SatCom For Net-Centric Warfare December 2011

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2011 YEAR IN REVIEW

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"…departments and agencies shall work jointly to acquire space launch services and hosted payload arrangements that are reliable, responsive to United States Government needs, and cost-effective."

NATIONAL SPACE POLICY
June 28, 2010

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FEATURES

Command Center" Gen. Craig P. Weston

Craig Weston is President and Chief Executive Officer of U.S. Space, LLC, a U.S.-owned provider of dedicated, commercial space solutions to serve the interests of the nation and its coalition partners and commercial enterprises worldwide...**P20**

Tackling Satellite Interference

Satellite interference is a huge problem in this industry and affects a whole plethora of different users across various sectors of this extremely diversified business. The military is no exception and is the one area where fixing the problem of satellite interference is the most crucial, as it can, and often does, jeopardize vital operations... **P26**

by Martin Coleman, Executive Director, sIRG

Why Is Training Critical To The Satellite User Community?

To put Martin Coleman's article into context, consider the following hypothetical, but realistic, scenarios:

A mission commander plans to deploy a UAV over a certain zone. The mission must be canceled because available bandwidth in that zone is contaminated with interference.... **P30**

by David Hartshorn, GVF, and Ralph Brooker, SatProf

Secret Spy Ops

According to recent declassified documents, President Reagan commended GE employees for their work on a secret spy satellite. In September of 2011, the world at large learned that some 250 GE engineers and manufacturing workers were honored by a U.S. president. That president was Ronald Reagan and his presidential commendation took place 27 years ago, in August of 1984... **P34**

A Far Reaching Voice

"In this century, I have bounced sensitive whispers off the moon, and guided manmade moons in orbit around our Earth . For the first time ever, I have cupped my ears and listened to satellites."... **P36**

by Melissa Ziobro, Fort Monmouth Historical Office

A Versatlie Arena For Commercial MILSATCOM

For decades governments have relied on the commercial satellite industry to provide critical communications services from disaster relief, to humanitarian assistance and combat operations. Today more than 75 percent, and at times as much as 93 percent... P42

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YEAR IN REVIEW

Advantech Wireless

Unrivalled Product Selection

Solid State Power Amplifiers, Transceivers & BUCs

2W Ka-Band

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C-Band				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
X-Band		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Ku-Band			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Ka-Band	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓															

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"Smart" Move For U.S. Army

As the Army looks for innovative solutions to slim its financial waistline, a new facility for the advanced version of its protected satellite terminal has consolidated production, training and fielding in one location in an effort to save millions of dollars.

"The training facility is co-located with the production facility to reduce our logistical footprint, overhead and reliability risk," said Larry Raville, project lead for the Secure, Mobile, Anti-Jam, Reliable, Tactical-Terminal, known as SMART-T. "No longer does a team have to travel all over the world to field, ship and train these systems. It's all done in one location."

The first class of students, consisting of Soldiers from the 101st Airborne Division (Air Assault), attended the Advanced Extremely High Frequency, or AEHF, SMART-T New Equipment Training, or NET, at the new facility in Largo, November 7-18. The facility's grand opening ribbon cutting ceremony was held on November 9, with the students from the 101st, members of the SMART-T team, and contractor leadership in attendance.

This is the first time in the Army's history that a weapon system has had a NET/fielding facility embedded with a production plant, Raville said. The AEHF SMART-T facility is expected to yield more than $9 million in cost avoidance and cost savings by reducing the logistical footprint of training, fielding and upgrading the terminals.

Product Manager Satellite Communications, or PdM SATCOM, which manages SMART-T, also expects to see an increase in the terminals' reliability rate, since all of the logistics are centrally located and issues can be more easily addressed," Raville said.

"Prior to the opening of this facility, if a failure occurred during training, we could be 900 miles away and it would take three or four days to get an asset out there, entailing huge shipping costs along with the loss of time," said Mel Pointer, SMART-T Integrated Logistics Support manager. "Now we just have to walk across the street."

SMART-T makes it possible for Soldiers to extend the range of their network in such a manner that communications cannot be jammed, detected, or intercepted. Soldiers can send text, data, voice and video communications beyond their area of operations without worrying that the information will fall into the hands of enemy forces.

Used at the brigade echelon and above, this satellite terminal mounts on High Mobility Multipurpose Wheeled Vehicles, or Humvees, and provides robust worldwide communications.

"SMART-T provides a means of [protected satellite] communications that isn't available through other terminals," said Sgt. David Carpenter, with the 101st, who was part of the first class at the new facility. "It may not be used quite as often, but when it is needed, no other terminal can do what it does. No other capability can replicate it."

SMART-T enables the Soldier to extend communications in harsh environments without the risk of enemy interception or detection, increasing the safety of Soldiers on the battlefield. It provides tactical protected SATCOM for the close fight. When removed from the Humvee it is capable of standalone operation and can be airlifted via helicopter so it can get to a particular point on the battlefield in a hurry, establishing and maintaining a link quickly and reliably.

"Any time a commander needs protected, secure throughput for worldwide communications for current operations, this is his only capability," Raville said.

The biggest difference between the legacy and the new AEHF satellite terminal upgrade is a fourfold increase in capacity and improved security features. AEHF terminals will increase satellite throughput with the extended data rate payload.

"Because SMART-T is protected, the systems have a lower bandwidth capability, but the upgrade gives us a higher bandwidth throughput by fourfold," said LTC Gregory Coile, PdM for SATCOM, which is assigned to Project Manager Warfighter Information Network-Tactical, or PM WIN-T. "The advanced system also provides greater overall satellite access."

Approximately 240 of the legacy systems have been fielded to date, plus an additional 60 AEHF SMART-Ts. Currently 39 new AEHF SMART-T terminals are in production and the remaining legacy systems will all be upgraded with the AEHF capability. By 2018 the total force is expected to have 411 of the AEHF SMART-Ts, with users including the Navy, Air Force, National Guard, Homeland Security, Missile Defense Authority, international partners and other special users.

While the Air Force is responsible for developing and maintaining military satellites, the Army develops, procures and fields the Earth terminals such as the SMART-Ts. The two work closely together to ensure system interoperability. The Air Force is in the process of changing from the military's legacy satellite constellation to the new AEHF satellite constellation, and it uses the Army's version of the AEHF terminals for satellite testing, Coile said.

"The best benefits [of the new AEHF SMART-T] are the data rate, the bandwidth, being able to push more data and get more users on it, and its reliability," said Sgt. Jesse Murphy of the 101st, who was part of the first training class at the facility and has worked with legacy SMART-Ts for four years. "It will be invaluable."

Along with the NET, the facility will also offer delta training, which provides experienced legacy SMART-T operators such as Murphy training on the AEHF version of the terminals. One of the biggest values of the facility is that roughly 75 percent of the training is hands-on, with only a minimum of classroom time involved, leaving the Soldier well-prepared upon deployment," Pointer said.

After Soldiers complete their training, the unit actually signs for the same equipment that they have trained on, and that equipment is then shipped to their new location. Prior to the opening of the facility, the SMART-T team would have to fly out to the unit several times to get them set up with the equipment, help with training and then inventory and sign over the equipment. The new facility allows the team to take care of everything in one spot.

The SMART-T NET/Fielding facility will also be a portal for data exchange and will be linked to Tobyhanna Army Depot in Pennsylvania, which will input valuable reset information into the facility's database. The intent is to have a database that follows each SMART-T through all phases of its life cycle, from produc-

tion to fielding, to upgrades to reset, with all of the data filed at a single source. This information is expected to save time, provide cost avoidance in maintenance and increase system reliability," Pointer said.

SMART-T is part of the WIN-T architecture and is compatible with both WIN-T Increments 1 and 2 and their corresponding equipment. Similar to a home Internet connection, WIN-T Increment 1, the Army's current tactical network backbone, provides high-speed, high-capacity voice, data and video communications to units on the battlefield, at-the-halt or at-the-quick-halt. WIN-T Increment 2 will provide this network to military formations while on the move. In the spring of 2012 WIN-T Increment 2 will undergo its Initial Operational Test and Evaluation, or IOT&E, at White Sands Missile Range, New Mexico, and SMART-T will have a supporting role in that event.

PM WIN-T is assigned to Program Executive Office Command, Control, Communications-Tactical, or PEO C3T.

"The AEHF SMART-T is a new capability within the WIN-T construct and a chance to marry our capability in line with the ARFORGEN [Army Force Generation] cycle requirements," Pointer said. "When a unit rotates out of the box, that whole unit gets reset, and we are making sure that when they move back onto the ready line, we have conformed to all of their requirements. Here we have our own resources to get that done. You just can't beat the value of that."

Story by Amy Walker, who is a staff writer for Symbolic Systems, Inc., which supports the Army's Program Executive Office Command, Control and Communications-Tactical (PEO C3T).

Blocked Signal Bustout

On November 3rd , the Arizona Vigilant Guard exercise involved approximately 250 government agencies and 8,000 participants responding to simulated flooding and an improvised nuclear device detonation in the Phoenix metropolitan area.

In response, NORTHCOM 302 Airlift Wing, Communications Flight deployed their trailer based Joint Incident Site Communications Capability (JISCC) Teams. These teams were tasked with providing satellite based reachback communications. However, the concrete and rebar building construction blocked signal transmission to the Joint Operations Center (JOC). Deployment of their recently delivered SATPAK cellular and satellite data relay system, manufactured by 308 SYSTEMS solved this urgent need.

The JISCC Teams then relied upon the briefcase sized SATPAK to provide a high-bandwidth wireless pipe from the JISCC satellite location into the JOC, along with a 21Gbps cellular data backup connection. This ultra-agile system improved the efficiency of critical Vigilant Guard Internet connections and CONUS data networks during the exercise.

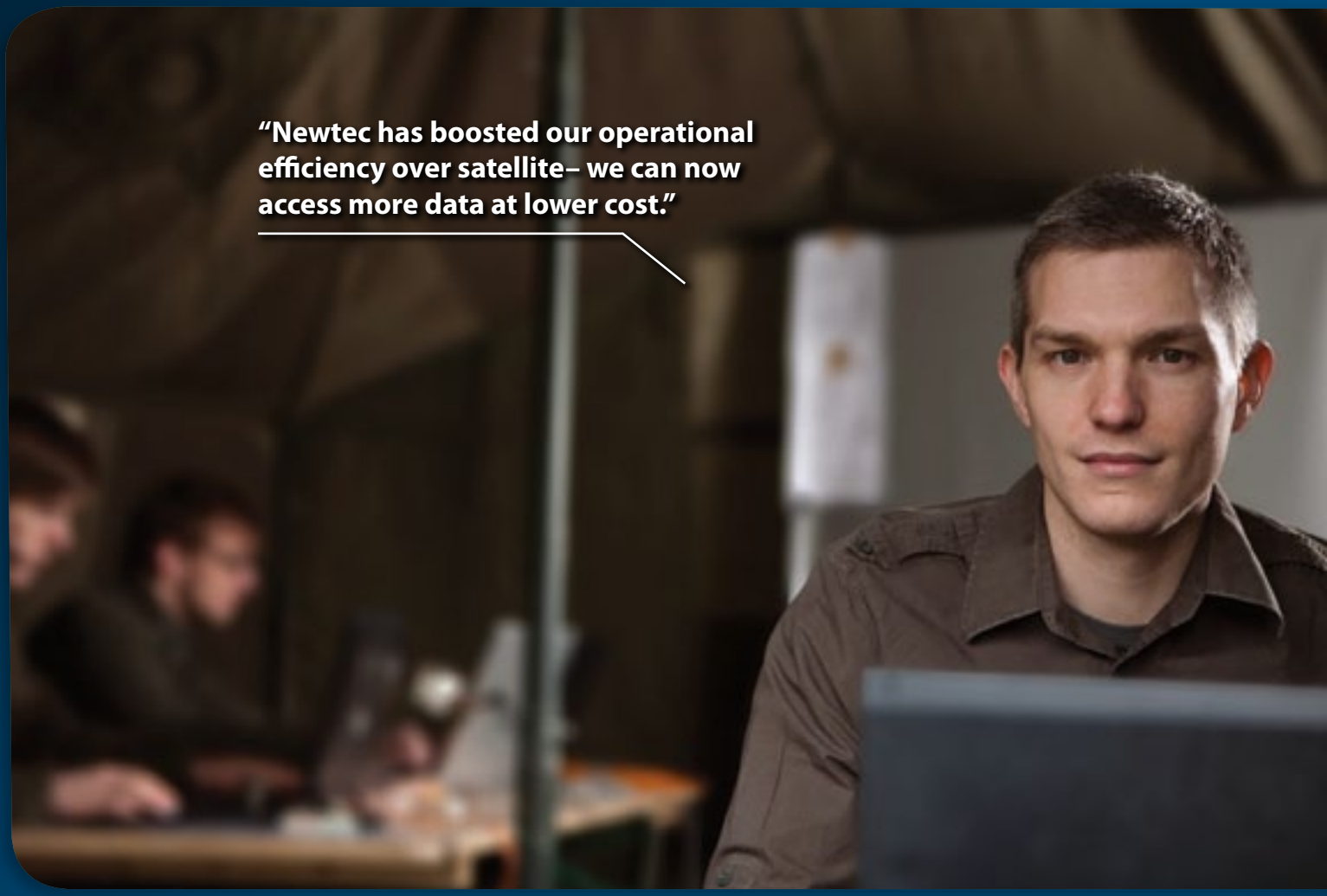
The Vigilant Guard exercise, sponsored by the Arizona Department of Emergency and Military Affairs, is designed to ensure effective coordination between local, state, private sector, non-governmental organizations and federal partners. The JOC was established inside a building at the Papago Park Military Reservation, and could not receive satellite signals directly inside the facility due to the concrete and rebar facility construction.

To relay the JISCC satellite signal into the non-Line-Of-Sight (nLOS) JOC location, NORTHCOM deployed their SATPAK Ultra-Agile satellite and cellular data relay system. In addition to the local JISCC-to-JOC data pipe, the innovative SATPAK was capable of projecting Internet data connections with deployed teams up to three miles from the JISCC trailer, thereby increasing the efficiency and effectiveness of deployed troop assets.

USSTRATCOM Symposium

The 2011 U.S. Strategic Command Cyber and Space Symposium kicked off, November 15, at the CenturyLink Center in downtown Omaha with discussions highlighting the evolving nature of cyber and space capabilities and the rippling effects of their technological advancement through military, industrial and domestic applications.

More than 1,500 senior military leaders, service members, Department of Defense personnel, industry insiders, academic authorities, sponsors and international partners from 13 nations were in attendance as various expert panels and keynote speakers offered a varied and comprehensive information exchange on emerging



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Gen. C. Robert Kehler, commander, U.S. Strategic Command, and Gen. Keith Alexander, commander, U.S. Cyber Command, share a lighter moment after Alexander's speech on cyber related issues during the 2011 USSTRATCOM Cyber and Space Symposium held November 14-17 at the CenturyLink Center in downtown Omaha. (US Air Force Photo by Daniel J. Rohan, Jr.)

concepts in cyber and space. Gen. C. Robert Kehler, commander, USSTRATCOM, said the accessibility and progression in cyber and space realms have led to a new age of unique prospects and concerns as his opening remarks centered on the symposium's theme of "New Challenges, New Opportunities."

"Space and cyber capabilities provide the U.S., our allies, and our partners with unprecedented advantages in national decision-making and military operations, in homeland security, in economic strength, and in scientific discovery. Friend and foe alike are tapping into those benefits, sometimes maliciously, at times driven by profit-seeking motives to their own advantages," Kehler said. "The potential battle space has expanded to encompass areas and domains that previously didn't figure in our calculations. It wasn't too long ago that operationally we, in the U.S. military, believed that space was something of a sanctuary for our operations. That is certainly not true today."

He later added, "Recognizing U.S. conventional dominance, adversaries are seeking ways to negate key elements of U.S. power asymmetrically in all domains, and surprise remains an attractive objective, especially where surprise can be strategically decisive in areas like cyberspace and space."

The general noted how the last decade has seen significant technological changes in both cyber and space landscapes. General Kehler spoke on how computing power has increased, comparably offering super computer-like capability to the average user, and how space is no longer limited to world powers.

"What used to be reserved for only the most technically advanced nations is now available to the general public, like one-meter satellite imaging of our neighborhood or of distant travel destinations. And that's now a reality just a couple of clicks away from where you happen to sit today," he said.

Kehler further explained how cyber and space principles coincide with one another, citing similarities in the National Space Policy and the National Cyber Policy. Both documents outline beneficial advantages; mutual interest for acting responsibly in cyber and space domains; facilitating, strengthening and empowering coalitions and partnerships with allies; and how cyber and space initiatives can improve partnerships in science and technology, and education and professional development.

Brazilian Army Lt. Gen. Jose Carlos, chief, Cyber Defense Center of the Army.

Gen. Keith Alexander, commander, U.S. Cyber Command, also offered his perspective on cyber issues as one of the keynote speakers for the event. "Cyberspace is ubiquitous, most nation states are creating capabilities and when you look at it, we've got to have our doctrine, our tactics, our techniques and procedures out there. We've got to understand that we've got to be prepared to defend our nation in cyberspace," Alexander said. "Our adversaries are going to use asymmetric capabilities against us, look at 9/11. Cyber is one of those asymmetric capabilities. We should not be surprised if someone uses it against us."

Alexander highlighted the vast number of Internet users, the proliferation of malware through online applications and web pages, the theft of intellectual property in the cyber realm, and the vital need for trained and ready cyber forces to counter growing cyber threats.

The general further explained statistically how online environments have volumes of exploitative vulnerabilities citing, "AT&T mobile data rates have increased 8,000 percent over the last four years. [There are] over two billion Internet users today. Last year there were 107 trillion emails sent — that's 294 million a day. Of that, 89 percent was spam."

Other conference speakers included Madelyn Creedon, Assistant Secretary of Defense for Global Strategic Affairs; Lt. Gen. Michael Basla, vice

commander, Air Force Space Command; Christopher Painter, Coordinator for Cyber Issues, Department of State; David Thompson, Chairman and Chief Executive Officer, Orbital Sciences Corporation; Frank Rose, Deputy Assistant Secretary for Space and Defense Policy; Adm. James Winnefeld, Vice Chairman of the Joint Chiefs of Staff; and the Honorable Howard Schmidt, White House Cybersecurity Coordinator.

Various panels also covered a wide range of topics including managing risks associated with internet-based networking, the future of cyber and space, international cooperation, diplomacy to strengthen stability in space, as well as other cyber and space related subjects of interest. The International Cyber Collaboration panel consisted of military officers from Brazil, Canada, France and Estonia who discussed their views of cyber-related issues. This year marks the first time the event merged cyber and space themes under one banner as discussions drew parallels to their mutual significance and application. USSTRATCOM sponsored symposiums are noted for creating an open forum environment encouraging further discussion and networking among guests.

A Mod For TDRS

Boeing has received a $289 million contract modification from NASA, exercising an option to add Tracking and Data Relay Satellite (TDRS) M to the existing TDRS fleet.

Three Boeing-built TDRS satellites are currently providing critical services to NASA, and two more are on schedule for delivery to the customer with launches planned in 2012 and 2013. The TDRS satellites incorporate a modern design based on flight-proven performance. The steerable, single-access antennas can simultaneously transmit and receive at S-band and either Ku- or Ka-band, supporting dual independent, two-way communication. The 15-foot diameter antennas are designed with flexible membrane reflectors that stow for launch before springing back into their original parabolic shape on orbit.

Boeing was awarded a contract for the TDRS K series in December 2007. The initial award included TDRS K and L, with an option for TDRS M.

Artistic rendition of the TDRS satellite. Image—Boeing

The company previously built the three satellites in the TDRS H, I, and J series for NASA's Goddard Space Flight Center. Boeing continues in its role supporting NASA's key programs over a period that spans more than four decades.

Boeing has teamed with General Dynamics to modify the existing TDRS system ground terminals to be compatible with the TDRS K, L and M satellites. The ground terminals, located at the White Sands Complex in New Mexico, are the primary two-way communications link between the TDRS satellites and the ground-based elements of the TDRS system communications network.

Comms Maintained @ Basrah

Ensuring that communications are maintained for troops on the ground is crucial to mission success. At Contingency Operating Base Basrah, Iraq, the soldiers of 2nd Platoon, Bravo Company, 3rd Brigade Special Troops Battalion, 3rd Advise and Assist Brigade, 1st Cavalry Division have remained vigilant in their work to ensure communications are fully functional at all times as forces drawdown.

