SATCOM For Net-Centric Warfare October 2013

# MilsatMagazine

The launch of AEHF 3 aboard an Atlas V.
Photo courtesy of United Launch Alliance.

PROTECTED SATELLITE COMMUNICATIONS

## ***THE VALUE OF*** *ASSURING PROTECTED AFFORDABLE COMMUNICATIONS FOR EVERY WARFIGHTER.*

***Get protected communications for the cost of unprotected.*** Only Northrop Grumman guarantees affordable and truly protected anti-jam communications for warfighters and decision-makers. For three decades, we have provided sophisticated payloads capable of seamless communication in even the most challenging conditions. ***That's why we're leading the next generation into space.***

***THE VALUE OF*** *PERFORMANCE.*

NORTHROP GRUMMAN

www.northropgrumman.com/**protectedsatcom**

ANTCOM

ISO 9001:2008/FAA Certified
Made in USA

**Leading Manufacturer & Rapid Customization of High End**
**UHF, L, S, C, X, Ku-Band,**
**GPS, Glonass, GNSS, CRPA, Compass, Iridium, Inmarsat,**
**Thuraya, Globalstar, XM/Sirius, GSM, and Wi-Fi**
**Antennas**
**for Avionics, Ground, and Marine Applications**

http://www.antcom.com; Sales@antcom.com; 367 Van Ness Way, Torrance, CA 90501, USA

# MilsatMagazine

October 2013


## PUBLISHING OPERATIONS

*Silvano Payne, Publisher + Writer*
*Hartley G. Lesser, Editorial Director*
*Pattie Waldt, Executive Editor*
*Jill Durfee, Sales Director, Editorial Assistant*
*Simon Payne, Development Director*
*Donald McGee, Production Manager*
*Dan Makinster, Technical Advisor*

## SENIOR CONTRIBUTORS

*Mike Antonovich, ATEME*
*Bert Sadtler, Boxwood Executive Search*
*Richard Dutchik*
*Tony Bardo, Hughes*
*Chris Forrester, Broadgate Publications*
*Karl Fuchs, iDirect Government Services*
*Bob Gough, Carrick Communications*
*Jos Heyman, TIROS Space Information*
*David Leichner, Gilat Satellite Networks*
*Giles Peeters, Track24 Defence*


## THIS ISSUE'S AUTHORS

*Captain Zachary Anderson*
*Tony Bardo*
*Chuck Cynamon*
*Martin Deery*
*Lance Cpl. Shaltiel Dominguez*
*Karl Fuchs*
*Jim Garamone*
*Lieutenant Stacy Glaus*
*Hartley Lesser*
*Karen Parrish*
*Scott Prater*
*Lance Corporal Scott Reel*
*Staff Sgt. Julius Delos Reyes*
*Nicole Robinson*
*General William L. Shelton*
*Pattie Waldt*
*Whitney Williams*
*Koen Willems*


**Published 11 times a year by**
**SatNews Publishers**
**800 Siesta Way**
**Sonoma, CA 95476 USA**
**Phone: (707) 939-9306**
**Fax: (707) 838-9235**




***Editors note: A special thanks to United Launch Alliance, Northrop Grumman and Lockheed Martin for the inclusion of their photos on the cover, table of contents and feature articles throughout this issue.***

*Atlas V launch vehicle with the AEHF-3 payload aboard. Courtesy of United Launch Alliance.*

# Being green just got easier.

750W Ku-Band HPA

400W Ku-Band HPA

## *Xicom's new highly-efficient SATCOM HPAs and BUCs can help you go green.*

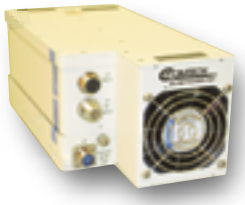
**Xicom Technology** is introducing NEW high power amplifiers and BUCs with radically improved efficiency that will help you achieve your green goals.

- **As much as 50% Space Savings**
- **Up to 50% Lower Power Consumption**
- **One-Third Lighter than Traditional Amplifiers**
- **Rugged Design for Mobile Environments**
- **Reduce Fuel and Charging Requirements**

You can't beat the combination of features and performance of Xicom amplifiers. Contact Xicom today and find out more.

High Linear Power Ka-Band HPA

Green Powered By XICOM TECHNOLOGY



40W Ku-Band BUC

COMTECH XICOM TECHNOLOGY

*Amplifier Quality & Reliability Since 1991*

FREE Android Link Calc App

**3550 Bassett Street · Santa Clara, CA 95054 USA · Phone: +1-408-213-3000 · Fax: +1-408-213-3001**

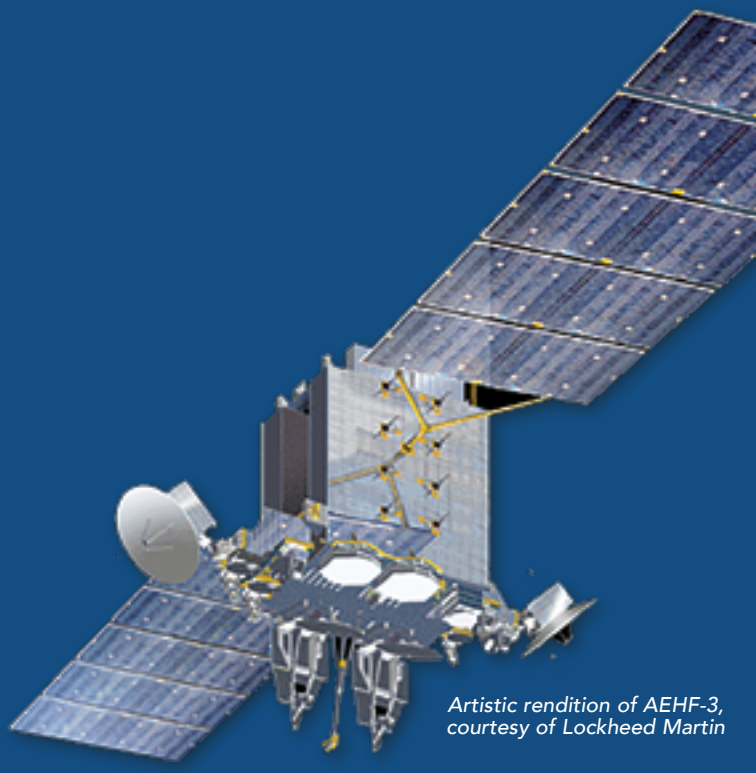
***www.xicomtech.com • e-mail: sales@xicomtech.com***

# MilsatMagazine

October 2013

## DISPATCHES





*Artistic rendition of AEHF-3, courtesy of Lockheed Martin*

# MilsatMagazine

October 2013

AEHF-3 on the launch pad. Photo courtesy of Pat Corkery, United Launch Alliance

## FEATURES

MilsatMagazine October 2013

FEATURES (CONT.)



*The encapsulation of AEHF-3.*

MilsatMagazine
October 2013

## ADVERTISER INDEX

# DISPATCHES

## HARRIS CORPORATION—INFRASTRUCTURE SUPPORT



**Harris Corporation has been awarded the Communications and Transmission Systems (CTS) contract by the U.S. Army.**

The contract enables the company to compete for a wide range of communications systems and services projects supporting the ongoing upgrade and maintenance of the Army's terrestrial network infrastructure.

Harris was one of 12 prime contractors selected for the five-year, indefinite delivery/indefinite quantity (IDIQ) contract, which has a total potential value of $4 billion.

Under the CTS IDIQ, Harris will pursue individual task orders for satellite communications systems and components, multimedia/multi-frequency solutions, and corresponding management and administrative responsibilities to support the Army's worldwide networks of satellite communications terminals and terrestrial transmission systems. Specific services could include systems integration, engineering and analysis, and facility and site preparation, as well as installation, operation, maintenance, program management, logistics, technical field assistance, and other support activities.

"This contract win reflects the broad expertise of Harris and its team members in satellite communications systems, networks, information technology and services supporting critical defense missions," said Ed Zoiss, vice president and general manager, Defense Programs, Harris Government Communications Systems. "The CTS work will support the Army's strategic communications networks worldwide, including Harris-built GSC-52 and Modernization of Enterprise Terminals."

The Harris CTS team is comprised of more than 100 companies recognized as leaders in the development, deployment and sustainment of communications and transmission systems technology.

**The Company has also been awarded a $65 million contract modification to provide worldwide satellite data and communications support to the U.S. Air Force's Satellite Control Network (AFSCN) and Global Positioning System antenna sites.**

Harris received the modification to its current Network and Space Operations and Maintenance contract, which supports the U.S. Air Force Space Command's 50th Space Wing.

Under the contract, a team led by Harris will continue to support both inbound and outbound data and communications for more than 150 Department of Defense satellites, operating and maintaining the AFSCN's antenna and ground system infrastructure at 10 locations worldwide.

Located at Schriever Air Force Base, Colorado, the 50th Space Wing is responsible for the operation and support of Department of Defense satellites, as well as the worldwide AFSCN. The AFSCN provides readiness, launch, early orbit/on-orbit support, and anomaly resolution for a variety of satellite constellations.

"The 50th Space Wing plays a vital role in our nation's defense by managing a complex system of satellites. This requires extraordinary technological knowledge and management skill," said Wayne Lucernoni, president, Harris IT Services. "Harris helps ensure that communications and critical data are properly managed. This contract modification expands our support at a reduced cost to the Air Force and U.S. taxpayers."

In IT Services, Harris designs, deploys, operates and maintains secure communications systems and information networks for some of the most complex, essential applications in the world for high-profile customers in government and commercial markets. Well-credentialed professionals deliver expertise worldwide in Systems and Network Integration, Managed Services, Cyber Security/Information Assurance, Mobility, and Cloud Services—on time, on budget, with solutions that are ready for today and built for tomorrow.

## EXACTEARTH + USCG—DEPENDENT UPON THE DATA


**In September 2013, the U.S. Coast Guard (USCG) Command, Control, and Communications Engineering Center awarded a contract to the Marine Exchange of Alaska (MXAK) to provide exactEarth Satellite AIS data for the USCG Nationwide AIS Program.**

The purpose of this contract is for the USCG to obtain Satellite AIS data and maintenance support services 24 hours a day, 7 days a week.

