Force Base

A U.S. Air Force Global Positioning Systems satellite built by Boeing was successfully launched today. The third GPS IIF satellite, Space Vehicle Number 65, was carried aboard a United Launch Alliance Delta IV Launch Vehicle at 8:10 a.m. EDT Oct. 4 from Cape Canaveral Air Force Station, Florida.

This launch marks the first launch of a GPS satellite this year. SVN-65 will assume position A-1,

replacing SVN-39 which will be moved to another auxiliary position in the A-plane. The satellite is expected to be set healthy for navigation users approximately 90 days after launch to conduct an extended navigation signal test.

"We, of course, are incredibly pleased with the successful outcome of today's launch. Thanks to the tireless efforts of the 45th and 50th Space Wings, United Launch Alliance, our industry partners, and the Delta IV and GPS IIF launch teams, this morning's launch was flawlessly executed. The talented group of individuals carried out the GPS IIF-3 mission with great diligence and professionalism," said Colonel Bernie Gruber, director of the Space and Missile Systems Center's Global Positioning Systems Directorate.

Since its inception, GPS has progressed from an idea, to a prototype, into a reality. "It's an amazing component of today's technical capabilities and culture, and shows how important our space systems have become to our defense and to our way of life. An incredible number of people around the globe use and depend daily upon GPS and we are proud to serve and provide this service to the nation and our allies," said Col. Gruber.

The new capabilities of the IIF satellites will provide greater navigational accuracy; a more robust signal for commercial aviation and safety-of-life applications, known as the new third civil signal (L5); and a 12-year design life providing long-term service. These upgrades improve anti-jam capabilities for the warfighter and improve security for military and civil users around the world.

The U.S. Air Force, as the developer, operator, and steward of GPS, is committed to maintaining GPS as the "Gold Standard" for providing accurate, reliable and continuous positioning, navigation and timing information to users around the globe.

GPS uses 24 satellites, in six different planes, with a minimum of four satellites per plane, positioned in orbit approximately 11,000 miles above the Earth's surface. The satellites continuously transmit digital radio signals pertaining to the exact time (using atomic clocks) and exact location of the satellites.

The GPS IIF series have a design life of 12 years. With the proper equipment, users can receive these signals to calculate time, location, and velocity. The signals are so accurate that time can be

measured to within a millionth of a second, velocity within a fraction of a mile per hour, and location to within feet. Receivers have been developed for use in aircraft, ships, land vehicles, and to hand carry.

As a result of increased civil and commercial use as well as experience in military

operations, the USAF has added the following capabilities and technologies to the GPS IIF series to sustain the space and control segments while improving mission performance:

- *Two times greater predicted signal accuracy than heritage satellites*

- *New L5 signals for more robust civil and commercial aviation*
- *An on-orbit, reprogrammable processor, receiving software uploads for improved system operation*

- *Military signal "M-code" and variable power for better resistance to jamming hostile environments, meeting the needs of emerging doctrines of navigation warfare*

ULA's next launch is the Atlas V OTV mission for the Air Force, which utilizes a different model RL10 engine. A thorough review and understanding of this issue will be completed prior to certifying the OTV mission for launch. #



COMMS EXERCISE FOR RESERVISTS IN PUERTO RICO

The Army Reserve places an emphasis on continually preparing its troops for mobilization.

In recent years, reservists have learned that their services may be obtained by units who they have never trained with or served under; in deployments, this action is called cross-leveling.

In a fairly unusual move, members of the 324th Expeditionary Signal Battalion voluntarily came on active duty after responding to an open call for personnel by their parent unit, the 335th Signal Command (Theater), when a satellite team critical to network operations suddenly lost key personnel.

Spc. Tremain Coleman got a call to report to military duty on June 26. A multichannel systems operator for the 324th ESB, Coleman volunteered earlier in the month to be available to provide troop support for a short time period. Coleman had heard unofficially that soldiers were needed to help support some training exercises held in Kentucky, but when he arrived at his company's headquarters in East Point, Georgia, Coleman learned that he would be partially responsible for manning a satellite system that provided a direct link for the 335th SC (T) to troops participating in Grecian Firebolt 2012.

"When I reported in to my company, I came in assuming something totally different," said Coleman, a Decatur, Georgia, native. "Once I began to hear what I would be doing, I was like 'Oh! [long pause] Wow!'"

The 35th Expeditionary Signal Battalion, a signal unit based in Ponce, Puerto Rico, accepted assignments under the 335th SC (T) to help

support Grecian Firebolt, an annual exercise that provides reliable communications support to a number of Army Reserve-directed exercises. Beginning in late May until Aug. 25, Grecian Firebolt 2012 provided support for nearly 22,000 soldiers.

During training, most companies try to practice unit-integrity, making sure they pulled from designated resources so an accurate state of preparedness can be recorded. When five members of the 35th ESB flew to Atlanta prior to the beginning of Grecian Firebolt, it was believed that the team had enough manpower to support the 335th SC (T) with installing and maintaining a robust and responsive tactical communications network at various stateside locations.

By June, the team suddenly saw themselves short two personnel—with the team down to just three members, Sgt. Joses Nieves, the non-commissioned officer in charge of the 35th ESB's Atlanta team, knew that his troops could not manage a 24-hour workload alone.

"Things [had] gotten tough for us very quickly," Nieves said. "Not only had we lost two of our people, but we had just started performing 24-hour operations. So we needed to have someone around to watch the equipment. There was no way that three of us could keep up with a schedule that had us each come and work eight hours every day for two months. We would burn out before the exercise ended."

Nieves, a Moca, Puerto Rico native, put in a request for personnel additions to his home unit, but that effort was denied because of financial considerations. Master Sgt. Michael Irvin, the NCOIC for Grecian Firebolt, decided a more financially and logistically feasible alternative for Nieves was to bring in MOS-qualified soldiers who were assigned to the 335th and were willing to make themselves available for a real-world training mission.

Irvin sent an email to the 359th Theater Tactical Signal Brigade, who then relayed the email down to all of its subordinate units. The 324th ESB, which has a company headquarters in the same



Photo of the Joint Network Node site at the 335th Signal Command's Headquarters in East Point, Georgia

building as the 335th SC(T), decided to put out an open work call to any Atlanta-area soldiers who could make themselves available from work or school to help out with a special duty. Coleman, along with Spc. Hayden Lisenbee-Davis and Pfc. Quantoris Weatherspoon, were the soldiers who stepped up and answered their unit's call for assistance.

Asked why 324th ESB personnel were able to step in and help, Sgt. Major Andrea Powell, the command sergeant major of the 324th ESB, wrote in an email response that her unit has an "always available" status, meaning the unit is ready, willing and able to deploy within 72-hours notice. She said that as citizens-soldiers, her troops train to maintain a state of preparedness.

"Reserve soldiers are being used more regularly for peacekeeping and presence missions overseas," Powell said in the email. "Reserves don't do their technical jobs every day on equipment, so they have to work twice as hard to stay proficient in our military occupational specialties."

Although the soldiers were qualified systems operators, Nieves said the troops needed to become familiar with the equipment, namely identifying and troubleshooting the Phoenix, a tactical satellite terminal that allows soldiers to transmit and receive high bandwidth voice, video and data.

An additional barrier the team had to adjust to was the conversation. Each member of the 35th ESB's team spoke fluent Spanish and regularly used it when they shared information. Nieves realized he and his coworkers would not only have to train the augmenting soldiers on how to maintain links or add

some on their own, but also restrict the Spanish they often casually used among their regular coworkers.

"When we would talk to [operators in Puerto Rico], we spoke to the distant end in Spanish, then we turned around and spoke to the 324th ESB guys in English," said Spc. Efrain Izquiendo, a satellite communications systems operator with the 35th ESB.

"You can tell this group knew their stuff. When people called from other sites, they were able to help them sync up systems and prepare them for what issues might come up while they are in system. They did a good job of explaining to us what questions people might ask us when we are on shift and what sort of answers we could give them."

All the on-site operators said it took time for the new arrivals to get comfortable with the equipment, noting that some issues took often half a day to resolve. However, Nieves and his soldiers were more than happy to give some of their time to educate their new teammates if it meant an occasional day off.

"When I first met the new soldiers, I told them, 'If you are coming to help, you are welcome here,'" said Izquiendo, a Ponce, Puerto Rico resident. "We are from Puerto Rico, but we all wear the uniform—we all are in the same boat."

"It's a relief to have them here ... I don't have to work eight to 12 hours every day. We can get a day off now." #

Story by Spc. Anthony Hooker, 359th Signal Brigade

TACTICAL CONSIDERATIONS

Harris Corporation has received a \$297 million Indefinite Delivery/Indefinite Quantity (IDIQ) contract to deliver Falcon® tactical radio systems to the U.S. Department of the Navy.

The five-year contract, awarded by the Space and Naval Warfare Systems Command, enables the Navy to acquire Harris Falcon tactical radios and accessories for ground personnel and small craft tactical requirements.



Harris Falcon III AN-PRC-117G

The contract covers all major radio types and frequency ranges from the Harris Falcon family, including the Falcon III® AN/PRC-117G wideband manpack; the Falcon III AN/PRC-152 multiband handheld; and the Falcon II® AN/PRC-150(C) high-frequency manpack radios.

The contract is part of Portable Radios Program (PRP), which procures and fields radios for the Office of the Chief of Naval Operations for secure/non-secure voice and data communications, satellite communications, and emergency communications for ships. Harris has been a provider to the PRP program since its inception in 2007.

#

CRISIS TRAINING

U.S. Army Sgt. Christopher Garmon, native of Greenville, Alabama, and multichannel transmission systems operator-maintainer, assigned to Company B, 63rd Expeditionary Signal Battalion, 35th Signal Brigade, out of Fort Gordon, Georgia, uses a Defense Advanced GPS Receiver atop a Satellite Transportable

Terminal in support of the Vibrant Response 13 exercise, at Camp Atterbury, Indiana, last August.

The joint exercise brings various military and civilian agencies together to train on how to assist local, state and federal partners in the event of a national crisis. #

(U.S. Army photo by Sgt. Richard Andrade, 16th Mobile Public Affairs Detachment)



THIS DOES COMPUTE...

Trimble has debuted Infrastructure hardware and software that uses Trimble® RTX™ technology (Real-Time eXtended) for high-accuracy Global Navigation Satellite System (GNSS) corrections.

RTX technology uses real-time GNSS corrections from a global reference station network to compute centimeter level positions based on satellite orbit and clock information.



NetR9 GNSS Reference Receiver

The Trimble NetR9 reference receiver provides advanced global correction data with the addition of Trimble RTX technology. Receiving corrections via either L-band satellite or IP (cellular) communications, high-accuracy absolute positioning can now be achieved worldwide for coordinate and tectonic monitoring. The NetR9 with RTX is ideal for establishing or monitoring CORS station coordinates and static operations for survey campaigns.

Trimble Pivot™ software is an advanced platform for Infrastructure apps that supports a range of capabilities to serve various markets. Within the Infrastructure portfolio, two key applications—Trimble Pivot RTX Real-Time App (RTX) and Trimble Pivot RTX Postprocessed (RTX-PP) App—offer the advantages of absolute positioning techniques using Trimble RTX technology to provide users

with centimeter-level real-time position accuracy.

The new Infrastructure apps are ideal for establishing or monitoring station coordinates in Real Time Networks (RTN), measuring station movement for earthquake, volcano, landslide, dam or other monitoring applications, and also providing kinematic and/or static/filtered positions.

Trimble Pivot RTX App is designed to perform absolute position monitoring in real-time for a network of receivers. This is particularly helpful when operating a network for CORS receivers which may be used in an RTN or for monitoring applications.

The Trimble Pivot RTX App uses a software based RTX engine, so that the receivers which are to be monitored do not require RTX capability onboard. Using GNSS data streaming from a receiver, the Pivot RTX App applies RTX corrections in real-time, monitoring the reference station position.

Trimble Pivot RTX-PP App is designed to perform position monitoring in postprocessing mode. The Pivot RTX-PP App provides highly accurate position results based on the RTX postprocessing technique.

This enables precise determination of initial coordinates for CORS or measurement of displacements after station movement. The Pivot RTX-PP App supports different processing modes: static or kinematic. The static mode enables users to receive highly accurate absolute positions, while the kinematic mode allows users to process data to obtain position measurements during periods of station movement. #

INTEROPERABILITY, TACCOMMS, + MORE...

SMi wishes to invite all to attend the 6th annual Mobile Deployable Communications conference taking place in Amsterdam February 7th to 8th, 2013.

- **Innovative presentations on capabilities and requirements in military communications**
- **A more detailed and technical approach discussing communication equipment and the technical aspects of military networks will be addressed as a suggestion from past delegates**
- **More focus on training foreign nationals on how to use current communications systems i.e. the Afghan Army and Police Force**

This event will feature an array of expert speakers from across the communications field to address key topics including: CIS networks and tactical communications, C4I standardization, interoperability across the global armed forces, operational experiences and future technologies.

The domination of current events across the defense sector has reignited the need for multinational cooperation through interoperability. This year the conference will address the communication equipment used by our armed forces when deployed illustrating that the practical elements are just as significant as the technology which supports deployed soldiers. New developments for the 2013 event include...

- **Increased representation from European armed forces and global defence organizations**

The expert speaker panel...

- *Colonel Christine Marteau, Head Telecommunications Technical, DGA, France*
- *Colonel Horst Treiblmaier, Chief of Communications, Ministry of Defence, Austria*
- *Colonel Krasimir Yordanov, IT & Security Branch Chief, CIS Directorate, EU Military Staff*
- *Lieutenant Colonel Piotr Adamski, Senior Staff Officer, Command and Communications Systems Division, Polish Armed Forces*
- *Major Sebastian Trojanowski, Chief S6, Command Support Brigade, Multinational Corps North East*
- *Michael Sieber, Assistant Director R&T, European Defence Agency #*

INTEGRATION COMPLETED

Northrop Grumman Corporation has successfully completed payload integration and the ambient functional test of the U.S. Air Force's Space Based Infrared System's (SBIRS) third highly elliptical orbit (HEO-3) payload.

Lockheed Martin is the SBIRS prime contractor, Northrop Grumman is the payload integrator.

Featuring a mix of geosynchronous (GEO) satellites, hosted payloads in highly elliptical Earth (HEO) orbit, and associated ground hardware and software, the SBIRS program delivers improved missile warning capabilities for the nation while simultaneously providing significant contributions to the military's missile defense, technical intelligence and battlespace awareness mission areas.

Two HEO payloads and the first geosynchronous (GEO-1) satellite have already been launched.

During payload integration, the Northrop Grumman-led team verified the initial electrical functionality after

conducting mechanical integration of the payload, harness checks, bond joint checks, command confirmation and primary/secondary power checks.

Once the integration checks were completed, the initial ambient function test provided functional baseline performance and readiness to enter the next phases of testing, electromagnetic interference (EMI) and thermal vacuum characterization testing.

Following the characterization test, the HEO-3 payload will enter its prototype qualification acceptance testing for a scheduled delivery in 2013.

The SBIRS team is led by the Infrared Space Systems Directorate at the U.S. Air Force Space and Missile Systems Center, Los Angeles Air Force Base.

Lockheed Martin Space Systems Company, Sunnyvale, California, is the SBIRS prime contractor, with Northrop Grumman Electronic Systems, Azusa, California, the payload integrator.

Air Force Space Command operates the SBIRS system. #



*Artistic rendition of the SBIRS GEO Spacecraft.
Credit: Lockheed Martin*

COMMS UP...

During exercise Spartan Xiphos aboard Cherry Point and outlying military facilities, Company B, Marine Wing Communications Squadron 28, practiced providing a full array of communications abilities in an expeditionary environment.

The company spent the eight-day exercise preparing for Weapons and Tactics Instructors Course, where they will have to provide full communications support for units operating in 7,000 square miles of Arizona desert.

"You can get Google anywhere in the world as long as we're there," said 1st Lt. Charles M. McClurg, the operational leader of Company B, during Exercise Spartan Xiphos.

The squadron provides radio communications, telephones, satellite communications, live video feeds, voice over IP, Internet, intranet, and more without plugging into a pre-existing network. When the network is up, the operators of Marine Air Control Group 28 go to work providing air command and control in the battle space.



A forward operating base of Company B, Marine Wing Communications Squadron 28, stands on the Foxtrot taxiway on MCAS Cherry Point, North Carolina, July 31. The company practiced providing its full array of communications capabilities to prepare for supporting Weapons and Tactics Instructor's Course. During WTI, the company plans to provide its capabilities over 7,000 square miles of desert.



Pfc. Cory Cooper, a Tropospheric Scatter Microwave Radio Terminal Operator with Company B, Marine Wing Communication Squadron 28, inspects satellite equipment during Exercise Spartan Xiphos aboard MCAS Cherry Point, July 31. The company is scheduled to provide the communications support necessary to enable Weapons and Tactics Instructor's Course at MCAS Yuma, Arizona.

McClurg said providing the communications that makes combat operations possible is a massive team effort.

"We need the Motor-T guys to get us out there, maintenance guys making sure our equipment is ready, operators to get the transmission links up, and then radios up so we can coordinate the troubleshooting," McClurg said. "We need the data guys who coordinate getting services and making sure our routing is done right so we can get classified and unclassified intranets, Google, and email."

The first step in setting up a satellite-linked network is establishing basic radio communication between the headquarters and outposts.

"We are the first ones to get communications up so we can keep tabs on what's going

on at the other sites," said Pfc. Austin Klemm-Thornton, a field radio operator with the squadron. "If anything goes wrong, we can give them support. Radios can do things that other equipment cannot. The support wide area network system, or SWAN, needs a satellite. With radio, all you need is another radio and you can talk to another site."

For long-range radio, the squadron uses a tropospheric scatter microwave radio terminal, or AN/TRC-170A, for point-to-point radio communications up to 100 miles away. It works by sending 16 megabytes per second from one antennae to another directly, or by bouncing the beam off the atmosphere or the top of a mountain.

For the exercise, the radio operators set up a forward operating base and practiced relaying all the communications from that base to the main communications hub at the company's field headquarters, said radio operator Sgt. Adam Garcia.