Hard work and preparation have made mitigating outages easier for the platoon and they increase their capabilities daily. Teamwork is also an essential part of the platoon's effort as well.

In preparation of the transition from military to U.S. Department of State operations, the platoon worked closely with the brigade's communication shop (S-6) and the consulate transition team, located in Basrah, to ensure a smooth transition. As units redeploy, the platoon will fill the gaps left on COB Basrah and expand services to the remaining units as required.

Spc. Michael Cline, Company B, 3rd Brigade Special Troops Battalion, 3rd Advise and Assist Brigade, 1st Cavalry Division conducts routine maintenance checks on the satellite transportable terminal to ensure the equipment is functioning properly Oct. 24, 2011 on Contingency Operating Base Basrah, Iraq. (Photo by: 2nd Lt. Grace Geiger, 3rd BSTB, 3rd AAB, 1st Cavalry Division)

In addition to maintaining a Joint Network Node and a Satellite Transportable Terminal, Company B is responsible for several point-to-point communication lines and fiber links throughout the province. Several soldiers have completed missions taking them outside the base's perimeter wire and into the city of Basrah to troubleshoot systems at remote sites.

Several additional missions have been added to the duties of the platoon, such as the command and control vehicle system which provides commanders the capability to have all communications available inside a mine resistant ambush protected vehicle while it is moving. This allows for more efficient command and control on the battlefield which is important as the use of hardened structure makes way to more expeditionary and mobile platforms during movement out of the country.

The platoon also provides morale support as several soldiers have been tasked with the mission of ensuring the Armed Forces Network is up and running at locations around COB Basrah. This allows all soldiers and civilians the ability to watch television as well as listen to the radio.

Even as the mission is winding down, the soldiers of 2nd Platoon continue to maintain their most basic soldier skills, all while making sure their main focus is on the network and providing the best services possible for redeploying units.

Perfect Payload PDR

Imagery for military commanders will be timely and of high resolution…

Harris Corporation has successfully completed a two-day Preliminary Design Review for a synthetic aperture radar satellite payload that will provide military commanders in the field with timely, high-resolution radar imagery of the Earth's surface — regardless of weather conditions or time of day. The review is a key milestone that confirms the Harris design approach is consistent with the customer's technical requirements, allowing the payload team to transition into the detailed design phase of the program.

Harris was awarded a 30-month contract in December 2010 by Sierra Nevada Corporation to design, build and integrate the synthetic aperture radar (SAR) satellite payload for the Modular Space Vehicle. The contract is part of NASA's Rapid Response Space Works and Modular Space Vehicles program for the U.S. Department of Defense's Operationally Responsive Space (ORS) Office — a joint NASA/DoD initiative chartered to field modular payloads rapidly and inexpensively. The Harris payload architecture supports a new family of modular military satellites, offering flexibility to support multiple missions with minimal changes in the basic design. The SAR payload will produce high-resolution radar imagery of the Earth's surface, even during darkness or inclement weather.

"The Harris team has successfully architected a flexible, modular RF payload that can support the ORS program office through a variety of RF missions and provide the Joint Force

Commanders with the assets required to execute their missions," said Bill Gattle, vice president, Harris Space Communications Systems. "The ORS SARSAT configuration serves as the baseline for our reconfigurable payload, which reflects decades of Harris experience in antenna and electronics solutions for multiple space missions."

Kudos For Iraqi Op

In addition to providing satellite Internet services to residential and business clients all across Europe, Bentley Walker also provides vital services to many operations across the Middle East. One of our Iraqi based clients recently shared their experience with us.

"*Thanks to your system and your support we have been successful*." — Northrop Grumman.

Douglas T works for Northrop Grumman who provide field engineering and services to the US Military based in Iraq. They are the fourth-largest defence contractor in the world and provide a range of services to the military including the construction of aircraft carriers, missile defence systems and IT services.

Their first task in Iraq was to set up operations in the Al Faw Palace in Baghdad. Getting online is essential to their operations however there was no infrastructure in place in Baghdad at the time. They ordered a Bentley Walker satellite Internet and installed it on the Al Faw Palace roof.

"We relied on your Internet service to keep our systems running. Parts were ordered, software patches down-loaded, and critical information was passed to keep a family of high-tech, complex systems running." — Douglas T, Northrop Grumman.

Bentley Walker provided all the hardware that was required for the Internet connection to be set up. Northrop Grumman has been so impressed with the service that they are taking all the hardware back to the U.S. now that their work in Iraq has finished. They hope to be able to put it to use again soon though.

This satellite link was vital not only to keep their business running but it also provided a link with friends and families all around the world. Without a reliable, secure and fast Internet connection Northrop Grumman would have struggled to fully serve the needs of their clients in Iraq. Also the ability to call home every day boosted the morale of all staff.

It always brings us great pleasure to hear how our satellite Internet services are helping businesses to operate in the most remote and often hostile conditions. Not only have our services provided Northrop Grumman with vital communications support in the last decade but it has meant that all those working in the field were able to stay in touch with family and friends. We look forward to working with Northrop Grumman again in the future.

Al Faw Palace

There's A New Evolution

iDirect Government Technologies (iGT), in conjunction with the U.S. Air Force and the Defense Information Systems Agency (DISA), has successfully tested the Aero-Mobility features of iGT's advanced Evolution technology using a Ka-band Advanced Multiband Communications Antenna System (AMCAS) low-profile airborne antenna over the Department of Defense (DoD) Wideband Global Satcom (WGS) system.

Considered in the context of emerging commercial Aero Mobile Satcom Services (AMSS), iGT's Evolution product family provides a unified radio access network technology option for an integrated military WGS and commercial Ka-band AMSS. iGT's Evolution platform, which uses a Current-Force-Modem on multiple satellite bands, and the AMCAS low-profile antenna have demonstrated the capability to transmit and receive high-speed information when operating over a WGS system in Ka-band. The DISA demonstration, conducted October 6, 2011, validates a qualified solution for next-generation airborne wide-body, high-Doppler on-the-move capabilities and establishes a realistic production specification by demonstrating the performance criteria in an operational environment.

For the DISA test, the AMCAS antenna was mounted on an aircraft flying over the Atlantic coastline after taking off from Hanscom Air Force Base. The evaluation was conducted at a DISA Joint Satcom Engineering Center at Aberdeen Proving

iGT's Evolution Modem — select graphic for spec sheet

Grounds using a 9.1 M Ka-STAR Hub Antenna and iGT's Evolution e8350 Internet Protocol (IP) baseband equipment.

Shaum Mittal, Chief Engineer, PEO-COMMS, DISA, stated, "This demonstration of the Aero-Mobility features over the Wideband Global Satcom System using Commercial-Off-The-Shelf (COTS) technology is an extremely important step toward providing viable Aero Mobile communications by using a mixture of the readily available commercial solutions and DoD assets."

iGT demonstrated its next-generation transmission standard (DVB-S2) with Adaptive Coding and Modulation outbound technology with a Multi-Frequency Time Division Multiple Access inbound IP-based platform. The demonstration also included successful evaluations of iGT's latest AES-256 based Transmission Security software. Test criteria included an airborne bi-directional video teleconferencing session while simultaneously running IP file transfer applications.

With more than 380 high-capacity Evolution and previous generation iNFINITI satellite hubs, deployed for the U.S. DoD and more than 1,000 commercially deployed hubs with complete global coverage, iGT's satellite IP solutions are used for critical communications ranging from force protection, logistics, situational awareness, disaster recovery and emergency response.

A SNAP of Technology

Ground satellite terminals are being leveraged in the Army's most recent Network Integration Evaluation, or NIE, highlighting its objective to ensure that new technologies and network improvements work hand-in-hand with presently fielded systems.

"We have made an enormous investment in current theater-provided equipment, so when we bring in new technology, we want to see that it has open standards and will work with equipment that we have already purchased," said Lt. Col. Gregory Coile, product manager for Satellite Communications, or PdM SATCOM, which is assigned to the Project Manager Warfighter Information Network-Tactical, known as PM WIN-T.

Seven WIN-T Increment 1 SIPR/NIPR Access Point, or SNAP, satellite terminals and five WIN-T Increment 2 SNAPs are being used during the three-week NIE 12.1 to help the Army evaluate rapid acquisition solutions, while integrating and maturing its tactical network. NIE 12.1 involves the 3,800 Soldiers of the 2nd Brigade, 1st Armored Division, and nearly 1,000 vehicles spread across the austere environment of White Sands Missile Range, New Mexico, or WSMR.

SNAPs are designed to provide beyond-line-of-sight communications to small units at remote forward operating bases where they are unable to use line-of-sight radios either due to issues with terrain or distance. The terminals are represented at the NIE just as they are used in theater, as theater-provided equipment, or TPE, which is equipment that remains in theater instead of being taken back to a unit's home station following a deployment.

Since the mountains and deserts of WSMR replicate the challenging terrain of Afghanistan, SNAP capabilities and their integration with other systems can be evaluated in a realistic, reliable test environment.

"By integrating and evaluating current and emerging technologies in some of the same harsh conditions found in theater, the NIE allows the Army to make informed decisions on where it wants to go with the network," Coile said.

SNAP is a non-program-of-record commercial off-the-shelf system that provides reliable SATCOM access. Nearly 600 terminals have been fielded to date. In part, the terminals will be employed at the NIE to evaluate the TPE modifications needed to allow the SNAP

to work in concert with the second increment of the WIN-T network. A modified baseline will then be established for the SNAPs, so when new technologies that leverage the terminals are introduced, everything works together like a well-oiled machine.

"In NIE 12.1 we are modifying the current TPE baseline SNAPs to work with the WIN-T Increment 2 network to demonstrate that that the rest of the TPE equipment in theater can also be modified to work in the new Increment 2 network as needed," Coile said. "Then we will use that new baseline as benchmark for other technology that comes into the NIE either through sources sought or other programs."

WIN-T Increment 1, which is currently fielded to about 90 percent of the total force, is a communications network that enables the exchange of voice, video, and data throughout the tactical Army. While WIN-T Increment 1 provides satellite communications at-the-quick-halt to the battalion level, Increment 2 will bring the initial on-the-move capability to those at the company level.

"During the present fight, critical intelligence is gathered at higher echelons and disseminated to the company and platoon level," Coile said. "SNAP has empowered these small units with the information that is key to their decision-making process. Though SNAP users can't move and communicate, WIN-T Increment 2 will provide Soldiers at the company with that initial capability so they can share voice and data in a mobile environment."

In line with the Army's accelerated, more cost-effective approach to network modernization, WIN-T Increment 2 has been integrated into tactical formations at the current NIE a full six months ahead of its formal operational test.

"One of the purposes of the NIE is to make sure systems are fully interoperable when integrated into the Army's tactical network in CONUS (Continental United States) before deploying into theater; this prevents imposing unnecessary burdens on commanders and units," said Col. Ed Swanson, PM for WIN-T, which is assigned to the Program Executive Office for Command, Control, Communications-Tactical, or PEO C3T.

PEO C3T is leading the effort to build, integrate and fill the NIE network. During the NIE 12.1, SNAP

satellite terminals are also being used to evaluate the Company Command Post communications link from the company up to higher echelons and will be integrated with mission command servers and web-based, voice and video applications. These capabilities include:

- *Command Post of the Future, or CPOF, a collaborative system allowing users to visualize the common operating picture and efficiently plan the battle*
- *Tactical Ground Reporting, known as TIGR, which empowers Soldiers to collect, share and analyze patrol data in a central database*
- *The Effects Management Tool which provides access to critical fire support information*
- *The Microsoft Office Environment, which enables interaction with email and documents from the command post*

"My TIGR and all of my intelligence and communications systems worked better off of the SNAP," said Capt. Scott DeWitt, who previously served as a company commander with 2/1 AD. "And now with the SNAP I have a VoIP (Voice over Internet Protocol) phone; so no longer do I have to get on the radio. I can just make a phone call and talk to the people who I need to talk to without fogging up channels. The SNAP worked well."

These terminals are a key communications component for units, providing secure beyond-line-of-sight communications to battalions and below. In line with the Army's goal to extend the network to the furthest tactical edge, SNAP terminals take advantage of commercial equipment to expedite the fielding process and provide access to the tactical and strategic networks for mission command, calls for fire, medevac and information exchange.

"I was deployed in Afghanistan for 15 months, so I know disconnected operations at the company and platoon level," DeWitt said. "During the NIE, the SNAP gave me the ability to do non-line-of-sight, digital communications over a long distance. It gave me good throughput."

Newer technology has enabled engineers to design the terminals to weigh only 300-400 pounds and fit into three transit cases, which can be transported in the back of high-mobility multipurpose wheeled vehicles or helicopters. Their modular design allows for varying dish and antenna sizes to appropriately satisfy mission requirements.

Because they can be packed in transit cases and have low-power requirements, SNAPs are easy to move around the battlefield, providing an expeditionary element to the force. As priorities change and more resources are needed in different locations, they can be quickly deployed and set up for quick network accessibility.

"Every time we broke it down (during the NIE), we put it back together," DeWitt said. "These weren't specialized satellite operators who came out to do it. It was always handled by infantry men."

As the network lead for the NIEs, PEO C3T integrates its own capabilities as well as those from other PEOs and industry to ensure that they function together as an overarching network. The aim is to get capability into the hands of the Soldier much faster than normal acquisition cycles allow.

The NIE process is shortening the development cycle, and units are getting a better product, "especially with the network," DeWitt said. The network is not something that the Army has time to "mess around with," he said.

The normal acquisition process could take upwards of 10 years to get needed capability to the field and by that time needed capability can be obsolete.

"We have to have the systems in place to evaluate the equipment, to make sure that it is secure and operationally it is sound, and then push it out," DeWitt said. "If we are going to play in these waters, we have to move quickly."

A Step Closer

U.S. Army engineers discussed the results of their efforts to enable a self-aware, decision-making network during the Military Communications Conference 2011, which was held at the Baltimore Convention Center on November 8th.

The U.S. Army Research, Development and Engineering Command's communications-electronics center, or CERDEC, has developed cognitive wireless networking capabilities that employ network-wide learning and reasoning algorithms that share information that enable nodes to make decisions.

CERDEC engineers hope that the results of their Cognitive Algorithm & Network Design Experiment, or CANDE, will enable easier network maintenance, reduce human decision-making requirements, increase network lifetime, transfer data with less delay, and reduce energy consumption — all of which result in a higher degree of network performance on the battlefield.

(Left to right) Mitesh Patel, technical lead for the Cognitive Algorithm & Network Design Experiment, and Eric Williams of C4ISR & Network Modernization inspect radios during an E11 test. The CANDE algorithm can determine which tactical radio signal has the best bandwidth or least traffic before transmitting data.

"It's important that we apply learning and reasoning because currently, there's no 'intelligence' in the network. Therefore, we're developing capabilities that will aid the network in taking on this adaptive layer of learning and information sharing to reduce the complexity in managing the network," said Sharon Mackey, chief for the Network Design and Cognitive Networking Sciences branch of CERDEC's Space &Terrestrial Communications Directorate.

"A more intelligent infrastructure reduces the need for Soldier intervention and aids in providing seamless information," noted Mitesh Patel, S&TCD technical lead for CANDE.

"A Soldier has to keep track of a lot of things to maintain the network such as network constraints, requirements and objectives. With cognitive algorithms, the network is more intelligent and self aware thus reducing resource management in the network," Patel said.

One of the products within CANDE is the Cognitive Network Engineering Design Analytic Toolset, or CNEDAT, which can provide network design architectures for networks as they are being engineered, maintained, repaired or redesigned.

"The CNEDAT does not need a constructed network. Provide the constraints and objectives, and it will create a network for you: That is the power of this tool. It can optimize existing networks, and it can design a network from scratch while providing the most optimized way of maneuvering through the network," Patel said. One way it does this is by choosing a tactical radio signal's "hopping pattern." Radios typically "hop" to the closest radio; however, the closer radio may not always be the better choice if it is congested with traffic, explained Charles Graff, an electronics engineer with CERDEC S&TCD.

"The algorithm looks at the delay estimation to all source destination pairs and then determines which route has the best bandwidth or least traffic before transmitting data. The algorithm then updates itself on a periodic basis and learns from past experience not to take certain paths," Graff said. The algorithms can also enable a "dimmer-switch" capability to help reduce network energy consumption.

CERDEC S&TCD proved their concept in an operationally-relevant environment June 1st to July 15 at Fort Dix, New Jersey, during Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance & Network Modernization Event 2011.

"Throughout CANDE, CERDEC S&TCD used commercial off-the-shelf radios to prove the operations of cognitive algorithms. The overall field network performance validated the predictions of CNEDAT based on prior work done in CERDEC laboratories," Mackey said.

"Anytime you try to put something on the network, it consumes network overhead, which in turn reduces bandwidth; the implementation of CANDE was achieved with minimal impact on the network overhead," Mackey said.

CERDEC S&TCD is seeking to establish a follow-on program to conduct analysis on tactical radios in a testbed environment; currently, they are looking at the WIN-T and JTRS communities as targets of opportunity for transition," Graff said.

Story by Edric Thompson, RDECOM CERDEC Public Affairs

Phones + Veternarians In Parched Kenya

Reaching out before it's too late for man or beast in Kenya's rural draught stricken villages...

Télécoms Sans Frontières is launching a pilot project in Kenya using the mobile phone-based, payment and money transfer system M-PESA for the benefit of populations in pastoral areas.

The M-PESA pilot project is part of Vétérinaires Sans Frontières, Germany's emergency response program in Kenya, and more particularly, of its "Response in Arid-lands for Pastoralists in Drought affected Kenya (RAPID) project". The objective for VSF-Germany is to conduct Cash For Work activities, and thanks to TSF's expertise, to remunerate the beneficiaries through the M-PESA system.

This is a five-month collaboration initiative; the program will end in March 2012 and will be implemented the Marsabit South district (Northern Kenya) in six specific villages and cities: Laisamis, Merille, Logologo, Kamboe, Lontolio and Koya. The goal of this project is to enhance food security for vulnerable households and protect livelihoods from the effect of the drought.

Photo courtesy of www.worldvision.org

Combatting Weather

Satellite communications and Global Positioning Systems are common battlefield tools for U.S. and coalition forces in today's overseas contingency operations. Occasionally, these tools can be hindered by space weather and solar activity.

To counter these unpredictable situations, the Air Force employs space liaison officers, embedded with combat forces, to train forces on how to effectively use these tools and to teach troops how to ensure these devices are as accurate as possible.

"People always assume space is going to work and space is going to be there," said Capt. Bryony Veater, a space liaison officer and space weapons officer embedded with the 807th Expeditionary Air Support Operations Squadron. "But when it doesn't work or when it's not being optimized correctly for a mission, I can step in to help."

Veater is one of two SpaceLOs in Afghanistan and the first female to hold the position, she said. Veater is also a graduate of weapons school, which helps her integrate aspects of air and space.

In her SpaceLO role, she troubleshoots the tools that ground troops use daily.

"Figuring out why a GPS isn't working, why a GPS isn't getting good accuracy and how to mitigate those effects or how to plan a mission around those effects is a key part of my job," said Veater, who is deployed from the 2nd Space Operations Squadron at Shriever Air Force Base, Colo. "I also help them know what some of the alternatives are and understand some of the limitations and vulnerabilities of (satellite communications)."

Capt. Bryony Veater, a space liaison officer and space weapons officer embedded with the 807th Expeditionary Air Support Operations Squadron, looks at a Defense Advanced GPS Receiver at Kandahar Airfield, Afghanistan, Nov. 23, 2011. Throughout the past six months, Veater trained U.S. and coalition forces on how to best use space in ground warfare. (U.S. Air Force photo/Staff Sgt. David Carbajal)

During her six-month tour here, she visited more than 15 locations in Regional Command South, Southwest and West, training Soldiers, Airmen and Marines as well as Italians, Lithuanians, British, Australians and Canadians on the tactical exploitation of space.

This task did not come without its fair share of challenges. "Sometimes 'space' can be very technical, so we have to speak (to) the knowledge of the audience," Veater said.

This task was increasingly difficult when she taught some coalition partners, who aren't fluent in English.

"It's a dual challenge with them because you have to make sure they're understanding the actual words as well as the space effects you're trying to explain to them," she said.

As a SpaceLO, she also held an important role in mission planning. For example, she provides mission planners with predictions on when they can expect certain communications systems to be working better than others. Forecasting these effects enables mission planners to bring backup forms of communication or to ensure the affected communication system isn't their primary one.