This effort entails providing the USCG with Satellite AIS data in near real time, stored and forwarded, and archived from a constellation of multiple satellites that cover the entire Alaska District of the USCG, including the polar region, with AIS collection capability.

The USCG Command, Control and Communications Engineering Center in support of the USCG Nationwide Automatic Identification System (NAIS) program will conduct a project to provide/evaluate Satellite AIS data in USCG District 17 (Alaska).

The Marine Exchange of Alaska currently contracts with exactEarth for Alaska Satellite AIS Data, and will provide the exactEarth data to the USCG in addition to the coastal AIS data for Alaska from over 100 terrestrial AIS receiver sites that it already provides under a separate USCG contract.

The contract period of performance is 12 months.

# Finisar®

*World's Largest Supplier of Optical Communication Components and Subsystems*

# When Your Applications Demand High-Performance and Reliability

## Use Only the Best RF-over-Fiber Solutions

### By the Leader in Optics

- Optical transmitters and receivers available in frequency ranges from DC to 50 GHz
- Optical Delay Lines and Optical Amplifiers
- Indoor rack-mount solutions
- Outdoor solutions in IP65/NEMA 4 enclosures
- Discrete analog optical modules

### Endurance™ Rugged, Compact 10 Gb/s Transceiver

Provides bi-directional optical data links from 1 to 10Gb/s for harsh environments. Interoperable with standard SFP/SFP+ pluggable modules and contains 2-wire serial communication interface for digital control and diagnostics. Operates at wide temperature ranges (-40˚C to 85˚C) and available with optional conformal coating resistant to corrosive environments. Mounts directly to the PCB to handle excessive shock and vibration. Endurance has been qualified to military specifications for long-term aging, salt spray and vibration.

Endurance®

Contact Finisar Today to Discuss Your Application Requirements

www.finisarmilitaryoptics.com

25 CELEBRATING 25 YEARS

# DISPATCHES

## U.S. ARMY—APPROVAL FOR WIN-T INCREMENT 2 CONTINUANCE

**The Army has received approval to continue with further limited additional production and fielding of its mobile tactical communications network backbone, Warfighter Information Network-Tactical, or WIN-T, Increment 2.**

The Army remains on track to field Capability Set 14 to brigade combat teams, known as BCTs, and will continue developing follow-on capability sets in support of its network modernization strategy, officials said.

As the centerpiece of CS 13, the Army's advanced, integrated package of tactical communications equipment that was deployed in support of Operation Enduring Freedom this summer, WIN-T Increment 2 is supporting operations by the 4th Brigade Combat Team, 10th Mountain Division, across vast distance and challenging terrain.

From inside their WIN-T Increment 2-equipped vehicles, Soldiers and commanders can now provide and receive real-time situational awareness using on-board mission command systems, Secure Voice over Internet Protocol calls, chat and other collaborative enterprise capabilities. Units can exchange critical information and send and receive mission orders anywhere on the battlefield.

"The ability to access these capabilities has greatly increased situational awareness and coordination, while decreasing the 'time' load on leaders as they can file reports while en route, rather than having to wait until they return to base," said Col. Mario Diaz, commander of the 4th BCT, 10th Mountain Division. "Capability Set 13 and the PoPs [WIN-T Increment 2 Point of Presence vehicles] are game changers."

The 3rd BCT, 10th Mountain Division, will also be deploying with WIN-T Increment 2 and CS 13 capabilities this year.

Meanwhile, two more BCTs from the 101st Airborne Division (Air Assault), are conducting fielding and training operations with CS 13 and WIN-T Increment 2. WIN-T Increment 2 provides Soldiers with high-speed, high-capacity voice, data and video communications down to the company level for the first time.

WIN-T Increment 2 provides major enhancements over the previous WIN-T Increment 1, which began fielding in 2004.

Within the last two years, the Army executed two large-scale operational tests for WIN-T Increment 2. During the most recent test in 2013, the program demonstrated significant improvements over 2012, meeting the vast majority of its requirements, officials said.

At the same time that it fields to CS 14 units, the Army will continue to coordinate with the Office of the Secretary of Defense and the test community to address remaining issues and simplify the system.

"WIN-T Increment 2 brings mobility to the tactical network backbone for the first time and provides mission command on the move," said Col. Ed Swanson, project manager for WIN-T. "By continually improving WIN-T Increment 2 throughout its lifecycle, we will provide Soldiers with the best capabilities available."

## GENERAL DYNAMICS C4 SYSTEMS—WINNING WITH WIN-T


**The first Brigade-level deployment of the General Dynamics-built Warfighter Information Network - Tactical (WIN-T) Increment 2, the Soldier's Network, is successfully supporting soldiers with the 4th Brigade, 10th Mountain Division (4/10) in Afghanistan. Their mission, supporting Afghan security forces, involves communications across dispersed forces in some of the most rugged, remote locations in Afghanistan.**

Over this past summer, WIN-T Increment 2 participated in its first successful combat patrol using its on-the-move capability between several network nodes. Voice over IP calls were placed and use of on-board mission command applications was successful. Using WIN-T Increment 2, soldiers down to the company level have unprecedented secure access to voice and data that vastly increases their ability to communicate during a mission and on-the-move.

Deployed in July as a Security Forces Advise and Assist Team, the soldiers of the 4/10 work as advisers to the Afghan National Security Forces (ANSF), a critically important mission as United States military and coalition forces drawdown and the ANSF takes the lead for Afghanistan's security.

The entire fleet of WIN-T Increment 2 vehicles helps to maintain mission-critical connectivity for soldiers and commanders at the company level and up to higher echelons. Tactical radios like the AN/PRC-154A Rifleman radio complete the Soldier's Network extending network communications and connectivity to the dismounted soldier. The Soldiers' Network is the centerpiece of Army's network modernization strategy that includes WIN-T Increment 2 and Increment 3, the AN/PRC-154A Rifleman and AN/PRC-155 two-channel Manpack tactical radios, Nett Warrior and mission command on-the-move capabilities including Command Post of the Future (CPOF) and Tactical Ground Reporting (TIGR) systems.

Chris Marzilli, president of General Dynamics C4 Systems, said, "Commanders and staff can talk, text and collaborate with one another on a conference call or chat room in real time, even moving at 25 miles-per-hour inside of their vehicles."

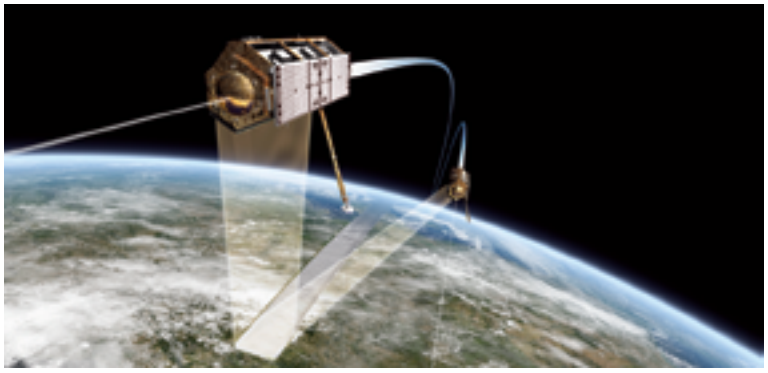
# DISPATCHES

## ASTRIUM + OHB SYSTEM—PHASED ARRAY FOR SARAH

*Artistic rendition of the SARah satellite reconnaissance system, courtesy of Astrium.*

**Astrium and OHB System AG (Bremen, Germany) have signed a contract for the development, construction and launch of a high performance radar satellite for the 'SARah' satellite-based reconnaissance system, for a total value of 344 million euros.**

The contract also covers the provision of all necessary components for the ground segment to ensure the image production process, from requesting images through to final delivery is fully operational from the end of 2019.



*The German TerraSAR-X and TanDEM-X are GMES Contributing Missions. The missions operate as a two-satellite constellation. Image courtesy of DLR.*

The overall SARah system consists of three satellites and two ground stations. The space segment consists of two satellites equipped with the reflector technology from OHB, and a third satellite, equipped with Astrium's proven phased-array technology, currently operating perfectly in orbit on the civil satellites TerraSAR-X and TanDEM-X.

The term 'phased-array' is used to describe phase-controlled antennas made up of numerous individual transmitter/receiver modules which can be interconnected, bundled and variably controlled. This enables direction and range of view to be adjusted without needing to move the antennas mechanically, thus providing the user with rapid image sequencing, variable image sizes and 'blur-free' recordings.

"This is the first time that Astrium is supplying an Earth observation satellite to the German Armed Forces—and in addition, it will be equipped with the latest technology, namely the ultra-high performance active phased-array. This will significantly enhance the German Forces' capabilities and also helps better position Germany industrially for the future," said Evert Dudok, Head of Astrium in Germany, at the contract's signing.

# DISPATCHES

## COM DEV INT'L—BEST CONTRACT... EVER


**COM DEV has won its largest contact to date.**

The company is to deliver C-, Ku- and Ka-band multiplexers, switches and microwave components for multiple satellites which will be part of a global network of communication satellites.

COM DEV International Ltd., manufacturer of space hardware subsystems, today announced that it has received its largest commercial award ever. This major contract is in excess of $65 million to deliver C-, Ku-band and Ka-band multiplexers, switches and microwave components for multiple satellites which will be part of a global network of communication satellites.

The initial funding release, in excess of $38 million, is to cover procurement activities for these satellites as well as engineering and manufacturing activities for the first satellite to be delivered. Work will be ongoing until 2018, and will be carried out at the Company's facilities in Cambridge, Ontario and El Segundo, California.

"COM DEV is pleased to support our longstanding customer on this multi-satellite program," said Mike Williams, President of COM DEV International Products."We are happy that this relationship has allowed us to provide a technically optimized and cost-effective solution that will enhance our leadership in the supply of passive microwave devices for the communication satellite market."