He said his favorite part about his job is the important role he plays. Marines can't call for air support without the communications he provides.



Marines hook up a satellite dish to the communications network set up by Company B, Marine Wing Communications Squadron 28, aboard MCAS Cherry Point, during Exercise Spartan Xiphos, July 31. The squadron builds the communication network necessary to relay information between all parts of the air combat element.



A tropospheric scatter microwave radio terminal array, or AN/TRC-170A, communicates with another array on the Foxtrot taxiway on MCAS Cherry Point, July 31. This radio can communicate 16 megabytes per second to another terminal up to 100 miles away. It can communicate directly, or by bouncing the beam off the atmosphere or mountains.

After the radios are ready, data specialists set up the wide area network for satellite access and then the servers and switchboards to run the network. Exercise Spartan Xiphos was useful for the data Marines in particular because they have few opportunities to practice their full capabilities.

"I'm responsible for building all the servers and setting up all the networking equipment so a laptop can get do whatever the mission requires," said Cpl. Brayden Streeter, a data specialist with the squadron.

Streeter said communications school teaches only the basics of building a network, and exercises like Spartan Xiphos are a good opportunity to learn more of what they do.

Once the network is running, Company B has to operate and protect it. Switchboard Marines make sure phone communications are reaching the right places and information assurance Marines safeguard the information on the network.



Lance Cpl. Derek B. Ruffing, front, and Lance Cpl. Vicky Sanchez, back, switchboard operators with Company B, Marine Wing Communications Squadron 28, work in the back of a digital technical control refresh truck aboard MCAS Cherry Point during Exercise Spartan Xiphos Switchboard operators integrate the phone network with other systems and make sure calls get to their destination.

"We're always going to have people trying to get into the network to try and steal information," said Sgt. Jennifer Finney, the information assurance Marine for the company. "We're in charge of securing the network and safeguarding it."

Finney said she updates the server's protective firewalls and other protective software

to keep threats like enemy hackers out.

Switchboard operators work alongside data Marines to integrate the phone system with the rest of the network, said Lance Cpl. Vicky Sanchez, a switchboard operator with the squadron. Working from the digital technical control refresh truck, essentially a mobile switchboard station, Sanchez makes sure all of the remote outposts can talk to each other by telephone and can connect with the civilian network when necessary.

Other Marines keep the network running by maintaining the equipment and providing power.

"My job is to oversee all the maintenance operations just in case one of the links goes down," said Staff Sgt. Lucian Noble, a ground communications maintenance technician with the squadron. Noble maintains the network equipment to keep the impact of malfunctions to a minimum.

Lance Cpl. Kyle J. Dahood, acting as a utility board chief with the squadron, sets up the generators. The generators are hooked up to 'turtles,' which distribute power to various equipment. It's a critical job as Dahood keenly pointed out, "Without power, nothing runs."

This communications network provides the infrastructure necessary for Weapons and Tactics Instructors Course to be successful, said Capt. Kevin J. Stepp, the commander of Company B. Without the network, other parts of the aviation combat element would not be able to communicate or do their jobs.

"We essentially provide the digital backbone for the wing," said Lt. Col. Matthew E. Limbert, the commanding officer of the squadron. "Without this squadron, we wouldn't be able to move the air picture around, the air tasking orders around or launch or recover aircraft."

Limbert said the network is necessary for all parts of the air combat element to know what they need in order to accomplish their assigned missions.

The purpose of the Weapons and Tactics Instructors Course is to train pilots to become instructors and in advanced aviation tactics. Course graduates return to their home squadrons to teach the same tactics to other pilots. It occurs twice a year and draws pilots from around the Marine Corps.

Company B will be part of the detachment MACG-28 is planning to send to support the upcoming course. The Marines will establish the communication architecture the students will integrate into.

"Are we the focus? No, the students are," said Stepp. "But would it be possible without the control group? No way." #

Story by Lance Cpl. Scott L. Tomaszewski, 2nd Marine Aircraft Wing

ENEMIES WILL BE PRAYING... MANTIS...

Vislink International has announced the immediate availability of the military spec'd Mantis MSAT, the world's smallest and lightest satellite data terminal.

At 12.5kg (27.5 lbs) MSAT is designed for one man operation in challenging operational environments. It is a rugged terminal, resistant to extreme environmental conditions, that is deployed from a single lightweight backpack.

Initial military orders are being filled and MSAT terminals are currently undergoing field trials for battlefield, command center and special operations.

Stephen Rudd, Chief Executive of Vislink International, said, "MSAT

meets the exacting, high-bandwidth, connectivity requirements now demanded by forces around the world to address an increasingly difficult operating environment. It is an extremely complex sector but we have not only met the core need, we have created a rugged, highly reliable and lightweight package that can be deployed anywhere in the world. At only 27.5 lbs (12.5kg) it is the lightest satellite data terminal on the market and compliments a range of manned and unmanned solutions Vislink already provides for land, sea and air based communications and surveillance."

Vislink developed the military spec. MSAT to

address demand from forces around the world that require a highly portable solution capable of delivering high bandwidth voice and data communications. Providing up to 5Mbps upstream data throughput, MSAT can be used to deliver high definition video intelligence in addition to standard voice and data requirements. Even in the most hostile operating

environments, the terminal can be unpacked and operational within five minutes.

MSAT meets the MIL 810F & DEF-STAN military specifications for shock, vibration, sand and rain and is provided as a 'one box' solution incorporating antenna, modem and all electronics. A high performance parabolic antenna is coupled, according to customer requirements, with interchangeable modem and encoder options. The terminal is available to operate in X-, Ka- and Ku-bands. #



A DAY IN THE LIFE OF N.I.E.

When the first Network Integration Evaluation was conducted by the Network Integration Triad partners about 16 months ago, “A Day in the Life of NIE” was not even a concept, let alone something that could be predicted.

Now, just weeks before embarking on the most important part of the fourth NIE at Fort Bliss and White Sands Missile Range, the Triad partners are in the last planning phases for NIE 13.1 that will culminate in the operational field phase from October 15 through November 16.

Triad partners include elements of the Army Test and Evaluation Command’s Operational Test Command, the Assistant Secretary of the Army for Acquisition, Logistics and Technology System of Systems Integration Office and the Brigade Modernization Command, which is headquartered in Fort Bliss’s Hinman Hall.

As soldiers and civilians in the BMC have participated in past NIEs, they and their Triad partners have developed a process of how to prepare for, and conduct, these important exercises.

NIEs are conducted twice each year and allow soldiers of the 2nd Brigade, 1st Armored Division, attached to the BMC, to evaluate and test new equipment and systems as part of the Army’s modernization program.

Now that they have three successes under their belts, they are using a somewhat standardized blueprint for each NIE, providing valuable feedback and recommendations to Department of the Army on which items show promise in filling capability gaps for fielding to the first soldiers who need them.

BMC Chief of Staff Doug Fletcher noted that this NIE, like its predecessors, will be conducted incorporating lessons learned from the previous NIEs, which has made the process run more smoothly. Also, he said, a timeline has emerged, and it increases predictability

and greatly aids in the planning process.

The operational field phase of the last NIE ended at the beginning of June, and the NIE 12.2 report was due to DA at the end of that month. Since then, NIE 13.1 planning has been progressing at a brisk pace, although some early

tasks were completed even before and during NIE 12.2.

Almost immediately after the last phase of NIE 12.2 ended, the systems which had just been evaluated had to be removed from the 2/1 AD’s vehicles, so that the new systems to be evaluated during the next NIE could be

installed in their place. This deinstallation and installation takes place at the Integration Motor Pool on Fort Bliss and is overseen by SoSI.

While deinstallation/installation have been ongoing, 2/1 AD soldiers have worked to attain certification and qualification on all the weapons systems they will be using during NIE 13.1. They have also been participating in New Equipment Training to learn about and become familiar with the new systems they will evaluate.

For equipment that will become part of the unit's permanently authorized equipment, this is followed by New Equipment Fielding, when the unit signs for the equipment and its soldiers can begin to train with it and maintain it on a daily basis. NET/NEF began in July with operational energy systems and will continue through most of September.

Currently, the NIE 13.1 timeline is in the phase known as VALEX/ COMMEX, which includes a Validation Exercise



A Bradley Fighting Vehicle is shown here with a Mission Command on the Move (MCOTM) system from the DRS Tactical Systems, Inc., installed. Currently located in the Integration Motor Pool, it will be one of 22 systems under evaluation in the upcoming Network Integration Evaluation to be held at Fort Bliss and White Sands Missile Range in October and November. The MCOTM is a system of systems that leverages the power of digital communications to enhance the planning, monitoring and control of military operations.

and two Communication Exercises. VALEX is conducted to ensure the equipment is properly configured and operational before the 2/1 AD signs for it. It also allows the program managers of the new systems and the vendors who produced them to ensure their systems are operational and interoperable before handing the systems over to the 2/1 AD soldiers for the COMMEX.

The COMMEX is a communications exercise that verifies communication equipment and the network to which it is connected are functioning satisfactorily to support each identified activity. There are two COMMEXes scheduled, one in garrison in the Integration Motor Pool and one in the field from October 15 through 19 at Dona Ana Base Camp.

After the VALEX and COMMEXes have been completed, 2/1 AD soldiers will participate in the Pilot exercise, which is a rehearsal of the final field phase, the meat of the NIE. The final part of the NIE is the "operational exercise that replicates operations in the mountains of Afghanistan," according to BMC Command Sgt. Maj. Louis Torres.

During this final phase, ATEC/OTC provides data collectors called Observer/Controllers to document how the new systems perform. They collect feedback from the 2/1 AD soldiers who are using the systems and write reports at the end of each day detailing how the systems performed in the tactical scenarios.

According to Maj. William Eldridge from BMC's Brigade Modernization Integration Division, his division also provides data collectors to interview 2/1 AD soldiers daily and send reports to analysts in the BMC Mission Command

Complex. Those analysts use the BMID data collectors' reports to write system annexes.

"The data collectors go back daily to ensure the analysts understand what the data is saying and assist these guys in writing the annexes," Eldridge noted. The annexes then become part of the BMC report to DA with recommendations on the value of the systems.

Eldridge explained that the equipment/systems soldiers will be using fall into three primary categories, including Systems Under Test (SUT), which will be undergoing a strictly-controlled series of tasks conducted by engineers from the OTC; Systems Under Evaluation (SUE), those that have shown promise for meeting previously identified capability gaps; and special evaluations on items identified by DA objectives.

"An example of a SUT from NIE 12.2 is the WIN-T, Increment 2, which is an integrated set of satellite and terrestrial radio systems and IP network infrastructure," according to Lt. Col. Lawrence Karl from BMC's Network Integration Division. WIN-T, Inc 2, he said, "is designed to extend network communications supporting Mission Command to company level on the battlefield, even while units, their commanders and key staff are on the move."

Currently 22 new systems will be under evaluation in NIE 13.1, and they include many items in the major categories of Mission Command on the Move and Operational Energy.

Eldridge also pointed out that the length of the planning period for each NIE is based on whether it is focused on company/platoon level, as the NIE 13.1 is (traditionally conducted in the fall), or on brigade/battalion level, as

the NIE 12.2 was (generally conducted in the spring).

The planning period for NIEs that are focused on the lower-level units is about 16 to 18 weeks; for the higher-level unit focused NIEs, the planning period is about six months. Of this time period, soldiers from the 2/1 AD are directly involved in the execution phases for about five weeks for company/platoon-level NIEs and about seven to eight weeks for brigade/battalion-level NIEs, according to Torres.

The importance of the role 2/1 AD soldiers play during NIEs and in Army modernization cannot be overemphasized, according to Lt. Gen. Keith Walker, former BMC commander and now U.S. Army Training and Doctrine Command Deputy Commanding General, Futures, and Director, Army Capabilities Integration Center. He stated during a recent visit to BMC, "The 2/1 AD has a greater strategic impact on the Army than any other brigade in the Army."

A typical day—if there is such a thing—in the life of NIE depends on many things, such as where in the planning process you are, to which of the Triad organizations you are assigned and what your duty position is. If you are a soldier in the 2/1AD, most of your days will involve training on, and learning, the new systems, evaluating and testing them and then providing honest feedback on how they performed in a tactical scenario environment. At the end of the day, you can rest assured that what you do will have a lasting and profound affect on the future of the Army. #

LIFE AND DEATH SITUATIONS REQUIRE SATCOM

The importance of communication cannot be over-stated, especially in matters of life and death. An Alabama Army National Guard unit knows this well and is currently honing its skills in an exercise effort at Camp Atterbury, Indiana.

The 31st Chemical, Biological, Radiological and Nuclear (CBRN) Brigade from Tuscaloosa, Alabama, also known as Task Force Guardian, was among the first responders in preparing exercise rescue efforts for the people of a major Midwestern city. Its simulated mission was to promptly plan, organize, install and maintain all communications mediums among the massive joint task organization. This would be an absolute requirement to effectively restore safety and order to the affected areas.

In the event of a real catastrophic incident, the unit will have the high stakes task of supplying radio, satellite, broadband and telephone communications to nearly 1500 Soldiers in an immediate command post and an even greater number of field responders, such as law enforcement, paramedic and other incident liaisons.

The 31st Assistant IT and Automation Officer, Capt. Jeremy Goldsmith, was a part of the advance party making the 16-hour trip to Camp Atterbury, the exercise Incident Command Post. "We will make sure the commander has the best quality communication possible to support the people," said Goldsmith.

Most recently, the 31st was instrumental in the response to the historic tornado outbreak

in Alabama of April 2011. Goldsmith views the challenges in this simulated incident to be very similar, "We've got to be able to bridge the communication gap between local and national responders," he noted.

The 31st is participating in Exercise Vibrant Response 13.

Exercise Vibrant Response is a training event for the Defense Chemical, Biological, Radiological and Nuclear Response Force. The exercise focuses on Department of Defense support of civil authorities in a consequence management role. The DCRF is part of DoD's scalable

response capability to assist civilian responders in saving lives, relieving human suffering providing critical support to enable support to assist community recovery following a catastrophic CBRN incident. #

Story by Spc. Jonathan Wood, 131st Mobile Public Affairs Detachment

PLEASE FENCE US IN

The U.S. Air Force will base a Space Fence radar site on Kwajalein Island in the Republic of the Marshall Islands with Initial Operations Capability (IOC) planned for fiscal year 2017.

The Fence will provide a critical Space Surveillance Network capability needed to give warfighters the ability to maintain a full and accurate orbital catalog, ensure orbital safety, and perform conjunction assessments.

Air Force Space Command will award a contract to build the radar, and construction is expected to start in September 2013 and is planned to take 48 months to complete.

After construction is complete and the radar is operational, approximately 10-15 contractor personnel are projected for the long-term work force at Kwajalein to maintain the Space Fence radar. A Support Agreement will be established between Air Force Space Command and the U.S. Army Kwajalein Atoll/Reagan Test Site for site support and facilities maintenance, all under the responsibility of the 21st Space Wing.

Space Fence is a radar system operating in the S-band frequency range, to perform uncued detection, tracking, and accurate measurement of orbiting objects in low Earth (primary) and medium Earth (secondary) orbital regimes. Space Fence will provide precise positional data on orbiting objects and will be the most accurate radar in the Space Surveillance Network. Space Fence data will be fed to the Joint Space Operations Center (JSPOC) at Vandenberg Air Force Base, California. Data from the Space Fence radar will be integrated with other SSN data to provide a comprehensive SSA and integrated space picture.

The Space Fence will provide enhanced space surveillance capabilities to detect and track orbiting objects such as commercial and military satellites and space debris. The Fence will have greater sensitivity, allowing it to detect, track and measure an object the size of a softball orbiting more than 1,200 miles in space. Because it is an uncued tracking system, it will provide evidence of satellite break-ups, collisions, or unexpected maneuvers of satellites. #

BLOS BENIES FOR BACN

The U.S. Air Force awarded Northrop Grumman Corporation (NYSE:NOC) a \$20 million contract modification to add beyond-line-of-sight command and control (BLOS C2) capabilities to the Battlefield Airborne Communications Node (BACN) information gateway system, giving warfighters access to full-motion video (FMV), imagery, voice over Internet protocol and chat messages from multiple sources.

BACN is part of the Air Force's development of a BLOS C2 architecture to meet U.S. Central Command requirements, essentially creating a wireless Internet over the battlefield.

The company will also support government-sponsored BLOS C2 developmental and operational testing.

The high-altitude BACN system provides situational awareness and command and control coordination between warfighters by bridging and extending voice communications and battlespace information from numerous sources.

Since the BACN system was deployed in 2008 to overcome communications limitations, it has delivered near 24/7 coverage in theater. The BLOS C2 contract was awarded by the Air Force Life Cycle Management Center, Hanscom Air Force Base, Massachusetts.

Work is to be completed by June 30, 2013.



Northrop Grumman will help the USAF deploy BACN in up to four "E-11" Bombardier BD-700 Global Express ultra-long-range business jets (pictured) and in as many as four EQ-4B Global Hawk Block 20 UAVs, for sustained deployment through 2015.

Under the contract, Northrop Grumman will integrate Multi-Role Tactical Common Data Link and associated control terminals with the BACN suite of computers and radio systems aboard one of three BACN-equipped E-11A Bombardier Global Express BD-700 aircraft platforms.

Northrop Grumman is the prime contractor for the development, fielding and maintenance of the BACN system. The company was awarded the first BACN contract in April 2005. #



MILSATCOM AMPLIFICATION

Communications & Power Industries LLC (CPI) has received initial orders totaling more than \$5 million from a prime contractor for high-power, Ka-band satellite communications amplifiers. These SATCOM amplifiers will be used in a U.S. military communications program that is intended to provide worldwide communications connectivity to tactically deployed forces. CPI will provide solid-state and vacuum electron device products for the program, including solid-state power amplifiers (SSPAs) with internal block-up converters (BUCs) and CPI's SuperLinear® traveling wave tube amplifiers (TWTAs). Work on this program will be performed across several of CPI's divisions. The program is expected to continue for the next five years.