"When calling in precise locations, they need to know their GPS is accurate as it's supposed to be, especially if they're calling in munitions," said Veater, who is a Philadelphia native.

In the future, Veater foresees an integrated SpaceLO program aiding operations worldwide.

"We hope to continue the SpaceLO program and continue to integrate space into the fight," she said. "We hope this capability can expand to other combatant commands and support their operations."

Story by
Staff Sgt. David Carbajal,
451st Air Expeditionary Wing Public Affairs

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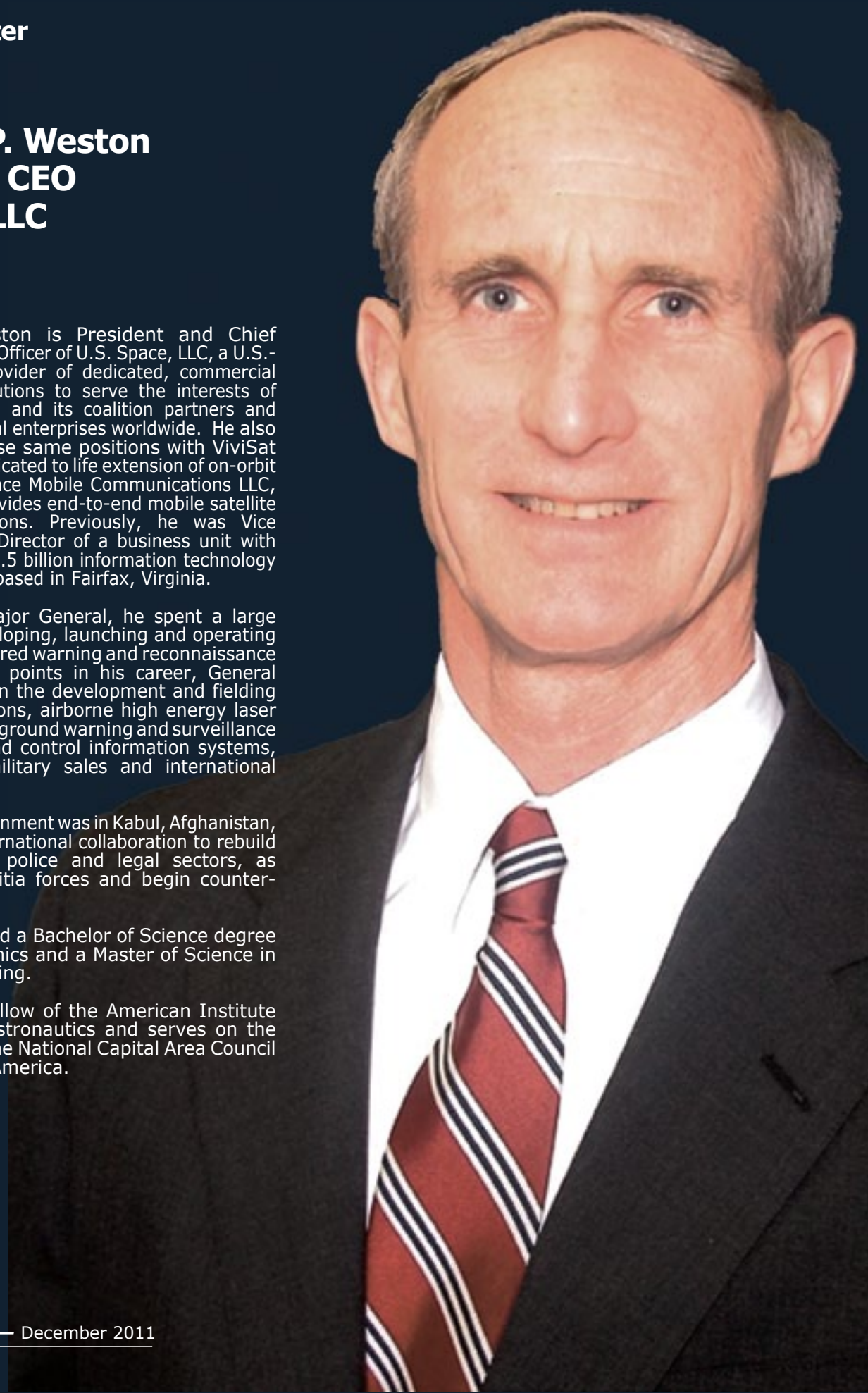

Craig Weston is President and Chief Executive Officer of U.S. Space, LLC, a U.S.-owned provider of dedicated, commercial space solutions to serve the interests of the nation and its coalition partners and commercial enterprises worldwide. He also holds these same positions with ViviSat LLC, a joint venture dedicated to life extension of on-orbit satellites, and U.S. Space Mobile Communications LLC, a joint venture that provides end-to-end mobile satellite communications solutions. Previously, he was Vice President and Deputy Director of a business unit with SRA International, a $1.5 billion information technology and services company based in Fairfax, Virginia.

A retired Air Force Major General, he spent a large part of his career developing, launching and operating communications, infra-red warning and reconnaissance satellites. At various points in his career, General Weston was involved in the development and fielding of air launched munitions, airborne high energy laser weapons, airborne and ground warning and surveillance systems, command and control information systems, as well as foreign military sales and international security assistance.

His last active duty assignment was in Kabul, Afghanistan, where he brokered international collaboration to rebuild the Afghan defense, police and legal sectors, as well as to disarm militia forces and begin counter-narcotics operations.

General Weston earned a Bachelor of Science degree in Engineering Mechanics and a Master of Science in Aeronautical Engineering.

He is an Associate Fellow of the American Institute of Aeronautics and Astronautics and serves on the board of directors of the National Capital Area Council of the Boy Scouts of America.

MSM
General Weston, U. S. Space LLC has branched out in a variety of different directions since it was formed two years ago ….satellite life extension, mobile communications, military satellite communication...Why have you selected these particular business lines? What's the common denominator?

General Weston
U. S. Space was formed as a call to service — to serve the nation. We believed from the start that by combining the best attributes of commercial and military satellite communications business practices we could provide our government a financially and operationally advantageous solution to a critical need. Fortunately, we had some of the best minds from both the commercial and government sectors working on the concept and the service — people like Ed Horowitz, Mark Piegza and Mark Albrecht. We have since been joined by other terrific people — Dr. Dany Harel, Randy Brinkley, Bryan McGuirk, Ed Wright, to name a few. Drawing on their insights, we have expanded into satellite life extension and mobile communications — two business areas in which we have found new and better ways of delivering high-value services. I'll give you two common denominators — we will only stand up a new business if it provides an essential service and if we have found a way to provide that service that delivers value in a different manner. We're in business to change the game.

MSM
An area of great interest for you and U.S. Space is that of In-Orbit Servicing. Other companies as well as government agencies are intrigued enough with this approach to extending satellite life that they, too, have joined in this market segment. Would you please explain exactly what In-Orbit Servicing is, and how U.S. Space plays its major role in this effort? Why is such so important?

General Weston
In-orbit servicing is actually several decades old but I see this as a mission area that can experience explosive growth. It is an expensive and complex undertaking to place a satellite in orbit, so once there, it would be great if we could extend its life rather than undergo the expense and complexity of replacing it. So, in-orbit servicing is the ability to extend the life of a satellite, either by supplementing its original propulsion capabilities or by replacing failed modules like solar areas, batteries or other hardware essential to continued operation of the satellite. Over the past several decades, NASA has been a leader for in-orbit servicing, with several missions with astronauts extra-vehicular activity to repair the Hubble Space Telescope. These were astounding successes that prove the utility of in-orbit servicing. The time is right to apply many of these proven technologies to the commercial marketplace. The challenge is to perform in-orbit servicing without humans turning wrenches to replace hardware, and to do so at other than Low Earth Orbits, e.g., geosynchronous orbits, where humans cannot easily perform EVAs. Therefore, the future of this industry is very dependent on robotics and remotely manipulated devices. This is the reason U.S. Space is teaming with ATK Space Systems, a world-class developer of robotics for satellite servicing, in our ViviSat in-orbit servicing joint venture.

MSM
You and ATK created quite a stir when you announced ViviSat earlier this year. Were you surprised by the big reaction?

General Weston
It's not often that an entirely new market in the satellite industry opens up. ViviSat offers satellite operators, the U.S. Government, and its coalition government partners a service that had previously been imagined but not realized commercially

Artistic rendition of ViviSat

— in-orbit mission extension and operations protection services. These services are flexible, scalable, capital-efficient and low-risk operations that can add years to the revenue producing life of a satellite. The potential long-term impact for the commercial operator, government user, manufacturer, insurance provider is substantial. So it's not surprising that players from all segments of the industry have been, and are today, quite keen to learn about ViviSat.

MSM
That being said, how's the ViviSat business doing?

General Weston
The last several months have been a period of substantial progress and achievement. We are now well along in the design phase. We also now have firm fixed price offerings that we have communicated to potential customers that are being well received by the market. Our discussions with satellite operators around the world have become productive and we are in serious negotiations with several of them. In addition, ViviSat is currently testing its rendezvous and proximity operations at a new ATK lab in Beltsville, Maryland.

MSM
Shortly after you introduced ViviSat in January, MDA announced a competitive offering. Have there been any developments in the competitive landscape since then?

General Weston
In a business this young and exciting, we should expect rapid evolution in the service offerings, new entrants, business arrangements and enhancements of various kinds.

MSM
Is ViviSat technologically different from the competition?

General Weston
Unlike our competitors' service, we don't interfere with anything the client satellite is doing. Our approach does not have any electrical connection or fuel exchange of any kind. Like a "jet pack" for satellites, ViviSat simply makes a physical connection through docking. In addition, ViviSat can repeatedly dock and un-dock, servicing multiple satellites. Our solution is simple, low risk and unique — and can provide years of extra mission life.

MSM
Also, please bring us up to date on your mobile communications business.

General Weston
We launched U. S. Space Mobile Communications in April 2011. This business provides the U. S. Government and commercial entities the most reliable, secure, flexible, stable and cost-effective mobile communications services available in the market. This is an operationally intensive business, so we have spent a lot of time ensuring we have top quality customer support capabilities, and have been reaching out to hundreds of potential customers. We have also been working with selected customers on end-to-end solutions that include our industry-leading durable, small and smart mobile satellite handsets, and a compact IP broadband terminal that is a generational leap forward in design and performance.

MSM
Do you have any customers yet at USSMC?

General Weston
We do. We are generating revenue and, more importantly, we have happy customers. We have had some exciting reports from users in the field, in places like Ulaanbaatar, Addis Ababa and the Himalayas who have told us that the phones and IP terminals have made critical differences for them.

MSM
How does USSMC address the government customer's specialized service and security needs?

General Weston
U.S. Space Mobile Commun- ications is a U.S.-owned and operated Company. We offer U.S. military personnel with increased OPSEC for sensitive operations by shielding customer identity from our service provider. Our Network Operations center that provides the 24x7 Help Desk and Customer Care Services for

USSMC is based in Maryland and is staffed by native-English speaking, cleared U.S. citizens.

MSM
One area of great interest for commercial and military firms is the hosted payloads segment. How do you see the role of hosted payloads gaining ground, and what importance will it play in our future satellite launch efforts?

General Weston
I see hosted payloads as an important ingredient in our nation's future space architecture. Whether it is a commercial communications satellite with a secondary military payload or our U.S. Space business model of purpose-built satellites dedicated to hosting military payloads as the primary mission, the government gains a number of benefits from hosting, among them: 1) A less expensive means of getting to, and operating, in space, 2) diversity of assets on orbit, 3) diversity in the industrial base, and 4) relatively rapid delivery timelines. In the forthcoming belt tightening our national security agencies must endure, hosted payloads is an idea whose time has come!

MSM
Start-ups are rare in this industry. Did U. S. Space make a mistake in the timing of the company's introduction in light of the way the budgetary environment has developed over the last two years?

General Weston
We think our timing was perfect. U.S. Space was created to provide rapidly delivered, high-quality services in a resource-constrained world. We bring to government customers private financing and

proven commercial business practices that provide space services that are transparent and fit easily into the government's existing operations infrastructure. The marketplace, Congress and the Administration all seem to be saying that this kind of cross-fertilization is precisely what these challenging times demand.

MSM
And are there other business initiatives we haven't heard about yet?

General Weston
Yes. Our business model is flexible and can be applied quite broadly, so we are developing and nurturing a number of other initiatives in the government space arena. Stay tuned!

MSM
General Weston, during your many years within the satellite and space segment of the U.S. Air Force as a Major General developing, directing, launching and operating MILSATCOM spacecraft, there must have been many projects which remain with you as the most satisfying of your military career. Would you please tell our readers about those projects, and why you consider them to be so important?

General Weston
I had the good fortune to be a part of a number of ground-breaking programs and systems during my Air Force career, both in the space and other mission areas. The most satisfying MILSATCOM project to which I contributed was the MILSTAR program, and the launch of the first military EHF frequency satellite in 1994. As with many high-technology programs, MILSTAR underwent a difficult birthing process but it and its successors, like the Advanced EHF satellites, provide a unique capability. The ability to communicate without disruption at all levels of conflict and in all conditions is a priceless advantage to our battlefield commanders, and is only possible with EHF satellites.

MSM
The technical needs of firms such as yours are huge. In order for our nation to compete on the global stage, our students' education must radically improve in the sciences, mathematics, the various technologies and engineering disciplines. Unfortunately for both the military and commercial segments, there is a decreasing pool of trained professionals from which to drive new projects and missions through new hires. How important is STEM training in your estimation? How can our industry drive home and support the need for today's students to be immersed in the sciences, mathematics, various technologies, and engineering disciplines? Is U.S. Space involved in any such programs?

General Weston
Yes — it is critical to our competitiveness as a nation to improve quality of education, especially at elementary and secondary levels, and especially in the areas of math, science and technology. That's why a number of us at U. S. Space are very involved in educational programs. As examples, I work with the American Institute of Aeronautics and Astronautics, which has extensive programs to support educators at all levels in math, science, and technology; our Chairman, Mark Albrecht is involved with the California State Summer School for Mathematics and Science, and he donated the proceeds of his recent book to that program; and our co-founder Ed Horowitz serves on both The Kenan Institute for Ethics at Duke University and the Board of Trustees of the New York Hall of Science.

While we have much work to do, it's also important to note the United States has the finest universities and colleges in the world. The U. S. dominates everyone's list of world's best universities, including schools like MIT, Stanford, Harvard, Cal Tech, Chicago, Johns Hopkins, as well as our outstanding service academies. No other country in the world is close to us in the choice of top-tier higher education — that's true in math, science and technology and across other areas of study.

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- Geosynchronous Satellites
- EIRP Maps
- Uplink Facilities
- Buyer's Guide and Index

Tackling Satellite Interference

by Martin Coleman, Executive Director, sIRG
with David Hartshorn, Secretary General, Global VSAT Forum
and Ralph Brooker, President, SatProf

Satellite interference is a huge problem in this industry and affects a whole plethora of different users across various sectors of this extremely diversified business. The military is no exception and is the one area where fixing the problem of satellite interference is the most crucial, as it can, and often does, jeopardize vital operations.

What Interference?

The problem of interference is widespread and it stems from the phenomenal amount of media and data streaming up to satellites. With so many satellites orbiting our planet, (and more to come!) the first thing that a user, or a system, must do is point it at the right one. With orbital spacing as close as 1.5 degrees, mistakes are often made using flyaway or mobile terminals. As important is the frequency at which the user transmits to the satellite; this has to be correct. In addition, the power at which the signal is transmitted is often forgotten, yet an important factor: Too low and it's too weak, too high and it often shows up on small antenna systems as adjacent satellite interference. This delicate setup, as a consequence, is therefore, inherently prone to human and equipment error.

The effect of interference is naturally a loss or degradation of signal, which in a military environment means a potential loss of communications, something, which everyone working in that environment is keen to avoid.

Causing Interference

There are a whole range of different causes of interference. A number of years ago we believed the biggest cause to be deliberate signal jamming, however we now know that is not the case and in fact the deliberate sabotage of satellite signals is a very small percentage of the problem, and currently, that is not our highest priority.

Indeed, we as an industry are the main cause, with poor installations and consequently equipment failure, as well as human error. We have found that auto-deploy systems, in particular, exacerbate the situation as unmanned systems are ideal, if not paramount, for communications in hostile environments, which therefore cannot

apply the human thought process should something not be quite right. They are used throughout the satellite industry, but one of the most prolific users of these systems is the military. It stands to reason — they are extremely useful and have become relied upon, heavily, to reduce both costs and manpower. It would simply not be practical to get rid of them, and that is certainly not what I'm suggesting. There are a number of well-thought out, intelligent systems available from very few companies that ensure proper operation at all times. If we could only guarantee that intelligent systems such as these are used, I am confident that alone would significantly reduce occurrences of interference.

Following a lively discussion at our recent sIRG conference, we have just set up a working group to look more deeply into improving auto-deploy software systems, and ensuring they can be as interference-free as possible. The group is just in its first stage and is initially tackling the issue of Satellite Identification. Our hope is to work towards some key resolutions and ideas that we can help introduce into GVF's Product Quality Assurance Framework which they have already begun by working with auto-deploy manufacturers to get those necessary design improvements as standard. We welcome anyone who thinks they may have something to add to this group.

Solving Interference

Another common misconception is that interference is something we simply have to put up with. There are, however, a number of ways to reduce interference and I would like to think that we will eventually be able to eradicate it altogether. The only way we can achieve this is by working together. We have already done a lot of work with satellite operators, broadcasters and equipment manufacturers across the globe, establishing a number of initiatives and good working practices to tackle this growing problem. I would like to now engage with the military, as I believe that if we roll-out these same initiatives, we would see a significant reduction in instances of interference within the military arena.

That said, some in the military have done much in trying to prevent interference. For example, the US Navy funded an IRG-GVF side-by-side WiMAX-VSAT C-band test and helped prevent the wireless industry from securing a global identification of C-band. Also, the DoD unit that sets up communications for the President have obtained GVF Certification and imbedded an Examiner on their staff. And there are many more...

Carrier Identification (ID)

Carrier ID has been a major initiative for sIRG thus far in the world of broadcasting, and, in fact, we are currently working closely with satellite operators, broadcasters, and equipment manufacturers to have the NIT Carrier ID in place in time for the 2012 Olympics.

Carrier ID essentially means that the carrier can be quickly identified, so when interference occurs the satellite operator can identify instantly who is causing the problem. With two technologies available, the original ID concept for video transmissions using the Network Information Table (NIT) of the DVB stream and, a newly developed method where the Carrier ID information is contained in a separate carrier that is visible to satellite operators under all interference conditions, without the need to interrupt the main feed. This second method can be utilized on all types of SCPC carrier, whether video or data. This, along with other industry input, is being reviewed by the DVB with a view to producing a Carrier ID standard for all MPEG streams. sIRG is currently working with a number of satellite operators to work towards Carrier ID being mandatory for all of their customers. This was kicked off with an announcement from Eutelsat at IBC 2011 that Carrier Identification, using the NIT method, will be integrated into transmission parameters for all SNG transmissions and new DVB broadcasts from 30 June 2012. It is hoped to extend this in the first instance to other operators and then with the DVB, and move to a situation whereby Carrier ID is mandatory on all transmissions on all satellites.

Of course, Carrier ID is only being applied to the commercial broadcast scenario! I believe that schemes can be developed for applying appropriate ID codes on carriers from military terminals to enable resolution of network degradation due to interference without compromising mission security. After all do we not want the situation where all broadcast carriers in the future have ID and, therefore, by simple analysis, anything else not having an ID must be military?

It is in the interests of everyone in the industry to integrate Carrier ID, however, as it means that if someone else causes interference on your feed, the operator can quickly and efficiently solve the problem, thus you can get on with the job in hand. There are already a number of equipment manufacturers developing and integrating Carrier ID and I would be happy to guide people in the right direction if further information is required.

Training, Installation and Best Practices

A lack of trained installers and bad installations has been a big factor in the instances of interference. The Global VSAT Forum (GVF) has established a system of training and certification for VSAT satellite installers globally. The GVF VSAT Installation & Maintenance Training Course was created to serve as the global industry standard for installers of

bi-directional satellite Earth stations. It was established by a consensus of expert volunteers serving in the GVF Education & Training Working Group.

The course was developed and is hosted by GVF's training partner SatProf, Inc. The course uses animation and simulator-based interactivity to highlight and make learning easier. Technicians who successfully complete the training course are automatically added to the GVF Certified Installer Database.

GVF are now looking to integrate these methods for SNG and FlyAway operations.