COM DEV International Ltd. is a global provider of space hardware and services. The company has a staff of 1,300, annual revenues of $208 million, and facilities in Canada, the United Kingdom and the United States. COM DEV designs manufactures, and integrates advanced products, subsystems and microsatellites that are sold to major satellite prime contractors, government agencies and satellite operators, for use in communications, space science, remote sensing and defense applications. The company has won contracts to supply its equipment on over 900 spacecraft.

## SPACE FOUNDATION—A FAREWELL TO SCOTT CARPENTER

*Scott Carpenter stands in his Mercury spacesuit in this 1962 NASA photo.*

**Scott Carpenter, the second U.S. Astronaut, has passed at the age of 88.**

It seemed fitting that on the final day of the global celebration of World Space Week, the world said goodbye to NASA astronaut M. Scott Carpenter, who died in Denver on October 10th at the age of 88.

Born in Boulder, Colorado, in 1925, Carpenter was one of the original seven Mercury astronauts selected by NASA in 1959, the second American to orbit the Earth and the fourth American in space. Carpenter retired from the Navy in 1969 with the rank of commander, and pursued his interest in oceanography.

"Scott Carpenter's star always burned bright, and the space community's sky is dimmer for his loss," said Elliot Pulham, chief executive officer of the Space Foundation. "Scott would be the first to say that it is long past time to create some new heroes, and the best way to honor his legacy is to press on with the exploration of space - to the Moon, Mars and beyond."

In 1965, Carpenter broke the record of human underwater habitation by spending 30 days in SEALAB II, an experimental underwater habitat developed by the United States Navy and used, among other purposes, to prove the ability of humans to live in isolation for extended periods of time.

The Space Foundation acquired the Scott Carpenter Station in 2012, and it is currently on display at the Space Foundation Discovery Center, the region's first and only space, science and technology attraction, located at 4425 Arrowswest Drive, Colorado Springs, Colorado.

NASA developed the Scott Carpenter Station for use during the summers of 1997 and 1998 to demonstrate and teach about life support concepts for space missions. It was named for Scott Carpenter, and was originally known as the Scott Carpenter Space Analog Station because its primary mission was to demonstrate the ways in which the ocean environment could be used as an analog for space.

## IRAN—THREE PLANNED FOR SPATIAL EXCURSIONS

**The latest talk from an Iranian aerospace official says the country plans to launch three indigenously designed and manufactured satellites into orbit by the end of the current Iranian calendar year (March 20, 2014).**

Deputy head of Iran Space Agency (ISA), Hamid Fazeli, said on Thursday that the satellites Tadbir (Prudence) and Sharif Sat will be lifted into space by the year-end. He added that Tadbir satellite is being developed in cooperation with Iran University of Science and Technology, while Iranian students and academics from Sharif University of Technology are busy preparing Sharif Sat for lift-off.

The senior Iranian aerospace official said the two indigenous satellites will be delivered to ISA within a month, noting that compatibility tests on both satellites will take about two months at the ISA. Sharif Sat reportedly weighs less than 50 kilograms and will be launched onboard the indigenous Safir B-1 carrier. It is planned to be placed into a Low Earth Orbit (LEO) at an altitude between 350 kilometers (217 miles) and 500 kilometers (310 miles) above the Earth's surface.

The satellite will capture images with a high degree of accuracy of less than 10 meters and then transmit them to stations on Earth.

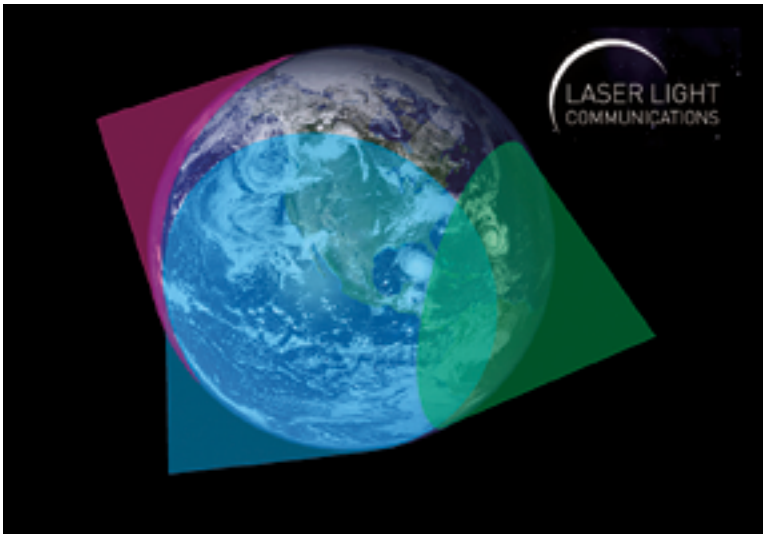
Tadbir is an upgraded version of the Navid-e Elm-o Sanat (Harbinger of Science and Industry) satellite, which was put into space earlier. The satellite has Global Positioning System (GPS) as well as higher precision in taking photos in comparison to its predecessor.

Fazeli further noted that Nahid (Venus) satellite, which is being developed in cooperation with Amir Kabir University of Technology, will be also launched by the end of the current Iranian calendar year.

He expressed optimism that Pishgam-2 (Pioneer-2) bio-capsule, carrying a living creature, will be soon sent into the space onboard an indigenous satellite carrier.

# DISPATCHES

## LASER LIGHT COMMUNICATIONS—THE POWER OF LIGHT




**Laser Light™ Communications, LLC, was launched during the World Satellite Finance Forum in Paris, France.**

Laser Light™ intends to deploy and operate what it believes to be the world's first commercial satellite communications constellation based entirely on optical wave technology.

The planned constellation is to be comprised of 12 satellites [8 primary; 4 spares] in Medium Earth Orbit [10,500KM] with an operating system capacity of 4.8Tbps, including satellite-to-satellite optical crosslinks and sat-to-ground optical up/down links of 200Gbps, without reliance on radio frequency [RF] spectrum.

Laser Light™ intends on interconnecting its proposed Optical Satellite System [OSS] with the global fiber network—terrestrial and undersea—establishing a truly meshed optical network, ensuring world-wide coverage at service levels and connectivity options previously unattainable by other satellite platforms.

"Laser Light™ may truly be a "game changer" in the delivery of large quantities of bandwidth from a satellite platform to the global fiber network system...," said Robert H. Brumley, Senior Managing Director, Laser Light™ Communications, LLC. Laser Light's™ potential service delivery advantage is made possible by the decades of federally funded research in the field of free space optical lasers...,," Brumley said. "Laser Light™ will enable the commercial communications market to benefit from the deployment of this next-generation, highly complementary all Optical Satellite System."

"With year over year increases in the volume of global Internet traffic, demand for high rate data transport potentially places Laser Light™ in a unique market position...," said Clifford W. Beek, Managing Director, Laser Light Communications. "Our aim is to offer telecom service providers, commercial enterprises, and government users a high quality service with an efficient technology platform—an all optical integrated satellite and terrestrial communications platform. It is expected that Laser Light's global routing options will align telecom carriers with service capabilities reaching symmetrical bidirectional connectivity at OC-192 speeds. Ultimately, the end customer stands the most to gain from the increased transport efficiencies offered by Laser Light™".

Laser Light™ will commence the development of its break-through OSS constellation immediately, including vendor selections for spacecraft, commercial launch, and field trials of its meshed optical-wave communications network.

Laser Light™ anticipates a first Quarter 2017 deployment of its OSS with service availability mid-2017.

# DISPATCHES

## DOD—AN OFFICIAL'S LOOK @ SPACE DETERRENCE

**Space is a current and future battleground without terrain, where invisible enemies conceivably could mount undetectable attacks to devastating effect if the right deterrent and defensive plans aren't pursued now, the assistant defense secretary for global strategic affairs told a think tank audience.**

Madelyn R. Creedon spoke to a Stimson Center gathering whose audience included analysts focused on the question of deterrence in space. The center released a publication this week titled "Anti-satellite Weapons, Deterrence and Sino-American Space Relations," presenting a number of essays examining various perspectives on space deterrence.

Creedon noted that in Defense Department parlance, deterrence is "the prevention of action by the existence of a credible threat of unacceptable counteraction and/or the belief that the cost of action outweighs the perceived benefits." In other words, she said, if deterrence is effective, an adversary has or believes he has more to lose than to gain by attacking.

Deterrence remains a core defense strategy for the United States, she added, and the nation's nuclear deterrent is "still alive and well."

Creedon acknowledged that one classic approach to considering space deterrence—that is, preventing potential enemies from attacking U.S. or partner satellites and other military or economic assets in space—is to try to apply lessons learned during the Cold War. Then, the United States and the Soviet Union kept an uneasy diplomatic truce and piled up enough nuclear weapons to guarantee mutually assured destruction.

But one flaw to comparing the two deterrent challenges, she said, is that an attack that disables a satellite, unlike one from a nuclear warhead that flattens a major city, doesn't threaten a nation's existence.

Another is that the two superpowers spent decades constructing an elaborate, mirrored, deterrent Cold War architecture and protocols, while space is still, comparatively, "the Wild West."

A third is that an attack in space or cyberspace may rely on digital rather than conventional weapons, and so could occur without warning or even detection.

"If there is an attack against a space asset, it isn't visible," she said. "You can't watch it on CNN, and unless you're directly affected by the capability that the space assets provide, you're probably completely oblivious that the attack happened." She said DOD is developing and implementing what safeguards it can implement in space using four mutually supportive elements to deter others from taking action against U.S. assets:

- Working to internationalize norms and establish a code of conduct to enhance stability;
- Building coalitions to enhance security;
- Adding resilience to U.S. space architectures; and
- Preparing for an attack on U.S. and allied space assets using defenses "not necessarily in space."

"We believe this four-element approach ... will bolster deterrence," Creedon said.

The department is working with the State Department and international partners to define elements of good behavior in space, she said. "States must remain committed to enhance the welfare of humankind by cooperating with others to maintain the long-term sustainability, safety, security and stability of the outer-space environment," she added.

Creedon said work is underway to build deterrent coalitions and increase space awareness. She said the "Five Eyes" nations, which include the United States, United Kingdom, Canada, Australia and New Zealand, are extending their intelligence cooperation to expand their collective space situational awareness.