Joe Caldarelli, chief executive officer of CPI, said, "Communications systems that are reliable and rugged, yet small and light, are of critical importance to our warfighters, and CPI has devoted significant resources to developing and manufacturing dependable and state-of-the-art military communications products. In particular, our high-power SSPAs and SuperLinear TWTAs, such as the ones being used in this program, have been well received by our military communications customers." #

MAKING SATCOM HEADWAY

Bentley Walker has unveiled their new Freedomsat service to Iraq and Afghanistan, the fastest satellite broadband connection available in both countries to date.

Freedomsat is a Ka-band service operating on the Hylas2 satellite, offering speeds of up to 10Mbps to military personnel and contractors in Iraq and Afghanistan. Previously, the most popular service for Afghanistan and Iraq was Bentley Walker's Ku-band service that ran on the HX50 modem at 4Mbps. Freedomsat offers speeds over twice as fast and at a fraction of the cost.

Neil Denyer, Sales Manager at Bentley Walker, said of the new service, "We are honored to have an ongoing relationship with those serving overseas, keeping military personnel and civilian contractors connected with family and friends back home, as well as helping with essential tasks like rebuilding and installing infrastructure. We are also the first ISP in Afghanistan and Iraq to offer this new high speed service, and we are already seeing fantastic results on smaller 98cm and 74cm size dishes. The Freedomsat package comes with a unique pin service allowing 24/7 activation and access for users. We are also happy to offer detailed web filtering, should such be required."

Bentley Walker can potentially offer existing customers using a HX50, HX90 or iDirect modem a completely free upgrade with no equipment or shipping costs. Simply email sales@bentleywalker.com with your ESN to find out if you're applicable. There are also deals for new customers including free hardware installation. #

WIDEBAND, GOOD — NARROWBAND, CRITICAL

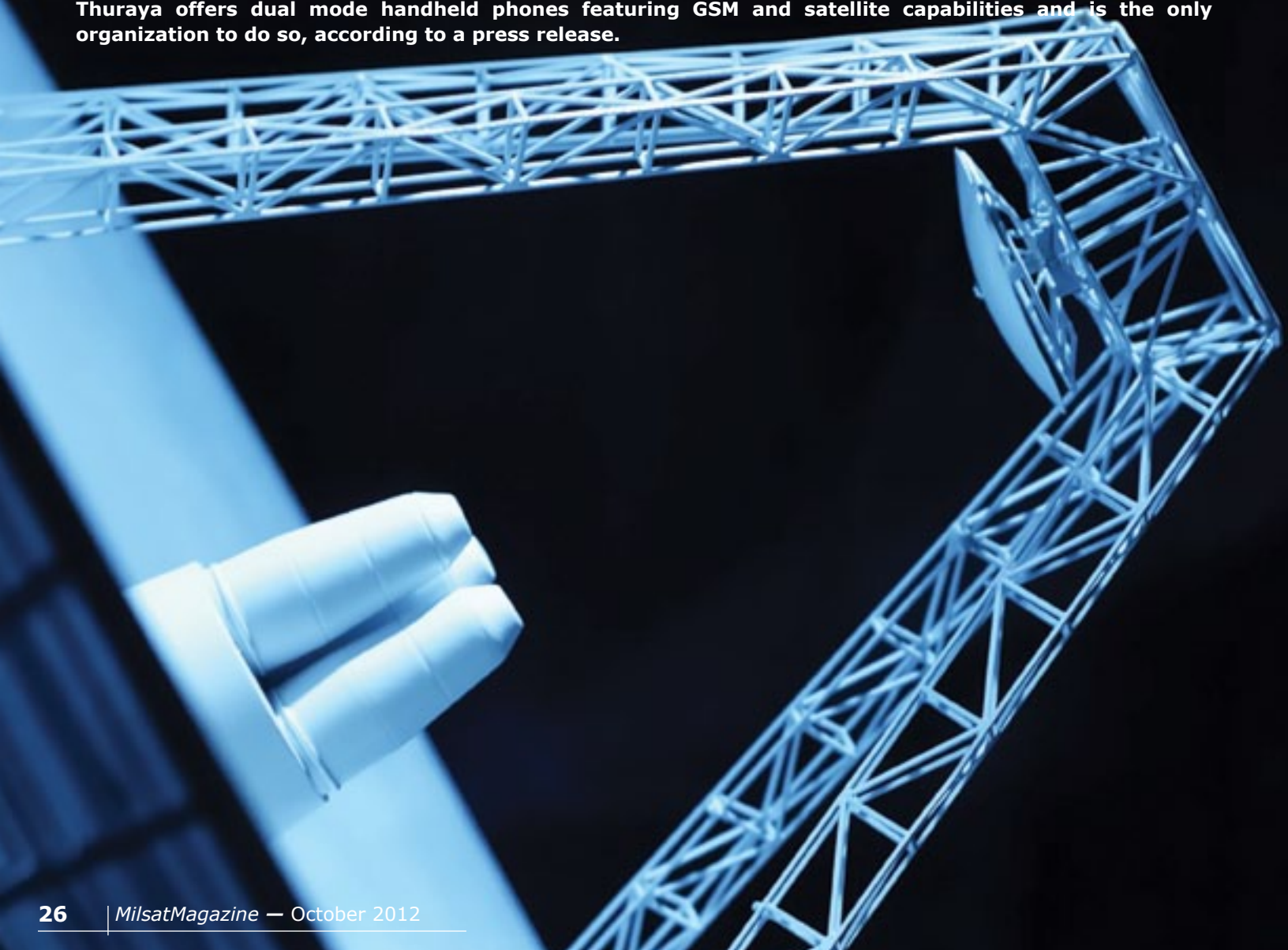
By David Cavossa, President, Government Solutions, Harris CapRock

The hype in the satellite industry for the past few years has been all about Ka-band and tens to hundreds of megabits of throughput to small and-on-the move terminals. Multi-gigabit links from MILSATCOM programs like Wideband Global SATCOM (WGS) and the Transformational Satellite Communications System (TSAT) have been a major focus as well for a community whose data requirements are increasing at an exponential rate. Yet, while much of the attention has remained focused on wideband communications, it's important not to forget the continued demand for narrowband offerings for users who need secure voice, text and low-data-rate critical communications. Simply put, wideband is great, but narrowband is critical.



Several players, such as Thuraya and Iridium, recognize the importance of this narrowband need and continue meeting it in improved ways.

For instance, the new *Distributed Tactical Communications System (DTCS)* is a government-managed system providing netted voice and data communications *beyond-line-of-sight (BLOS)* and over-the-horizon using the Iridium network. With the launch of *Iridium NEXT*, that company's second-generation constellation, the company will support enhanced and new services, according to its website. By way of another illustration, Thuraya offers dual mode handheld phones featuring GSM and satellite capabilities and is the only organization to do so, according to a press release.



In addition to Iridium and Thuraya, there has been some attention in recent years given to the *Ultra-High Frequency (UHF)* band and the substantial investment by government and industry in UHF payloads and their associated radios and waveforms.

UHF is the ultra-critical communications link designed for users at the tactical edge as well as for command and control reach-back. As the most robust BLOS satellite communications available, access to scarce UHF capacity is becoming increasingly important.

However, the health and capacity of the current U.S. UHF satellite constellation is continuing to weaken and fewer circuits are available for military users. Waveforms such as *Demand Access Multiple Assignment (DAMA)*, and now *Integrated Waveform (IW)* are used to effectively increase the capacity of a channel by allowing multiple simultaneous users to communicate on dedicated channels. Industry as well has invested in developing commercial waveforms.

While these waveforms allow users to increase the use of scarce UHF resources, the **U.S. Department of Defense** additionally plans to mitigate the impending shortage and the weakening fleet by introducing a new satellite constellation called **Mobile User Objective System (MUOS)**.

The MUOS constellation will consist of five next-generation UHF satellites. After a 26-month delay, the first MUOS satellite was launched last winter. However, the MUOS waveform that is required to make use of these new capabilities has been delayed. When the MUOS waveform and certified terminals are fully developed, they'll enable increased BLOS capabilities, improving upon the capacity and throughput available today.

Despite the substantial increase in capacity and capability offered by MUOS, the demand for UHF satellite capacity still exceeds supply by more than 200 percent, according to some Government estimates. In light of this, several new commercial offerings are being launched this year to support the remaining UHF gap.

For example, **Intelsat General** and **Astrium Services** have invested in multiple UHF payloads, two of which are scheduled to launch this winter. Furthermore, **Harris CapRock** recently joined Astrium Services in providing UHF solutions across the entire **Skynet Fleet**. As a global UHF channel partner, Harris CapRock is building a UHF service offering that will be made available in

the spring of 2013, designed to leverage the well-established base of Harris **Falcon** radios.

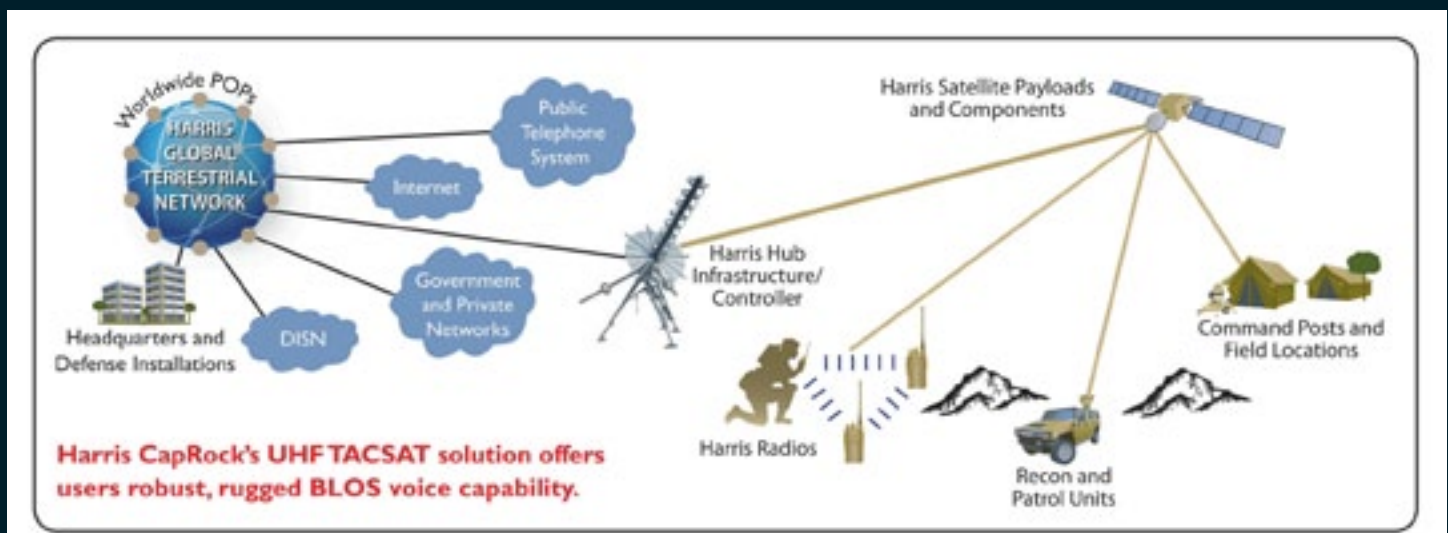
The Harris CapRock end-to-end commercial UHF service offers users an unprecedented level of control over UHF capacity compared to today. The service will include dedicated 25kHz and 5kHz satellite channels for use with any UHF *Tactical Satellite (TACSAT)* capable radios, including several prevalent Harris models such as its **Falcon II®** and **Falcon III®** product lines. Using a Harris UHF TACSAT waveform, users will be able to actively manage their channels without the need for expensive controllers.

If users decide to set up a network with the Harris TACSAT waveform, they can quickly configure data and voice channels according to their mission requirements. The Harris waveform can provide as many as 11 voice channels or three voice channels and one high-speed data channel with a single 25KHz dedicated UHF TACSAT channel. The **AN/PRC-117F** is the actual *Time Divisional Multiple Access (TDMA)* controller and can act as such from anywhere within the satellite footprint. The UHF service also will support legacy UHF waveforms, such as DAMA and IW when using government infrastructure.

No one would deny the importance of wideband communications as applications continue to drive growth and mobility continues to increase. Yet, reliable, mission-critical voice communications can be even more important to tactical users at the tip of the spear. The good news is that in addition to the MUOS and DTCS programs, companies such as Iridium, Harris, Intelsat and Astrium Services are developing new services to meet the growing needs and potential gap for this set of requirements.

About the author

David Cavossa leads Harris CapRock's Government Solutions team and oversees the direction and growth of the business, which focuses exclusively on serving military and federal civilian agencies. With over a decade in the telecommunications industry, Mr. Cavossa has extensive experience supporting the government community in both the public and private sectors. **Additional information is available at the Company's website.**



COMMAND CENTER: THERESA BEECH, CEO, GMV USA

Theresa Beech is responsible for overseeing all aspects of GMV USA's business development and contractual agreements, as well as coordinating GMV's business strategy worldwide. She has been jointly responsible for the set-up, launch and successful growth of the company in the United States and expanded presence worldwide. Since 2004, GMV has seen a growth in revenue to well over \$125 million U.S. dollars and has secured a significant number of new contracts in North and South America, as well as Asia. Beech's technical background is in orbital mechanics. She has worked as engineer, technical lead and project manager for a wide variety of programs in mission analysis, mission planning and flight dynamics systems for the European Space Agency (ESA), the European Commission, Alcatel, Alenia, Astrium and Thales.



Beech was involved in the definition and testing of GMV's flight dynamics suite of products (focusSuite), as well as in the business analysis and commercial development of hiflyTM, GMV's real time system for satellite command & control which is based upon the SCOS-2000 TM/TC kernel, ESA's highly configurable generic mission control system. She was deeply involved in the initial phases of the ground segment architecture definition and trade-off analyses of Galileo and the Galileo System Test Bed, collaborating with both ESA and the European Commission. Since assuming the chief executive officer position, Beech has successfully lead GMV to become the number one ground systems supplier in the world. Under Theresa's leadership, GMV has been named to the top 50 space manufacturing and services companies for the past two years by Space News. In 2010, GMV was ranked number 48 based on the firm's space-related revenue in ground systems, engineering services and software.

Before GMV, Beech worked as an orbital mechanics engineer at the Boeing Company in Seattle on a variety of projects including Teledesic, SeaLaunch and the Alpha module of the International Space Station. Beech has a B.S. in Physics from the University of Michigan, Ann Arbor and an M.S. in Atmospheric Sciences from the University of Washington, Seattle.

MilsatMagazine (MSM)

Ms. Beech, could you tell our readers about your background and how you came to decide on a career in the satellite industry?

Theresa Beech

I have always been interested in math and science and intrigued by how the physical universe works. This attraction led me to study Physics at the University of Michigan, Ann Arbor and Atmospheric Science at the University of Washington, Seattle. Once I completed my graduate studies in Atmospheric Science at University of Washington, I was offered and accepted a job at the Boeing Company in Seattle. Boeing put me on a space station project, which at that point in time was called the Alpha Module.

My career in the space industry really took off from there. I was able to work as an orbital engineer, and as the technical lead and project manager for a wide variety of programs in mission analysis, mission planning and flight dynamics systems, working with institutional and commercial customers around the world. The satellite industry is an extraordinary industry to work in, but I can't say that I planned to go into the field at any particular time—it really just happened.

MSM

Given your academic credentials in Physics and Atmospheric Sciences, a B.S. and M.S. respectively, what would you recommend to students as curriculum for careers in our various and sundry industries?

Theresa Beech

There are very few people who know from a young age what they want to do in life. But one thing I recommend: Students should take as many math and science classes as possible. They should expose themselves to greater learning opportunities. They should remain open to taking challenging academic subjects, so that in the future they have a broader spectrum of opportunities available to them and a baseline for discovering what it is they really want to do in the future.

Often, "a career focus" is not something a person knows when they are maybe 10, 15 or even 18 years old. The best advice I can offer is to never close your doors and to continue to expose yourself to math and science courses early, which can open many doors to an exciting career.

MSM

One area of great concern throughout the satellite communications and space segments is a lack of adequately trained candidates for crucial high technology positions. How can the industry further promote STEM training at the middle and high school, college and post graduate levels? Does GMV USA offer any programs in support of STEM training?

Theresa Beech

One of our main challenges is making math and science appealing—fun and cool to younger generations. **GMV USA** is a strong proponent of STEM training and programs for students in middle school, high school and college. There are numerous industry groups that have robust STEM initiatives and GMV USA is active in many of them.

On a corporate level, we are starting an internship program at GMV USA, which we plan to roll out next year. The internship program will expose students to a broader spectrum of industry-related careers. Also, we have a number of engineers who frequently visit local schools to encourage youth to study math and science, and educate young people about our industry, through a very practical representation of space. Personally, I often go to my kids' schools and speak about science and space to inform them of the opportunities and the education and training necessary to have a successful career in our field.

MSM

Would you please tell us about the COTS (Commercial Off The Shelf) products offered by GMV USA that are available to the defense sector?

COMMAND CENTER: THERESA BEECH, CEO, GMV USA (CONT.)

Theresa Beech

GMV USA is a satellite ground systems supplier. All of our products are related to ground control. We have four basic products: flexplan, hifly, archiva, and focussuite. These products are all related to different areas within what is referred to as ground control of satellites. **hifly** is used for satellite command and control; **archiva** is for trending, archiving and engineering analysis of satellite telemetry data throughout the lifetime of the satellite; flexplan is used to coordinate the planning and scheduling of missions; and **focussuite** is for "flight dynamics" or space navigation of the satellites.

MSM

What are the differentiators of GMV COTS products that would cause an acquisition agency to consider such offerings for their mil/gov clients?

Theresa Beech

All of our products are very open, adaptable, and flexible and have a high degree of automation built into them. Our products are made to cater to multiple missions and are both interoperable and modular. Our COTS products are state-of-the-art and they are particularly strong in the areas related to planning and scheduling.

MSM

What are the benefits of these products to the defense sector?

Theresa Beech

One of the biggest challenges in the defense sector is the current budget environment and figuring out how to support the same missions or even more missions with less money. One of the best ways to do this is to plan and schedule existing assets better, so that it's possible to get more use out of them. The integrated and automated planning and scheduling of all of space and ground assets is a very hot topic within the defense sector. Our COTS products provide solutions to these problems.