Our global aim is to only use installers who have undergone formal training and certification to work in all areas of satellite transmission.

Unintended interference can cause serious service disruptions, capacity reduction, and mission compromise. Field technicians and network operations center staff have critical roles in the prevention of interference. To prevent interference, these personnel must be trained not only in installing specific hardware but in several critical, fundamental skills:

1. *Accurate antenna pointing*
2. *Accurate polarization adjustment*
3. *Proper transmit power adjustment*
4. *Correct modem signal settings*
5. *Correct selection of cable and attachment of connectors*

In addition, working with the Radio Frequency Interference - End User Initiatives (RFI-EUI) group of broadcasters and other affiliates, the Best Practices and Documentation group is currently updating the Universal Access Procedures (UAP) to catch up with today's technology as well as getting better standards in all parts of our industry.

Product Quality Assurance

Again, our colleagues in GVF have been working hard to bring back order in to our industry by tackling the need for better equipment performance and quality through an industry-approvals framework. GVF, sIRG and RFI-EUI have been working closely with numerous satellite operators and equipment manufacturers to affect this initiative. I know that many manufacturers ensure a great deal of due diligence when it comes to ensuring their products include high quality and outstanding specifications needed for satellite equipment. sIRG has been working with GVF to help define those minimum requirements and introduce a cost effective system of Type Approvals.

As with training, I would like to see a situation whereby equipment not meeting those requirements will simply not get purchased.

Satellite Identification (ID)

Satellite ID, i.e. recognizing a satellite correctly, is considerably more complicated to achieve than Carrier ID and it is something we simply cannot do as yet, but it is something we are working to achieve. The first step towards this is our new working group I mentioned earlier. The first task of that group is to look at Satellite ID and the numerous methods of achieving the identification of any Satellite accurately and simply. This should lead naturally to the improvement of Auto-Deploy and Comms-On-The-Move (COTM) systems specifically and thus, formulating new standards.

Military and Private-Sector Collaboration

The problem of interference is not going to be solved overnight and nor by any one individual or group of individuals. We place a lot of emphasis on working together with the other groups, from within the entire industry, from equipment manufacturers, through to satellite operators, uplinkers to end users; whether that is broadcasters, military users or from the maritime industry, all have an important part to play.

These initiatives are in place to help tackle interference, and we are working to encourage people experiencing interference to share the problem and resolution, or the lack of resolution, ask for guidance and help from our members and associates. Working together in this way, we can solve interference!

Please engage with us...

Website—http://www.satirg.org

LinkedIn—http://www.linkedin.com/groups/Satellite-Interference-Reduction-Group-3954645?gid=3954645&trk=hb_side_g

Why Is Training Critical To The Satellite User Community?

by David Hartshorn, Secretary General, Global VSAT Forum + Ralph Brooker, President, SatProf

To put Martin Coleman's article (*see Page 26*) into context, consider the following hypothetical, but realistic, scenarios:

» *A mission commander plans to deploy a UAV over a certain zone. The mission must be canceled because available bandwidth in that zone is contaminated with interference.*

» *A broadband service provider's customers are suffering from dropped packets. No hardware faults can be found and all transmitters are operating at their assigned power levels. The cause is traced to interference from another VSAT network on the oppositely-polarized transponder.*

» *A VSAT network is operating perfectly until certain nodes suddenly experience outages and lost packets, due to interference created by an incorrectly-installed terminal. The installer of that terminal is unaware that he caused other links to be degraded.*

Let's review why these situations can happen and why field technician training can prevent them.

Commercial geostationary satellites are shared by diverse users, including military (UAV, COTM, tactical, voice, data, imagery, etc.), commercial Internet access and backhaul, wireless communications backhaul, video contributions (SNG), and Direct-to-Home TV.

For these diverse uses, a variety of types of ground terminals is employed, such as VSATs in managed networks, manually configured SCPC or SNG terminals, and large gateways and teleports.

Because commercial geostationary satellites use simple analog repeater transponders, interference can be generated by improper installation or operation of terminals. Such interference can have severe consequences:

» *Commercial service outages*

» *Throughput degradation*

» *Reduced available satellite capacity ("no-man's land" spectrum)*

» *Mission compromise*

The inherent characteristics of commercial geostationary satellites lead to five main reasons for interference.

Interference Reason #1: Spectrum Sharing
Commercial satellites are shared, wideband analog repeaters ("transponders"), which amplify any and all signals they receive.

Transponders have limited aggregate power capability. A transponder can support multiple users who are not aware of each others' existence. Signals in a transponder must not overlap in frequency, or destructive interference will result. In a VSAT network, the network management system must be correctly configured to command the remote VSAT to the correct frequency and bandwidth. Alternatively, in a manually-operated ground station (e.g. SCPC, SNG, or gateway), the terminal operator must manually adjust frequency, bit rate, and other settings to match the frequency slot assigned by the satellite operator.

Solution: Train field technicians to correctly set modem frequency and other signal settings.

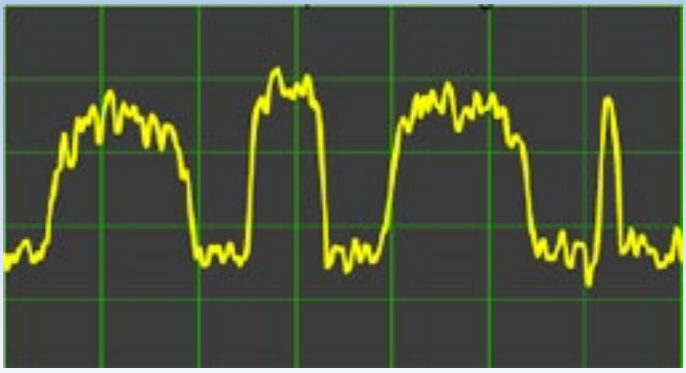

Figure 1: Typical transponder spectrum showing multiple independent users

Interference Reason #2: Retransmission
All ground terminal hardware has broadband, high-power uplink capability. Any signal in the 1-2 GHz range present on the transmit cable will be amplified and upconverted, and will appear on the satellite.

Local broadcast signals, and wireless services, and even the ground station's own downlink signals can potentially leak into the transmit cable and be uplinked to the satellite. Such signals appear as spurious interference in the satellite. In order to prevent this leakage, cables must be have good shielding, be of high quality, and have connectors correctly attached.

Solution: Train field technicians to correctly attach connectors and use the correct cable types.

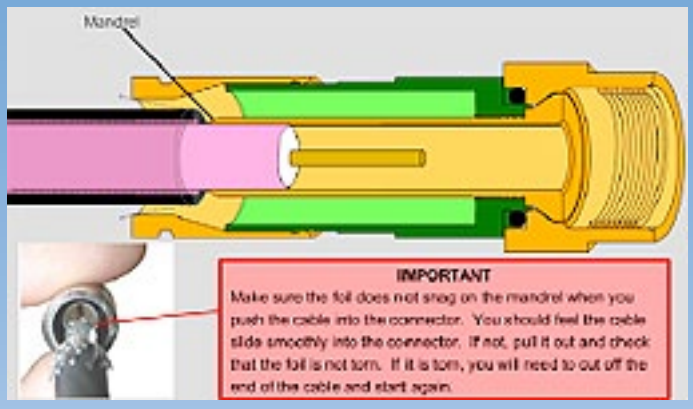

Figure 2: Correct procedures must be followed when attaching coaxial cable connectors

Interference reason #3: Power sharing

Every transponder is, in effect, a bandpass filter followed by a power amplifier. Therefore each transponder has a limited aggregate signal power budget. However, signal power is completely controlled by the ground terminal, not the satellite; the transponder simply amplifies whatever signals are present by a constant gain.

Therefore, the level of every signal must fall within a tightly-constrained power window, or the transponder will distort all the signals and generate wideband intermodulation distortion products, resulting in degraded signal quality for all users.

In a VSAT network, the network management system must be correctly configured to command the remote VSAT to the correct power. In a manually-operated ground station (e.g. SCPC, SNG, gateway), the operator must manually adjust uplink power to achieve a target level measured by the NOC.

Solution: Train field technicians to correctly adjust transmit power; train VSAT network managers to correctly set system power levels. (See Figure 3)

Interference Reason #4: Polarization Sharing

Re-use of frequencies by polarization separation is employed on the vast majority of satellites. Almost every frequency channel is shared by two transponders using opposite polarizations. The ground equipment must be designed to suppress transmitted leakage on the opposite polarization typically 30 dB or more compared to the assigned signal.

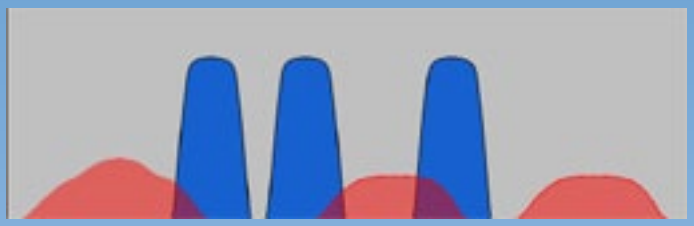

Figure 3: Intermodulation interference due to excessive signal power

Two polarization schemes are possible: circular and linear. Circular Pol is used on most Ka-band and international C-band satellites, whereas linear polarization is used on U.S. domestic C-band satellites and almost all Ku-band satellites, which carry the bulk of VSAT services.

For linear polarization (unlike circular polarization), every ground station antenna must be adjusted to within 1-2 degrees feed rotation angle, otherwise destructive cross-Pol interference will result.

This presents a serious challenge to field technicians because it can only be accurately determined by having the network operations center monitor the level of a test signal in a "cross-Pol" transponder while the antenna is being adjusted.

Misunderstanding of, or incomplete, linear polarization alignment of VSAT antennas is one of the most significant root causes of transponder interference.

Solution: Train field technicians to correctly adjust feed polarization. See Figure 4 on the next page.

Interference Reason #5: Orbit Sharing

In order to remain stationary as viewed from the ground, a satellite must be placed precisely on a ring 22,300 miles above the equator — "the geostationary arc." There is tremendous demand for slots on this arc, which are coordinated by the ITU and spaced as closely together as practical.

The beamwidth of any ground station must be narrow enough discern the desired satellite. If beamwidth is too wide, the ground station's signal will be received by neighboring satellites

Figure 4: Linear polarization is adjusted by physically rotating the feed assembly

on either side and will interfere with other users on the same frequency on those satellites. This is known as Adjacent Satellite Interference (ASI). The smaller the ground station antenna, the wider its beamwidth. For example, at Ku-band, a 2.4m diameter antenna has a beamwidth of 0.6 degrees, whereas a 0.75m diameter antenna has a beamwidth of 1.8 degrees, which is almost as wide as the common spacing between satellites (2 degrees). The lower limit for antenna size for interference-free use of geostationary satellites is determined by satellite spacing, not by technology or arbitrary regulations.

Small antennas (under 2m for Ku-band) must be accurately pointed, otherwise destructive adjacent satellite interference (ASI) will result. Because of the broad shape of the center of their beams, small antennas cannot be accurately pointed by simply peaking the signal. The beam must be centered to minimize signal strength towards the neighboring satellites on either side.

Solution: Train field technicians to correctly adjust antenna pointing using the "beam balance" method to center the beam on the target satellite while minimizing ASI. (See Figure 5)

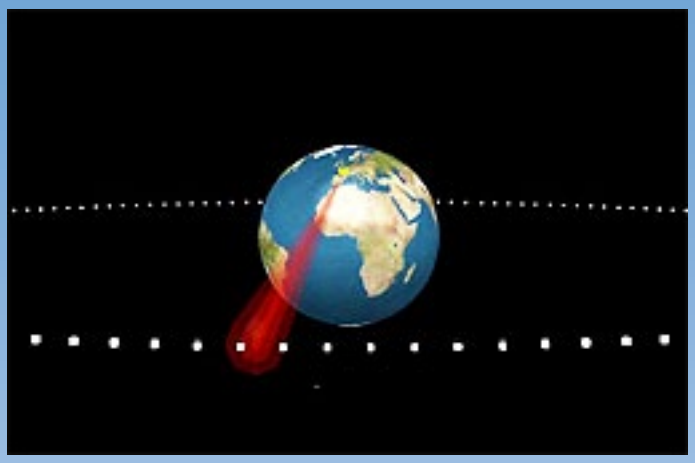

Figure 5: Geostationary arc, satellite slots, and ground station beamwidth

Conclusions

Unintended interference can cause serious service disruptions, capacity reduction, and mission compromise. Field technicians and network operations center staff have critical roles in the prevention of interference. To prevent interference, these personnel must be trained not only in installing specific hardware but in several critical, fundamental skills:

1. Accurate antenna pointing
2. Accurate polarization adjustment
3. Proper transmit power adjustment
4. Correct modem signal settings
5. Correct selection of cable and attachment of connectors

About the authors

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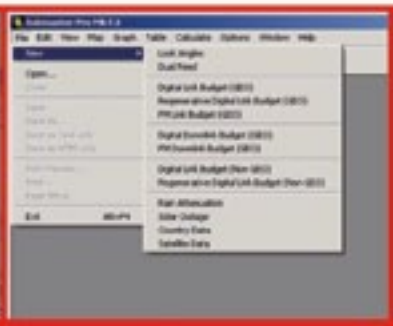
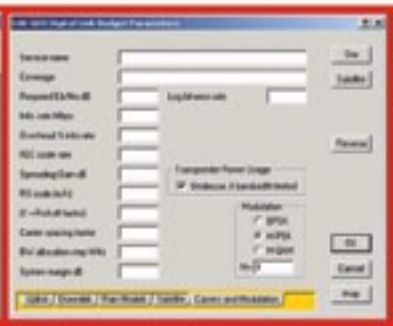




http://www.satnews.com/satfinder

Secret Spy Satellite Ops

First published in GE Reports...

According to recent declassified documents, President Reagan commended GE employees for their work on a secret spy satellite. In September of 2011, the world at large learned that some 250 GE engineers and manufacturing workers were honored by a U.S. president. That president was Ronald Reagan and his presidential commendation took place 27 years ago, in August of 1984. That satellite is now on display at the Smithsonian National Air & Space Museum's Udvar-Hazy Center and is one of 20 such satellites that were launched between 1971 and 1986.

The KH-9 HEXAGAON spy satellite being prepared for testing prior to its launch. Photo credit: NRO

The reason for the delay was the workers' top-secret mission, which was only just declassified: They were building key components of Cold War-era spy satellites, the Gambit and the Hexagon. "I've been waiting for this to happen," says retired engineer Fran Smith.

Smith, an Air Force veteran, spent 33 years with GE, including 19 years working on the satellite program. He said that on occasion he "had to travel incognito. My wife would think that I went to one place, but I would be somewhere else." Smith recalled that "it was difficult at first to not to be able to talk about our job, especially with close family, but people eventually got used to it and so did we."

The spy satellite programs ran from 1963 to 1986. The Hexagon was one of the largest spy satellites ever built. It was the size of a tractor trailer, 10 feet in diameter and 55 feet in length.

GE designed and built recovery vehicles for the satellites, command systems, mission planning software and other systems critical for the mission. The recovery vehicle for example was designed to bring safely to Earth the satellite's precious cargo: The exposed film. This was still during the dawn of digital communications and the era when images can be beamed from space wirelessly.

The engineers were working with the cutting edge technology of the time: Transistors, diodes, and capacitors. Smith recalls that his top-notch memory system could store 1000 words holding 40 bits of data. Today, a simple memory stick can hold gigabytes of data.

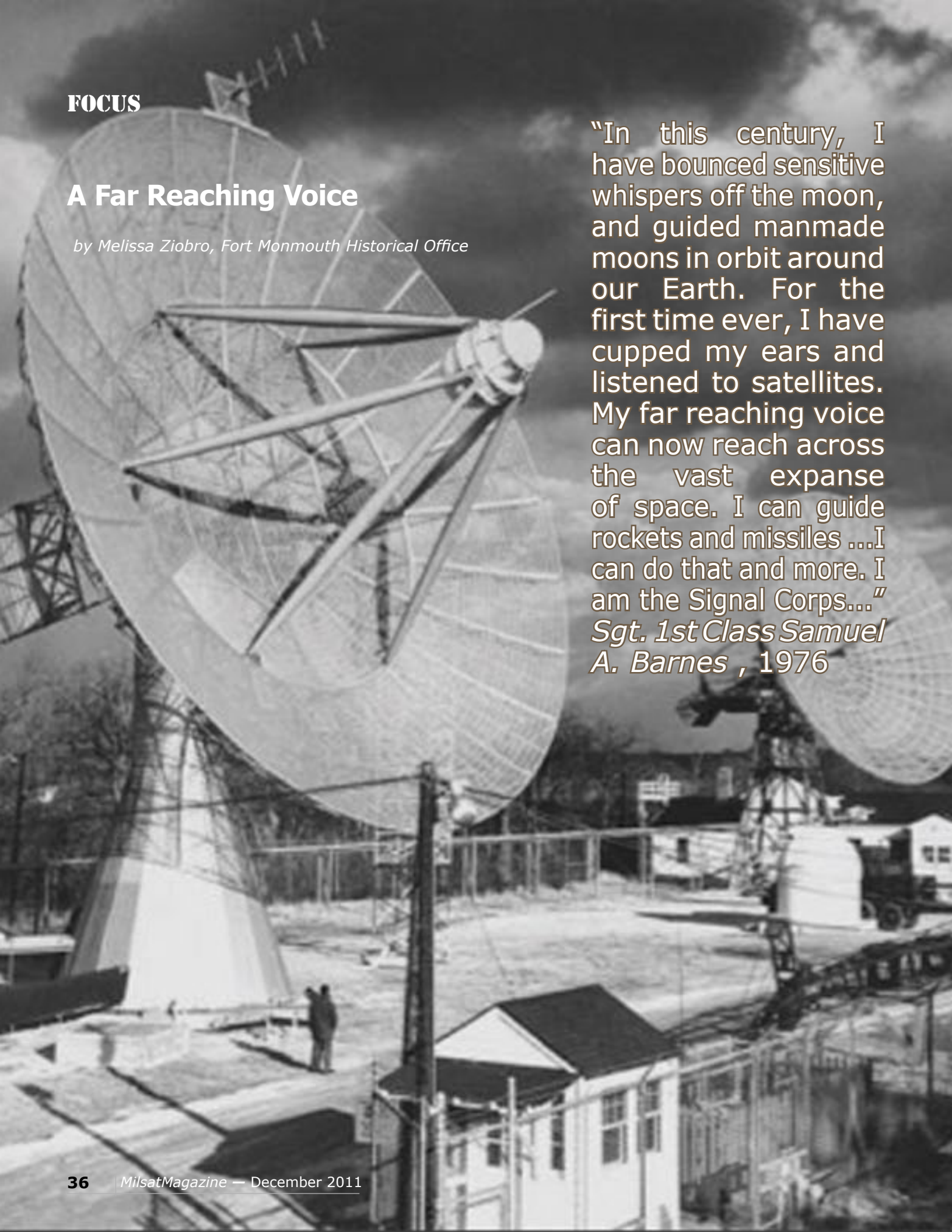
Still, they succeeded. In 1984, President Reagan commended all of the contractors who worked on the satellite programs. He stated that "a generation of this Nation's youth has grown up unaware that, in large measure, their security was ensured by the dedicated work of your employees. National security interests prohibit me from rewarding you with the public recognition which you so richly deserve." The president stated that "the technologies we now take for granted had to be invented, adapted and refined to meet the Nation's highest intelligence information needs while exploring the unknown and hostile medium of space."

Although the Gambit and the Hexagon programs have been declassified, the photographs the satellites took are still secret. The National Reconnaissance Office stated that the programs gathered "highly detailed imagery of sensitive targets, and became a major source of information for photo analysts during the Cold War." The NRO also said that the satellites served as "primary means for verifying Soviet compliance" with nuclear arms control agreements.

Says Smith: "I feel that because of these systems we were able to win the cold war."

A Far Reaching Voice

by Melissa Ziobro, Fort Monmouth Historical Office



"In this century, I have bounced sensitive whispers off the moon, and guided manmade moons in orbit around our Earth. For the first time ever, I have cupped my ears and listened to satellites. My far reaching voice can now reach across the vast expanse of space. I can guide rockets and missiles ...I can do that and more. I am the Signal Corps..."
Sgt. 1st Class Samuel A. Barnes , 1976

This year marks the 150th anniversary of the Signal Corps. It also marks the 50th anniversary of TIROS, the first televised weather satellite, and COURIER, the first high capacity communications satellite and the satellite technology that has helped to make possible today's command and control systems such as the Warfighter Information Network-Tactical (WIN-T).