"The more we all know about what's going on in space, and the more we can all share with each other about what's going on in space, [the better we can] we establish a ... deterrent environment so that no one can do something and get away with it," she said.

The United States is meanwhile working to lower the benefit to potential attackers by employing more satellites, participating in satellite constellations with other countries and purchasing payload space on commercial satellites when feasible.

Creedon said the U.S. approach to space deterrence is similar to its strategy in any domain: take "prudent preparations to survive, and to operate through, and, hopefully, prevail in any conflict."

**About Madelyn R. Creedon**

*Madelyn Creedon was confirmed by the U.S. Senate as the Assistant Secretary of Defense for Global Strategic Affairs (GSA) on August 2, 2011. In this capacity she supports the Under Secretary of Defense for Policy in overseeing policy development and execution in the areas of countering Weapons of Mass Destruction (WMD), U.S. nuclear forces and missile defense, and DOD cyber security and space issues.*

*Prior to her confirmation, Ms. Creedon was counsel for the Democratic staff on the Senate Committee on Armed Services and was responsible for the Subcommittee on Strategic Forces as well as threat reduction and nuclear nonproliferation issues.*

***Story by Karen Parrish, American Forces Press Service***

## ORBCOMM + SAVI—IT'S ALL ABOUT LOCATION


**ORBCOMM Inc. (Nasdaq: ORBC) and Savi Technology (Savi) now have a strategic relationship to provide advanced location-based monitoring solutions to government and commercial markets.**

ORBCOMM and Savi have submitted a proposal in response to the U.S. Army RFID IV project, which will provide ISO18000-7 RFID tags and a suite of satellite solutions for military logistics support.

ORBCOMM's GlobalTrak division has been a leading player in providing military Enhanced-In-Transit-Visibility (EITV) solutions to the government market since 2008.

Savi has been the de facto market leader in military RFID solutions, enabling them to offer vast market experience with the right blend of technology platforms for this proposal.

"The combination of ORBCOMM's satellite expertise and broad network service portfolio with Savi's state-of-the-art RFID technology offers a full spectrum of innovative monitoring solutions to our collective market base with focus on our government and international customers," said Marc Eisenberg, Chief Executive Officer of ORBCOMM.

"Although RFID and satellite tracking have traditionally been divergent technologies, the synergy of these solutions within a common operating environment creates a seamless transition from infrastructure to wireless-based location services for tracking and monitoring high-value assets."

"By bringing two market leaders with highly complementary technologies together, we have created a best-of-breed solution for our customers in both government and commercial markets," said Bill Clark, Chief Executive Officer of Savi Technology.

"This relationship will support Savi's operational analytics capabilities by providing additional ways to collect critical data and deliver timely and reliable operational intelligence to our customers. We look forward to partnering with ORBCOMM on RFID IV and other global opportunities in the near future."

# COMPLETE SATELLITE COMMUNICATIONS SOLUTIONS. ALL FROM ONE COMPANY.

If you're looking for complete satellite communications solutions, look to L-3 GCS. Our combined expertise in satellite systems, airtime, network architecture and field support allows us to provide you with the tools for critical communications on and off the battlefield. We understand today's missions and are equipped to deliver reliable, interoperable solutions when you need them, where you need them.

**For more information, visit L-3com.com/GCS.**

GCS

L-3com.com

# DISPATCHES

## USAF 3 SOPS—SECOND WGS BLOCK II ADDED

*Col. Bill Rittershaus, 50th Space Wing vice commander, right, presents Lt. Col. Chadwick Igl, 3rd Space Operations Squadron commander, with a ceremonial key to the Wideband Global SATCOM-5 satellite on Oct. 7, 2013, at Schriever Air Force Base in Colorado. During the ceremony,the 3rd Space Operations Squadron accepted satellite control authority of WGS-5 from the 14th Air Force and the Space and Missile Systems Center*

**Accepting satellite control authority of Wideband Global SATCOM-5 on October 7th, the 3rd Space Operations Squadron added increased capability to the constellation.**

Launched from Cape Canaveral Air Force Station, Florida, on May 28th, WGS-5 is the fifth vehicle in the WGS constellation and the second spacecraft in the program's Block II series.

It features a new radio frequency bypass that supports the transmission of intelligence, surveillance and reconnaissance imagery at data rates three times greater than Block I vehicles.

The satellite also includes new, user-preferred narrow-gauge antennas, a channelizer cable swap, which better utilizes bandwidth routing, and more efficient solar arrays.

Col. Bill Rittershaus, 50th Space Wing vice commander, and Lt. Col. Chadwick Igl, 3 SOPS commander, accepted the transfer of responsibility from Lt. Col. Sherman Johns, 14th Air Force deputy director of operations and exercises, during a conference call that also included Col. Xavier Chavez, Space and Missile Systems Center, acting director of Military Satellite Communications Systems Directorate.

"Thanks to everyone in 3 SOPS," Rittershaus said. "This is a huge group effort in cooperation with SMC and it's a significant milestone for space communications. Every time we bring a WGS satellite online it provides a huge increase in capability to the warfighter."

Operators in 3 SOPS have been flying WGS-5 since Oct. 2 on behalf of the Military Satellite Communications Systems Directorate, a division of the Space and Missile Systems Center.

*ULA's Delta IV rocket launches the USAF's WGS-5 satellite from Cape Canaveral AFS.*

Satellite Control Authority is the last step before the vehicle is operationally released to the U.S. Strategic Command, the owning combatant command, who will then assign users based on priorities and requirements.

The WGS system of satellites is the follow-on to the Defense Satellite Communications System. The new vehicle joins an eight-satellite constellation of DSCS communications satellites and four WGS satellites that 3 SOPS operators currently command and control.

Together, the constellations provide flexible, high-capacity communications for U.S. forces throughout the world while enabling battle management and combat support information functions.

During the past several months, 3 SOPS operators have been carefully preparing for the transfer of WGS-5 SCA. They have made more than 200 procedural changes and spent many hours training satellite vehicle operators on the Block II vehicle's capabilities.

The squadron also sent a launch-and-early-orbit team to Los Angeles Air Force Base, California, to provide support and continuity during the transition.

"We'll fly WGS-5 with pride," Igl said. "I want to thank the entire launch and early orbit team for helping support during the launch and early orbit activities. Wideband Global SATCOM-5 SCA also represents a critical step in declaring full operational capability of the WGS constellation."

The Air Force has tentatively planned for 10 WGS satellites. Vehicle six launched from Cape Canaveral on August 8th, 2013.

***Story by Scott Prater, 50th Space Wing, USAF***

## SPACE TANGO—FUNDING ACCELERATION


**Space Tango is now formally accepting proposals for funding and acceptance to its space business accelerator.**

Space Tango is the nation's first business accelerator specifically for space enterprises and entrepreneurs, with a goal of assisting enterprises in developing innovations, novel applications and diverse markets.

Opportunities (including adjacent applications) lie in developing entrepreneurial ideas, companies and products that enable the further exploitation of space.

Possibilities involve small high-value satellites and space platforms, the International Space Station (ISS) and opportunities in biotechnology, exomedicine, novel materials, energy, education and game design and development, as well as areas and applications not yet imagined.

In the initial round, Space Tango will accept as many as six companies from across the U.S. and around the globe.

Each enterprise will receive funding of up to $20,000 and will participate in an intensive 12 week onsite program that will provide a complete constellation of services, advisors and networks necessary to successfully start and grow an entrepreneurial space-driven business.

# Newtec

## BE READY FOR MORE DATA

If challenges like failsafe technology and need for ever-increasing bandwidth drive your organisation, we can help. We design solutions to get more out of the same bandwidth and increase efficiency over satellite. We back this with the proven experience and support you need to cope with data demands of today… and tomorrow.

www.newtec.eu

OCT 23

**GOVERNMENT & DEFENSE** SATELLITE COMMUNICATIONS SEMINAR

**BRUSSELS, BELGIUM**

(Near National Airport & NATO Headquarters)

▶▶ **WWW.NEWTEC.EU/EVENTS**

# DISPATCHES

## L-3 TRL + AVANTI—CATAPAN COVERAGE FOR MAG

**L-3 TRL Technology (L-3 TRL) has been working with Avanti Communications to provide secure Ka-Band satellite services to government and military agencies that use L-3 TRL's CATAPAN® encryption devices for direct high-speed connectivity—coverage includes parts of Europe, the Middle East, the Caucasus region and Africa.**

Ideal for high-demand government and military operations that require unlimited data transfer at super fast speeds (up to 10Mbps), the new Ka-band offering provides secure, cost-effective network options for users with multiple transportable and/or fixed nodes.

Numerous encrypted secure voice and data scenarios have been tested over the capability, under differing weather conditions, without any degradation in service.

Options include transportable variants using highly portable antennas for rapid deployment and a fixed-site variant providing a cost-effective connection.

Tailored uncontended packages are available, including dedicated bandwidth and occasional use packages.

Shared contended bandwidth packages are also available. This allows the services to be configured to meet a user's specific operational requirements.

Ka-band is part of L-3 TRL's CATAPAN Bundled Airtime Service packages, which are designed to work in conjunction with its CATAPAN government grade network encryption devices and COTS modem hardware to provide secure mobile communications.

A number of "out-of-the-box" dedicated service packages are available to ensure the highest levels of security for individual operational requirements.

## IGT—DOD + GOVERNMENT SERVICES ARE SCAP'D

**iDirect Government Technologies (iGT), a wholly owned subsidiary of VT iDirect, Inc. (iDirect), has announced the launch of its Security Content Automation Protocol (SCAP) hardening scripts.**

SCAP is an improved information assurance (IA) compliance and security support service for network management systems, protocol processors and SatManage servers.

Information assurance is a critical component of any organization's information systems' management strategy to ensure that data and systems integrity, confidentiality and availability are protected and available to support missions.

Available to iGT's premium iSupport customers, the SCAP hardening script supports secure networks by managing vulnerabilities and evaluating information assurance. SCAP hardening scripts are now available for any iGT customer operating iDX 2.3, 2.3.1, 3.0 and SatManage 5.2.