MSM

How does GMV USA obtain the attention of government entities such as DISA and the GSA, as well as military space and satellite division commanders, in promoting COTS products for their concerns?

Theresa Beech

Our presence in the United States has allowed us to build relationships with those entities. They know and trust us as a reliable provider. We have a lot of contacts who highly recommend our products. We pride ourselves on building and maintaining strong relationships with our customers.

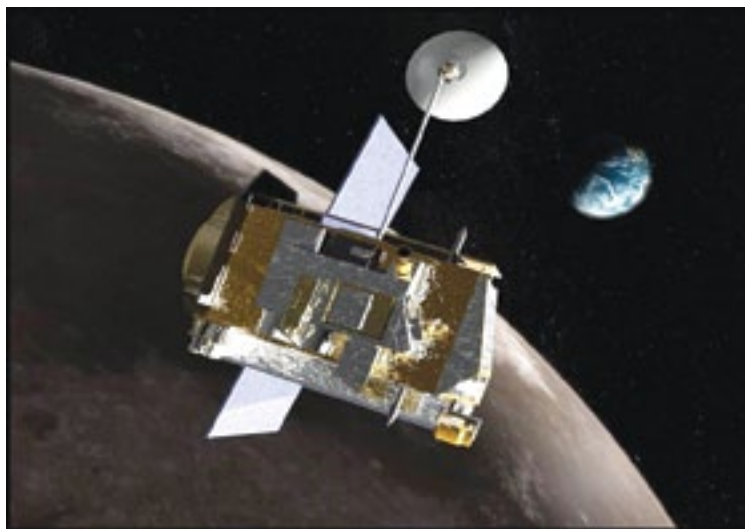
MSM

What are some of the examples of recent missions in which these products have been used? What were the results of their use?

Theresa Beech

One of the most recent missions was the **Lunar Reconnaissance Orbiter (LRO)** of **NASA**. There are some images that LRO produced, which are images of the rover that was left on the moon by the last **Apollo** mission. Our software enabled us to plan, schedule, and generate the necessary commands to make it possible for LRO to take the pictures of those rovers. We have a number of other missions that we can't talk about. In some cases, a satellite may be about to be launched or it is in development and deployment.

On the commercial side, we consolidated a fleet of satellites for the Brazilian operator, **StarOne**. That project has been highly successful and they have been very satisfied with our work, throughout the course of the project. As a result, they are currently controlling more satellites with the same number of operators.



Artist's rendering of the LRO spacecraft in orbit.
Credit: NASA

MSM

How would they potentially apply to future military missions?

Theresa Beech

By using GMV products, it is possible to reduce costs by consolidating operations of the existing stove-piped operations and also by better planning and scheduling of space and ground assets, to obtain more services.

MSM

How customizable and compatible are your COTS products with existing programs used by the military?

Theresa Beech

Our products adapt to all sizes of satellite fleets and to existing hardware and software systems, as well. GMV's solutions are highly customizable for missions and users' needs and can be adapted for missions that are still evolving.

MSM

What differentiates the workings of GMV USA from those of the parent company, GMV, in Spain? How much autonomy does GMV USA have in the workings of your product lines?

Theresa Beech

We have a firewall which allows us to operate independently of our parent company. This firewall includes a separate board of directors, which allows us to operate very independently and autonomously of our parent.

How much autonomy do we have in the product lines? The main product lines for three of the products are maintained out of Spain. One of our products is maintained and evolved out of the U.S. and that product line is completely under our control. However, all of the customization and anything we need to do for a U.S. customer—commercial, civil, defense, etc.—is done by us here in the U.S. and how we do that is completely up to us.

MSM

Can you tell our readers about some of GMV USA's upcoming projects and products?

Theresa Beech

In terms of products, we are expanding our products in the bandwidth optimization management and modeling for planning and scheduling of bandwidth usage. I am unable to comment on the specifics of these projects due to the sensitivity of the project details.

MSM

What challenges do you believe the satellite industry faces over the next year or so, and how do you believe such will be successfully overcome?

Theresa Beech

There are several challenges. One of the main challenges on everyone's mind is the federal budget. It is an issue. However, I also see it as an opportunity for companies that are willing to adapt or change the way they do business.

There are two other hurdles that I would say are not necessarily a one-year or even two-year challenge. The first is the generational transition which is going to have to occur within the industry, given the average age of those in the industry. The age of retirement keeps getting higher and higher, but at some point, people are going to retire and that's a generational transition that will have to occur. It will be challenging.

The second hurdle is selling science to U.S. government policymakers. There is a lack of understanding about the fact that science is the basic building block of everything we do in STEM industries, and anything in science or engineering ultimately comes out of science.

MSM

When you look back upon your already stellar career, what project or projects bring a true sense of satisfaction to you?

Theresa Beech

One of the projects that I look back on with a real sense of satisfaction is the **NASA Goddard Lunar Reconnaissance Orbiter**. That was a huge success for NASA and GMV USA. We are extremely proud to have taken part in it.

There are also a number of projects that I can't talk about that I'm also very proud of. Another huge accomplishment is the building of GMV USA itself, and doing so successfully. We've grown the Company from two employees to almost 60 and I would like to go further. How much further? I don't know! Time will tell.

About GMV USA

GMV is a leading supplier of commercial telecommunications satellite ground systems in the world and is a global leader in satellite flight dynamics for all types of satellite missions (LEO, MEO, GEO, HEO and interplanetary). GMV has been providing satellite ground systems to satellite manufacturers, commercial operators, integrators, and Space Institutions around the world for over 25 years. More than 280 space missions have selected GMV technology, and GMV's operational systems are currently installed on six continents in 25 countries. For more information, please contact Jennifer Strohm at **301-836-1516**, or email to jstrohm@veandco.com.

Company website: <http://www.usa.gmv.com/>



THE FUTURE IS LIGHT

By Joe Petrie, Marketing Manager, ViaLite Communications

RF links in military communication are ubiquitous, from just a single antenna used by mobile troops right up to the large satellite dish farms used for government monitoring. Tactical UHF/VHF radio links, communication buoys and secure network data centers all use RF links. However, the traditional copper cable link between the antenna and control station has significant performance limitations and is not secure. In contrast, optical fiber is lightweight, inherently secure and incurs negligible signal losses, bringing flexibility to the design of fixed installations and mobile applications.

The Technology

In the majority of applications, optical fiber is used to carry digital signals. However, it can also be used to carry analogue signals such as the RF signals received and transmitted using satellite links. The technique uses intensity modulation which means transferring an electrical signal to the optical domain without any form of digitization. Consequently, the system is agnostic of the type of signal being transmitted and makes it suitable for almost any format. RF over fiber links are typically used to deliver services such as satellite L and C bands, GPS/MSF time signals, digital TV and VHF/UHF radio as well as cellular and mobile radio signals.

Copper Versus Fiber

Historically, the link between an antenna and a control station has been achieved using copper cable. However, copper is a poor performer at high frequency and cables with a relatively large diameter are required. Even with these bulky and costly cables, the link distance achievable is limited to a few hundred meters at best. In contrast, optical fiber is lightweight and capable of supporting very long link distances—even up to 50km.

Information security

Unidirectional

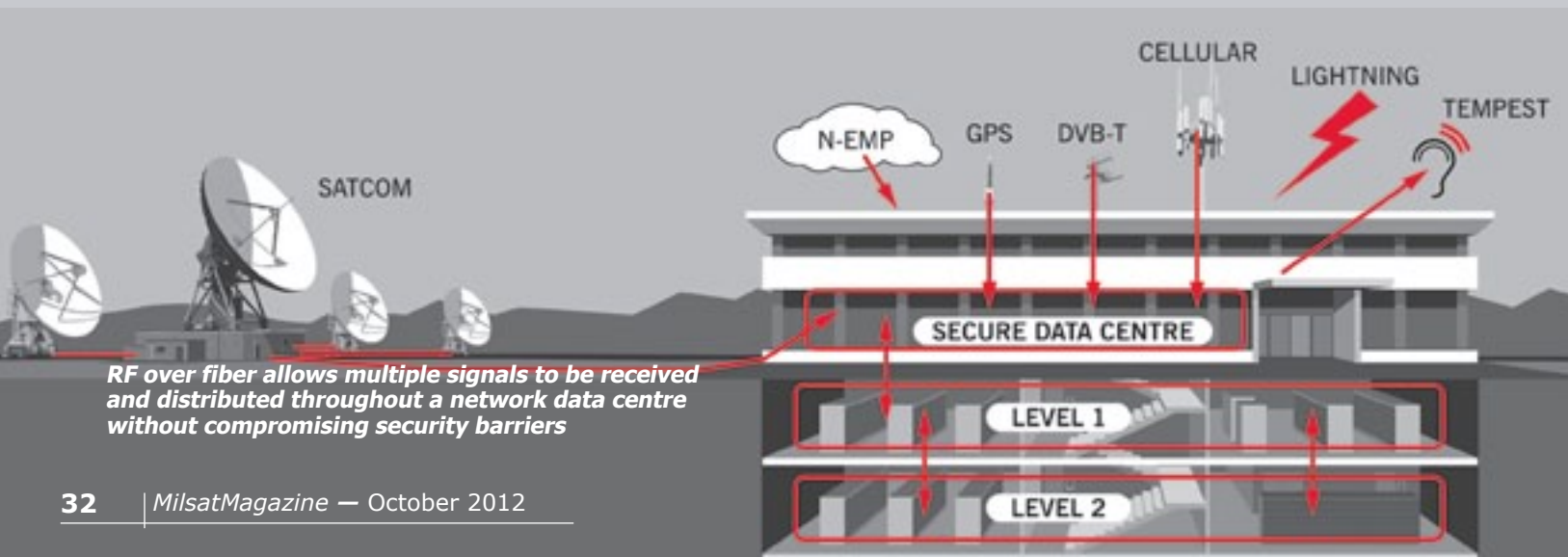
A fiber optic link is inherently unidirectional. Consequently, connections between areas with different security levels can share assets, e.g., the same satellite dish, whilst maintaining the integrity of security barriers.



RF over fibre antenna remoting kit using a hybrid 0 power/fiber cable

Fiber cannot easily be tapped

Unlike copper cable, optical fiber is almost impossible to tap successfully and is therefore ideal for applications where security is paramount. A signal transmitted along a copper wire generates an electromagnetic field which can easily be “sniffed” using a simple current sensor. Signal propagation along optical fiber is based on the phenomenon of total internal reflection. Malicious access to the signal requires the glass fiber to be broken. Even if access to the signal were gained, the catastrophic effect on



RF over fiber allows multiple signals to be received and distributed throughout a network data centre without compromising security barriers

the signal level at the receiver is easily detected with a simple alarm function.

Protection from EMP and lightning strikes

As optical fiber is non-conducting, it is resilient to threats such as lightning or *electromagnetic pulse (EMP)* strikes. RF over fiber is used routinely in EMC testing, most notably in the aircraft industry, to help ensure accurate results and protect sensitive equipment.

Antenna Remoting

Mobile troops deploying radio antennas in operational environments are faced with the inherent conflict between the optimal placement of an antenna e.g. the top of a hill, and the choice of location for a forward operating base. Moreover, a transmitting antenna has a detectable electromagnetic signature. A short distance between the antenna and the operating base is a security compromise.

Copper cable will allow only for an antenna link of couple of hundred meters. The remoting distance may be increased by co-locating encrypted assets with the antenna however encrypted assets outside the tactical operating base is clearly a security compromise.

Using an RF over fiber link allows the antenna to be placed much further away without the need to co-locate encrypted assets outside the operating base. This improves security but also allows more optimal placing of the antenna. A well-placed antenna means a reduced electromagnetic signature due to the lower power required for transmission—a further improvement in security.

Security Improvements

Due to its inherently secure nature, potential for long link distances, plus resilience to electromagnetic radiation, RF over fiber delivers significant improvements in the security of information as well as personnel in fixed and mobile SATCOM applications.

About the author

Joe Petrie has more than 10 years of experience in the mobile communications sector with involvement in handset and infrastructure supplies. He possesses a BEng. in acoustics and electronics from Salford University, U.K.



THE HPA CORNER: FACILITATING FOREIGN LAUNCH EXEMPTIONS

By David Anhalt, V.P., U.S. Government Solutions, Space Systems/Loral



There has been a lot of discussion over the past year about how the commercial space industry can be leveraged by the U.S. Government to achieve its goals of resilience, affordability, risk reduction and increased flexibility, capability, and capacity for national security, space exploration, and science missions.

One of the impediments to a clear road ahead for this strategy is the commercial satellite industry's reliance on affordable, reliable launch services by overseas providers. For the dozen years since 2000, more than 220 commercial GEO satellites were manufactured worldwide and, even though two thirds of them were manufactured in the U.S., less than 10 percent of them were launched in the U.S.

The **2004 U.S. Space Transportation Policy** states that U.S. Government payloads shall be launched on U.S. vehicles unless exempted by officials in the White House after a thorough interagency vetting.

If the timing of this exemption review is delayed until all the facts about the nationality of the launch vehicle are known, then the "legitimacy" of commercial hosting will be threatened. Some simple changes to the U.S. Space Transportation Policy would help improve the business case for hosted payloads.

Recommended Alterations

The Hosted Payload Alliance (HPA) recently recommended three changes to the Space Transportation Policy:

- **The exemption process needs to be transparent and time limited.**
- **Exemptions with conditions should be allowed even before the ultimate launch service provider is known.**
- **U.S. departments and agencies should have the option of seeking an exemption for foreign launch as early in their planning process as possible, ideally before formal analyses of alternatives are performed.**

Subject-Matter Expertise

We asked members of the **Hosted Payload Alliance** the following question:

When in the satellite procurement process do you think exemptions should be considered and what kinds of conditions would make exemptions more workable?

James Mitchell, Vice President, Boeing Commercial Satellite Services:

"The recent successes at SpaceX are encouraging for the United States launch industry, however, from a combined cost and access-to-space perspective, for the foreseeable future, commercial satellite operators will need to

launch a significant percentage of their future satellites on French and Russian launch vehicles. Therefore, to the extent government payloads will seek commercial rides, there must be a corresponding flexibility in launch vehicle choices. Absent this flexibility, commercial operators will see little or negative benefit to hosting government payloads and will turn their attention elsewhere."

Don Thoma, Executive Vice President, Iridium and President of Aireon LLC:

"It is important that the exemption process in the Space Transportation Policy allows U.S. Government missions to assess foreign launch opportunities as early in the procurement process as possible. Launch costs represent a significant investment for companies and can often impede access to space.

The HPA evaluated the current policy and the aforementioned recommendations will ensure that mission security requirements are met while making the exemption process transparent and time limited; allowing for conditional exemptions until the launch service provider is known; and providing U.S. departments and agencies the option to seek an exemption for foreign launch earlier in their planning process."

Robert Cleave, President of Commercial Launch Services, Lockheed Martin:

"Exemptions should be considered whenever a viable alternative that is cost effective and does not infringe U.S. National Security Interests. Any loss of focus on the government's responsibility to its citizens to protect and serve the National Interest would result in disapproval, regardless the business case."

Rich Pang, Senior Director of Hosted Payloads, SES Government Solutions:

"Government agencies are given the most flexibility and potential for cost savings and access to space when they are allowed to consider the use of and/or receive an exemption for foreign launchers as early in the planning process as possible. This in turn will allow the government and the contractor to have open and meaningful conversations as



The SES-5 satellite, also known as Sirius 5, includes an L-band hosted payload for the EU... the payload is part of EGNOS, which is being developed by the ESA and the EC. The successful launch occurred on July 10, 2012, via an ILS Proton-M launch vehicle.

they determine the contractual and operational relationships. Reducing unknowns, reduces risks."

David Anhalt, Vice President, U.S. Government Solutions, Space Systems/Loral:

"Fundamentally, we need to know if the U.S. Government will permit a foreign launch for a particular government payload when we are evaluating the business case for a new satellite. With nearly 90 percent of GEO commercial satellites launching on French or Russian rockets, the HPA's recommended changes to the exemption policy will reduce the business risk to satellite operators.

"Our commercial customers require us to bid spacecraft designed for the environmental requirements of a range of launch vehicles. That's why I favor an exemption process that provides at least a conditional OK for launch on certain foreign rockets dependent on an early assessment of the national security interests involved. Conditional exemptions will allow for programs to move forward when the launcher is still unknown."

Thanks to the following individuals for their valuable insight and feedback...

- Russ Gottfried and Cliff Perkins, Lockheed Martin
- Don Thoma, Iridium
- Rich Pang, Tim Deaver and Kent Verner, SES
- Jim Mitchell, Boeing
- David Anhalt, SS/Loral



The Hosted Payload Alliance Charter

Justification

The Hosted Payload Alliance (HPA) is a satellite industry alliance formed to increase awareness of the benefits of hosted government payloads on commercial satellites. The U.S. National Space Policy published in 2010 calls for an increasing role for commercial space to meet government requirements. It also explicitly directs the use of non-traditional options for the acquisition of space goods and services, and cites hosted payloads as one of these non-traditional options. The policy notes that public-private partnerships with the commercial space industry can offer timely, cost-effective options to fill government requirements.

Goals

Serve as a bridge between government and private industry to foster open communication between potential users and providers of hosted payload capabilities.

Build awareness of the benefits to be realized from hosted payloads on commercial satellites.

Provide a forum for discussions, ranging from policy to specific missions, related to acquisition and operation of hosted payloads.

Act as a source of subject-matter expertise to educate stakeholders in industry and government.

Membership Criteria

Membership in HPA is open to satellite operators, satellite manufacturers, system integrators and other interested parties.

More information is available at the organization's website via this link.

A close-up portrait of Dr. John Paffett, a middle-aged man with short brown hair and glasses, smiling. He is wearing a dark suit jacket over a light-colored shirt. The background is a blurred image of green foliage.