PROJECT DIANA

The Signal Corps had opened up the space age electronically by bouncing radio signals off the moon from its Diana radar at the Evans Signal Laboratory in Wall Township, New Jersey, on January 10, 1946.

VANGUARD

The first major satellite payload contribution was a demonstration of the feasibility of solar converters for satellites. That came with the launching of the Vanguard I on March 17, 1958. The Signal Research and Development Laboratory headquartered at

Fort Monmouth developed solar power devices consisting of six cell clusters to power one of the two radio transmitters in the sphere. Vanguard's initial orbit time was 135 minutes.

Three minutes after the Vanguard I was launched from Cape Canaveral, Florida, its signals were being picked up at the laboratory's Deal, New Jersey, test station. In its first three years, Vanguard I traveled 409,257,000 miles in 11,786 orbits. It proved itself invaluable in scientific computations.

For example, because its orbit was definitely known and charted, it was used by map-makers

as a true "fix" in establishing positions of Pacific islands never definitively placed before. It also enabled geophysicists to determine that the Earth is slightly pear shaped, not the oblate spheroid previously envisioned. Still more importantly, it established solar cells as the most efficient and reliable source of electrical power for satellites.

On February 21, 1965, the National Aeronautics and Space Administration (NASA) reported that the tiny satellite's radio voice had weakened to the point where engineers believed it would never be heard from again after a transmission record of almost seven years.

SCORE

A prototype of the first communications satellite, Project SCORE (Signal Communications via Orbiting Relay Experiment), was successfully launched December 18, 1958, carrying from outer space President Dwight D. Eisenhower's Christmas message to people around the world.

The experiment effectively demonstrated the feasibility of world-wide communications in delayed and real time mode by means of relatively simple active satellite relays and provided valuable information for the design of later communications satellites.

SCORE was an Advanced Research Project Agency (ARPA) project carried out by the Signal Corps with the Air Force providing the Atlas launching vehicle.

VANGUARD II

The second major satellite payload contribution was the complete electronics payload for the Vanguard Cloud Cover Satellite, 1959 Alpha, launched on February 17, 1959. Vanguard II, with infrared scanning devices to provide crude mapping of the Earth's cloud cover and a tape recorder to store the information, operated perfectly during the entire 20-day life of the battery power source. It made 211 orbits and was successfully interrogated 155 times to release the stored information.

The Signal Corps Research and Development Laboratory also contributed special components or subsystems to the payloads developed by other organizations, such as high-frequency control crystals, special batteries, and high efficiency, low voltage to high voltage transistor power converters.

TIROS

To televise cloud formations within a belt several thousand miles wide around the Earth and transmit a series of pictures back to special ground stations, the 270 pound TIROS (Television and Infra Red Observation Satellite) was launched on April 1, 1960 by an Air Force vehicle. The first television-type satellite for world-wide cloud cover mapping was produced under Signal Corps technical supervision and NASA sponsorship.

Its two television cameras — one a wide-angle lens photographing 800-mile squares of the Earth's surface and the other shooting 30-mile squares, ranging between the latitudes of Montreal and New Zealand, were of different resolution for direct readout and tape storage. That represented the most intricate control so far used in a satellite.

The first orbit pictures were rushed to Washington on a new facsimile machine, also developed by the Signal Corps Research and Development Laboratory.

It transmitted a high quality picture to its destination in just four minutes. As a result, the first pictures from TIROS were on the President's desk shortly after they were received from the satellite, and he personally released the information to the world.

During its three months of operation, TIROS sent down more than 22,952 pictures of cloud formations, depicting the world as man had never seen it. Although it was only an experimental forerunner, TIROS I made some important discoveries and contributions to meteorological research.

TIROS II, launched November 23, 1960, followed TIROS I to provide new and more comprehensive views of Earth's ever changing weather patterns from its vantage point some 400 miles in space. The new, more definitive pictures and data it gathered and returned to Earth provided a

ground work for new giant strides in meteorology and long range weather forecasts.

The TIROS II satellite included all of the equipment of TIROS I: TV cameras, tape recorders, TV transmitters, command receivers, timing mechanisms, beacons and telemetry equipment, new scanning and nonscanning infrared sensing devices, new magnetic orientation device, new noise suppressor circuits, new miniaturized radio frequency diplexer, improved horizon scanners, and sun angle sensors.

COURIER

The U. S. Army communication satellite COURIER I B was launched on October 4, 1960. It went into orbit and began to receive, store, and transmit to Earth a stream of voice and telegraph radio messages at the rate of slightly more than 67,000 words a minute.

Each time it passed over Salinas, Puerto Rico, or Fort Monmouth, the Signal Corps loaded it with hundreds of thousands of words in teletypewriter code. In the 14 minutes it stayed within range of either station, COURIER picked up or transmitted the 773,693 words of the *King James Bible* — or did both simultaneously — and still had two minutes' time left. COURIER's communication system broke down after 17 days operation. COURIER figured in the transfer of roughly six million words a day. Both on the ground and aboard the satellite, the telegraphic signals were first recorded upon, and then transmitted from, magnetic tape. The tape was moved through the transmitter, aground or aloft, at 740 times the normal transmission rate for high-speed teletypewriters.

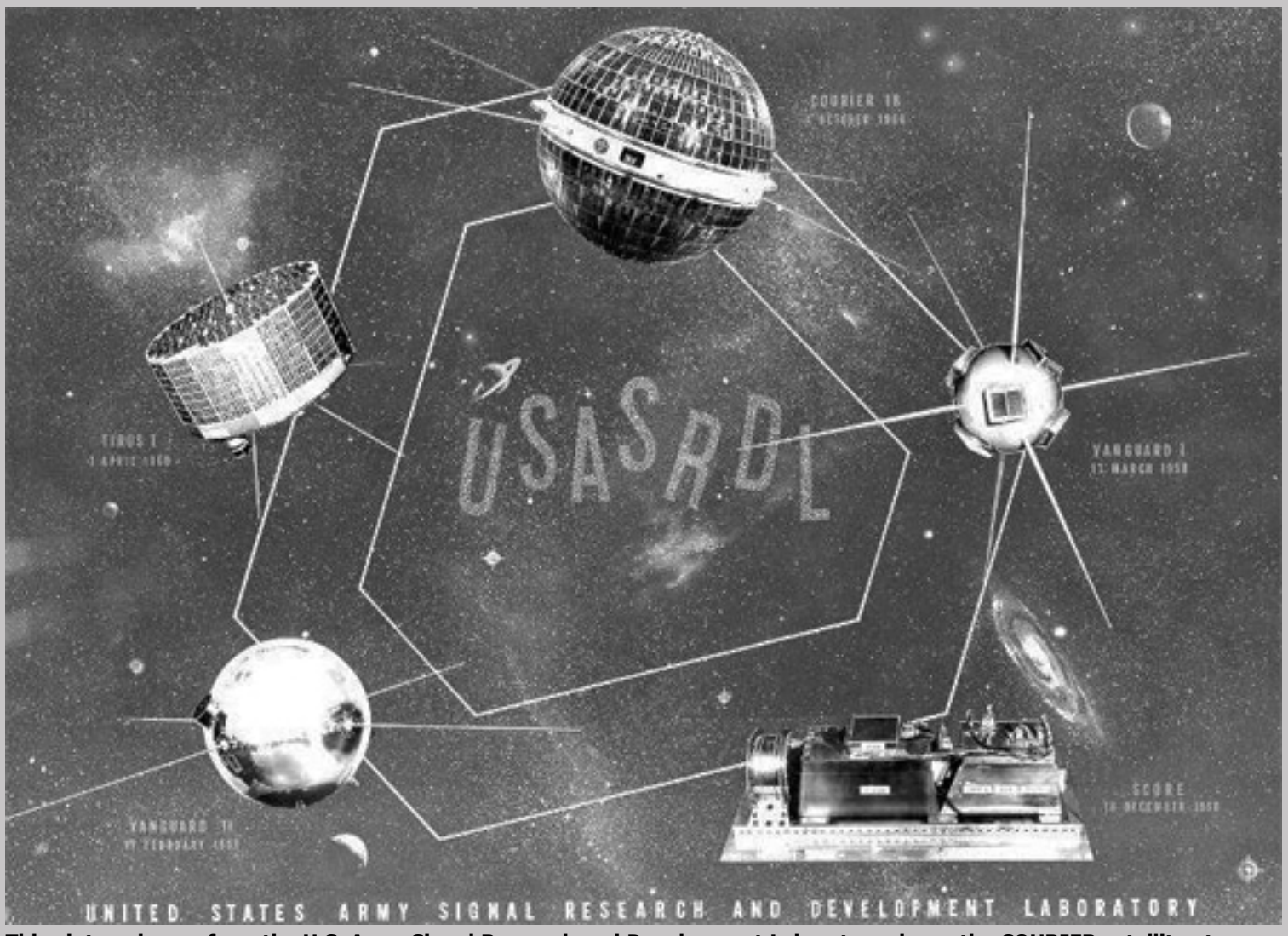
Nine days after the launching, a photograph transmitted from Fort Monmouth was retransmitted from COURIER and received at Salinas with

no substantial loss in quality. The achievement established the feasibility of satellite storage and relay of all types of facsimile messages, including letters, maps, charts, and photographs.

COURIER was a 51-inch sphere, the outer surface of which was studded with 19,200 solar cells. When the sun shone on them, they generated 62 watts of electricity, which could be used immediately or stored in batteries. The most important items of COURIER's equipment were five tape recorders; one for handling voice and four for storing the ultra-high speed messages. All equipment, including the recorders, four receivers and four transmitters, weighed 300 pounds. The satellite weighed 500 pounds.

Developed and launched as an experiment to test the feasibility of a global military communication network using delayed-repeater satellites, COURIER was replaced with a group of three satellites that followed 24-hour equatorial orbits at an elevation of 22,300 miles above the Earth.

In 24-hour orbits, the new satellites were to follow exactly the rotation of the Earth. In effect, each hovered permanently over a particular point of the equator, and the three together were intended to supply a constant means of contact between points lying, roughly, between the Arctic and the Antarctic circles. The three communication relay stations were to form the Synchronous Satellite system. To explore and develop this new means of communications, the Initial Defense



This vintage image from the U.S. Army Signal Research and Development Laboratory shows the COURIER satellite at top-center, and clockwise from there: VANGUARD I, SCORE, VANGUARD II and TIROS I

Communications Satellite Program, known as the IDCSP, was established. The responsibility for carrying out the Army's portion of the program was assigned to the Army Satellite Command here.

In addition to its work with satellites, the laboratory headquartered here developed and tested all phases of work to fit its equipment into the new concept of rapidity and flexibility of communications: Jamming of the enemy's electronic equipment; use of light, mobile rapid computing machines to assist battlefield commanders in making decisions; the use of photographic drones over the enemy's lines; and the employment of silent radar "Sentries," television, infrared detection and photographic devices and seismic and acoustic systems for battlefield surveillance. The contributions of the Signal Corps to the advancement of satellite communications were cited by former Signal Corps Research and Development Laboratory employee John Cittadino.

"Its legacy is enormous when you consider how commonplace and important satellite communication has become to the world. Not only for the military, but even more so for the commercial world. I mean, things like broadcasting the Olympics, they do all of that via satellite communications. So, it was a major step forward. Now, if we hadn't done it, somebody else would have, you know, done it soon after. We just happened to be the ones that did the first one," he said.

(Author's note: This article is largely based on an excerpt from the Signal Corps' Tradition Committee's Historical Sketch of the United States Army Signal Corps, 1860-1969. Contact the CECOM LCMC Historical Office for further details at 732-532-6322.)

A Versatile Arena For Commercial MILSATCOM

Mr. Robert Demers, Vice President, Government Services

For decades governments have relied on the commercial satellite industry to provide critical communications services from disaster relief, to humanitarian assistance and combat operations. Today more than 75 percent, and at times as much as 93 percent, of current government needs for satellite communications are being met by the commercial satellite industry — it is forecasted that the trend will most likely continue.

The need to relay sensitive information rapidly, reliably and securely is key to facilitating military command and control. The more rapid the access to information during military operations, the better the situational response, which is vital when deploying troops in hostile environments. It is imperative that satellite communications solutions for government operations be robust, fast, dependable and resilient to interference; ensuring success for mission-critical operations. Requirements for high data speeds, highly portable and flexible terminals, as well as smart phones that provide advanced and imbedded secure encryption capabilities supported by powerful networks, continues to grow exponentially.

As commercial satellite providers have played a key role in providing defence consumers with critical satcom services, one such operator is Thuraya Telecommunications Company, with coverage areas that span 140 countries across Europe, Africa, Middle East, Asia and Australia where many of the world's challenging communications environments and of late, disaster relief operations, are located. By virtue of this, Thuraya has many years of experience in providing proven, reliable communication solutions, allowing military forces engaged in conflict or supporting humanitarian and disaster relief operations, to communicate across Thuraya's coverage area rapidly and securely through one network.

Powerful networks are a basic necessity for government consumers: Thuraya is a viable and ideal operator of choice since it has a network that is amongst the most robust in the world. The Company's satellites offer high gain spot beams and Dynamic Resource Allocation (DRA), features that ensure high quality service throughout the coverage area. Thuraya's network intelligently allocates resources to high traffic areas automatically,

enabling multiple users to simultaneously benefit from a strong signal and clear communications. As a result, call drops are problems Thuraya defence consumers rarely experience.

Through considerable research and development, Thuraya has developed a portfolio of diverse products and services specifically tailored to defence and government consumers. Thuraya products are environmentally resistant, portable, simple to use and packed with market-leading functionality; and due to the range of available fixed fee and lease pricing plans, they are also highly affordable. The data, voice and maritime services are all streamlined to provide exceptional delivery of information, a necessity for military forces.

Making its mark in the data sector is Thuraya IP, the world's smallest satellite broadband solution supporting 384 Kbps of streaming data. The exclusive A5 size (158X225 mms) of this terminal makes it the most compact in the market to offer 444 Kbps Standard IP, ensuring rapid data speeds through a ruggedised solution — a basic prerequisite for the defence sector. The size of the terminal makes it highly portable and easy to pack in standard issue military rucksacks. Instantly deployable due to a simple plug and play system, compatible with military applications and easy to connect Thuraya IP requires no additional software making it the solution of choice for consumers requiring an intuitive option that can be set up in seconds.

Trialed by the Royal Signals Squadron of the British Ministry of Defence and the Aerial Defence and Operations Command of the French Ministry of Defence, Thuraya IP consistently exceeded expectations and outperformed other solutions during testing. This has made the Thuraya brand synonymous with quality, reliability and affordability across the military sector.

Thuraya IP's ability to connect while on the move (Comms-on-the-Move, or, COTM) makes it an ideal option for humanitarian relief operations as well as for military deployments in contentious environments. Thuraya IP's vehicular antenna is the smallest in the market and allows consumers, due to its design that is based on a two-axis system, to access high-speed data while moving at speeds

Navy fleets will also find Thuraya's soon to be launched MarineNet Pro maritime broadband solution ideal

that exceed 150 kph. Moreover, Thuraya IP is the only terminal on the market that can connect to a number of different antennas, giving consumers the freedom to decide on their application without having to buy multiple terminals.

Thuraya pioneered a leading edge netted communications solution based on Thuraya IP which integrates different communications technologies into a single closed user group. This service allows for the interconnection of individuals using different communication networks, such as Thuraya IP, Thuraya handheld phones, public switch telephone networks, GSM systems, and radio systems, in order to provide military officers a powerful netted communications solution.

The versatility of Thuraya IP does not stop there; it is the only satellite broadband solution with Asymmetric Streaming capabilities. This unique feature translates into immediate cost savings for consumers as it allows a flexible and custom selection of upload and download speeds, meaning defence consumers only pay for the bandwidth they use. Coupled with unlimited data packages with a fixed monthly fee, Thuraya consumers are able to access high-quality and high-speed data services at affordable prices.

Furthermore, Thuraya also offers a lease service based on Thuraya IP which provides dedicated capacity to high-speed data users. An exceptional feature of Thuraya's Lease service is the "Follow Me" lease which ensures consumers can access unlimited bandwidth within a certain spot beam or region. As such, navy fleets which travel over expansive maritime waters can greatly benefit from reliable connectivity while embarking on long regional journeys.

Navy fleets will also find Thuraya's soon-to-be launched MarineNet Pro maritime broadband solution ideal as it provides data speeds up to 444 Kbps as well as streaming speeds up to 384 Kbps while at sea. The solution also offers voice, fax and SMS services. Compliant with maritime standards, MarineNet Pro has a phased array antenna option with fast tracking capabilities and no moving parts; ensuring speedy satellite acquisition and solid performance in rough weather conditions throughout Thuraya's coverage area.

The Company has a 65 percent market share in the satellite handheld market. The Company has set the bar for leading voice products, the latest being Thuraya XT, one of the world's toughest satellite handhelds. This device is the smallest to offer IP54/IK03 certification making it splash water, dust and shock proof. This sturdy phone combined with its beneficial size and ease-of-use, provides instant assurance that it will operate even in the most challenging operational environments, which is a basic factor of military operations.

The most significant feature of the phone is its full walk and talk capabilities, allowing consumers to move rapidly while remaining connected to the satellite. The Thuraya network ensures constant connectivity, meaning network congestion and call-drop out is never an issue for defence consumers. An intelligent device with a glare-resistant display, Thuraya XT handheld has the fastest data service (60 Kbps) with optional GPS waypoint navigation. It also offers embedded commercial grade encryption and is compatible with third party manufactured FIPS 140 encryption which is vital for almost all government communications.

Thuraya prides itself on innovating ahead of the market and is working closely with its partners to deliver fit-for-purpose solutions. The Company is currently developing a new solution for unmanned aerial vehicles (UAVs), a rapidly growing segment, requiring assured communications and information over a reliable satellite network. This product will be designed to the highest industry standards and tailor-made to meet stated requirements.

The ruggedness of Thuraya's products, the robust satellite network, and the specifically tailored pricing plans present an unbeatable package for government consumers, a realization that is underlining Thuraya's rapidly growing position as the MSS operator of choice within this sector that is one of the major growth drivers of the SATCOM industry.

SatCom For Net-Centric Warfare December 2011

MilsatMagazine

MilsatMagazine presents the annual opportunity for companies within the various SATCOM industries and market segments to inform all of our readers of the challenges and successes they faced during 2011. Many wrote extensively of their efforts — this is a review of the past year for these companies presented by a member of their executive team. Additionally, several have stepped up to prognosticate their views for 2012 and beyond.... Thanks to all who participated in the 2011 Year In Review issue of MilsatMagazine. To learn more regarding each company, select the company name in the article's title or their logo.

2011 YEAR IN REVIEW

ATK / COMTECH AEROASTRO / ELBIT SYSTEMS / HARRIS CAPROCK / HUGHES iDIRECT / INTELSAT GENERAL KRATOS DEFENSE AND SECURITY SYSTEMS / KVH INDUSTRIES / NEWTEC / SEGOVIA / SKYWAVE MOBILE SIGNAL CORPS / SSC USN'S TOM PIRRONE / TELECOMMUNICATION SYSTEMS / THURAYA / U.S. ARMY'S CERDEC U.S. SPACE'S CRAIG P. WESTON / USSECURENET / VIZADA

Advantech Wireless

by David Gelerman, CEO

In 2011, Advantech Wireless continued to be a world leader in satellite and terrestrial communications. We firmly believe our commitment to innovative design, in-house manufacturing and quality control, interoperability and global presence made this year a record success.

We are especially proud of the next generation of VSAT hubs, introduced earlier this year. The Discovery Hub is a two-way, open standard (DVB-RCS), broadband satellite access system that includes a fully functional hub with four inbound carriers, scalable as needs grow, all for under $50,000. The new Discovery series allows small to medium private satellite networks, commercial or government, to get started at the lowest possible cost. As growth is experienced, the investment remains intact, as the solution scales with need requirements. For clients who need to support more terminals or links, Advantech Wireless offers the Challenger and the Millennium DVB-RCS hubs that include DVB-RCS and SCPC operations; either independently or within the same Hub. Inside these hubs are the Advantech Wireless MCD cards that can support as many as 96 carriers on a single card.