"iGT is committed to providing the latest security enhancements and following the latest Security Technical Implementation Guides (STIGs) and SCAP guidelines, allowing Department of Defense (DoD) and government agencies to maintain information assurance and DoD Information Assurance Certification and Accreditation Process (DIACAP) accreditation for their networks," said Karl Fuchs, iGT Vice President of Technology. "SCAP improves our automated information assurance assessments to mission-critical defense systems, resulting in improved policy compliance and vulnerability management."

iDirect Government Technologies (iGT) delivers secure satellite-based voice, video and data applications with anytime and anywhere connectivity in the air, at sea and on land.

iGT's advanced satellite IP solutions are used for critical ISR, airborne, maritime and COTM communications to support force protection, logistics, situational awareness, disaster recovery and emergency response.

Building on more than 15 years of global satellite communications experience, iGT provides the most bandwidth-efficient, scalable and highly secure platform to meet specialized applications of multiple federal, state and local government agencies, including the Department of Defense, domestically and abroad. iGT is headquartered in Herndon, Virginia.

## JOINT CHIEFS OF STAFF—SECOND TERM STARTS

**Army Gen. Martin E. Dempsey has begun his second two-year term as the Chairman of the Joint Chiefs of Staff.**

The challenges are piling up—the arguments over the East and South China Sea as well as trying to cajole allies to see the wisdom of your ways. Some challenges he will expect, but others will crop up and he will have to deal with them along with all of the additional things he must attend to.

Now, the money that was there when he first took office, is gone. In fact, instead of finding just $487 billion in savings in the defense budget, he needs to find an additional $500 billion—forcing a $1 trillion cut to defense. When he started his first term as chairman, he issued four priorities. The first was to achieve the national objectives that the military forces had—Iraq and Afghanistan, deterrence in the Persian Gulf and so on. Second was to build Joint Force 2020, which was a look to the future to build the capabilities we will need in the future and not just today. The other two priorities dealt with the profession of arms.

"It occurred to me that after 10 years we needed to take a look at the values to which we claim to live to determine whether the personnel policies, training, deployment, all of that was contributing to our sense of professionalism or whether we had some points of friction," he said.

His final priority was keeping faith with the military family. Dempsey is an Armor officer by trade, and an English professor by heart and he is choosy about his words. "I chose family not families, because it's not just spouses and children; it's about veterans and it's about the many young men and women who will transition out of the military under my watch," he said.

These priorities will remain the same, he told reporters traveling with him. "But what I've learned over the past two years is where I have to establish some initiatives, some milestones, some programs and processes to achieve progress in those areas over the time remaining to me."

Dempsey said, "Expectations about levels of support, the pace of training, and the pace of deployments are all going to change in the next couple of years, and I have to make sure the force adapts to that. We're going to transition 100,000-plus out of the military, and I have to make sure those young men and women are ready for that change. I have to slow the growth of pay and health care—I don't have to reduce it—I have to slow the growth [and] make it sustainable. And I've got to reshape the force, both in size and capability, and we've got [to] renew our sense of professionalism."

Dempsey is most worried about uncertainty in the force and what that is doing to the military family. He said, "There's this notion of the cumbersome military bureaucracy. Some is true, but there is also underneath the Pentagon an incredible group of young men and women leaders who change as they need to change to address the challenges as they find them. And they will continue to do that."


SES
Government Solutions
Bandwidth and Beyond
solutions for all you have riding on us
With our global satellite fleet, we enable communications capability wherever your mission takes you. From satellite bandwidth and end-to-end communications capability to hosted payloads, every solution is customized to meet your specific mission.
www.ses-gs.com
Scan this QR code with your mobile deviceto see our satellite fleet

# DISPATCHES

## HIMAWARI + MITSUBISHI—OPS ON TARGET

*L: Artistic rendition of the Himawari-8/-9 satellite. R: Ground system center.*

**Himawari Operation Enterprise Corporation and Mitsubishi Electric Corporation have completed the ground operations system for the Himawari-8 and Himawari-9 weather data transmission satellites.**

The Japan Meteorological Agency (JMA) plans to launch Himawari-8 and -9 in summer 2014 and 2016, respectively, to enhance public safety and security through relaying sophisticated weather data contributing to disaster prevention and monitoring global environment.

The ground operations system designed, built and installed by Mitsubishi Electric, consists of antennas with a 9-meter diameter and radio frequency and satellite control equipment installed at the main unit in Hiki-gun, Saitama Prefecture, and the sub unit in Ebetsu, Hokkaido.

Through their involvement in weather satellite operations, the two companies will continue to contribute to disaster prevention and monitoring global environment. The system features include:

- Double redundant configuration for stable and accurate operations—A two-unit operation scheme ensures stable and consistent observation data transmission to JMA. Each unit features a redundant configuration including antennas with a 9-meter diameter
- Timely retrieval of observation data—Thanks to the system's alignment to the geographical coverage area of Himawari-8 and -9, observation data can be retrieved once every 2.5 minutes (up to 576 times per day), enabling the provision of up-to-the-minute information on typhoons, rainstorms and other climatic anomalies by geographic sectors. Previously, data retrieval was limited to once per day
- Reducing labor—The introduction of an integrated system simultaneously monitoring the two satellites and both ground units enables manpower to be reduced over a 15-year period

Himawari Operation Enterprise and Mitsubishi Electric will soon begin comprehensive system tests and personnel training for satellite operations for Himawari-8 under the supervision of JMA.

Mitsubishi Electric, which is contracted by JMA to build and deliver Himawari-8 and -9, received the manufacturing order for antennas with a 9-meter diameter, radio frequency equipment and satellite control equipment from Himawari Operation Enterprise in September 2010.

## EUTELSAT + SBS NET—THE ENFORCEMENT CONNECTION


**Eutelsat Communications SA and Satellite Broadband Service Network Montenegro (SBS Net) have completed a satellite network connecting Montenegro's police headquarters with the country's six border control stations.**

The implementation is the first live VPN to use OneAccess's satellite router, which delivers services via Eutelsat's next-generation KA-SAT satellite. The new network delivers transmission speeds of up to 20Mbps download and 6Mbps upload and will enable the Police of Montenegro to benefit from the most advanced uses of an ultra-fast broadband VPN, including the rapid implementation of integrated backup and traffic offload solutions in highly secure environments.

"The ability to exchange information quickly and securely between Montenegro's Police HQ and its six border control stations will enhance its operations considerably," said Ljiljana Vukovic, Manager of SBS Net. "This project provides the Police of Montenegro the means to control the country's borders via a highly secure network. The results of extensive testing demonstrated that the OneAccess solution significantly improved the network's user experience and bandwidth capability, while maintaining an absolutely secure environment. We are confident that the benefits of this one-box solution will be recognized by other business clients."

In March, Eutelsat and OneAccess introduced an innovative satellite router solution using next generation KA-SAT capabilities to deliver DSL-like satellite VPN services at DSL-like prices to the enterprise market. The solution enables the delivery of a variety of traffic acceleration, IP routing and IP-VPN secure transport services and has been specifically designed to meet the needs of organizations that require centralized control over geographically dispersed offices, like Montenegro's police HQ and border control stations.

Jean-Francois Fenech, General Manager of Eutelsat Broadband, said: "Montenegro Police's decision to choose a KA-SAT delivered service for vital communications further underlines the capability and reliability of next generation satellite technology. Our KA-SAT services are leading the market for satellite broadband, while our partnerships with OneAccess and SBS Net enable us to deliver this capability to businesses and other large organizations."

## GILAT—BOLIVIAN BONANZA

**The Bolivian National Telecommunications Company has awarded the implementation of 1,000 satellite telecenters to Gilat Satellite Network for US$ 12 million.**

Internet, telephone and television services will be provided via Tupac Katari (TKSAT-1), a telecommunications satellite that is expected to launch this year aboard a Chang Zheng 3B/E (CZ-3B/E) booster from the Xichang Space Center in Sichuan, China.

The satellite will pack 30 transponders and is being built by China Great Wall Industry Corporation with a projected 15 years of service.

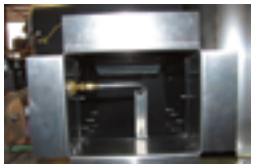
Entel, Bolivia, will also invest another US$ 8 million to deploy base stations for coverage of the local route of the 2014 Dakar Rally race.

# Protecting Your Signals From Ice and Snow Just Got Better

WALTON DE-ICE

## With Walton's new Gas Heating Systems

**New** dual redundant ignition system for faster, more-reliable, pilot-free operation. Air turbulence no longer an issue.



**New** Air-flow-sensing ignition system for added safety

**Easily Upgraded**

**Mounting, electrical, and gas line configuration matches older systems**

## Walton Gas Heaters

**for large antennas**


**Plenum Systems**
Unique hot air enclosure design mounts behind antennas — from 5 to 32 meters.

**or small antennas**


**Snow Shield**
Antenna cover and heater system for .6 to 6.3 meters.

## More Eco-Friendly Gas Heater

CE

**In addition to our electric heaters, now our Gas Heaters meet more EU safety, health, and environmental protection requirements. And we are pursuing cULus LISTED listing for gas heaters.**

**Learn more at www.de-ice.com**

## Protecting Networks From Rain, Snow and Ice For Over 30 Years

- De-Icing systems - gas & electric - for antennas from 2.8 to 32 meters.
- The leader in quality and reliability - over three decades of field-proven experience worldwide.

WALTON DE-ICE

**Original De-Icing Systems**
**• Industry leading hot air de-icing systems.**

Snow Shield

**Snow Shields**
**• Passive and heated**
**• .6 to 6.3m**

Rain Quake

**Minimize signal loss due to rain fade**

Solar Cover

**Better reflector performance**

Ice Quake

**The Ultimate Power-Ef. cient Vibrating De-Icer**

W. B. Walton Enterprises, Inc.

+1 (951) 683-0930 | sales@de-ice.com | www.de-ice.com

W. B. Walton Enterprises, Inc.
P.O. Box 1328 Riverside, CA 92502 USA

# DISPATCHES

## USMC—MEB DEPLOYMENT SIM

*L: Lance Cpl. Derek Heeter, field radio operator, 9th Communication Battalion, checks radio connection during a month long field exercise. 9th Com Bn., simulated a 1st Marine Expeditionary Brigade deployment situation. R: Lance Cpl. Domenic Redd, field wireman, 9th Communication Battalion, guards the main communication hub during a month long field exercise.*

**Marines from 9th Communication Battalion, I Marine Expeditionary Force, conducted an exercise aboard Camp Pendleton, California, to prepare for operations in an expeditionary and deployed environment.**

Capt. David Burton, assistant operations officer for 9th Comm. Bn., supervised operations and assessed the Marines' capabilities of providing communication to a simulated Marine expeditionary brigade situation.