COMMAND CENTER: DR. JOHN PAFFETT, CEO, SST-US

Dr. John Paffett is chief executive officer for Surrey Satellite Technology US LLC (SST-US), the United States subsidiary of world-leading small satellite manufacturer Surrey Satellite Technology Limited (SSTL). SST-US was created to serve the U.S. market with rapid, cost-effective small satellite systems, applications, and services. John is also director of telecommunications and navigation for SSTL with responsibility for those programs and the group strategic development activities, as well as chief executive officer of Surrey Satellite Services Limited, the SSTL subsidiary responsible for provision of launch and launch service activities.

John has proven engineering, management, and business development skills, with a track record of working with international space industry partners in securing new business opportunities and delivering projects. He is accustomed to interfacing with senior officials in the international space community and skilled at developing innovative approaches to meet challenging space business goals. John holds a bachelor's degree (honors) in electronic engineering and a doctorate in electronic engineering from the University of Surrey. He is an author and co-author of over 35 scientific and engineering publications.

MilsatMagazine (MSM)

Good day, Dr. Paffett. With SST-US being a regular exhibitor at the annual Geospatial Intelligence Symposium (GEOINT), taking place this year at the Gaylord Palms, Orlando, Florida, October 8th to 11th 2012, could you tell me as a leading small satellite proponent whether you believe small satellites have utility and application in this market.

Dr. Paffett

Absolutely. In the last 15 years we have seen a significant increase in the utility and application of small satellite solutions, driven by enhancements in technology, both on the bus and payloads, and a significant reduction in cost. Surrey has been at the forefront of this activity implementing systems providing high-quality 32m, 22m, 2.5m and 1m Earth observation imagery at a fraction of the price of previous programs.

The NigeriaSAT-2 satellite launched August 17, 2011, is a good example. We designed, manufactured, and launched this 300kg, agile, 2.5m resolution Earth observation satellite for less than \$30M, significantly improving the price performance point for this class of mission.

Our ongoing 1m resolution Earth observation satellite development is another great example. We're planning to launch three SST-300 S1 spacecraft in 2014 for approximately \$160M including launch and insurance—that's less than half the cost of what others have paid for a single on-ground satellite with comparable performance. As budgets become increasingly constrained, small satellite solutions will play an increasingly important role in fulfilling user and market needs.

MSM

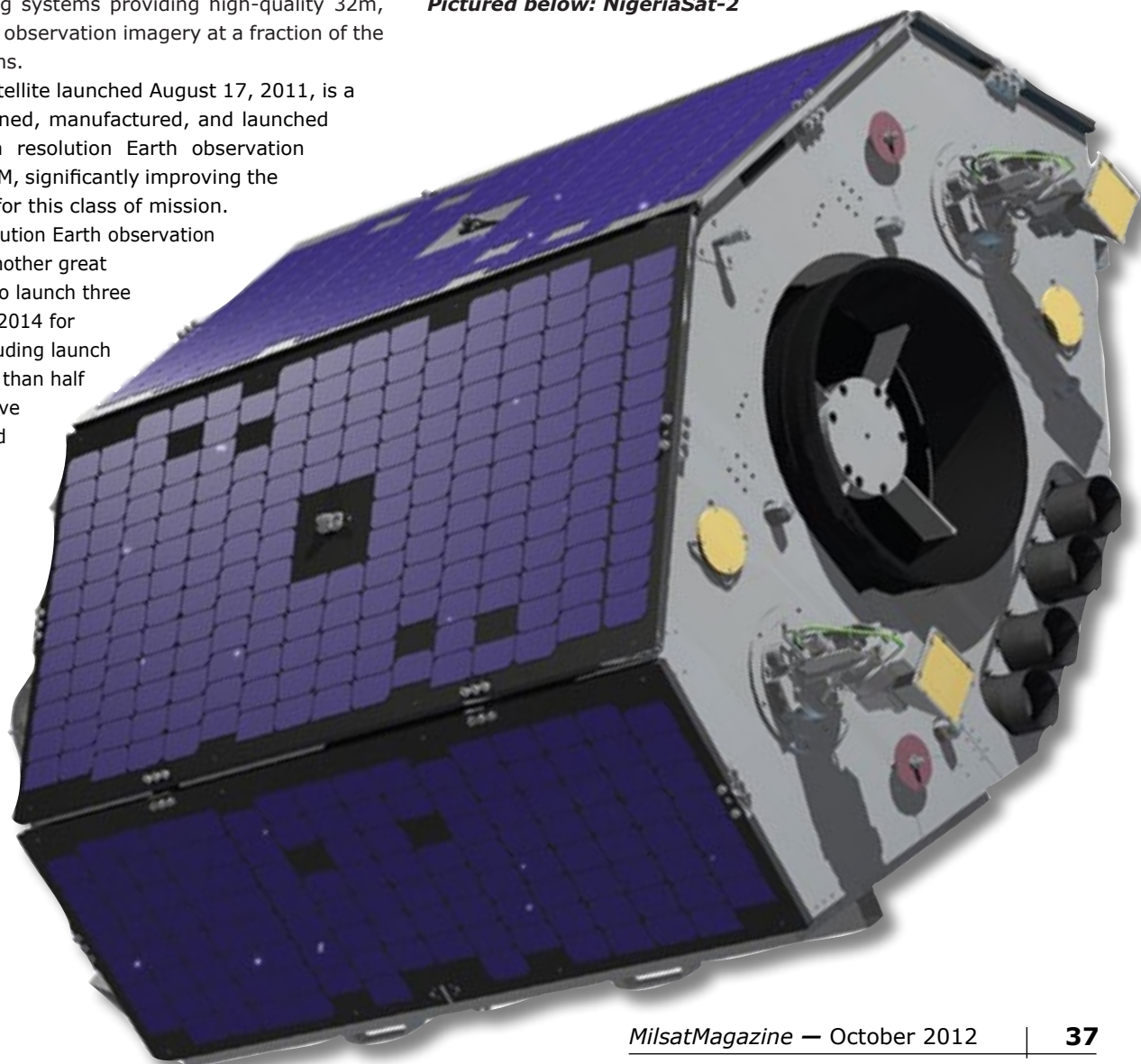
You mention budgetary constraints, something that is obviously at the forefront of people's minds today. How

do you see the current economic climate impacting the market and future opportunities?

Dr. Paffett

In the short term, it's making things very difficult. The need for, and our reliance on, the data and information produced by these systems only continue to increase, yet available funding is declining. A lot of the community has become accustomed to operating in a particular way, something the worsening financial conditions struggle to support. This is forcing people to change and consider different options—some are embracing this quicker than others.

Pictured below: NigeriaSat-2



COMMAND CENTER: DR. JOHN PAFFETT, CEO, SST-US (CONT.)

Unfortunately we have found that several of our opportunities have been delayed with paralysis occurring while the customer considers the options and accepts the need to do things differently.

Landsat is one example. Despite significant user community demand for the data, increased latency, and continuity of service, the budgets have been cut and the program delayed. The customer is now considering alternative options for the system's implementation.



Artistic rendition of a U.S. Landsat satellite, courtesy of NASA

Long-term I believe the situation will stabilize. In fact, I see the market for small satellite solutions increasing as the community becomes more financially aware and budget-constrained.

MSM

We understand that this market is predominately government customer based, do you believe this will change?

Dr. Paffett

Yes, it will change. I firmly believe that we are in the infancy of the commercialization of the Earth observation market and that it will follow a similar pattern to what occurred in the geostationary communications market 15 to 20 years ago. As commercial and entrepreneurial entities begin to figure out how they can derive income from the market and as the infrastructure costs decrease, then the commercial nature of the market will evolve. I expect that first we'll see growth in the commercial provision of optical Earth observation products and services at various resolutions.

The next stages of commercialization will be with systems providing higher temporal data, daily and even sub-daily imaging, and also the use of other sensors or payloads such as synthetic aperture radar, hyperspectral, infrared, and GPS radio occultation.

MSM

With some systems giving data away for free, how does that impact the commercialization of the market?

Dr. Paffett

That is a good question. The availability of free imagery helps to stimulate its use, the growth of applications, and our dependency on the data—ultimately generating an increasing demand, which is good. Unfortunately, the infrastructure has a cost associated with it, and so sustainability becomes an increasing issue. We are certainly seeing it with some systems today, where the user community has become used to having the data, but now there are questions over how future infrastructure will be funded—Landsat being the obvious example. This is where small satellite solutions can play a valuable role in limiting the cost of deployment of future infrastructure. For some of the commercial and entrepreneurial entities, the availability of free imagery makes the generation of revenues more complex, and that is undoubtedly reflected in the pace at which the market is commercializing.

MSM

In the geospatial intelligence domain, do you believe small satellites can provide the solution to all upcoming requirements?

Dr. Paffett

Definitely not—I do not believe that all requirements have to be met with large, complicated, or expensive satellites. What's actually important is identifying the most appropriate solution to fulfilling a given requirement, and, in fact, challenging the premise of the requirements to see whether there are smarter ways to achieve the same or similar result. Large satellites will be ideally suited to addressing some needs, smaller satellites others. It is definitely not the case of one size fits all.

The challenge we regularly face is getting prospective customers to consider other options or ways of working. Some have become used to or even ingrained in a particular class of mission and way of doing business, and considering alternatives is difficult. I guess that's human nature. It's something we occasionally find when dealing with a new customer: adopting a different approach can be feel like a leap of faith, and it's only afterward that the customer realizes that it's not really that different.

MSM

You said that you saw future stages of commercialization of the remote sensing market, systems providing higher temporal revisit and alternative sensor suites, is this something Surrey is planning to address?

Dr. Paffett

Absolutely—we're already doing it. Systems we've provided, such as the **Disaster Monitoring Constellation (DMC)** and **RapidEye**, are already providing high temporal revisit. The DMC constellation, for example, will provide daily revisit, providing imagery products that have significant utility in a number of areas including the disaster management arena, climate and weather management, and agriculture. The range of products

and applications is very much in its infancy, with people only just beginning to imagine what they can do with regular imagery of a given location.

With respect to sensors and payloads, we're already working to provide higher resolution optical solutions, with the 1m resolution system to be deployed in 2014 and plans to improve the resolution further in the future. We are also looking at a broader spectrum of other instruments and payloads.

NovaSAR is a great example. For years we have seen the future need for low-cost, moderate-resolution *synthetic aperture radar* (SAR) for a range of applications such as maritime situational awareness, disaster management, and agricultural and land management. Up until now we've not had a solution that meets the desired price performance point.

That's now changed, and, thanks to advances on both the payload and platform, we're now developing the NovaSAR product—an S-band SAR able to provide 6m and 30m resolution imagery, planned for launch in 2014.

As another example, **SST-US** is part of the team for the recently awarded **NASA Earth Venture 2 (EV2)** program **CYGNSS**. Under this program, we will be providing the **SGR RESI** payload, which will be used to forecast weather and monitor climates by measuring ocean surface winds throughout tropical storms and hurricanes.

MSM

Clearly, Surrey is active in this market and has small satellite solutions that could address many customers future needs, what are the main points which you think are stopping people considering your solutions?

Dr. Paffett

That's another good question. The biggest issue to be honest is false perceptions. There are several points which routinely come up—the first relates to cost credibility: Although there are growing budgetary constraints, people do not believe we can deliver missions at the price we do, and a comment often made is we're "too cheap." We recently commissioned **The Aerospace Corporation** to audit six of our previous programs to provide independent assessment that we did deliver them for the price we quoted and also to demonstrate that the current cost modeling tools yield the wrong results for this class of mission. I am happy to share the report on this audit.

The second point is that people equate cost with quality and believe that our low cost equates to low quality—something that really is not the case. While our approach to delivering a program may be different from that taken by a larger, more conventional prime, the end result has to be the same. If a customer contracts us for a provision to fulfill specific requirements, be they technical or mission lifetime, then we have to achieve these requirements, same as everybody else. We'd have been out of business a long time ago if that were not the case.

The last point is the one made earlier about fear of change and human nature. One of our biggest challenges is getting a new customer to embrace something different or adopt an alternative product solution or approach. I think the saying is "better the devil you know, than the one you don't."

Surrey has now launched 39 satellites, and so we have a significant heritage and track record for provision of this class of mission which should give future customers reassurance. Many of our previous customers also faced the need to embrace change—a testament to the fact that our solutions and approach aren't that different and that change is not to be feared.

MSM

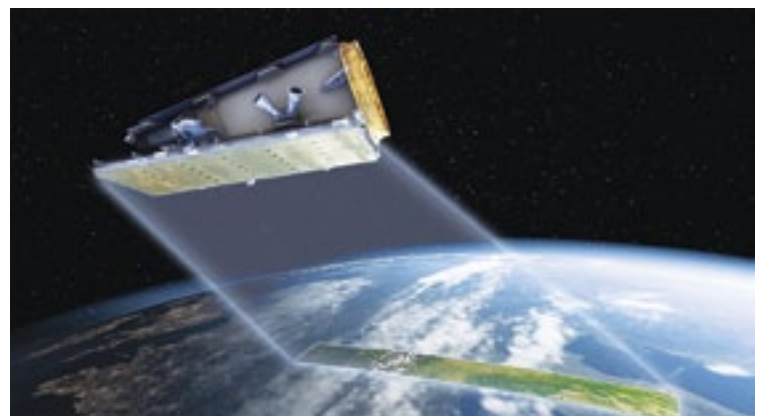
Final question, with an impressive career already well underway, when you look back over your accomplishments, which ones truly bring a smile of satisfaction to you?

Dr. Paffett

I get a huge amount of satisfaction from what I do personally, the team I work with, and the things we've accomplished since I joined the company 16 years ago.

When the company first started, small satellites were seen to be a novelty or curiosity—now they are very much part of the fabric of satellite engineering, with proven utility, application, and the solution for many of today's challenges. Our whole ethos and approach enables customers to close their business cases and bring their ideas to fruition. Every time we have a launch I get a huge sense of pride in that we've just helped a customer bring its vision or dream closer to being a reality.

Personally, I get the greatest satisfaction from doing things that everybody else says are impossible—I definitely have a can-do attitude, and that has paid off. Whether it's been closing a deal to secure a launch option that nobody has believed would be possible, or convincing the **European Space Agency** that Surrey really could build and launch a 660kg navigation satellite to secure the ITU regulatory filings in under 30 months and then deliver on that promise—such have all given me a massive amount of pleasure and satisfaction.



Concept illustration of NovaSar-S scanning the Earth.

MILSATCOM IS CRITICAL TO MISSION SUCCESS

By Karl Fuchs, V.P., Technology, iDirect Government Services (iGT)

The United States military has to do more with less. With the official end of the war in Iraq last December and the military drawdown ongoing in Afghanistan, there are fewer boots on the ground. Yet, the troops that remain in theater still need to gather information, communicate with personnel in the air, at sea, and on land, and perform their missions. To do so, they rely heavily on military satellite communications (MILSATCOM) with worldwide connectivity required for everything from checking emails to downloading high-definition intelligence, surveillance and reconnaissance (ISR) video.



As is the case with any communications network, whether terrestrial, satellite, or *communications-on-the-move* (**COTM**), the design must start with a firm understanding of the user application and requirements. These end-user applications often require high bandwidths that must be supported on a fast moving aircraft using a very small antenna, while providing global coverage under stringent *communications security* (**COMSEC**) and *transmission security* (**TRANSEC**).

With this reality comes a host of challenges—from securing information on a global network to supporting the bandwidth required to transfer large imagery files.

MILSATCOM technologies are answering the call, providing cutting-edge solutions and helping troops ensure mission successes and the saving of lives. One example is the development in the areas of airborne SATCOM, and how those developments are being used to enhance critical military ISR missions.

Combined with COTM technology, airborne SATCOM allows commanders to securely communicate with troops dispersed globally in remote regions. Advances in the speed and throughput of satcom equipment have made high-definition video a reality for airborne applications.

iDirect Government Technologies (iGT) is certainly at the forefront of designing satellite communications technologies that improve our military's ability to conduct day-to-day operations while keeping updated information on our nation's enemies.

For example, consider iGT's latest satellite airborne router, the **e8000 AR**, which provides military customers high-speed communications on a variety of transport and ISR aircraft platforms.

Features include an intelligent antenna integration processor to support any vendor's type of antenna system; integration into both low-speed and high-speed military airframes which support multiple missions from a single satellite router that can be connected into an existing iGT regional or global satellite network; a lightweight frame that weighs less than 16 pounds; aircraft grade 38-999 connectors for all RF and Ethernet inputs; high-speed

MILSATCOM IS CRITICAL TO MISSION SUCCESS (CONT.)

COTM capabilities with the iDirect IP network delivering voice, video and data applications to and from personnel on board the aircraft; and spread spectrum technology that allows waveform spreading to meet *Power Spectral Density (PSD)* requirements while maintaining the same data rate.

The router also includes both AC (100V to 240V, 50Hz to 400 Hz) and DC (28V) inputs, enabling it to be easily powered from an airplane's native power buss, eliminating power converters that may produce dirty power. The entire unit is designed and tested to meet **MIL-STD 810G** airborne environmental standards and **MIL-STD 461G** standards for electromagnetic interference and radiated emissions.

The e8000 AR routers have flown on multiple military airframes, including the **King Air C12** surveillance aircraft and the high-speed **C17** transport aircraft, supporting numerous military missions. The routers can be optimized for downstream or upstream data rates using either *Deterministic Time Division Multiple Access (D-TDMA)* or *Single Channel Per Carrier (SCPC)* operational modes. The router can be operated in either mode and switched by the operator to suit the mission.



The U.S. Air Force's first ISR-equipped King Airs arrived in Iraq in June of 2009. Photo by Senior Airman Tiffany Trojca/U.S. Air Force

For bandwidth-intensive ISR applications, the e8000 AR can be operated in SCPC mode where as much as 19Mbps can be transmitted off the aircraft in the upstream path. These data rates can support multiple high-definition cameras for surveillance and sensor data from on-board video and sensor-gathering equipment. The e8000 AR can be operated in D-TDMA mode for improved bandwidth efficiency and achieve transmit data rates as high as 11Mbps upstream from the aircraft, depending upon satellite link budget limitations.

Router data rate performance on aircraft platforms are antenna and satellite frequency band dependent. The e8000 AR is designed to operate in any combination of antennas and satellite frequency bands, including wideband global satellite constellation, to provide optimum performance to the operator.