Within the RF line, the SUMMIT system was launched earlier this year. The outdoor system is a fully modular SSPA with built-in redundancy and can provide output power of up to 3500W in C-and, 2800W in X-and 1600W in Ku-band. The Company's GaN line of Ku- and X-Band Bucs also grew in 2011 to include a 600W C-, 400W Ku- and a 500W X-band Buc. These are ideal for manpacks, flyaways, mobile applications, or when smaller antennas are desired with increased power efficiency, reduced power dissipation, more linear amplitude response, and an increased MTBF.

Advantech Wireless also launched a high power 12kW solid state pulse amplifier (SSPA) that can be vehicle-mounted. Its modular design allows elements to be hot-swapped without any interruption of service or noticeable reduction in power. This product reveals Advantech Wireless' ability to research and develop customized solutions for clients around the globe.

Other introductions included the ruggedized router and the Raptor, a compact mobile transportable VSAT hub. The router has high packet and data performance, two router interfaces, four switched LAN ports, and one WAN port. The Raptor hub can be deployed in less than an hour and can support as many as 500 terminals, with up to 135 Mbps outbound and up to 6 Mbps inbound per carrier. Both of these products are designed and built to be used in some of the harshest environments on Earth and to be interoperable. The Point-to-Point Microwave Radio product line grew to include an 8 ASI interface option, enabling 8 HD quality channels support in a single unit. The Transcend 800 provides the maximum bit rate of 214 Mbps per ASI interface compared with the typical 100 Mbps of most other units on the market with up to 10 dB more system gain than split-mount competitors. Smaller antennas can be used, less expensive towers, and longer hop lengths.

2011 also gave rise to a dramatic increase in sales to Latin America — we signed a contract with Hoje Telecom of Brazil to provide them with VSAT upgrade hub, RF equipment, and more than 1,000 remote terminals. Other telecommunication customers in the region agreed to purchase an additional 1,720 terminals and RF equipment for VSAT hubs. Advantech Wireless also experienced continued support from our key customers in North America and Asia.

For the fiscal year ending on April 30, the Company posted a record $21.3 million in profit, as compared to the $4.5 million loss the previous year. This was achieved through successful sales in our RF, Microwave and VSAT product lines as well as increased internal efficiencies that resulted from various corporate consolidations. The Company will continue to invest 18 percent of gross revenues toward research and development. Advantech Wireless is looking forward to the next year and plans to introduce many innovative products — we will continue to expand our global network of resellers and The Company is working on some very exciting projects.

Advantech's Discovery Hub

ATK Spacecraft Systems & Services

by Tom Wilson, Vice President + General Manager

ATK Spacecraft Systems & Services marked a very successful year in 2011 providing mission critical capabilities and game changing technologies within the satellite industry. The ability to deliver premier aerospace products in 2011 strategically positions the division to meet growing government, commercial and international customers demand in 2012.

A broad portfolio of products including small satellite bus systems, market leading integrated thermal control systems, and world-class engineering services, were featured on several high profile missions in 2011. The division's strategic plan for growth also generated aggressive entries into adjacent and emerging markets. Once again, SSS delivered a 100 percent on-orbit mission success rate to all our customers. Every satellite, thermal component, or flight mechanism we provided for the last decade is still successfully operating.

Our capability to build small satellites quickly and effectively was demonstrated with the successful launch of the Department of Defense's Operationally Responsive Space-1 (ORS-1) satellite in June. The space vehicle began operational use in September at the U.S. Air Force Space Command at Schriever Air Force Base, Colorado following successful on-orbit deployment and checkout of all systems. ATK built the spacecraft bus at its Beltsville, Maryland, facility in only 17 months and delivered it to the prime contractor, Goodrich Corporation, ahead of schedule. The program was also honored by an industry trade journal (*C4ISR Journal*) as one of the top technologies in the nation. ORS-1 is the first satellite in the Operationally Responsive Space Program designed to support combatant command operations as an operational satellite. The ORS Office is seeking DoD approval to sell additional systems to U.S. Allies.

ATK marked two years in orbit in for the TacSat-3 satellite, an ATK-built satellite bus supporting a Raytheon hyper-spectral sensor. The spacecraft was originally designed for six months of operation with a one year goal yet continues to outlive its design life and to support military operations around the world. ATK micro satellites took scientific center stage with a breakthrough mission for NASA. Two of the five microsatellites originally built for NASA's THEMIS mission to the Earth's geomagnetic interaction with particles from the Sun, were redirected to new orbits around the Moon. There they will continue the study, adding the Moon's interaction, highlighting the Company's performance and reliability in small satellite bus technology.

Spacecraft Systems & Services leveraged its satellite bus experience to open a game-changing new space market, commercial satellite servicing. In 2011, ATK and its partner U.S. Space LLC, attracted wide attention by publicly introducing "ViviSat", the first U.S. based company to offer satellite life extension services to commercial and government geosynchronous satellite operators. ViviSat's Mission Extension Vehicle (MEV) is designed to dock with the orbiting satellite and provide an alternate attitude control & propulsion system.

To support satellite life extension and other future space programs, SSS opened new facilities in 2011. The Robotic Rendezvous and Proximity Operations (RPO) Lab will demonstrate critical enabling technologies and uses state of the art robotic and air-bearing test-beds to simulate satellite motion. The Lab draws from a strong heritage of engineering services expertise provided to NASA Goddard Space Flight Center (GSFC) on manned and robotic satellite servicing missions, such as Hubble.

In 2011, on its final flight in July, Atlantis carried the ATK supported Robotic Refueling Mission (RRM) to the International Space Station (ISS). It will demonstrate the technology and tools to robotically refuel and repair satellites. ATK ES is also a significant partner in the GSFC program office developing a generational on-orbit refueling system, RESTORE, as part of NASA's long term space exploration plan.

The Defense Advanced Research Projects Agency (DARPA) also has requested substantial ATK participation in their planned satellite servicing mission starting early next year. As the market grows for RPO related satellite servicing missions in commercial, NASA, and military markets, ATK's new lab will play a key role in developing and demonstrating capabilities to potential customers.

In addition to satellite servicing, ATK Engineering Services continued to provide support to a wide variety of U.S. government activities in 2011. One of many highlights was the design of a number of instruments on the Mars Science Laboratory spacecraft launched on November 26th — these instruments will analyze samples of materials collected and delivered by a rover's robotic arm to help assess whether Mars ever had an environment capable of supporting microbial life.

ATK Spacecraft Systems & Services also expanded operations at the Company's Integrated Thermal System plant to meet increased demand for existing space thermal contracts, create new jobs, and support business growth in adjacent markets. The recent contract from Lockheed Martin to develop the Thermal Control Subsystem for the Integrated Sensor is Structure (ISIS) program will benefit from this increased space. This contract is a critical component of the DARPA ISIS Airship and marks ATK's first thermal award in a high altitude, near space defense market. This builds on our continued growth in the Integrated Thermal Systems market. Overall, we are approaching almost 500 heat pipes and related radiator panels on orbit without a failure.

2012 is filled with growth opportunities for Spacecraft Systems & Services. Our strategy to break into new space markets — responsive small satellites and on-orbit satellite servicing — is yielding solid results. We also realize that our government and commercial customers are clearly affected in terms of priorities and budget. It is essential that we continue to drive efficiency improvements across the division and manage our costs effectively to deliver even more value to the customer. We look forward to building on our success and creating new opportunities for the future.

Comtech AeroAstro

by Paul Lithgow, President

Comtech AeroAstro, founded in 1988, continues as a leader in the small satellite segment of the aerospace industry. For more than 20 years, Comtech AeroAstro has been an advocate for, and producer of, highly efficient and agile small satellites. For the past decade, the Company has been a major contributor for plug-and-play innovations and standardization efforts. In addition to offering high-performance satellite buses and supporting varied space missions, Comtech AeroAstro features a full line of small, space-qualified components. Comtech AeroAstro, Inc., is a wholly owned subsidiary of Comtech Telecommunications Corporation (NASDAQ:CMTL) in Melville, New York.

As an economic growth engine, Comtech AeroAstro has a solid track record of delivering unique technologies to government and private sector customers that include the U.S. Air Force Research and U.S. Naval Research Laboratories, the National Reconnaissance Office, DARPA and NASA. Comtech AeroAstro maintains strong memberships within AIAA and AIA while promoting national defense and preserving national aerospace dominance. Equally, the Company is a national space proponent with its ongoing corporate membership with the Space Foundation.

Comtech AeroAstro is currently developing the satellite bus for the U.S. Navy's Joint Milli-Arcsecond Pathfinder Survey (JMAPS) Program, to provide highly accurate star position data for military and civil applications. Similar in size to the STPSat-1 and -2 vehicles, this satellite bus, derived from their Astro 200AS, is a more stable, more agile bus with better pointing accuracy than much larger vehicles in the commercial imagery industry at a fraction of the cost. This capability enables a range of new high-value mission and sensor options on an affordable platform that can be rapidly developed and deployed.

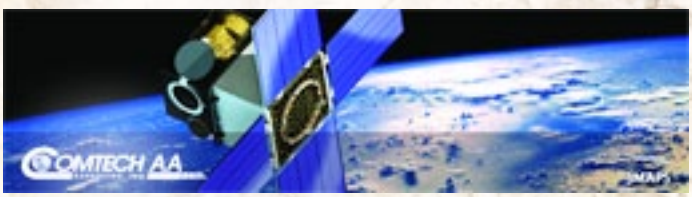
The STPSat-1 and STPSat-2, satellites developed for the DoD Space Test Program, were designed to capitalize on excess mass and volume margin as secondary missions on Atlas V and Minotaur IV launch vehicles respectively. STPSat-1, the first ESPA ring satellite, launched in 2007 for a one-year mission life and was decommissioned in October 2009 after successfully providing over two-and-a-half-years of valuable mission data. Launched onboard a Minotaur IV rocket as a secondary payload for the DoD's STP-S26 mission, the STPSat-2 satellite launched in November 2010 and is on orbit and performing nominally. NASA's FASTSAT satellite was also launched as part of the S26 mission on which Comtech AeroAstro has their miniature star tracker, a five sun sensor cluster and a threat detection system supporting the Air Force Research Laboratory's Space-Based Advanced Sensing and Protection Branch for detecting, tracking and characterizing resident space objects and local space environment.

For the past decade, Comtech AeroAstro had supported the Operationally Responsive Space Office's initial efforts. Refined designs led to an award for a five-year IDIQ contract from the AFRL for Advanced Plug-and-Play development. Comtech AeroAstro's small, space-qualified components include miniature star trackers, miniature imagers, sun sensors and transceivers; Comtech AeroAstro has also expanded its expertise into unique mission areas such as payload and sensor development supporting national security needs in ISR, space situational awareness and special communications. An internally funded effort, PACS, Comtech AeroAstro's Payload Alert Communications System, is a revolutionary approach supporting low-Earth orbit space traffic control.

With Comtech AeroAstro's ongoing internally funded efforts, it ensures technological advances to offer our nation new tools while aiding in national defense, international and homeland security, natural disaster preparedness and advanced telecommunications. Comtech AeroAstro also continues its outreach and partnerships with universities to promote and foster interest in the national STEM program. Comtech AeroAstro's Coral high-performance nanosatellite, about the size of a loaf of bread, deploys as a secondary payload from almost any launch vehicle and is configured into a small, compact, low-cost package. By using miniaturized but sophisticated components (many also developed by Comtech AeroAstro), Coral is offered as an affordable platform with the opportunity to quickly launch and test mission and payload concepts as a single spacecraft, or as a multi-spacecraft constellation.

Over the years, Comtech AeroAstro has developed many technological innovations and wins various awards, such as the SBA Tibbetts Award, selected for NASA's SBIR/STTR Hallmarks of Success video feature, Virginia's Vanguard Award and selected as one of the Fantastic 50; most recently, presented with USCA's Best of Herndon in Aerospace Industry Award and AIAA's annual Space Systems Award.

Comtech AeroAstro advocates a supportive role for its employees. While most production activity is managed from its two physical locations, Ashburn, Virginia, and Littleton, Colorado, the Company also facilitates a strong virtual operations environment for uninterrupted communication and responsiveness from around the world.



Elbit Systems, Shiron SatCOM Business

by Dr. Shaul Laufer, Senior Director, Technology

The Shiron SatCOM Business Line, part of Elbit Systems Land and C4I, is a leading satellite communications technology powerhouse, dedicated to the design and production of the InterSKY™ network systems for cost efficient delivery of mission critical Broadband IP over satellite. The solution focuses on the resilient delivery of high quality broadband IP over satellite with emphasis on satellite space segment efficiency while maintaining the required availability, scalability, high availability/resilience and system configurable multi service.

Shiron's InterSKY 4G for commercial applications and InterSKY 4G for tactical military applications are best suited to serve the high-end needs of satellite operators, governments, military, Telco's, ISP's, public and private companies. To date, Shiron has deployed hundreds of broadband hubs and tens of thousands of remote terminals worldwide.

Shiron's InterSKY 4G/4M are considered to be the most cost effective quality broadband satellite systems available in the market. With new satellite communication products and applications for commercial and military markets, offering a full spectrum of quality cutting-edge satellite networking solutions, for which the company is well-known in the Broadband SATCOM market. Shiron's world-class team of engineers has consistently been ahead of its competition in introducing innovations such as the first integrated L-band 256Ksps satellite communications modem in 1998, the introduction of InterSKY, the first Digital Video Broadcasting/Frequency Division Multiple Access ("DVB/FDMA"), broadband satellite communications system in 1999, and the first shared alternative to Single Channel Per Carrier ("SCPC").

In 2006, as DVB-S2 standards were accepted, Shiron was the first to add DVB-S2 capabilities to its suite of InterSKY VSAT satellite communications systems. More recently, Shiron's innovation yielded a revolutionary bi-directional Adaptive Coding and Modulation ("ACM") technology with integrated Automatic Uplink Power Control ("AUPC"), which delivers more than a 30 percent throughput gain improvement over competing ACM solutions used on DVB-S2 products. Shiron has been able to package InterSKY 4G/4M as a multi service broadband SATCOM solution. The modem will be the key enabler for the support of military satellite communications' key requirements, namely, rapid deployment, mobility, security, intentional and non intentional interference resistance, survivability, hybrid star-mesh connectivity, high speed return link, multi band operation, and so on.

Such capabilities are crucial for mission critical, multi-service, On-The-Move (OTM) and On-The-Pause (OTP) manpack and portable applications, large communication networks, and small command and control networks for controlling unmanned systems, on the ground, in the air or at sea, as well as small antennas operation, and able to resist interference from neighboring satellites. The modem will comply with regulations for maximal off-axis EIRP spectral density so that interference to other neighbor satellites is limited.

The advanced MILSATCOM modem will be equipped with a high speed return link capability based on new ETSI standards that define mobile mode based on continuous carrier with spread spectrum rather than TDMA / MF-TDMA which is not efficient for broadband mobile COTM. Such high speed return link is essential among other applications for unmanned systems. For increased resilience in such mission critical high speed return applications, the Company's advanced, Bidirectional ACM technology will provide for increased survivability and maximizing of throughput per given bandwidth. This is accomplished by adapting the coding and modulation to actual climate conditions, essential in the support for Ka-band operation with its large dynamic range and fast fading, and the support for quick synchronization for rapid recovery from shadowing for OTM applications. This advanced MILSATCOM modem will also feature a full set of local management capabilities in order to facilitate for a simple and swift OTP installation, including auto commissioning, support for easy antenna alignment process and interoperability with terrestrial wireless networks. The above mentioned technologies will make this advanced modem a key building block for modern military satellite communication deployments and enable optimal integration of C4I applications.

Harris CapRock Communications

by Tom Eaton, President

Harris CapRock Communications had a significant year in 2011, as the business experienced measurable growth and change. Harris CapRock was formed in April, after Harris Corporation acquired CapRock Communications in 2010. Combined with two subsequent acquisitions and Harris' existing maritime-subsea business, the newly formed Harris CapRock is now the world's largest provider of communications to customers in remote and harsh environments across government, energy and maritime markets.

Terrestrial network capabilities that were acquired during that integration further strengthened Harris CapRock's service delivery platform with increased points of presence (PoPs) around the globe. Other highlights included significant maritime contract wins and several key land drilling wins, as the business' FieldAccess™ service solution saw the completion of its first full year in the marketplace. In November, the Company announced its new customer service and network management program, AssuredCare™, which is scheduled for official launch in the first quarter of 2012.

With the acquisition of Core180 in March 2011, Harris CapRock benefited from the key infrastructure assets of the newly acquired business, expanding its terrestrial network infrastructure and ability to offer fully managed, end-to-end communication services for both government and commercial customers. Included in the acquisition was a proprietary, carrier-agnostic Network as a Service (NaaS) platform, which enables customers to extend their networks without additional capital or operational expenses. Additionally, the number of global points of presence (PoPs) for Harris CapRock greatly expanded. Harris CapRock's maritime communications business, SeaAccess, continued to experience great success in the marketplace with major wins in 2011, including fleet-wide contracts with BP Shipping Limited and Shipping. BP Shipping Limited signed a multi-year contract with Harris CapRock for VSAT service deployment to more than 50 vessels in its global tanker fleet, extending its corporate IT network and applications to its vessels and providing attractive crew welfare solutions. Securing BP Shipping's fleet further builds upon the strong relationship Harris CapRock has established with the company, as BP's operations in the Gulf of Mexico and West Africa are also supported by the business' SeaAccess solution.

Farstad Shipping was another major maritime win for communications services to more than 50 offshore supply vessels. Included in the service provisions are corporate networking capabilities, Internet access, crew calling solutions and email service. Following the launch of FieldAccess in August 2010, Harris CapRock received several notable contracts with leading drilling contractors and service companies in North America, including Allied Wireline. Harris CapRock is providing FieldAccess communications services to Allied Wireline's multiple trucks in its fleet supporting wireline services to land sites throughout North America. Provisions of the service include data transmission, Internet access, unlimited voice and other communication services.

A significant milestone for the service solution was the official opening of two new FieldAccess service centers in Texas during October. The new service centers in San Antonio and Odessa, Texas, strengthen Harris CapRock's existing service capabilities via the FieldAccess solution, as well as meet the needs of land drilling operations in Texas' Permian Basin and Eagle Ford regions. The service center houses critical spares and allows for quicker service response in their respective regions.

November was an exciting month for Harris CapRock as the business announced the finalization of AssuredCare™, its comprehensive customer service and network management program. The AssuredCare program will enable Harris CapRock customers to have improved real-time visibility into their global communications. AssuredCare guarantees that Harris CapRock's multi-disciplined engineers answer and handle customer calls from end-to-end. The company's certified field technicians and engineers are available to provide field service support, handling all logistics from equipment delivery and installation to configuration and start-up. Harris CapRock began live testing the program with selected customers in October, and is currently working to port all customers' service to the expanded system by the first quarter of 2012.

Harris CapRock saw many successes and changes in 2011. As the business' integration efforts come to a close, the result of these acquisitions is a stronger organization with more robust service capabilities and increased customer support. The reliable communications services that the business has provided for more than 30 years is now stronger than ever, and that growth and commitment to the market is clearly evident through the successes it has experienced in 2011. With its sights set on 2012, Harris CapRock is fully positioned to meet, and exceed, its goals and continue to provide communications to remote and harsh locations around the globe.

HARRIS CAPROCK

Hughes Defense & Intelligence Systems

by Rick Lober, Vice President and General Manager

The military market has changed dramatically over the course of 2011 — most agencies are facing significant budget reductions. As Congress and the "Supercommittee" work to reduce $1.2 trillion over the next 10 years, the military and intelligence communities could feel the biggest impact from the cuts. At Hughes, we've been busy working with our customers and partners to help provide the best and most cost-effective communications solutions to some of the most pressing issues facing our military today.

We've made great strides in 2011, working with the U.S. Air Force (USAF) studying commercial technology applications for the military; growing our airborne intelligence, surveillance, and reconnaissance (ISR) contributions to the government; continuing to expand our communications capabilities for the intelligence sector; and working with Coalition partners on communications-on-the-move (COTM) operations to secure borders and keep homelands safe.

In September, the Department of Defense (DoD) awarded Hughes an extension contract for its study with the USAF of commercial communications satellite (COCOMSAT) systems capabilities. This has expanded the initial study beyond how changes in various SATCOM architectures would impact military needs and outcomes, to an assessment of complete systems — space, ground and terminal segments — along with approaches to commercially-oriented acquisition. We're using the same systems level approach as in our commercial network developments in order to realize savings in cost and schedule should a new COMSATCOM initiative be put in place. The results of the study are scheduled for delivery in early 2012 to the USAF Space and Missile Command Center's Military Satellite Communications (MILSATCOM) Systems Directorate.