"Our success allows the MEB (Marine Expeditionary Brigade) to communicate across all warfighting functions," Burton said. "We don't provide command and control, but we enable command and control."

From the moment the Marines hit the ground, they have 48 hours to set up their equipment and establish communication. The Marines were successful in 47 hours.

"We've done tremendously," Burton said. "I'm real proud of the Marines that have been out here. They've demonstrated the ability to not only execute their individual training and readiness standards but also to meet the intent of our battalion commander and thus commanding general."

The 9th Comm. Bn., allows contact between forward deployed units and the 'rear', or stateside. Units would not have orders without the Marines performing exercises as they have during the month of September.

"What these Marines do is vital to the success of any operation," Burton said. "You can have the best plan in the world, but if you don't have the means to communicate that to your subordinates, you're less than likely to be successful."

One of the Marines ensuring mission completion was Sgt. Christopher McNeil, a server chief for 9th Comm. Bn. The communication exercise operates like a fire-team, McNeil said. One member of an infantry fire-team will push forward into an ambush and establish control. Once established, other members will pass the Marine in control to provide assistance further in the fight.

McNeil said the 'forward' section of communication will land on enemy territory and establish connection. Once this is successful, 'main' will take over while 'forward' continues to press further in country. The 'main' then has the ability to communicate through satellites and talk to commanders stateside and the unit pressing forward.

"Our responsibilities are pretty much to keep the networks alive and up so we don't lose services," McNeil said. "If we lose services we have to get them up as quickly as possible. If we lose services, troops don't have that contact for orders."

McNeil has been providing his experience and skills to the Marine Corps for nearly seven years and recently returned from Afghanistan, last December.

"We have had some hiccups but it's just a learning experience, something to take to the next field operation or next exercise," McNeil said.

***Story by***
***Lance Corporal Scott Reel,***
***I Marine Expeditionary Force***

## USAF—AN ART SHOW AT THE BEACH

**The 23rd Space Operations Squadron completed installation of an Automated Remote Tracking Station capability on its Eastern Vehicle Checkout Facility, call sign BEACH, at Cape Canaveral Air Force Station, Florida.**

The EVCF is responsible for launch-based compatibility testing and launch data collection, primarily on the Eastern Launch Range.

"The Air Force Satellite Control Network uses the ARTS core for continual execution of telemetry, tracking and commanding operations," said Master Sgt. David McDonald, 23 SOPS superintendent and maintenance contracting officer representative.

"This is vital for the AFSCN to maintain control of all satellites within its span of responsibility."

At the facility, the ARTS system checks and verifies whether the user or owner of the satellite can access its information using the AFSCN.

During building of a satellite's communications equipment, users/owners will perform several tests from their clean rooms to EVCF through the ARTS core equipment to verify compatibility with AFSCN or to work out any communications issues they may have with their satellite.

"BEACH ensures satellites to be supported by the Air Force Satellite Control Network are working and compatible before they launch into space," said Lt. Col. Cary Belmear, 23 SOPS operations officer.

McDonald said it is better to fix a problem on a multi-million dollar satellite while on the pad versus waiting for it to get into space.

"During launch and post-launch, the EVCF uses the ARTS system to gather data and relay information to the Space Operations Center," he said.

Prior to gaining the capability, 23 SOPS used a transportable vehicle checkout facility received from Vandenberg Air Force Base, Calif, many years ago.

The TVCF was cleared for operational use this month by the 22nd Space Operations Squadron at Schriever Air Force Base, Colo.

"Now that the ARTS equipment is on the operations floor, the TVCF is freed up to be used for its actual mission," Belmear said. "It is now at Schriever as part of the POGO-A [mission redundancy assurance plans]."

The squadron worked closely with the Space and Missile Systems Center to create checklists and write deficiency reports and helped resolve the issues along the way.

Belmear said funding challenges have delayed the project for several years.

"While there were certainly many bumps in the road, we are proud that our teams got the job done to everyone's satisfaction," he said.

"The teamwork was incredible," McDonald said. "This was a multi-year project that kept changing in scope through the years. We worked hand-in-hand with SMC's government project officer, Lisa Markel, for completion of this project. Honeywell was tasked for the install while Harris was the recipient and operators of the system."

McDonald said this project could not have been accomplished if it weren't for the excellent team work, communication and dedication of Lisa Markel, Staff Sgt. John Bille from 23 SOPS, Ramon Ford from Honeywell, and Jim Cobb, Paul Banks and Bruce Foster from Harris Corporation.

***Story by***
***Staff Sergeant Julius Delos Reyes,***
***50th Space Wing***

# Government and Military Applications

**VISIT US AT:**

**SATCON 2013**
Booth 531 - Nov 13 - 14

**MILCOM 2013**
Booth 1041 - Nov 18-20

Advantech Wireless accredited products and advanced technologies have provided leading-edge innovations for over 20 years. We provide diverse and extensive technologies and products for video and data transmission and proven flexibility for specialized solutions.

The Raptor series of transportable DVB-RCS hubs are turn-key systems which can be deployed in less than 1 hour, to enable a wide range of public and/or private network topologies with satellite interactive terminals.

The AMT 73L was the World's first deployed modem with certified compliance to the MIL-STD-188-165A standard, designed to fulfill two way satellite communication requirements in Defence Satellite Communications Systems (DSCS).

The 25W GaN X-Band BUC is perfectly suited for harsh environments such as man-pack terminal deployments. Constructed in a compact cooling enclosure for outdoor operation is the smallest fully integrated unit on the market today.

Advantech Wireless' S5920M Ruggedized VSAT Terminal is a complete DVB-RCS modem that can be used in very harsh environment as in military and desert operations. The RAR9160 Ruggedized Router is designed to provide best in class performance for critical applications under harsh environments.

Advantech Wireless KR Series products empower system integrators to address US and allied defense departments and government agencies with rapid, reliable, secure, global satellite & wireless communications networks abilities.

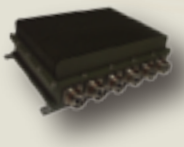
**X-Band 25W GaN BUC for man-pack terminals**

**X-Band 300W / 600W GaN BUC G-Series**

**Raptor - DVB-RCS Compact Transportable Hub**

**S5920M Ruggedized DVB-RCS VSAT Terminal**

**KR Series - WBR-2000 Mobile Wireless WAN or LAN**



**Ruggedized Router RAR9160**

**Solid State Pulse Amplifier**

**AMT 73L Modem DISA CERTIFIED**

Advantech Wireless

**www.AdvantechWireless.com/gov**

# DISPATCHES

## RAYTHEON—GPS CDR IS GOOD

*Artistic rendition of the GPS III satellite. Image courtesy of GPS.gov.*

**Raytheon Company has successfully completed software Iteration 1.5 Critical Design Review (iCDR) for the Global Positioning System (GPS) Next Generation Operational Control System (OCX).**

The Iteration 1.5 software development provides the mission-critical Launch and Checkout System (LCS) software to support the first GPS III satellite launch and serves as the cyber-hardened baseline to which additional capabilities will be added to complete OCX Blocks 1 and 2.

"This successful CDR for GPS OCX's Iteration 1.5 software is a major milestone and demonstrates that OCX is on track to support the first GPS III satellite launch and to deliver critical Block 1 and 2 capabilities," said Matthew Gilligan, Raytheon's GPS OCX program manager and a vice president with Raytheon's Intelligence, Information and Services business. "Iteration 1.5 also provides the initial OCX baseline for key deployments and early site integration scheduled for early 2014 at Schriever and Vandenberg Air Force Bases."

The Raytheon-built GPS OCX has recently achieved several key milestones, setting the stage for GPS III launch support:

LCS, which is a subset of Iteration 1.5, recently completed the third of five GPS III launch readiness exercises in cooperation with the U.S. Air Force Space and Missile Systems Center and Lockheed Martin.

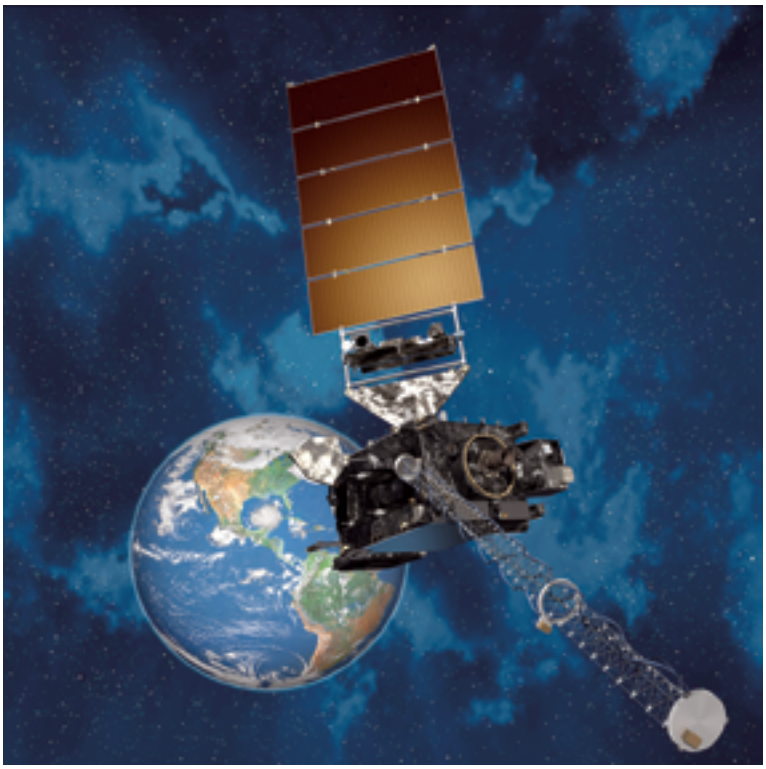
LCS recently received Interim Authority To Test certification for one year with no liens, demonstrating that Raytheon meets the Air Force's high standards for Information Assurance as this critical national system is developed.