The e8000 AR has a built-in *open antenna modem interface protocol (OpenAMIP)* to interface with airborne antenna's antenna control unit, which provides real-time location and pointing information during flight.

For antennas without OpenAMIP, the e8000 AR includes an on-board CPU with an applications interface for custom antenna development. The CPU comes with a thin-**Linux** operating environment that can be accessed through keyboard, video and mouse interface, front-panel universal serial bus, or Ethernet port.

Some frequency bands, such as Ku-band, have *adjacent satellite interference (ASI)* requirements due to decreased satellite spacing that can limit the *power spectral density (PSD)* transmitted from an airborne antenna system.

On other satellite frequency bands such as X-and Ka-Band, ASI is less of an issue due to increased satellite spacing and allows much higher transmit power in the airborne antenna system.

The e8000 AR takes advantage of this higher power operating environment and can be operated without waveform spreading, and uses SCPC mode where **iDirect** routers have achieved data rates upstream from the aircraft as much as 14 Mbps from a 17-inch airborne antenna.

The military has a need to achieve bandwidth efficiencies as well as a need to prioritize voice, video and data traffic coming in. This *Multilevel Precedence and Preemption (MLPP)* provides multiple levels of prioritization through strict priority queuing and group *quality of service (QoS)*. This capability exceeds the QoS capabilities of commercial grade satellite products on the market today but is required on MILSATCOM networks.

Another MILSATCOM technology that is helping to improve military COTM missions is the *global network management system (GNMS)*, developed by iDirect. The system allows a single COTM remote to have multiple instances in teleports around the globe. GNMS is flexible enough to allow IP and satellite networks to remain fixed while allowing for differences in configuration across different beams. In order to maintain fixed IP network architecture when the antenna re-points, the modem and the router re-homes to the new hub. The e8000 AR and GNMS work together to make this physical transition nearly seamless.

GNMS is a solution that fixes a challenging aspect of COTM remotes—switching from one beam to another. Beam switchover requires the ability of the remote to determine when and to which beam to switch as well as communication with the COTM antenna.



To determine the optimal point at which to switch beams and the best beam to switch to, iDirect developed an *Equivalent Isotropically Radiated Power (EIRP)* map server. The map server holds the familiar contoured EIRP satellite maps. The remote, having access to latitude and longitude information from a Global Positioning System is coordinated with the EIRP map server and determines the appropriate place and time to switch beams.

We have come a long way in military communications capabilities. We have improved the way and speed in which troops receive and share information. We have done so, even as the numbers decrease and troops shift from Southeast Asia to new deployment areas.

About the author

Karl Fuchs is Vice President of Technology for iDirect Government Technologies (IGT). Mr. Fuchs, who has more than 15 years of expertise in the technology, federal government and satellite industries, has been a featured speaker at leading industry conferences and events, including the DoD SATCOM User Workshop, ISCe, IBC, Pacific Telecommunications Council, IWCE, Satellite and Emergency Management Talks.



**COMMAND CENTER: JIM ARMOR, V.P.,
STRATEGY & BUSINESS DEVELOPMENT, ATK**

Jim Armor has been Vice President of Strategy & Business Development for Spacecraft Systems and Engineering Services of ATK Space Systems, Inc. at Alliant Techsystems Inc. since April 2009. Major General Armor [U.S.A.F., ret.] was the Founder and Owner of The Armor Group, LLC, and served as its Chief Executive Officer since September 2007. He served as an active duty officer in the United States Air Force from May 1973 to January 1, 2008. As a Major General, he served as a Director, National Security Space Office, Office of the Under Secretary of the Air Force until retiring in January 1, 2008.

*Jim Armor pictured inside
ATK's new state-of-the-
art Robotic Rendezvous
and Proximity Operations
(RPO) Lab*



Armor was responsible for integrating and coordinating defense and intelligence space activities, and advising the Office of the Secretary of Defense and the Office of the Director, National Intelligence, on matters affecting national security space capabilities. Prior to that, Major General Armor served as Director of Signals Intelligence Systems Acquisition and Operations, National Reconnaissance Office and he directed the development, launch, and operation of the U.S. Signals Intelligence satellite constellation and related global ground systems supporting intelligence and military operations worldwide.

His other positions includes Vice Commander, Warner Robins Air Logistics Center; System Program Director, and Program Director of the NAVSTAR Global Positioning System Joint Program Office, Space and Missile Systems Center. Major General Armor serves as a Director of Navsys Corporation. He served as a Director of Integral Systems Inc., from March 14, 2008 to February 15, 2011. Previously, he served as the Director of the Global Positioning System, the U.S. Government's largest satellite constellation. He served as Director of the GPS Program, and Director of Acquisition and Operations for Signals Intelligence.



Illustration: The new bus lines from ATK, courtesy of the company.

COMMAND CENTER: JIM ARMOR, ATK (CONT.)

MilsatMagazine (MSM)

Would you please explain what these new buses offer and the differences between the basic and elevated configurations?

Jim Armor

ATK's expanded **A-series** product line consists of four basic configurations: the **A100**, **A200**, **A500** and **A700** models, with elevated platforms of **A150**, **A250** and **A550** which aim to provide broader capability and flexibility for customers. The products are designed for a range of mission requirements based on mission class, design life, propulsion, pointing accuracy, payload mass and launch capability.

MSM

What market segments are the targets for these new offerings?

Jim Armor

There is strong interest from both government and commercial sectors. Though mostly government today, commercial interests are growing and government organizations are steadily transitioning to commercial business practices and use of commercial space systems and products.

MSM

When new satellites are birthed, launch vehicle selection can sometimes be somewhat minimized... how do these new buses fit in with current and future launch vehicle configurations?

Jim Armor

The A-series satellite buses are compatible with most launch vehicles, and in many cases are suitable to rideshare in a launch vehicle with other spacecraft. We have a variety of choices to fit customer needs depending on the mission. We have been very successful building small satellites quickly and efficiently over the years. This new family of A-series satellite buses is really just a way to communicate more clearly with a wide variety of customers who are looking for small, rapidly developed spacecraft.

MSM

Will the buses be available for domestic and overseas satellite manufacturers? How will they be marketed?

Jim Armor

Yes, the buses are available for domestic manufacturers and for international markets. Our ability to build this type of spacecraft quickly and affordably is resonating with the marketplace and quite frankly, our timing to announce this expansion is on target. We are marketing this product line through advertising, trade shows, conference panel appearances, video animations and interviews like this one. We have found that our multi-pronged communications platforms are working and that potential customers are actually reaching out to us to learn more about the product line, as are launch providers to insure compatibility.

MSM

We want to address the changing space market—what, exactly, is changing in this market?

Jim Armor

We are seeing an increased need for small satellites in the market given dwindling budgets in both the government and commercial sectors. Plus, the Department of Defense is rethinking how it acquires and manages its satellite programs in order to drive down costs and production timelines. They're looking to launch smaller, less expensive satellites for most military and national security missions. We had demonstrated our capability in that arena with the successful launch of the **ORS-1** satellite for the Air Force. We built the bus from start to delivery in just 17 months when the usual time frame is three to seven years. ORS-1 launched in the summer of 2011 and achieved final operational capability in January.

That kind of "can-do" technology along with today's economic challenges is driving government users to adopt business practices already in place for the most part in the commercial sector. NASA also has begun to appreciate the high payoff of smaller, more specialized science spacecraft. We believe our expanded family of space platforms will enable us to capitalize on the up-swing we expect to see in a number of our targeted market segments.



On June 29, 2011, the Operationally Responsive Space office's inaugural satellite, ORS-1, successfully launched from Pad 0B at the Mid-Atlantic Regional Spaceport, a facility owned by the Virginia Commercial Flight Authority, located at NASA's Wallops Flight Facility, Wallops Island, Virginia. Photo is courtesy of NASA.

MSM

How do these new buses fall into line with increasing focus on the concept of Hosted Payloads?

Jim Armor

They are fully consistent with the concept. Depending on the specific mission, all our buses have capacity for hosted payloads. We look at hosted payloads as another tool in the toolkit for getting missions into space on a timely and cost effective basis. Hosted Payloads are applicable to all mission areas but not necessarily all missions. Clearly, at some point small free-flyers are cost and performance competitive with Hosted Payloads—it is not a given that Hosted Payloads are always a superior offering. Our bus line is ready for both options.

MSM

Will they be amenable to in-orbit servicing and/or capture for repair and refueling?

Jim Armor

We are highly predisposed to in-orbit servicing and ready to include those features, but most customer missions in low earth orbit or beyond geostationary are not yet amenable to it. On the other hand, we believe that satellite servicing is an important new market, whether it involves life extension, satellite repair, in-orbit refueling or spacecraft repurposing.

Our ATK A700 series, the largest mission class, is the foundation of the **ViviSat Mission Extension Vehicle (MEV)**, a significant new satellite servicing spacecraft capable of docking with a client satellite and providing an alternative attitude control and propulsion system for satellites out of fuel but with functioning payloads.

The MEV was introduced in 2011 when **ATK** and its partner, **U.S. Space LLC**, launched **ViviSat LLC**, the first U.S. based company to offer satellite life extension services to commercial and government geosynchronous satellite operators. Through

ATK's long, successful history with **Hubble** repair missions and ongoing spacecraft servicing work at **NASA/GSFC**, and now as part of the **DARPA Phoenix** program repurposing a satellite in orbit, we have laid the groundwork for this game changing technology and believe the commercial market is ready.

MSM

Given client specifications, how quickly can the new, smaller buses be built? How cost effective are they when compared to current products?

Jim Armor

Typically 12-18 months depending on the complexity of the customer's requirements.

In terms of price, we believe our options are highly affordable for today's market expectations. Obviously, the price of a smaller satellite is considerably lower than the larger systems, which could take as long as seven years to build and launch.

MSM

What is the future of the smaller satellite market?

Jim Armor

I believe the small satellite market is coming of age. Primarily, the government is looking for ways to downsize and reduce costs while increasing the resiliency of their constellations, so they are turning to smaller satellites that can be built in a matter of months instead of years.

However, I also think smaller satellites will generate new uses and applications that don't even exist today. As sensors and payloads become smaller and more innovative, national security, scientific and commercial communities are finding more uses for them. There is a huge interest in cubesats and nanosats in academia which points the way in the future. We are seeing existing companies and start-ups put more capability in smaller packages more affordably increasing the value of small satellites. Based on our heritage and performance, we believe we have positioned ourselves very well with this new and expanded line up of small satellite buses.

The small satellite market will be an active one in both government and commercial sectors.



The ViviSat MEV is design to attach to an existing satellite that is in dire straits as its propellant is dangerously low—the MEV would take over station keeping and attitude control of the target satellite while accomplishing its mission.



THE PHOTO RECONNAISSANCE SATELLITES OF THE USS/RUSSIA

By Jos Heyman, Senior Contributing Editor, Managing Director of Tiros Space Information



Similar to the United States, the former Union of Socialist Soviet Republics recognized the value of military reconnaissance satellites early in their development of spaceflight. In doing so, the USSR took a standard spacebus that was being developed for its manned program and fitted craft with specialized equipment. As is the case with U.S military programs, details of the USSR/Russian programs are classified and the minimal of information that is known is mostly gathered by western observers. To add to the secrecy, the USSR/Russian photo reconnaissance satellites are included in the 'all-purpose' Kosmos series of satellites which began in 1962 and had reached 2,481 in number by the close of August 2012.

Zenit

The **Zenit** series of photo reconnaissance spacecraft was derived from a basic spacecraft design that also spawned the **Vostok** manned spacecraft and several other types of USSR satellites.

Designed by **OKB-1** under the leadership of *Sergei Korolov*, the satellites consisted of a spherical re-entry module with a diameter of 2.30m and a mass of about 2400kg., which contained the specialized camera equipment, recovery beacons and parachutes. In orbit, this was attached to a service module containing batteries, electronic equipment and an orientation system as well as, on a later version, a liquid fueled rocket engine that would slow the satellite down for re-entry prior to separation from its service module. The total length was around 5m and the mass was up to 6300kg.

The combination of the basic spacecraft and equipment allowed a variety of configurations that could be tailored to a specific mission requirement—these included strategic and tactical reconnaissance as well as surveillance of predetermined targets. The spacecraft were also used for Earth resource missions and the observation of crops in an effort to verify the accurate reporting of crop yields by agricultural communities.

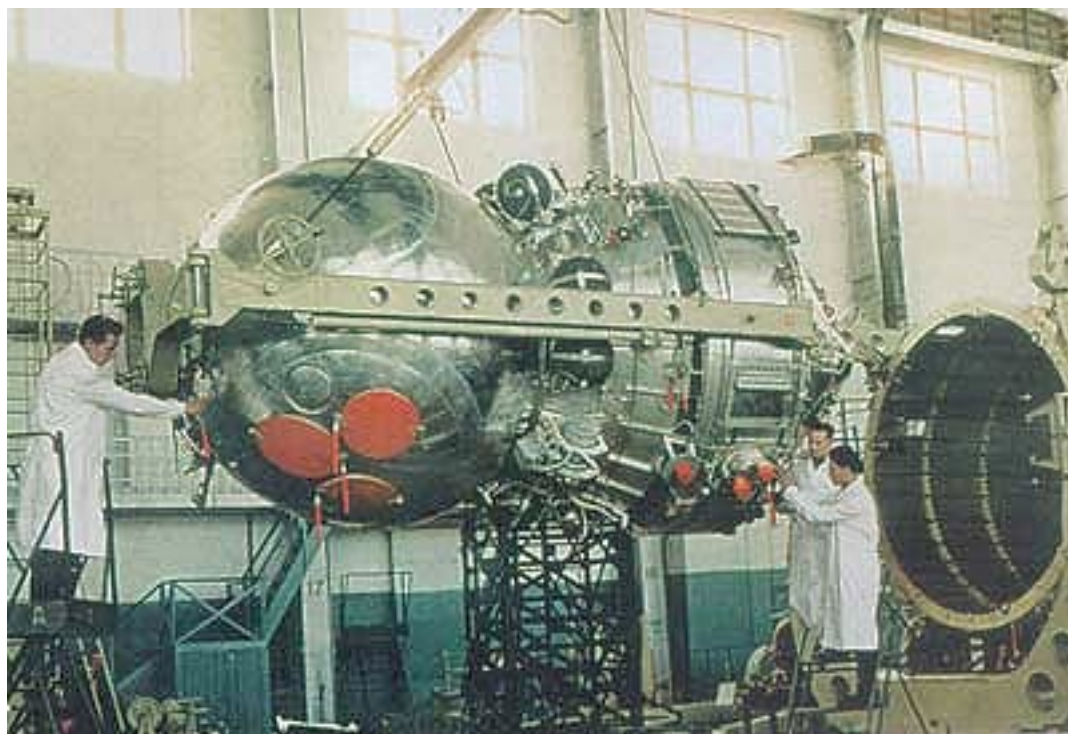
Zenit 2

The first version was **Zenit 2** (there was no **Zenit 1**) and it carried an **SA-10** camera, an **SA-20** camera, a **Kust** 12M electronic intelligence gathering radio package as well as the **Baikal** photo-television device. Following the poor performance of the **Baikal** device, the **Ftor-2P** package was installed, which incorporated the camera equipment and provided 60x60km images with a resolution of 10 to 15m.

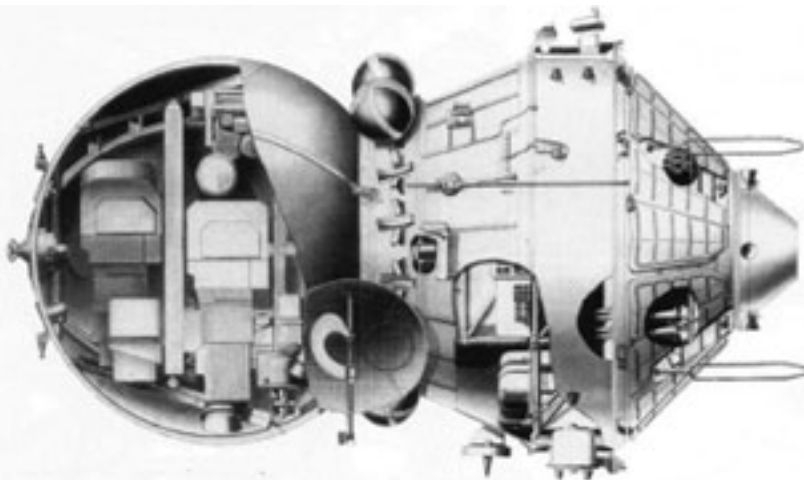
The typical life span of a mission was eight days, after which the re-entry module with the exposed film was recovered. Several versions of this satellite carried ancillary payloads for geomagnetic, radiation, meteorological, and biological experiments.

The **Zenit 2M** satellites were built by **TsKB** and were fitted with a **Ftor-2R3** camera system. The mass was approximately 6300kg. and the typical mission duration was 12 days.

The spacecraft, which were also known as **Gektor**, were modified by the addition of a capsule for an ancillary payload. Identified as **Nauka** (science), this capsule had a diameter of 1.9m and a mass of 200kg. and was mounted on the forward end of the spherical reentry module. The spacecraft had a basic mass of 5900kg. and a length of 5.9m.



The Zenit 2 satellite



Zenit 2 diagram

The **Zenit 4** version was based on the **Soyuz** spacecraft, itself a development of the **Vostok** spacecraft. Designed by OKB-1, the Zenit 4 had a mass of 6300kg. and a length of approximately 5m. The satellites were equipped with the **Ftor-4** camera system, providing high resolution imagery. It also had a manoeuvring engine that allowed the orbit to be altered. Some of the satellites also carried ancillary payloads for scientific purposes. The typical life span of a mission was eight days, after which the reentry module with the exposed film was recovered.

The **Zenit 4M** was a further development of the Zenit 4 and was equipped with the **Ftor-6** high resolution camera system. The typical mission duration was 14 days and it is understood some satellites were equipped with film return capsules as well as ancillary payloads. This version has also been referred to as **Rotor**.

A further modification with a modernised high resolution camera, led to the **Zenit 4MK**, also known as **Germes**.