Airborne ISR is a natural fit for Hughes as we partner with Row 44 to provide in-flight broadband to commercial airlines such as Southwest. Our proven on-board, commercial HX platform provides significant advantages for military and intelligence applications, and in particular, maintaining links under adverse conditions. Information reaches the HX terminal from five separate satellite gateways, each enabling service on a different satellite. By backhauling traffic on the system, a single platform is able to track the position of the aircraft as it switches from one gateway coverage area into another, and dynamically establishes new connections.

Our HX terminal employs Performance Enhancing Proxy (PEP) technology, and during a gateway switch, the underlying transmission channel is reestablished through a new gateway without disrupting the connection to the Internet. This preserves the user's connection and minimizes impact on system operations. Hughes is providing government customers airborne ISR solutions that utilize a number of Hughes technologies, including, the HX200 router, HX Gateway, and the HX Expert Network Management System (ExpertNMS).

The intelligence community has been center stage in 2011, publicly leading a number of counter-terrorism operations. At Hughes, we are able to provide the intelligence community a variety of solutions from COTM, to ISR, to continuity of operations (COOP) solutions. Our intelligence-related business did very well in 2010, and we will continue to grow this area of the business in 2012. With the current U.S. warfighter drawdown, SATCOM solutions for the intelligence community become even more critical to homeland defense and peacekeeping efforts. As the U.S. and its Allies continue to work together to provide unified military missions and peacekeeping efforts, it is important that the technology of Command and Control (C2) has the capability to communicate with the other units in a Coalition. Net-centric SATCOM is a central component to this success, especially in underdeveloped, or harsh environments.

When Coalition Forces deploy, individual units often cannot operate beyond their own network, and information sharing is challenging due to proprietary and national communications standards. Satellite transmission equipment, such as the Hughes HX280 high performance router, which uses open standard waveforms defined in the global IPoS standard, approved by ETSI, TIA and the ITU, provide greater flexibility for deploying militaries to be able to interoperate with partners. Commercial waveforms and security standards also make military users interoperable with Non-Governmental Organizations (NGOs), which are often part of the front line operations in disaster recovery or rehabilitation missions.

Much of the world is facing a severe financial crisis. U.S. and Allied militaries must use the best practices of commercial SATCOM providers to help increase capabilities while decreasing costs. Bandwidth efficient technologies and advanced network management techniques are inherent to commercially oriented companies like Hughes, and can provide significant savings in the SATCOM area for military customers, reducing hardware and operational costs. This includes working with both public and private sector partners to reduce size, weight, and cost of portable SATCOM equipment such as antennas and battery packs, while increasing communications capabilities in a bandwidth constrained environment — which is essential for our warfighters.

Hughes is proud to support the U.S. military and its Allies, and I see us playing a much larger role within the DoD and intelligence community to help increase capabilities while drastically reducing costs in 2012.

HUGHES

iDirect

by David Bettinger, CTO + Senior Vice President, Engineering

From the beginning, iDirect has taken a visionary role in VSAT, helping to shape the industry through breakthrough technologies, winning economics and flexible business models — 2011 was no exception to this. As the global market for satellite connectivity grows across a wide range of industries, the opportunities for service providers continue to expand.

We address customers' and partners' needs using a three-fold strategy: First, we continually extend the value of the core iDirect Platform, optimizing for all frequencies and networks to enable our partners to meet the most complex and diverse applications. Second, we focus on high-value, specialized market segments, delivering integrated solutions and features to help partners meet unique requirements and untapped opportunities. Finally, we invest in co-innovation with best-in-class industry leaders to accelerate the delivery of superior products, fuel our platform, and expand the VSAT market. The following is a recap of the trends and technologies we've seen and been a part of over the past 12 months.

As the demand for satellite communications accelerates, new Ka-band satellites are primed to dramatically expand the market. By 2015, it's expected that 70 percent of total available capacity will be Ka-band, holding great potential for success across a broad range of vertical markets. iDirect's frequency-agnostic approach means our platform is Ka- ready today, enabling service providers to capitalize on emerging Ka-band opportunities by leveraging their existing portfolio, people and technology investments. We have built our platform around the concept of a single, integrated, multi-band network, equipping iDirect partners to manage a blended portfolio of Ka-, C-, Ku- and X-band services. Over the past year, iDirect was awarded the contract to develop the satellite ground infrastructure of Inmarsat's next-generation Ka-band satellite network, GlobalXpress.

Together at last — TDMA and SCPC: Earlier this year, iDirect reached an important technology breakthrough when it became the first satellite technology manufacturer to bring SCPC and TDMA together on a single platform. Available via a simple software upgrade to iDX 3.0, iDirect's SCPC Return Channel technology enables service providers, for the first time, to switch any Evolution router back and forth between TDMA and SCPC based on dynamic bandwidth requirements.

With the development of next-generation smart grid systems, utility companies are seeking to extend broadband connectivity across entire service areas. As the utilities and energy sector is still an emerging market for satellite communications, iDirect continues to foster end-user education to help drive greater adoption. To help service providers capture an opportunity for narrowband connectivity in the utility market, iDirect developed a new Evolution X1 remote router that is currently being field tested and will be released in Q1 2012.

Cellular backhaul over satellite is providing millions of people with connectivity while opening new business opportunities for network operators. Our new SCPC return feature offers an affordable solution for mobile operators to profitably pursue the rural market. When operators first introduce service in remote areas, they can use TDMA networks to cost-effectively backhaul data.

VSAT broadband continues to provide a high-speed, economic alternative to L-band networks as vessels become remote offices and homes, driving business productivity and improving crew welfare. During 2011, iDirect commissioned maritime specialist agency Stark Moore Macmillan to conduct the largest and most comprehensive maritime VSAT survey ever undertaken, which found demand for VSAT services in the commercial maritime sector increased significantly over the last five years — up to 30 percent of the maritime market is looking to fit VSAT within 24 months.

The military and defense market remains the largest satellite customer segment in both value and demand. iDirect's defense product line and advanced features provide a reliable, efficient and highly secure solution for militaries and civil government agencies across the globe, with 18 of 27 EU Member States and 16 of 28 NATO member countries using iDirect today. Complex environments on land, at sea, and in the air. Earlier in 2011, iDirect expanded its government and defense feature set to make satellite communications more reliable in the harsh and remote field environments in which militaries operate. The iDX 2.3 software release expands iDirect's TRANSEC security capabilities, adds new FIPS 140-2 Level 2-compliant remotes and line cards capable of supporting multiple return channels, and introduces a new feature that extends the battery life of portable satellite terminals.

What's next? 2011 was a momentous and exciting year for the satellite industry — 2012 promises to be no less significant. While we achieved a lot this year, we're certainly not resting on our success. Our engineers are already developing and testing new specialized technologies and products that will enable service providers take VSAT to new markets, applications and environments. Moving forward, we will continue to shape the future of VSAT through a well-thought-out strategy.

Intelsat General

by Kay Sears, President

Intelsat General continued to play a key role in supporting the global reach of the U.S. military and its NATO allies in 2011, providing solutions ranging from UAV data transfer to television signals to U.S. troops around the globe. Satellite capacity provided by Intelsat General and other commercial companies continued to make up the lion's share of bandwidth used by the military for both normal operations and in the combat zones of Southwest Asia.

Intelsat General is a critical enabler for medium- and high-altitude UAV operations around the world. Manned ISR platforms are transitioning from narrowband communications using L-band satellites to wideband commercial and military SATCOM, creating even greater demand for high-capacity bandwidth. It is projected that ISR bandwidth demand will reach 16GHz by 2018, more than double the commercial SATCOM in use today to support operations in the Middle East. The satellite industry has been successful in supporting this recent growth due to the scale and flexibility inherent in commercial satellite fleets and the frequent technological upgrades offered by robust fleet replenishment schedules. Intelsat General today provides some 1 GHz of total wideband capacity, representing more than 50 simultaneous flights of manned/unmanned ISR missions in a number of theaters.

Intelsat General is working with satellite manufacturers on specialized payloads, some with the economic advantages of hosted payloads, for next-generation capabilities that would provide dramatic increases in overall bandwidth. In further support of military units, Intelsat General's was awarded a contract to provide comprehensive satellite connectivity to the Armed Forces Radio and Television Service (AFRTS), which provides multi-channel, broadcast-quality radio and TV programs to military forces and their families stationed outside of the United States and aboard Navy ships at sea. Intelsat General is now providing the satellite capacity and terrestrial infrastructure via the IntelsatONE network in support of the service, as well as additional internal information programming offered by the Department of Defense. AFRTS uses seven satellites and six data entry points to carry television and stereo audio services to over 1,000 outlets in more than 175 countries and U.S. territories and to U.S. Navy ships.

The U.S. Centers for Disease Control (CDC) selected Intelsat General Corp. to provide satellite connectivity to 17 field offices in Africa and the Caribbean, regions of the world where crowding, poverty and tropical weather combine to create environments ripe for the incubation and spread of communicable diseases. The Intelsat network will provide CDC field offices and research stations with real-time data to promote health throughout developing countries by disseminating disease prevention and treatment information.

The CDC, with operations in more than 50 countries, relies on a global communications network to move data about disease outbreaks and prevention measures to and from its Atlanta headquarters and field offices. The Intelsat General network will allow the CDC to allocate bandwidth to the regions where data demand is highest at any given time. IS-25, which will provide connectivity, is one of the few satellites on orbit capable of covering both Africa and Latin America.

As part of its work with U.S. government customers in 2011, Intelsat General was one of four firms awarded a U.S. Air Force contract to undertake a range of studies showing how the U.S. military can make better use of commercial satellite capabilities. The contract is further evidence that the Pentagon intends to incorporate commercial satellite capabilities into its long-range planning and to make better use of commercial assets already in orbit.

Under the award, Intelsat General is examining how hosted payloads could be used by the military on commercial satellites. The other firms are looking at how commercial firms can augment the government's Ka- and X-band capacity; whether small Ka-band terminals could be supported by commercial satellites for COTM needs and AISR; and ways of providing increased commercial support for Ka-band long track terminals, and for intra-theater low and medium altitude AISR terminals.

As part of the U.S. government's shift in how it buys commercial satellite capacity, Intelsat General was among a number of firms added to the new Future COMSATCOM Services Acquisition (FCSA) contracts for transponded services and subscription services. Intelsat General was among the first commercial satellite operators to be granted this eligibility under the new contract vehicle jointly managed by the General Services Administration (GSA) and the Defense Information Systems Agency (DISA). The award will permit the Department of Defense to directly acquire transponder capacity and subscription services from Intelsat General during the initial five-year term.

The collaboration of the GSA and DISA creates a central marketplace for all government customers needing commercial satellite communications capacity while at the same time making sure that satellite solutions meet the government's information assurance and security requirements. The GSA estimates that the government will save millions of dollars by being able to purchase satellite communications services directly from providers rather than through transponder capacity brokers.

Kratos Defense & Security Solutions—Integral Systems

by John Monahan, President, RT Logic, and Robert Wright, Jr., Sr. V.P. + GM, Integral Systems

2011 has been a year of opportunity. Despite the state of the global economy, it has reinforced the axiom that those who stay close to their customers and offer innovative and flexible solutions will do well. As demand for increased satellite bandwidth, improved ROI and QoS continue to grow, it is driving innovation and efficiencies never before seen. Industry customers will continue to seek out affordable, easily accessible and customizable commercial-based solutions as an alternative to expensive, proprietary products.

Since 1997, RT Logic has delivered innovative ground-based, signal processing systems for the space and aerospace communications industry. More than 4,000 of our systems have been deployed and are being used by 90 percent of U.S. space missions during their test, launch and/or on-orbit phase. Our solutions help ensure that customers meet their mission requirements and optimize their operations, while doing so with little to no increase in staff, on-schedule and within budget.

Earlier this year, our parent company, Integral Systems, was acquired by Kratos Defense and Security Solutions. Now, as part of this leading technology solutions provider with nearly $1 billion in revenue, RT Logic is closely partnering with other elements of Kratos and with our sister companies — CVG-Avtec, SAT Corporation, Newpoint Technologies, and Lumistar — to provide best-in-class, commercial-based products and services that assure the availability, reliability and security of satellite and terrestrial networks. This includes solutions across a wide spectrum, from command and control to signal processing, interference monitoring and geolocation, network management, cybersecurity, data recording, test applications and other areas where the industry is seeking new and advanced solutions.

It is clear that 2012 will continue to be a time of change. To meet the increasing demands of government and commercial customers, vendors will have to be even more flexible, innovative and responsive. They will need to tackle additional program requirements, even during the development and deployment phases, and provide solutions that drive efficiencies throughout the system. Upcoming U.S. Government budget reductions will pose an interesting challenge in driving the next generation of efficiencies. New program starts will be few and far between. Existing programs will need to adapt to and integrate new capabilities, or solve obsolescence issues in a cost constrained environment. Companies that offer commercial-based solutions and rely on open and adaptable architectures at a fixed price will hold a considerable advantage.

Left: Monahan — Right: Wright

On the technology side, we will see a new set of capabilities come online, or be exploited in novel and possibly unanticipated ways. These include the Space-based Infrared System (SBIRS), Space Based Space Surveillance (SBSS) System, Rapid Attack Identification Detection Reporting System (RAIDRS), Advanced Extremely High Frequency (AEHF), hosted payloads, and others. As the ground systems for many of these programs were delivered many years prior to initial operations, this will offer opportunities to adapt the current ground systems to meet changing Concept of Operations (CONOPS), as well as new applications and threats. It will reinforce the need for flexible architectures that can accommodate unanticipated changes to the global situational/threat landscape.

In addition, RF interference will continue to challenge the industry. By proactively addressing the problem, commercial satellite operators, service providers, resellers and broadcasters can mitigate the loss of millions of dollars of revenue/profit by applying proven technologies. In 2011, in partnership with our sister company, SAT Corporation, we increased our ability to offer satellite interference monitoring and mitigation capabilities as a service. SAT Corporation is the only company that can provide comprehensive RF mitigation solutions (analysis, monitoring, detection and geolocation) as either a product solution or a service. Customers of all sizes now have access to the most powerful interference detection and geolocation capabilities available today.

While other trends are sure to arise, no matter what the coming year brings we will continue to do what we have always done: Focus on the customer. We remain committed to listening and to delivering innovative products and services that meet the sometimes contrasting needs of providing greater levels of service in a cost-conscious environment. As we close this year and enter 2012, it is clear that the need for more efficient, scalable, flexible and affordable products will continue to increase.

KRATOS
FROM STRENGTH TO SUCCESS

INTEGRAL SYSTEMS

NEWPOINT | RT LOGIC | SAT CORPORATION | CVG-AVTEC | LUMISTAR | INTEGRAL SYSTEMS EUROPE

KVH Industries

by William A. Houtz, Manager, Military Products

KVH's military satellite communications business grew in a number of ways over the past year. That growth was supported by some key developments in our product and service offering, including the completion of the original global expansion plan for the mini-VSAT Broadband network. We also introduced the ultra-compact (14.5") TracPhone® V3 satellite communications antenna in February, making the mini-VSAT BroadbandSM service available to a much wider array of vessels and vehicles than ever before.

The TracPhone V3 is already in use with the U.S. Navy's Southern Command and, along with the TracPhone V7, played an important role during the 2011 PANAMAX training exercise in August. This 12-day exercise involved more than 3,500 military and civilian personnel from more than 17 countries. Dedicated to maintaining the security of the Panama Canal, it is one of the largest multinational training exercises in the world, so clear and reliable communications — despite differences in native languages and data network specifications — are key to its success. The rugged TracPhone V-series antennas and reliable mini-VSAT Broadband network provide an outstanding solution for keeping coalitions like this one working smoothly.

Our partner, Mackay Communications, took the TracPhone V3 one step further in September, introducing a portable system configuration that is housed in two hard cases and can be deployed anywhere in the world. The configuration is so versatile, it can be easily transported as checked baggage on commercial flights. Just a few months after its introduction, the system is already being adopted by contingency response units.

Mackay Communications was also a key player in orchestrating the first TracPhone V7 deployment on U.S. Navy and National Oceanic and Atmospheric Administration (NOAA) vessels. NOAA's Office of National Marine Sanctuaries (ONMS) is using the TracPhone V7 aboard an 85' small research vessel (SRVx). These vessels support a range of NOAA research activities, including critical ocean conservation and resource protection missions.

The U.S. Navy adopted a KVH solution specifically to support crew welfare and retention efforts — it includes a TracPhone V7 satellite communications antenna and mini-VSAT Broadband service, along with KVH's CommBox™ Ship/Shore Network Manager and the CommBox QuickCrew™ software module. This configuration offers a variety of features for convenient, prepaid crew access to e-mail and web browsing anywhere in the world. The QuickCrew status window allows users to see their available credit and other details at a glance, and the application supports e-mail accounts from any POP3/SMTP/IMAP client. For vessel managers, this solution is easy to manage, with usage that is logged and easy to retrieve, along with automatic termination of service when credits are depleted.

The U.S. Coast Guard completed its deployment of the TracPhone V7 on its 110' WPB class cutters and 225' WLB class seagoing buoy tenders, and began installing the systems on its 210' WMEC class medium endurance cutters. Fulfillment of the systems purchased in the $42 million, 10-year contract announced in September, 2010 for the Coast Guard's small and medium cutters is progressing steadily, with the pilot stage for deployment of TracPhone V7 systems on its 87' WPB class coastal patrol vessels nearing completion. These vessels are utilizing the TracPhone V7's robust communications capabilities in a variety of U.S. military operations and exercises, including PANAMAX.

A number of navies around the world are making use of the TracPhone V7 and mini-VSAT Broadband service for similar operations. For instance, the Republic of Korea Navy recently installed TracPhone V7 systems on two additional destroyers, completing deployment of the system on this class of capital ships.

KVH continued to offer TracVision® satellite TV products to military customers through 2011, as navies and coalitions worked to support crew morale and retention aboard their ships. Worldwide satellite TV systems like KVH's TracVision M9 and the new, HDTV-ready TracVision HD11 provide access to high-powered regional satellite TV services around the globe, so crew members have access to the same kind of satellite TV programming they enjoy at home wherever they travel.

As 2012 approaches, KVH is looking forward to supporting international militaries with a global presence, including offices in Middletown, Rhode Island, Tinley Park, Illinois, Denmark, Norway, and Singapore, with plans for KVH entities in Brazil and Japan. We will also open a new 75,000 square foot manufacturing and warehouse facility at our world headquarters in Middletown, Rhode Island, to support growing demand for our satellite products.

We are just now scratching the surface of communications needs for international navies, coastal defense teams, and other government customers. We're just getting into new markets like contingency response with new products like Mackay Communications' portable TracPhone V3 configuration. Government and military entities are rapidly becoming more technologically dependent on satellite broadband for mission requirements, while having to simultaneously reduce budgets, and KVH is poised to offer the satellite communications solutions they need at the prices they want.

Newtec

by Serge Van Herck, CEO

This year has been a particularly successful one for the satellite industry. Whilst the global markets in 2011 have been steady, but lack lustre in many regions, they have been particularly strong in rapidly developing parts of the world. The satellite industry has been buoyant with connectivity, increasing TV transmissions, IP broadband traffic, a growing requirement for mobile backhaul and also implementation of technological innovations such as Ka-band pushing it forward.

In a recent paper by international telecom market research and consulting firm NSR, analysts predict that 1,600 satellites will be launched in the next 15 years. This will likely be worth $250 billion to the satellite industry over the same time period.

With the future outlook for the industry being particularly bright, Newtec has been planning and implementing new strategies in 2011 to align itself and reap the potential rewards. Innovations this year, major contract wins and the decision to improve the way Newtec works with its partners, have assured 2011 has its place in the record books as one of the most transformational in the company's 26-year history.

Newtec has also set a clear ambition to strengthen its core focus onto key vertical markets. The company's sights are set on broadband, Ka- and multiservice solutions, converging broadcast technologies, government and defence solutions, and IP trunking and backbone markets as primary targets. For the latter, market research has already shown that Newtec is the global market leader.

With the burden on governments to monitor their budgets tightly, and to make the most of satellite throughput, Newtec continues to see this as an area where major efficiencies can be made. Satellite communications are vital to many government communications. They play an important role in communicating with UAVs, fixed communications, Intelligence gathering and also with troop Morale, Welfare and Recreation (MWR) programs.