The Iteration 1.5 development software will enter system test and evaluation in late 2013 in preparation for LCS system acceptance testing in 2014

GPS OCX provides command, control and mission management for the GPS constellation, including the IIR, IIR-M and IIF satellites, as well as the new GPS III satellites, in a system that is protected against current and future cyber threats. OCX enables full navigation messaging on the new L2 and L5 civil signals as well as the new, jam-resistant military signal (M-Code), providing essential new capabilities to military, civil and commercial users worldwide.

OCX supports the new L1C civil signal on GPS III satellites to provide interoperability with international global navigation satellite systems, such as Europe's Galileo. With its built-in automation and compact, efficient, service-oriented architecture, OCX increases operator efficiency, reduces operator requirements, is less expensive to maintain than current GPS control systems, and provides the ability to evolve as the GPS system evolves.

## LOCKHEED MARTIN—POWER ON FOR GOES-R



*Artistic rendition of the GOES-R satellite. Image courtesy of Lockheed Martin.*

**Lockheed Martin has powered on the system module of the GOES-R satellite for the first time.**

The Geostationary Operational Environmental Satellite–R series (GOES-R) is NOAA's next geostationary weather satellite. Power-on of the spacecraft's avionics and major electronic subsystems is a key milestone to delivery of the first satellite.

The system module of the A2100-based satellite is being built at Lockheed Martin Space System's Newtown, Pennsylvania, facility. The system module testing will demonstrate the functionality and integration of three major electrical subsystems, Command and Data Handling, Communication, and Electrical Power. A total of 76 electronic boxes and 12 wiring harnesses were installed in preparation for this power up.

Power-on of the spacecraft's avionics and major electronic subsystems on the systems module is a key milestone to delivery of the first GOES-R satellite.

With successful completion of the system module testing, the GOES-R system module will be shipped to Lockheed Martin Space Systems' Waterton facility near Denver to be integrated with the propulsion module. Once the system module and propulsion module are mated, the spacecraft will move onto the payload integration, functional testing and environmental testing phases of the program.

Data from NOAA's GOES satellites provides accurate real-time weather forecasts and early warning products to NOAA's National Weather Service and other public and private sectors. The advanced spacecraft and instrument technology on the GOES-R series will vastly improve forecasting quality and timeliness, generating significant benefits to the U.S. and Western Hemisphere.

In January 2013, NASA exercised the option for Lockheed Martin to develop two additional GOES R-series satellites, designated T & U, for NOAA bringing the total number of satellites that will be built to four.

In addition to the spacecraft, Lockheed Martin is also designing and building the Solar Ultraviolet Imager (SUVI) and the Geostationary Lighting Mapper (GLM) instruments that will each fly aboard the four spacecraft.

The NOAA Satellite and Information Service funds, manages, and will operate the GOES-R series satellites. NASA oversees the acquisition and development of the GOES-R spacecraft and instruments for NOAA. The program is co-located at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

## U.S. ARMY + USAF—CAN YOU HEAR ME NOW?

*L: U.S. Air Force Staff Sgt. William Lane sets up a SWEDISH communication system during a disaster response exercise in Belize. Lane serves on Joint Task Force-Bravo's Central America Survey and Assessment Team and set up the team's tactical communication capabilities for the exercise. R: Lane inspects a Broadband Global Area Network (BGAN) connection during a disaster response exercise in Belize.*
*(U.S. Air Force photo by Capt. Zach Anderson)*

**For a forward-deployed unit, one of the most critical keys to mission success is the establishment and maintenance of clear communication with leadership.**

At Joint Task Force-Bravo, the responsibility of establishing that vital communication while in the field falls on the shoulders communication experts such as Staff Sgt. William Lane, U.S. Air Force radio frequency specialist.

"We provide the reach-back for the command and control cell for the forward-deployed team and their leadership to be able to communicate with the main joint operations center (JOC)," said Lane. "We set up a tactical operations center with every capability required in order to get the intelligence, oversight and communication needed to run the mission. We set up phone, Internet, and any required radio support. We're basically a one-stop shop for all of it."

That one-stop shop capability was tested during a recent disaster response exercise, during which Joint Task Force-Bravo's Central America Survey and Assessment Team (C-SAT) deployed to Belize.

Lane was tasked with setting up communication with the Joint Task Force-Bravo JOC within three hours of arrival in country. He met the deadline with time to spare.

"It was very satisfying to be able to do that," said Lane. "Even better was the fact that we maintained our up-time during the exercise. The fact that all of my systems stayed green the entire time we were in Belize and that we had all lines of communication up the entire time was extremely satisfying. That's the ultimate goal for a comm person: 100 percent up-time."

U.S. Army Lt. Col. Alan McKewan, JTF-Bravo Army Forces Battalion commander and the team lead for the C-SAT, said the communication piece was critical to the team's ability to perform in the event of a real-world disaster.

"The C-SAT is the U.S. Southern Command commander's eyes forward in support of disaster relief," said McKewan. "Having the ability to quickly establish communications and pass critical information ensures that commanders can make the call to provide the right assets to prevent loss of life and reduce human suffering."

The tactical communications capabilities give forward deployed units several alternatives to ensure communication is achieved.

"During the exercise, we were able to join the network at JTF-Bravo so everyone could access their files just like if they were in their office back at Soto Cano. We also provided communication via satellite phone, which could be used to call JTF-Bravo or SOUTHCOM, as well as SATCOM radios which would be used to communicate from air to ground and coordinate a medevac or other operation if needed," said McKewan.

The exercise in Belize was built around the scenario of a powerful hurricane making landfall. In that situation, the communication capabilities provided by Joint Task Force-Bravo's C-SAT are crucial.

"A large hurricane would knock out all cellphone towers and other communication nodes," said McKewan. "The JTF-Bravo CSAT team's communication package includes the Broadband Global Area Network (BGAN) and the SWEDISH, which allows the team to push information within minutes of arriving at the disaster scene. This ability can make the difference between life or death in a humanitarian assistance situation."

It's that life or death difference that service members like Lane make each time they establish communication from a tactical location. But Lane says it's all in a day's work.

"It's just about doing the job, ensuring the connection is there and being able to get the word back to everyone and reach back to home station," he said.

***Story by Captain Zachary Anderson, 931st Refueling Group, Joint Task Force Bravo, USAF***

# DISPATCHES

## USGS—LANDSAT 7'S CALIBRATION UPDATE

*Artistic rendition of the Landsat-7 satellite.*

**The calibration of the Landsat 7 Enhanced Thematic Mapper Plus (ETM+) Band 6 has been updated to correct a bias error that has been present in all thermal data since the last calibration update in 2010.**

Vicarious calibration teams detected a bias error of 0.036 watts per square meter steradian micron (W/(m2 sr µm)) that causes overestimation of top-of-atmosphere temperatures by approximately 0.26 Kelvin (K) at 300K. Calibration parameters within the Calibration Parameter File (CPF) have been adjusted to correct for this bias error.

All data processed by USGS/EROS from October 1, 2013 forward will be correctly calibrated within 0.4K at 300K using updated CPF coefficients.

Users can correct for the bias error themselves by subtracting 0.036 W/(m2 sr µm) from the top-of-atmosphere radiance product for data products processed between January 1, 2010 and September 30, 2013.

The vicarious calibration teams, the Rochester Institute of Technology and the NASA/Jet Propulsion Laboratory, have been collecting field data coincident with the satellite overpass since the ETM+ launched in 1999.

Early in the mission, an offset error of 0.31 W/(m2 sr µm) was detected [Barsi, 2003], and subsequently a correction was applied to the processing system in October 2000. Further updates were made in January 2010 [Schott, 2012] to correct a 5.8% gain error.

Continued calibration monitoring has revealed that the 2010 calibration update resulted in a small but statistically significant bias error of 0.036 W/(m2 sr µm). The most recent October 2013 update corrects this error by adjusting the shutter view coefficient in the Calibration Parameter File (CPF).

The CPF biases were also adjusted for non-default processing conditions, but for most users, the view coefficient is the only parameter that will affect the product. Users should note that with the current distribution system, the downloadable product may not have been processed with the latest CPF.

Please check the "Product Creation Time" in the metadata file (MTF) that comes with the downloaded product to ensure that the product is processed after October 1, 2013.

*J.A. Barsi, J.R. Schott, F.D. Palluconi, D.L. Helder, S.J. Hook, B.L. Markham, G. Chander, E.M. O'Donnell, "Landsat TM and ETM+ thermal band calibration," Canadian Journal of Remote Sensing, 29(2), 141-153 (2003) John R. Schott, Simon J. Hook, Julia A. Barsi, Brian L. Markham, Jonathan Miller, Francis P. Padula, Nina G. Raqueno, "Thermal Infrared Radiometric Calibration of the Entire Landsat 4, 5, and 7 Archive (1982-2010)." Remote Sensing of Environment, July 2012*

## HARRIS—A PROPER GROUNDING 2 YEARS AHEAD OF TIME


**Harris Corporation has delivered a system that will help prepare National Oceanic and Atmospheric Administration (NOAA) satellite operators for the new Geostationary Operational Environmental Satellite – R (GOES-R) Series weather satellites.**

The new Mission Management Capability enables operators to prepare ground-based satellite command and control operations and processes more than two years ahead of the launch of the first GOES-R satellite.

A NOAA and NASA team also will use the Harris system to test the command and control procedures with the satellite as it is assembled by mission partner Lockheed Martin.

The Harris system consists of hardware, software, and a graphical user interface; the Harris OS/COMET® telemetry, tracking, and command software; as well as tools for customizing mission operations.