Also known as **Gerakl**, the **Zenit 4MKM** version carried much improved high resolution camera equipment.

The **Zenit 4MKT** version, also known as **Fram**, carried the **Priroda 3** Earth resources camera system which took multi-spectral photographs on black and white and spectro-zonal film with a resolution of 20 to 30m.

The **Zenit 4MT** version was optimized for topographical photography. The equipment consisted of the **SA-106** topographic camera, a laser altimeter, and a doppler apparatus. The series was also known as **Orion**.

The **Zenit 6** version, developed from the Zenit 4 version, was used for area observation as well as high resolution purposes. This version was also known as **Argon**.

The final Zenit version, **Zenit 8**, also known as **Oblik**, was for military cartographic photo surveillance while they also investigated natural resources of interest to the USSR national economy.

Yantar

The **Yantar** series of military reconnaissance satellites were designed by OKB-1 and built by TsSKB. They had a length of approximately 7m and a mass of approximately 6700kg. The satellites were able to maneuver to specific targets of interest. The satellites consisted of:

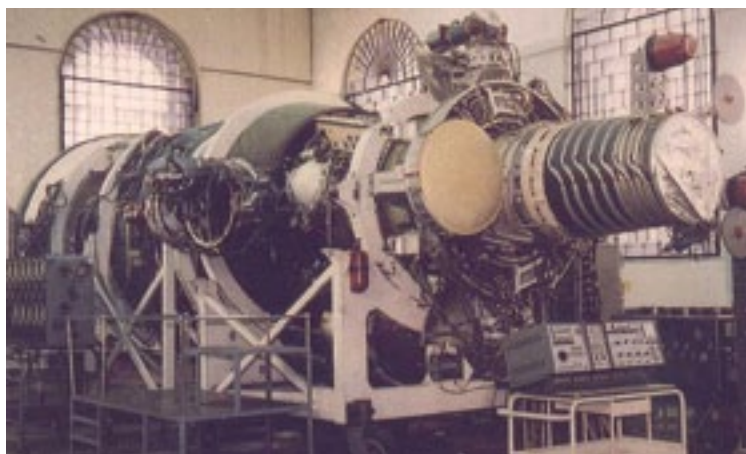
1. *The Agregatnyy Otsek (AO), an equipment module which included the manoeuvring engines*
2. *The Pribornnyy Otsek (PO), an instrument module for attitude control and spacecraft housekeeping systems*
3. *The Otsek Spetsial'noy Apparatury (OSA), a special apparatus module which was recoverable and carried the Zhemchug-4 camera with a resolution of 50 cm, the Salyut-3M onboard computer.*

Type	First flight	Last flight	Orbited	Failed
Zenit-2	26-Apr-1962	12-May-1970	74	7
Zenit 2M	21-Mar-1968	31-Mar-1979	92	4
Zenit-4	16-Nov-1963	7-Aug-1970	72	4
Zenit 4M	31-Oct-1968	25-Jul-1974	57	4
Zenit 4MK	23-Dec-1969	22-Jun-1977	78	2
Zenit 4 MKM	12-Jul-1977	10-Oct-1980	38	1
Zenit 4MKT	25-Sep-1975	6-Sep-1985	26	1
Zenit 4MT	27-Dec-1971	3-Aug-1982	23	0
Zenit 6	23-Nov-1976	19-Jun-1984	94	1
Zenit 8	11-Jun-1984	7-Jun-1994	100	1

Zenit reconnaissance satellites launch record

THE PHOTO RECONNAISSANCE SATELLITES OF THE USS/RUSSIA (CONT.)

The spacecraft also carried two 75kg. descent capsules, **Spuskayemaya Kapsula (SpK)**, which were used to return film to Earth before the end of the mission. The usual mission duration was 30 days. Spacecraft were recovered following re-entry and



The Yantar 1 satellite

it has been suggested that they were used again for subsequent missions. Similar to the earlier Zenit, the spacecraft came in various versions.

The **Yantar 2K** version was also referred to as **Feniks** and the 6600kg. satellites incorporated the **Zhemchug-4** photographic equipment.

The **Yantar 4K1** version, also known as **Oktant**, had a mission duration of 45 days and carried a **Zhemchug-18** camera.

The next version was the **Yantar 4K2** also known as **Kobalt**. These were fitted with a Zhemchug-4 camera system and carried 22 film return capsules.

The **Yantar 4KS1** version was also known as **Terilen**, which carried electronic imaging equipment and the data was transmitted to Earth via communications satellites in geostationary orbit. The operational lifetime of these satellites was 26 to 32 weeks.

The **Yantar 4KS1M** was a further development also known as **Neman**. These satellites had a mass of 7000kg. and were fitted with electro-optical equipment operating in the visible and



Yantar 4K

infrared bands. The satellites used an initially retrievable capsule to return film and later data relay satellites to return CCD imagery rather than physically recovering film.

The **Yantar 4KS2** version was a further development of the Yantar 4K2. Also known as **Kobalt M**, the satellite carried small film recovery capsules as well as a large re-entry vehicle. The Yantar 4KS2 seems to be the version that currently remains in service.

The **Yantar-1KFT** version referred to a mapping satellite and was not a military photo reconnaissance satellite, whereas the **Yantar 6K** and **6KS** versions were high resolution spacecraft that were never built.

Don

Don, or **Orlets**, was a series of military reconnaissance satellites built by TsSKB. The 6530kg. satellites, which were probably based on the unbuilt Yantar 6 version, carried a panoramic camera and as many as 8 film return capsules. They were also fitted with

Type	First flight	Last flight	Orbited	Failed
Yantar	23-May-1974	30-Oct-1980	9	1
Yantar 2K	5-Aug-1978	28-Jun-1983	22	1
Yantar 4K1	8-Jun-1982	30-Nov-1983	9	0
Yantar 4KS1	28-Dec-1982	21-Dec-1990	13	2
Yantar 4KS1M	10-Jul-1991	3-May-2000	9	0
Yantar 4K2	21-Aug-1981	25-Feb-2002	78	4
Yantar 4KS2	24-Sep-2004	current	8	0

Yantar reconnaissance satellites launch record

a manoeuvring unit. Unlike other satellites of the Yantar basic design, these satellites were not recovered but were destroyed in orbit.

Eight satellites were launched between 18 July 1989 and 14 September 2006 and it is believed they are no longer operational.

The **Yenisey** series, also known as **Orlets-2**, was based on the Don series but carried up to 22 film return capsules. It is also likely that the satellites' optics systems allowed them to take

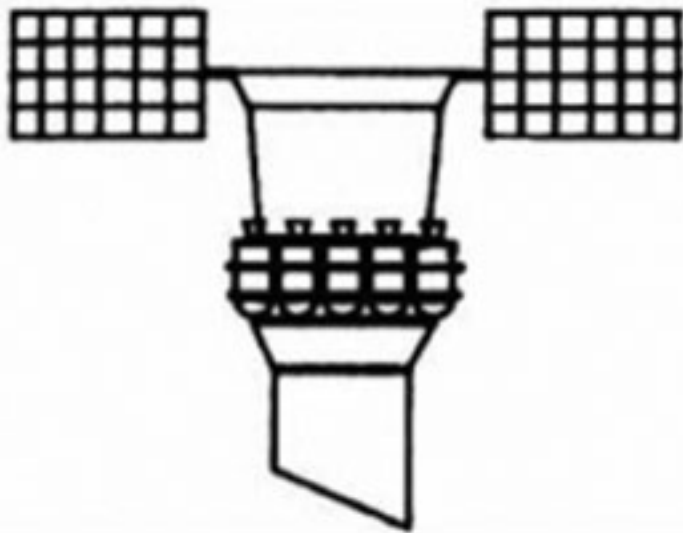


Illustration of the Don satellite

images at a higher resolution than that achieved by satellites of previous generations. The first of the series was launched on 26 August 1994 with a second launched on 25 September 2000.

Arkon

The first launch of the **Arkon** or **Araks** military reconnaissance satellites occurred on 6 June 1997. Built by **Lavochkin** and with a mass of app. 6000kg., the satellite was fitted with a reflecting telescope system with a focal length of 27m, providing a resolution of 2 to 5m, depending on the orbit altitude. The satellite's CCD sensor operated in 8 bands in the optical and near infrared region of the spectrum from 0.4-1.1 microns. The 30km swath width, combined with a capability of rolling at least 20 degrees, provided an observation path of 3000km in width. A second spacecraft was launched on 25 July 2002.



Russian Military Space Force patch

Persona

The first **Persona** military photo reconnaissance satellite was launched on 26 July 2008. Based on the Yantar spacecraft, this satellite was fitted with an imaging system derived from the Arkon satellite. This was the first USSR/Russian photo reconnaissance satellite launched into a sun-synchronous orbit and is expected to remain operational for seven years.

About the author

Jos Heyman is the Managing Director of Tiros Space Information, a Western Australian consultancy specializing in the dissemination of information on the scientific exploration and commercial application of space for use by educational as well as commercial organisations. An accountant by profession, Jos is the editor of the **TSI News Bulletin** and is also a regular contributor to the British Interplanetary Society's Spaceflight journal.





Ulf Sandberg has 25 years experience in the global satellite and telecommunications world. After completing his MSc in Physics at the Royal Institute of Technology in Stockholm, he served in the Swedish Armed Forces. From there Sandberg joined Notelsat, the operating company for Tele-X, one of the earliest Nordic Communication satellites. From there, he was with the Swedish Attaché for Science and Technology office, based in the USA. Leaving the Government sector, Mr. Sandberg worked for Swedish Telecom International and then Unisource, where he advanced to be Managing Director for the satellite business based in the Netherlands. As well as Versatel in the Netherlands, Mr. Sandberg was also involved in the start-up and creation of a number of companies and ventures in Europe and the USA.

In 1993 Sandberg became Managing Director, EMEA for ComStream, a San Diego-based satellite communications systems company, and was responsible for growing regional operations including the setting up of an office in Moscow, Russia. He was then with ACT Networks prior to starting Paradigm Communication Systems in 1996, where he has spent the past 16 years as Managing Director.

MilsatMagazine (MSM)

Mr. Sandberg, you have built Paradigm through an adherence to high standards of customer support, a reputation for engineering excellence as well as responsiveness to customer needs. Would you please tell our readers of the Company's history and how you came to found the company?

Ulf Sandberg

The philosophy behind **Paradigm**, then as well as now, is to add value to our customers. Paradigm is responsive to the many challenges that are placed in front of us. We assist customers in improving their existing products through the application of optimal solutions to their network and SATCOM communication needs. These solutions are based around functionality, performance, reliability and service and are the values at the heart of Paradigm's ethos and business model.

MSM

What are the primary solutions provided by Paradigm, and to whom are such services targeted?

Ulf Sandberg

There are three key areas to Paradigm's business—SATCOM Terminals, Earth stations and SATCOM Product Distribution. Terminals can be fixed or transportable and we typically have targeted a number of market verticals, such as Military/Government, Broadcasting, Network Operators, Oil & Gas and Service Providers. Our expertise in hub and remote systems allows us to better understand the complete system and to advise our clients accordingly. It's not surprising that some of the requirements are duplicated between sectors, particularly when you consider mobility and the nomadic side of deployable SATCOMs.

For example, government, first responder/disaster recovery, oil exploration, newsgathering and emergency network communications have many common key requirements. There are, however, many important differences between these sectors and it's vital to understand the fundamental distinctions between them.

To supply the best solutions we need to know how the solutions will be used and how they need to work, in addition to how the system/solution needs to be supported and delivered to really add value to these customer groups. With customers within the same user segment also doing things differently, it is important for Paradigm to customize and tailor solutions to provide viable solutions to address fit their requirements.

MSM

How will military sectors budget cuts impact global, as well as your Company's, business opportunities?

Ulf Sandberg

We see significant opportunities in Europe as well as globally for Paradigm. The marketplace is leaner and, to some extent, our ethos of delivering cost effective service is holding us in good stead as budgets are scrutinized. Scalability and flexibility are critical to our Government clients. With a significant portfolio of dual band, tri-band, and quad band terminals, we think we are ideally placed to provide migration paths from X- and Ku- now, to Ka-band in the future.

MSM

IBC 2012 has just concluded. What products and/or technologies did Paradigm bring to the show in Amsterdam? Were there any new product or project announcements?

Ulf Sandberg

We had gone into IBC2012 having just released announcements on our extensive work on the new state-of-the-art, multiband antenna farm which included a tailored network management and control system for **Sky News Arabia**. In addition, **Inmarsat** released an announcement the day before the show that named Paradigm as one of the *Launch Partners* for **Inmarsat GX Land Terminals**.

There was definitely a heavy Ka-band flavor to the show and having both hub and terminals to present lends itself to some interesting and open discussions with existing and potential customers. We also launched our LiteComm platform at the show. Initially developed to meet a specific government customer need,



This photo is of the SKY News Arabia satellite farm, for which the Company designed and installed the Network Management System (NMS) and a tailored control system.

COMMAND CENTER: ULF SANDBERG, PARADIGM (CONT.)



Paradigm's LiteComm unit

LiteComm is ideally suited to the broadcast sector as it provides the necessary common interface, it's easy to carry, and also discreet.

MSM

As SATCOMs push ever further forwards in deployed environments, more important than ever before is network management and client ease of use. How is Paradigm building products and solutions to ensure a seamless rollout of new technologies?

Ulf Sandberg

Our focus is on making a simpler operator interface that is independent of specialized skills—this means there is less need for training on the terminal itself. In recent years, deployed SATCOM has moved further forward in terms of its operational usage.

To assist unskilled and untrained users, we identified that a more logical and common interface to SATCOM terminals was required. We developed a terminal GUI called PRTM. This system enables the operator to easily deploy and stow the managed terminal. This guide also takes the operator through a process to unpack, setup, deploy, align, optimize, stow and pack away, as well as aid with logical fault identification.

The system was designed to contain the ability to have a pre-defined work order loaded into it, this incorporates a service transmission profile with the link budget defined specific's to really ease the process and reducing the chance of human error. It further enables use by non skilled users and simplifies training requirements.

Customer feedback has shown that PRTM also provides an additional capability for tactical terminals provided as an Urgent Operational Requirement (UOR). If the operator is familiar with the PRTM GUI, they require less operator training on a UOR terminal that comes with PRTM—it's already preconfigured with defined parameters. It is this focus on real added value at the heart of Paradigm's capabilities that enables users to focus on their real tasks, making operational projects simpler and providing our customers with complete solutions.

MSM

Paradigm and Inmarsat Global Xpress created quite a stir when you were announced as a GX Land Terminal Launch Partner earlier this year. Were you surprised? Or, was this a pleasant culmination to many months of inter-company work? How is the Paradigm work moving this project along?

Ulf Sandberg

We weren't surprised at the announcement, as with any large scale technology driven agreement there is significant work involved behind the scenes to bring elements together. Our GX Agreement was no exception. As an existing provider of L-band services to the Military and Government sectors, we were already used to working with Inmarsat—all the discussions went very smoothly.

Paradigm has extensive knowledge of the global VSAT arena and has implemented Ka-band systems from 60cm up to 4m, including site installation and testing. Alongside our relevant RF expertise, we are also a **Global iDirect Distributor** and **Preferred Solutions Partner**. Providing existing integration and support of iDirect allows us to seamlessly support the use of iDirect as the Core Module for Inmarsat Global Xpress moving forward.

MSM

Is the Paradigm technology different from that offered by the competition? If so, how? And why should the Paradigm product be considered over that of other solutions?



Photo of a Paradigm ruggedized unit

Ulf Sandberg

We like to add value and simplify the operator's usage of our systems. The technology used in the GX terminals is based around industry proven elements of RF, Satellite Routing and Reflector. However, the real value add by Paradigm is our approach to the complete system—Terminals, Documentation and Training all contribute together.

This value-add capability further enhances the high data rate and mobility orientated services that can be delivered over Inmarsat GX. We further operate Europe's largest SATCOM product warehouse and can add our experience in providing distribution to the mix.

MSM

As new technologies evolve and applications are acquired by mil/gov concerns across the globe, how do you think Paradigm is positioned to take advantage of these various markets?

Ulf Sandberg

We are ideally positioned as we are vendor independent, able to add value and customize our solutions to blend new and industry proven technologies with ease. Paradigm are very flexible and able to adapt solutions quite quickly to a high standard. We act as an unofficial beta test facility for many leading technology vendors. This allows us to get our hands on new technology and provide feedback to manufacturers, ensuring that we provide robust solutions to our customers.

The SATCOM industry is constantly evolving and being at the forefront of new technology rollout needs to be combined with the ability to deliver product to meet Military and Government operational requirements. This is where we are strongest as a company.

MSM

Can we expect to hear about new Paradigm technology efforts over the next few months?

Ulf Sandberg

Certainly. We've been working on hybrid solutions for L-band backup to our existing X-, Ku- and Ka- terminals. We love and thrive on change and there is plenty of that going on at this moment in this industry.

COMMAND CENTER: ULF SANDBERG, PARADIGM (CONT.)

MSM

What challenges do you believe confront the MILSATCOM industry over the near year or two, and how do you feel such should be addressed today in preparation for these events?

Ulf Sandberg

The next few years are going to be extremely interesting. With several new Ka-band satellites being launched, all with differing payloads and potentially different target applications, it's an uncertain time for the traditional MILSATCOM industry. At Paradigm, we are excited to see such challenges. Some people talk about there being a future glut of bandwidth with Ka-band, but we don't agree that such is happening. As these new satellites come online, end-users will devise new ways to use SATCOM and the attendant applications. Consider the impact UAV's have had on the military's use of commercial SATCOM.

MSM

Looking back over your career, are there any projects or products, in particular that bring a true sense of satisfaction to you?

Ulf Sandberg

As our whole company ethos is to add value to the customer, something that is easy for us to implement might be a game changer. Some of our work for our military customers in deployed environments has been particularly rewarding.

The Inmarsat effort from Paradigm—probably the complete system we delivered to Sky News Arabia for their state-of-the-art antenna farm truly showcased our capabilities. The project was delivered on time and on budget, with some game changing value adds introduced to the project during final rollout. From RF design and engineering, project management, logistics and shipping, through to bespoke software design, RF certification verification and testing, this was a successful test of Paradigm's integrated capabilities. The project in its entirety was shortlisted for the Innovation Award at IBC this year.