When talking about technologies for UAVs, Newtec's FlexACM® ensures more efficient beyond line-of-sight communications. At the same time optimal availability can be achieved in any fading condition — such as inclined orbit, weather and interference — to keep mission-critical communications running at all times.

With this in mind Newtec has expanded its conference and exhibition programme. In 2011 it exhibited at Milcom, Global MilsatCom and Milipol to name just a few. And for those who could not attend tradeshows, Newtec has regularly offered free webinars as well as hosted its own seminar in Miami.

Of course Newtec has maintained its focus on other exhibitions in 2011 too, launching many new products in the broadcast, IP trunking and broadband access markets at IBC 2011. It also had a major presence at NAB, CommunicAsia, Convergence India and the Satellite show in Washington among other industry shows.

The year 2011 has been a very successful one for Newtec in which it has won major contracts and aligned itself successfully with a buoyant industry.

In 2012 Newtec will increase its efforts across the globe but in particular, in Africa and Russia where market penetration will be boosted as new excellent partners combine with innovative new solutions and products.

Now and in the future Newtec is committed to its position in the market as an independent technology provider of choice. Its core belief is to help customers and partners to succeed through innovation and cutting edge technology. With a fine-tuned strategy there is every confidence that 2012 can be equally as successful.

The Newtec sales team

Segovia

by Andy Beegan, Chief Technology Officer + Senior Vice President, Engineering and Operations

In recent years, we watched the need for defense-centric communications increase, as the military continued to seek more efficient and effective ways of delivering net-centric applications capabilities that equip soldiers with better airborne intelligence and surveillance and reconnaissance (AISR) assets and improve the availability and reliability of mobile devices. At the same time, U.S. defense agencies were increasingly forced to work under more constrained budgets to meet and sustain their efforts.

What was often more difficult was to find contractors that could provide the depth and breadth of services required in a wholly efficient and reliable manner that could be available anytime, anywhere. Thus, the government customer seeks innovative ways how to procure those capabilities, which in turn drives the demand for end-to-end solutions. At the same time, this approach requires the broadening of vendors' capabilities.

As a result, Segovia has built and continues to innovate its business model based on the defense market's mandates and offers a secure managed service delivered in an end-to-end distribution path, which allows defense organizations to maximize network infrastructure performance at a reduced cost. We have made enhancements to the Segovia network, which encompasses every component of an end-to-end service. It's fully integrated, from the remote terminal segment, to the space segment, to the teleport services and the terrestrial backbone that connects the end-user back to a secure and private network. The Company has been delivering seamless network environments that support the basic core communication services relevant and common to every element of multi-agency organizations.

Next year we expect to see defense organizations seek solutions that can bolster security with an enterprise approach to information assurance and the detailed focus and attention required to combat evolving threats. To meet this demand, Segovia will continue to build and manage its own infrastructure, unlike other providers that may only resell various network components with no physical title or control to the assets. Our approach aims to minimize the number of layers that are between us and the customer, and between us and the control of those assets. This has enabled us to establish increased security measures over network devices, from both a physical and logical standpoint. We know how critical the diversity, redundancy and security of the network is to our customers, and we value that, which is why we remain fully involved with the management of each component, both at the physical and information layer.

Bandwidth requirements will continue to grow and it's clear that the satellite industry needs to find a way to deliver more bandwidth with improved cost efficiency. To deliver this critical need, Segovia, as part of the Inmarsat family of companies, has taken a leadership role in the delivery of Inmarsat's new Ka-band satellite platform, Global Xpress™. This next-generation capability will provide high capacity, global Ka-bandwidth delivered as a secure, managed service to customers that includes all components of the solution in an end-to-end chain, and, thus, enables us to lower customers' costs significantly. With the revolutionary value add, Global Xpress is a true game changer, redefining fixed and mobile satellite services and setting new standards for SATCOM. In 2013, the Global Xpress constellation will launch, and Segovia will be a key vehicle in delivering Ka band end-to-end managed services.

Finally, it's important to stress that the defense agencies' budget and resource constraints will be part of the environment for years to come, making the adoption of end-to-end delivery models critical for our industry. While this remained true even in recent years, still, many firms in our industry, whether they are traditional terrestrial or satellite telecommunication providers, tend to fixate on just one element of the communications chain. This has put government end users in the position of piecing together all of the elements, which can add costs. This method also becomes problematic from the lifecycle maintenance point of view or simply, when an issue arises and the end user needs to deal with multiple providers within its supply chain. This approach introduces significant inefficiencies and wastes and, in turn, can negatively impact the user's core mission. Executing the mission with one system integrator vs. multiple disparate vendors provides the end-user with one button to push for performance and accountability and obviates the recurring issue of scattered control.

In essence, the Segovia end-to-end delivery model is becoming the standard that our customers demand. As more and more defense agencies are realizing, the speed of the acquisition cycle is minimized with a single provider and cost efficiencies are realized with bandwidth sharing. In fact, the always-on framework allows for bandwidth portability and scalable services including bandwidth-on-demand and "pay as you go" surge support.

As requirements evolve, the market will continue to demand solutions that can easily adapt to future needs, including flexible, cost-effective and full-lifecycle managed solutions that use standard-based architecture and commercial-off-the-shelf (COTS) products. As a result, the industry, as Segovia has shown, will be required to bring secure, interoperable end-to-end solutions that can provide exceptional value and return on investment indefinitely.

SkyWave Mobile

by Dr. Sean Faulkner, Vice President

2011 has been a revolutionary year for SkyWave. Our biggest accomplishment thus far has been the introduction of IsatData Pro, a new Inmarsat-based machine-to-machine (M2M) service and platform that will enable our customers to offer wireless connectivity that previously was unavailable with any other global satellite services in the market.

As expected, the increased payload capacity offered by IsatData Pro, along with the decreased message delivery time, has opened up a number of new markets for SkyWave and allowed us to offer our services where previously we could not offer a compelling solution. We are seeing a surge of demand for the service in everything from the transportation, maritime and oil & gas, utilities and SCADA sector. The applications are not ones that we have seen before — in fact, the trend is to offer connectivity similar to what end-customers are used to experiencing when they can use cellular-based services.

The transportation sector has been, by far, the biggest sector to embrace IsatData Pro. While for many companies a cellular-based service is sufficient, for others having that seamless connectivity when their vehicles move in and out of cellular reach or avoiding costly and unpredictable roaming charges means they are using satellite service as a backup. In some parts of the world, it has taken a long time for the sector to embrace this concept because satellite has been viewed as "expensive"; the new price points now offered by M2M services like IsatData Pro suddenly make satellite the logical choice.

In geographies like Brazil, the benefits of satellite service have long been known and IsatData Pro is being embraced for the increased messaging capability and consequently the ability to deliver more services. SkyWave customers such as Brazil's OnixSat, who primarily offer security-based applications via satellite, are looking to offer services such as the ability to send "free-form" text messaging, logistics forms, telemetry reports, and driver monitoring information regardless of the location of their vehicle.

"Drivers and business owners no longer want to wait until the truck is in an approved cellular network to receive the information — they want connectivity now regardless of the vehicle's location" says Wagner Eloy, Director of Sales at OnixSat. "The IsatData Pro satellite service enables us to provide the connectivity that our customers are demanding."

Building on the concept of being able to send logistics forms while on the road, SkyWave customers like Skymira are driving business mobility solutions to the next level. The further proliferation of smartphones, tablets and iPads means that organizations are looking at how they can extend their enterprise IT system to the field workforce. They want field workers to immediately be able to access or input CRM/customer management, inventory, dispatch and work order data.

"The drive for business mobility solutions is the need for improved responsiveness to customers, increased worker productivity and transformed business processes," says Robert Landsfield, CEO of Skymira. "IsatData Pro integrated into our system allows us to provide that extension of the IT enterprise system wherever the field worker may be located."

For customers servicing the oil & gas sector like M2M Data Corporation, IsatData Pro allows them to offer the ability to send and receive more information, enabling customers to cost effectively get the field data they need for their operations. As an example, when a compressor reports an error code, with IsatData Pro M2M Data Corporation customers can request diagnostic, historical and trending data before sending a technician to the site.

"With IsatData Pro, customers have the ability to have more information on hand as to why the compressor is reporting a specific error code and prepare the technician with the right tools and knowledge to perform a first-time fix," says Donald Wallace, CEO of M2M Data Corporation. "It is not only about increasing customer satisfaction but also reducing employee windshield (driving) time."

Earlier this year, Quake Global announced that their new Q-Pro modem would be available in an IsatData Pro configuration. The addition of IsatData Pro capability to the Q-Pro will allow Quake Global's customers to send higher volumes of telemetry data, and to send that data from locations that might not be covered by other satellite services.

"The large packet sizes offered by IsatData Pro will enable our customers to quickly request and receive location, diagnostic and prognostic information at a very competitive rate," says Ken Connor, VP of Sales at Quake Global. "Customers can expect the Q-Pro module with the IsatData Pro configuration to provide a valuable extension of the services that they already receive with GSM."

The examples that I have talked about so far are just a few of the channel partners that have embraced IsatData Pro and are going to market with solutions. We have many more that are integrating the service into their offering. Expect to see many more solution announcements in 2012!

SkyWave

TeleCommunication Systems

by James Sprungle, Vice President, Government Programs

Despite the economic turmoil that impacted the U.S. and the world in 2011, TeleCommunication Systems, Inc. (TCS), a world leader in highly reliable and secure mobile communication technology, has managed to end the year on a high note, especially its Government Solutions Group, led by Michael Bristol, senior vice president and general manager, government solutions.

In 2011, TCS received significant wins related to the U.S. Army's $5 billion World-Wide Satellite Systems (WWSS) contract, including a $60 million contract providing Tactical SHF Satellite Terminals and a $20 million contract for systems and field services of Secret Internet Protocol Router and Non-secure Internet Protocol Router Access Point (SNAP) Very Small Aperture Terminal (VSAT) satellite systems, which brings the total of fielded SNAP systems to over 700. "The WWSS orders are a testament that the U.S. military has embraced TCS' line of deployable communications products and is making them an integral part of today's modern battlefield," said Bristol.

The company also launched the TCS Impact Tactical IP Terminal, a modular communication system that dynamically improves the warfighters capabilities while greatly reducing size, weight and power consumption. It can be deployed as a very small, standalone unit down to the team level, or, it can be expanded dynamically to serve the brigade or higher level.

TCS' Government Solutions segment entered into an exclusive arrangement to be the operator of the Cisco Internet Routing in Space (IRIS) solution using the Cisco® 18400 Space Router on Intelsat IS-14, the most advanced commercial satellite platform available today. This industry-first solution, known as OS-IRIS, enables the convergence of satellite communications and existing information technology infrastructure. By using the benefits of secure Layer 3 Internet Protocol (IP) routing on board the spacecraft, end-to-end IP Virtual Private Network services can be offered directly from space with new levels of flexibility and network control.

TCS has seen an upswing in interest and orders for the Tactical Transportable TROPO (3T) system, which provides long-haul, high-bandwidth and low-latency communications with best-in-class proven technology.

In 2011, TCS completed its infrastructure investments required to achieve Mission Assurance Category (MAC) II compliance for the Department of Defense (DoD), and stands ready to meet and certify to customer specific Information Assurance requirements. Mission Assurance Categories for DoD systems define mission requirements for availability and integrity.

What will we see in 2012 and beyond? According to Bristol, the key themes will continue to be "smaller, lighter, cheaper, and more throughput. The DoD will be looking for providers that offer total communications solutions, which will extend from the desktop at headquarters all the way to a warfighter's handset at the most remote edge of the network — in other words, you must be a 'core to the edge' provider," Bristol said. "With satellite (SATCOM), cellular and terrestrial communications becoming more interconnected, communications equipment must handle each of these transport mechanisms with ease. As satellite bandwidth is a finite commodity that is in growing demand, which drives up its cost, being able to offer alternatives like TROPO, tactical cellular and wireless will place even more emphasis on mature product availability," Bristol stated.

The future will also demand that providers use innovative techniques to extend Internet routing capabilities as far out to the edge as possible. Part of the reason for this is that as budget cuts translate into fewer troops, those troops will be called upon to do more.

This portends well for TCS, as the TotalCom portfolio of products, services and support provides cost-effective, core-to-the-edge solutions from a single vendor. In addition, TotalCom meets that needed blend of satellite, terrestrial and wireless solutions. TCS is also well-positioned when it comes to Internet routing, via their OS-IRIS solution. "The future will demand that suppliers meet the government's basic demand of 'more for less.' With our ability to meet this demand via TotalCom, TCS is well-positioned for the future," said Bristol.

TCS Impact Tactical IP Terminal

USSecurenet

by Brian Aziz, Sales Executive

Relatively new to the industry, USSecurenet is a fundamental provider of mobile satellite communications to U.S. troops overseas via DISA, DITCO, and VAS providers serving the DoD. USSecurenet is seeing a significant demand on U.S. soil for those same products it has developed and provided to the U.S. military. As the weather changes and our climate and ecosystems evolve, first responders, public safety, and government officials are pressing for the products that keep our military connected in the direst situations. This is a natural progression of technological improvement, and one that USSecurenet is proud to support. The company's training center is daily designing satellite and VAS communications packages for emergency responders and the United States government.

This past year has proven to be a virtual nightmare in the contiguous United States for first responders and government officials. Blizzards, tornadoes, earthquakes, and hurricanes have pummeled various areas of the country, devastating entire neighborhoods, towns, and cities, necessitating immediate and drastic relief measures. In August, as Hurricane Irene swept through the eastern United States causing massive flooding and rampant power outages, millions of individuals and businesses were affected. USSecurenet provided satellite phone kits to local municipalities as back-up communication systems when their standard cell and land technologies were rendered useless due to power outages. The state of Vermont was devastated by Hurricane Irene— homes were leveled, roads and bridges destroyed by flooding. Tens of thousands of citizens were left without power for several days. In response to connectivity failure, the state ordered a number of satellite phones from USSecurenet, ensuring their ability to communicate if a future crisis should arise.

In times of economic hardship, it is difficult to find and appropriate funding for units of technology that, at first glance, seem extraneous and costly. However, as 2011 meets 2012, this is the perfect time for local and state municipalities to consider satellite systems as a supplement or alternative to their existing Land Mobile Radio systems. While generally reliable, traditional LMR systems fail when power grids go down. In many situations all over the U.S. this year, satellite communications would have been ideal for local law enforcement and emergency services in the wake of the several earthquakes, tornadoes, and storms that leveled some areas and rendered basic communications inoperable. In severe weather conditions or local network outages, satcoms prove reliable since our satellites are independent of terrestrial systems.

With the narrowbanding deadline just over a year away, much of the older radio systems used currently by first responders are not compliant with narrowbanding requirements and will have to be replaced by updated equipment. For smaller towns, even having just one satellite mobile command pack with BGAN connectivity, cordless satellite phones, a wireless router, and self-contained power as back-up can prove essential in a crisis situation.

Command packs such as those offered by USSecurenet are expensive to the average consumer, but are comparable to costs that would outfit an entire police department with radio bases, antennas, repeaters, and portables. A basic kit with a few phones is only about 1/10 of the cost of an entire UHF/VHF system.

Even more innovative is integration of LMR with satellite. Integration of the two permits the user to maintain their radio communication despite power complications. This solution is cost-effective and reliable when terrestrial infrastructure is not. The coverage range is wider and more diverse, allowing interdepartmental connectivity, and communication is not disturbed in the event of a power outage. This option allows agencies to use satellite devices without being forced to reconstruct their communication infrastructure or abandon their existing equipment. USSecurenet plans to implement a new program in 2012 using LMR/satellite integrations. One product features an Emergency Back-Up kit that provides any-to-any communications, ensuring customers the ability to communicate via radio-to-satellite interface. The kit will interconnect any disaster site with radio dispatch, PBX, video or photo and data transmission, and closed circuit communications promoting Situational Awareness. The kit can be tailored to each customer's communications needs, all for a single monthly fee. This program will also be accessible for telemedicine, including video conferencing, web access, EKG and blood glucose monitors, and doctors on standby.

USSecurenet has been successful this year in creating new relationships in the public safety and emergency response sector. USSecurenet promotes the adoption and integration of satellite communications devices into existing emergency service communications systems as reliable communications resources. The growing company has expanded its influence, doubling its customer base since the beginning of the year. As emergency response teams continue to upgrade their existing radios' systems, USSecurenet foresees a significant increase in new satcom users. USSecurenet is equipped to provide a range of devices and services to both the United States military, in addition to the public safety and emergency response teams.

Vizada

by Bo Norton, Vice President of Sales

While other networked environments have been moving toward improved convergence and interoperability for years, this is still a relatively new trend in SATCOM. In the mobile satellite services market, we are seeing the traditional hard line between MSS and FSS continue to blur. This shift will ultimately accelerate the transition to broadband mobility and converged connectivity services. A number of key industry players such as Vizada are now involved in all facets of the mobility market.

In August 2011, it was announced that the Vizada Group was going to be acquired by Astrium, a subsidiary of EADS. With this move, Astrium Services complements its existing satellite communications portfolios, which was historically focused on government and secure civil SATCOMs. The acquisition significantly expands Vizada's market position as we integrate the Astrium services offerings.

Continuing political turmoil in the Middle East and North Africa and natural disasters around the world, compounded by highly volatile global financial markets, have made 2011 a particularly challenging year. This instability has intensified the need for solutions and services that allow our troops, first responders and government organizations to operate in remote locations with similar capabilities to those in a tethered environment. Against that backdrop, delivering flexible SATCOM services across the land mobile, maritime and aeronautical markets has never been more significant and urgent.

As the demand for high throughputs and hybrid services continues to grow, increasingly the burden is on industry to deliver innovation, as investment in government SATCOM systems continues trending downward. From hosted payloads, to dedicated commercial satellites and transponders, industry is leading the development of new technology to meet government SATCOM requirements. While most services and solutions are designed for broad market adoption, Vizada and its technology partner ARINC have been collaborating on custom solutions to address specialized needs for government and military customers. This year the two companies validated the performance of RapydConnex™ in an airborne environment. RapydConnex is a global communication network that provides fully managed, automated handovers between Ku- and L-band coverage areas for high-demand, mission-critical applications in flight, on land or at sea. It was first developed to meet the needs of a U.S. Department of Defense (DOD) contract in 2010 and is now being offered to additional military, government and commercial customers.

Communications on the Move (COTM) continues to drive demand for higher bandwidth in SATCOM. Throughout the year, we've seen increased up take for ThurayaIP, part of our portfolio of mobile IP services, by the government market. ThurayaIP delivers broadband IP services and advanced video streaming using a highly compact, ultra lightweight terminal. Designed to work in demanding environments, the ThurayaIP terminal is not only rugged, but easy to set up for COTM. For government users, adding ThurayaIP to their comms kit, which traditionally includes Inmarsat BGAN, ensures redundant L-band service in the field.

Another growing area for SATCOMs in the government and commercial sectors is machine-to-machine (M2M) communications. M2M communications allow devices like sensors or meters to report event information such as temperature, location or environmental status. The network then transforms that report into usable information, like an alert to repair equipment or restock an inventory item. Numerous routine communication applications especially in remote areas can be automated through the use of M2M.

Vizada's multi-SNO (satellite network operator) approach to M2M services includes Iridium Short Burst Data (SBD) and the newly launched IsatData Pro, a global, low data rate, two-way packet data service for M2M communications being offered with our partner, SkyWave. Vizada also plans to offer BGAN M2M, when it becomes available in early 2012. We are looking to Hughes as our primary M2M equipment manufacturer as they are the front-running providers of BGAN M2M services.

In July, Vizada launched its newest Point of Presence (PoP) for BGAN, Swift Broadband and Fleet Broadband services in Paumalu, Hawaii. This significant infrastructure investment was the result of a direct customer request for more efficient interconnects to Inmarsat's Broadband IP services in the United States. Moreover, by integrating Expanded WAN Optimization Acceleration Technology into our network, Vizada can provide customers with network and protocol optimization and TCP and applications for IP services.

In 2012 we expect the need for greater throughput and service innovation to continue. The global environment, political and social, will continue to dictate the need for reliable satellite communications available anywhere on the globe at a moment's notice. With their own investment slowing, our military and government customers are working more and more closely with us to envision, test, develop and deliver the future of SATCOMs. Through this collaborative approach, we can expect to see more flexible, customized solutions along with multi-network devices that enable expanded convergence. Seamless connectivity and enhanced reliability will begin to set new baselines for SATCOMs in the year ahead, and Vizada is prepared with the infrastructure, knowledge and innovation to meet our customers' changing expectations.

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