The rollout of Paradigm's 1.6m system

ESSENTIAL NATIONAL COMMUNICATIONS INFRASTRUCTURE NEEDED

By Brig. Gen. Tip Osterthaler, USAF (Ret), President & CEO, SES Government Solutions



In 2012, the DoD will spend approximately \$1 billion buying capacity on commercial communication satellites. That capacity will fulfill about 80 percent of the total satellite communication needs of the Department, the remainder being filled by government-owned satellites. This arrangement between the government and industry has evolved over time as the capacity needed to support a variety of bandwidth-hungry applications has exploded, and the capacity of government-owned systems has lagged. With the deployment of the government's *Wideband Global SATCOM* constellation, the Defense Department will take a bite out of commercial demand, but the continual fielding of ever more demanding sensors and applications is likely to result in the need for a huge amount of commercial capacity for as far as one can see into the future.

Today, the DoD buys an increasing amount of commercial capacity directly from satellite owner-operators and the balance from resellers. About half of the total bandwidth is bought for end-users by the Defense Information Systems Agency (DISA), and most of the remainder is purchased on a variety of single-award or multiple-award "indefinite delivery indefinite quantity" (IDIQ) contracts.

The benefit of these IDIQ contracts is to streamline the buying process by preselecting one or more vendors who can then bid on task orders as they arise during the period of performance. Over the past two years, the Department has doubled down on this buying strategy by creating a very large, three-part IDIQ vehicle called the Future Commercial Satellite Communications (COMSATCOM) Services Acquisition or FCSA contract.

Under the co-management of DISA and the General Services Administration (GSA) the vehicle is designed to create more competition and reduce prices while also remaining responsive to user needs. While there is not yet enough data to determine the extent to which government objectives will be met with FCSA, it's likely that cost savings will be achieved simply due to the fact that the government now buys bandwidth from the source rather than always having to go through resellers, a practice that was dictated by the old contract which FCSA replaced. Unfortunately for those who will continue to rely on commercial capacity for the foreseeable future, the story does not end here.

In order to see why, it's necessary to understand a little bit about the companies that provide commercial bandwidth—here are some facts:

—First, there are only a few firms that do this sort of thing—the so-called owner-operators. In fact, there are only two global satellite companies followed by two significant regional players, and together they provide the majority of the total capacity on orbit on their combined fleets of almost 150 satellites.

—Second, these companies are predominantly providers of capacity for commercial customers such as the big media companies, large network operators, and direct-to-home television consumers. In fact, the U.S. Government, while an important customer of all four companies, probably consumes only about 15 percent of their total combined capacity.

—Third, owning and operating satellites is a capital-intensive business, with the cost of a single satellite on orbit (including the

launch and the insurance) coming in at around \$300 million. These facts create an important dynamic in the relationship between the DoD and the industry: the government is heavily reliant on the owner-operators to support their communication needs, but the owner-operators are less dependent on the government, having to pay even closer attention to their commercial customers who represent most of their business. Now consider a few more facts about the industry.

Commercial satellites generally operate for about 15 years once they reach orbit, and the primary metric for measuring their business success is return on investment. Said another way, the commercial owner-operators are in a capital intensive, long-cycle business—what they themselves call an "infrastructure" business. They plan decades ahead and spend billions of dollars on fixed assets. Financially, satellite owner-operators have more in common with railroads or commercial airlines than they do with typical government service providers—the kinds of companies that typically do business with the government through IDIQ contracts. Why is this a problem?

Challenging Situations

Under an IDIQ contract, the government first creates a framework for doing business with one or more vendors by establishing a period of performance, a general description of the work to be done, a contract ceiling and contract terms and conditions. Once they have done that and signed one or more of these umbrella contracts, they define specific requirements in the form of a task orders.

When buying commercial satellite capacity, the government almost always contracts for one year while reserving the right to unilaterally extend a year at a time for some number of option years, typically three to five. That arrangement would seem to be fine in that it usually results in quick turnarounds of task orders, and there are sometimes cost benefits as well, particularly when more than one satellite can meet the requirements.

However, when one looks a little deeper into this process, there is an obvious problem: There is no incentive for commercial owner-operators to invest in the capacity **the government needs for the future. In other words, while IDIQ contracts such as FCSA appear to be providing some short-term benefits to the government, they are in fact also contributing to an**

escalating risk that future needs will not be met. In short, DoD is buying satellite capacity as if it were an easily scalable technical service, when what the Department is really buying is access to essential communications infrastructure. While we have not yet, as a nation, had to face the consequences of this practice, that time will come.

For the past decade, U.S. and Allied operating forces in Iraq and Afghanistan have consumed just about all the suitable commercial bandwidth available in the U.S. Central Command Area of Operations. Although it has been expensive and there is little available expansion capability in the region, most needs have been met by industry.

Fortunately for the government, during this time of great demand, the three largest owner-operators had many assets available with coverage of the Middle East, and to a somewhat lesser extent, Southwest Asia. However, earlier this year, the U.S. unveiled an updated national security strategy that envisions a more challenging Asia-Pacific security environment. The presence of the major operators in that part of the orbital arc is dramatically different than in the Middle East.

Although there are emerging commercial markets across Asia, access to spectrum for other than local operators is extremely limited; fill rates on existing satellites are very high; and regulatory barriers to entry are substantial across the entire region. In other words, it would be risky to assume that a crisis response in the Asia-Pacific could be supported by existing available commercial satellite capacity. While it's possible to relocate commercial satellites to new locations, in the Asia-Pacific region, most of the space real estate is in the hands of local governments and companies. Orbital locations may or may not be available for use by commercial companies that support the DoD, and it will take years to address that issue.

Meeting Critical Needs

This takes us back to the key question of how both the short-term and long-term satellite communication needs of the DoD can best be met, and at an acceptable level of cost and risk. While IDIQ contracts certainly have a place in the overall acquisition architecture, we also need to understand their limitations: they will only work when there are alternative solutions on multiple satellites and more capacity than demand. Given the heavy reliance of our operating forces on commercial capacity to carry out their missions, are we willing to bet the farm on IDIQ contracts, gambling that there will always be excess capacity in the right place and suitable for the task?

Commercial owner-operators have been arguing for years that they need better visibility into the U.S. Government's future needs as well as long-term commitments from them in order to justify investments on their behalf. It has been a somewhat sterile conversation because (1) the government has insisted that they cannot make commitments so far in advance, and (2) the companies have in fact made substantial investments even in the absence of such commitments.

Unfortunately, industry has not seen the promised results for the tens of millions of dollars they have spent on things such as DoD-specific security features they have been encouraged to build into their spacecraft, and that makes it increasingly unlikely

they will invest in USG-specific capabilities in the future. As to the Government's reluctance to collaborate with industry and make longer-term commitments, the time has come to be creative.

Large commercial customers who know they depend upon satellite capacity to deliver their products to market and support their essential operations routinely open their books and collaboratively plan with their infrastructure providers—and both sides benefit from this process.

The resulting arrangements often include things like long-term leases for a portion of a satellite payload, providing for assured access and the lowest possible prices. In some cases, commercial customers might even lease an entire satellite on a turn-key basis for most of the life of the asset. Even more important, these engagements lead to a better understanding of the customers' long-term needs and help owner-operators justify the effort and expense associated with the development of both orbital locations and spacecraft.

Truly Essential

Commercial satellite capacity is an essential part of the national communications infrastructure and it is unnecessarily expensive as well as risky for the DoD to continue the current buying practices. While most in industry will happily continue to sell excess bandwidth at premium prices to the government, they are also willing to engage in mutually beneficial negotiations aimed to ensure their infrastructure investments take into account future likely USG needs. FCSA is better for the Government than what preceded it, but it is not the entire answer.

There have been some preliminary efforts by the DoD to come to grips with this dilemma, such as the Assured SATCOM Services in a Single Theater (ASSIST) initiative by DISA last year. While the idea did not survive the budgeting process the first time around, and while it did not adequately engage industry or Congress in its earliest stages, it represented an important expansion in the way the Government thinks about commercial satellite capacity.

As we face continuing budget pressures, and as we become ever more reliant on space-based communications, the time is right to completely rethink how the government and this unique industry segment conduct business.

Forward-thinking individuals in the Department of Defense are doing just that, and their efforts need to be encouraged and supported by the satellite industry, the end-users of commercial capacity, and the Congress.

About the author

Mr. Robert Tipton (Tip) Osterthaler joined SES in 2006 when he became the President and CEO of AMERICOM Government Services. Since then, the wholly-owned subsidiary of SES SA has grown and integrated with other government focused elements within SES to become SES Government Solutions (SES-GS). During his tenure at SES, the U.S. Government business has been transformed from a product oriented sales channel into a solutions-focused independent subsidiary responsible for all aspects of SES's US Government business, including planning for the next generation of satellites that will be needed by government users.

MISSION CRITICAL COMMS IN AFGHANISTAN

By Bob Gough, Senior Contributing Editor

When Australian satellite communications support U.S. military operations in the Middle East, a number of factors play a vital role in the delivery of mission critical communications. South Australia provide some of the best satellite communications in the world, as low rainfall and mild temperatures make it the perfect destination to accommodate teleports.





Climate, however, is not the only factor that is making South Australia an ideal place to house teleports. Similar to the rest of Australia, South Australia is geologically stable with no major earthquakes. Its remoteness ensures minimal frequency interference, just as its geographical location enables it to achieve optimal look-angles into the Middle East and Africa, thereby enabling better coverage.

South Australia houses highly secure and government accredited teleports, which means Australia is able to meet the stringent security requirements needed to support the transmission of vital and sensitive information for government clients around the world.

As *Mike Kenneally*, Vice President of Satellite Strategy for **NewSat** explained, "One of NewSat's two world acclaimed teleports is located in Adelaide because of South Australia's location. Its remoteness means that our teleport can receive signals from a large range of satellites."

The ability to receive signals from various satellites is particularly important to the delivery of satellite services to defence personnel. Often situated in remote places with no terrestrial infrastructure, the military's preferred means of communication is via satellite.

Texas-based **Proactive Communications** provides secure satellite services to the U.S. **Department of Defence** through a partnership with NewSat, and the company is quite aware of the benefits of using Australian satellite communications.

"Australia is safe, reliable and trusted and shares common regional foreign policy objectives with the USA. Australia also has the right space infrastructure, with a range of satellites that can be seen from South Australia," said Mr. *LeGare*.

Since 2004, Proactive Communications has supported U.S. Army operations in the Middle East—its operations rely heavily on satellite communications, whether it is for warfighter welfare and recreation, telephone, or for unclassified research.



Seventy-five to 80 percent of the U.S. Department of Defence satellite consumption is supported by the commercial satellite communications arena. According to Mr. *LeGare*, one of the great positives about satellite telecommunications is that, in some cases, the visible signs of the antenna system cannot be differentiated from those of other commercial customers.

Mr. *LeGare* explained that Proactive Communications had to weigh its options carefully when selecting a teleport that would meet its customer's growing requirements. LeGare's company could have gone East, to Europe, and be one of many teleport clients, almost undifferentiated from its competition—or it could look to the West.

Proactive Communications selected to go to the West and settled on South Australia. From South Australia it was possible to "see" from the Pacific rim of the United States all the way to Africa and Eastern Europe. By choosing Australia, Proactive Communications found a geographically optimal location as well as a politically stable ally.

MISSION CRITICAL COMMS IN AFGHANISTAN (CONT.)



NewSat's teleport in Adelaide, Australia

At U.S. Foreign Operating Base (FOB) locations, reliance on communication technologies is crucial, as soldiers, emergency staff, medical technicians, firemen, electricians, construction builders and other resource providers need to communicate to camp commanders and beyond. As they all use a variety of communications systems, Proactive Communications worked toward providing a system that could seamlessly tie together all of the services in order for communications to run smoothly between camps and support headquarters.

Mr. LeGare stressed the importance of satellites for the integration of camp communications. The process involves turning data, usually in the form of radio signals, into IP data streams via Internet Protocol addresses, which are then backhauled over the satellite to a teleport, such as NewSat's facility in Adelaide, and then back to another base or to the home country. "Where there are soldiers, there will always be a need for satellite communications", Mr. LeGare said.

He also praised the Australian satellite communications industry, which, he said, is distinguishing itself on the global stage as more and more companies and governments around the world discover the many advantages of using Australian teleports. As demand for satellite communications across emerging markets is expected to increase, satellite companies such as NewSat are in a favourable position to continue growth by supplying needed services.



Military operations are also going to benefit greatly from the "new" high-powered capacity satellites which offer Ka-band delivery. "We require capacity over high demand regions across the Middle East and need the best quality communications for our operations. NewSat's satellite **Jabiru-1**, will address this need, and its flexible payloads and range of beams options are ideal for military operations", said Mr. LeGare.

There is an ever increasing demand for high quality bandwidth via satellite in the military, now and in the future. Mr. LeGare predicts that every soldier will be linked into a communication network of fellow soldiers and political allies. Such will enable overseas missions to run far more smoothly and efficiently.

"The U.S. soldier of 2016 is going to have to rely on data fusion, knowledge management, dynamic targeting and persistent *Intelligence, Surveillance and Reconnaissance (ISR)*. All this data is communicated via satellite. This makes for a growing, competitive market. However, for a team such as NewSat's, they can put together an entire delivery chain, from the teleport to the satellite, to taking care of the customer out in the field. This is, indeed, an exciting time", said Mr. LeGare.

Satellite communications is a growing global market with many opportunities and niches, due to the ever-increasing demand for high quality bandwidth communications via satellite across a wide variety of industries, especially the military. Global demand for Australian satellite communications has increased. As Australian teleports are becoming increasingly popular, there is no doubt that places like South Australia have something unique to offer.

It is not surprising that Australia provides some of the best satellite communications in the world. In fact, Australia's many key advantages have cemented into place the Australian satellite industry's status as a leading satellite communications provider.



Marc LeGare, Proactive Communications CEO, at NewSat's Military Accredited Teleport in South Australia.



HOW SIGNIFICANT IS THE RÉSUMÉ/CV?

By Bert Sadtler, President, Boxwood Executive Search + Contributing Editor

These are extremely challenging times for employers who need to acquire top level talent as well as for those seeking a career change. Today, companies' economics compel them to re-assess their talent needs in order to remain competitive and drive growth. The satellite communications industry is ripe with new opportunities. Employers are challenged with making a "great hire." For the candidate, finding an opportunity can sometimes be a rather difficult proposition.



To assist with career searches, we asked Bert Sadtler of Boxwood Executive Search to respond to readers' questions regarding the processes of recruitment and hiring as well as how Companies can retain crucially-needed talent. Boxwood is located in the Washington, DC, region and has success in senior level recruitment in satellite communications, government contracting, and within the intelligence community. Boxwood also provides a consulting solution for the analysis and improvement of the employer's current recruitment process. If you would care to submit a recruitment, hiring, or retention question for Bert to answer, please email your question to BertSadtler@BoxwoodSearch.com.



The résumé or CV (Curriculum Vitae) has been the focal point for interviewing within industry. *Does it provide the employer with insight into a great candidate?* The focus may be changing. The résumé carries less and less weight. It may eventually become a thing of the past. I say "the sooner the better."

In uncertain times, hiring the correct talent becomes even more critical. To do it well, is the résumé able to determine the right talent? Many recruitments start with the candidate's résumé as it has been commonly regarded as the standard document used to establish qualifications.

A very good résumé fosters dialogue. However, even a great résumé alone will not get you hired. Hiring managers are not going to extend an offer after just reading a résumé.

While the résumé lists the candidate's technical experience and accomplishments, it provides no insight into chemistry and cultural fit. Successful recruitments are the result of hiring the candidate who meets a combination of: the minimal technical requirements *AND* the best cultural fit. The hiring manager and hiring jury need to spend significant time with the candidate in order to determine the cultural fit or chemistry.

The résumé is playing a relatively small part in the total recruitment of critical talent. On a good day, it is a "ticket to the party", leading to a phone screen/in-person meeting, or a similar next step.

Specific aspects of concern by industry of a résumé include:

- A "business community" of professional résumé writers exists. This leaves the employer unsure if the candidate actually wrote their own résumé.
- Candidates practice traditional interview questions, which originate from résumé content. Change the emphasis on the résumé and you also change the rehearsed answers which gives the interviewer the ability to really get to know the candidate.
- Internet search engines have come on-line, which seek résumés that contain desired words or phrases. The candidate who can embed the most desirable word track will have their résumé land on top of the pile. Unfortunately, using desirable résumé words doesn't directly correlate to being a highly qualified candidate.
- A résumé by design only provides historic candidate information. Finding the right talent is less about where the candidate has been and more about where the candidate is and where the candidate is going. Good recruiting is finding out "what is going-on in the cockpit", not "where the plane has been flying".

Many résumés contain subjective information that provides little value. Below are examples from a résumé just sent to me. Do any of these provide factual qualifications?

- Strong planning skills
- Exceptional communication skills

- Problem solver
- Ability to increase organizational efficiency

Sophisticated employers are moving toward conversations and discussions with candidates. You want to earn the candidate's trust and have them relax. If successfully accomplished, the true candidate will reveal him or herself.

About Boxwood Search

There is an ongoing battle for senior level talent. A great hire can make a long term positive impact and a failed hire can prove to be very expensive. How does a company recruit and hire the right talent? It is more than just networking within the community of friends and business associates. It requires focusing on results through a process oriented approach. Boxwood Search is committed to reaching a successful outcome with recruitment methods that have repeatedly proven to deliver very qualified senior talent. The firm exclusively represents employers in the marketplace as a dedicated resource and discrete trusted advisor. Through original research and industry contacts, qualified candidates are targeted and then motivated to consider the opportunity.

Candidates are screened against key criteria, technical fit and cultural fit analyzed, interviews conducted, references contacted and hiring recommendations then presented. Upon making the offer, Boxwood Search is the employer's advocate and an active participant in communicating with the candidate until offer acceptance has been secured. Results are guaranteed.