Harris is the prime contractor and systems integrator for the contract to produce the GOES-R Ground Segment, which will process approximately 40 times more data than is possible today, and deliver weather products to NOAA's National Weather Service and more than 10,000 other direct users.

GOES-R will be a primary tool for detecting and tracking hurricanes and severe weather.

## OPTUS + WESTLINK—A VAST SERVICE


**Optus has signed a five-year contract with the State Government of Western Australia to deliver an enhanced satellite service through the Optus Aurora Digital Viewer Access Satellite Television (VAST) platform.**

Under the new agreement, Optus will continue to support the Department of Regional Development and Lands in the carriage of regional television through Westlink.

Broadcasting via the Optus Aurora Digital platform, Westlink hosts a range of vital public health and education television broadcast services throughout the state of Western Australia on VAST Channel 602.

Optus has been operating the Aurora Digital platform since mid-2010, when the VAST television broadcasters commenced transmission on this platform.

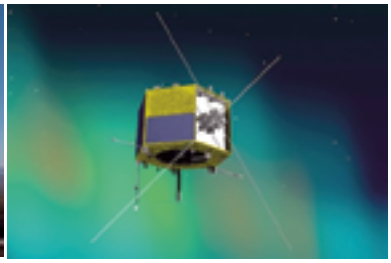
The Optus Aurora Digital satellite platform uses the latest MPEG4 and DVB-S2 technologies, providing a more efficient use of bandwidth and a better viewer experience for end-users.

Leading broadcasters such as Australian Broadcasting Corporation (ABC), Special Broadcasting Service (SBS), Southern Cross, WIN, GWN7 and Imparja use the Optus Aurora Digital platform to deliver the VAST service.

VAST is now available to more than 156,000 households.

# DISPATCHES

## SPACEX—FALCON 9 DELIVERS STORM SATELLITE



*Artistic rendition of the CASSIOPE satellite. Image courtesy of MDA.*

**A SpaceX Falcon 9 rocket was launched from Vandenberg Air Force Base last month carrying aboard CASSIOPE for the Canadian Space Agency (CSA).**

The satellite is a multi-purpose mission designed to conduct space environment research and telecommunications technology demonstration.

Its scientific payload ePOP (enhanced polar outflow probe) will observe the ionosphere and enable scientists to collect new data on space storms in Earth's upper atmosphere and assess their potential impacts.

This was the first time that SpaceX, the Southern California-based private rocket maker, flew the next-generation launch vehicle version that boasts upgraded engines that are designed to improve performance and deliver heavier payloads.

CASSIOPE also includes the Cascade technology demonstrator for high speed store and forward information delivery.

The communications technology demonstrator payload, entitled Cascade, serves as the second mission payload. Cascade will provide a 'proof of concept' design for a high volume store-and-forward data communications operational concept.

Like a courier in the sky, Cascade's operational concept is to pick up very large digital data files and deliver them to almost any destination in the world.

CASSIOPE's hexagonal Smallsat bus platform measures only 180cm long and 125cm high.

It is more cost effective to construct and launch several small satellites with different goals than combining all the functionality on one big satellite.

In addition to reducing the risk, this means that the satellites achieve their scientific or commercial objectives at a more reasonable cost.

The new platform produced for the CASSIOPE mission will also be versatile: it will be possible to adapt and use it for various missions involving science, technology, Earth observation, geologic exploration and information delivery.

Professor Andrew Yau of the University of Calgary directs the ePOP project and a team comprised of researchers and engineers from seven Canadian universities.

The Communications Research Center, located in Ottawa, as well as the Institute of Space and Astronautical Science of Japan and the U.S. Naval Research Laboratory are also partners in the project.

This science mission was developed as a result of a close collaboration between several key partners including the Canadian Space Agency (CSA), 10 Canadian universities led by the University of Calgary and 2 research organizations, among others.

# DISPATCHES

## NASA + DHS—LOCATER TECHNOLOGY INCORPORATED

*This photo is from a test of the Finding Individuals for Disaster and Emergency Response (FINDER) prototype technology at the Virginia Task Force 1 Training Facility in Lorton, Virginia. Image Credit: NASA*

**NASA and the U.S. Department of Homeland Security are collaborating on a first-of-its-kind portable radar device to detect the heartbeats and breathing patterns of victims trapped in large piles of rubble resulting from a disaster.**

The prototype technology, called Finding Individuals for Disaster and Emergency Response (FINDER), can locate individuals buried as deep as 30 feet (about 9 meters) in crushed materials, hidden behind 20 feet (about 6 meters) of solid concrete, and from a distance of 100 feet (about 30 meters) in open spaces.

Developed in conjunction with Homeland Security's Science and Technology Directorate, FINDER is based on remote-sensing radar technology developed by NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, to monitor the location of spacecraft JPL manages for NASA's Science Mission Directorate in Washington.

"FINDER is bringing NASA technology that explores other planets to the effort to save lives on ours," said Mason Peck, chief technologist for NASA, and principal advisor on technology policy and programs. "This is a prime example of intergovernmental collaboration and expertise that has a direct benefit to the American taxpayer."

The technology was demonstrated to the media Wednesday at the DHS's Virginia Task Force 1 Training Facility in Lorton, Virginia. Media participated in demonstrations that featured the device locating volunteers hiding under heaps of debris. FINDER also will be tested further by the Federal Emergency Management Agency this year and next.

"The ultimate goal of FINDER is to help emergency responders efficiently rescue victims of disasters," said John Price, program manager for the First Responders Group in Homeland Security's Science and Technology Directorate in Washington. "The technology has the potential to quickly identify the presence of living victims, allowing rescue workers to more precisely deploy their limited resources."

The technology works by beaming microwave radar signals into the piles of debris and analyzing the patterns of signals that bounce back. NASA's Deep Space Network regularly uses similar radar technology to locate spacecraft.

A light wave is sent to a spacecraft, and the time it takes for the signal to get back reveals how far away the spacecraft is. This technique is used for science research, too.

For example, the Deep Space Network monitors the location of the Cassini mission's orbit around Saturn to learn about the ringed planet's internal structure.

"Detecting small motions from the victim's heartbeat and breathing from a distance uses the same kind of signal processing as detecting the small changes in motion of spacecraft like Cassini as it orbits Saturn," said James Lux, task manager for FINDER at JPL.

In disaster scenarios, the use of radar signals can be particularly complex. Earthquakes and tornadoes produce twisted and shattered wreckage, such that any radar signals bouncing back from these piles are tangled and hard to decipher.

JPL's expertise in data processing helped with this challenge. Advanced algorithms isolate the tiny signals from a person's moving chest by filtering out other signals, such as those from moving trees and animals.

Similar technology has potential applications in NASA's future human missions to space habitats. The astronauts' vital signs could be monitored without the need for wires.

The Deep Space Network, managed by JPL, is an international network of antennas that supports interplanetary spacecraft missions and radio and radar astronomy observations for the exploration of the solar system and the universe.

The network also supports selected Earth-orbiting missions.

## IGT + DOD—REQUIREMENTS REACHED

**iDirect Government Technologies (iGT), a wholly owned subsidiary of VT iDirect, Inc. (iDirect), has announced that its Evolution® TRANSEC meets Department of Defense (DoD) transmission security (TRANSEC) requirements.**

A National Security Agency (NSA) evaluation report titled "iDirect TRANSEC Compliance Evaluation 314-007R-2013" states that the evaluation "provides confidence to DoD Teleport stakeholders and users that iDirect's Evolution System meets TRANSEC requirements and is in compliance with DoD directives and policies."

"Our nation's military and government agencies need an efficient, dependable way to transmit voice, video and data that is also secure, and iGT uses TRANSEC to deliver a secure IP-based satellite network," said John Ratigan, President of iGT.

"The positive results of this independent government evaluation should give users an increased confidence that when they use our Evolution satellite equipment, they are doing so securely. TRANSEC's ability to obfuscate any data flow and traffic engineering information provides advanced data security, masking data that could be exploited by an adversary."

iDirect's Evolution TRANSEC has been available and in wide distribution since 2010. iDirect recently received FIPS 140-2 Level 1 Validation from NIST for its Evolution hardware and iDX 2.3.1 System Software, and Level 2 hardware.

The iGT platform secures VSAT transmissions from interception and exploitation by incorporating encryption inherent in COMSEC; 256 bit, FIPS 140-2 certified AES, while masking traffic types, volumes and acquisition of remote terminals.

Through a combination of hardware and software, TRANSEC ensures data blocks are a uniform size. This conceals traffic engineering information, while incorporating x.509 digital certificates to authenticate remote terminals. Adversaries monitoring a TRANSEC-enabled network only see a constant wall of secure data, precluding anyone from monitoring the network and extracting any usable information.

Mask Channel Activity iGT masks channel activity by building a "wall of data" by using free slot allocations and creating a uniform size of all TDMA slots. By creating this "wall of data," iGT negates the risk of using transmission activity as a source of intelligence.

By incorporating FIPS 140-2 certified encryption, 256-bit keyed AES encryption and over-the-air key exchange features, iGT is able to mask the source, destination and volume of data being transmitted.

# DISPATCHES

## USAF—ANG IMAGERY AIDS COLORADO

**Recently the members of the 169th Communications Flight Eagle Vision IV (EV4) Mobile Ground Satellite Station, located at McEntire JNGB, South Carolina, provided images to support the flood recovery efforts taking place in Colorado.**

The flood damage spanned more than 2,000 square miles across 15 counties, stranding more than 1,000 residents and damaging or destroying as many as 19,000 homes, according to authorities.

Roadways and bridges have been destroyed and lives lost and severely disrupted since the flooding began on September 11, making the recovery effort that much more difficult. On September 15, federal aid for the flood-ravaged state was ordered.

Due to the heavy cloud cover over the flooded areas, Master Sgt. Eddie McManus and Staff Sgt. Dennis McDougal, EV4 Data Acquisition Segment operators, worked with RADARSAT 2 to acquire cloud-penetrating radar images. Once the images were obtained, they handed them over to Master Sgt. Troy Wilkerson, Data Integration Segment operator.

Wilkerson decided to apply a technique that involves overlapping an aerial image with a transparent radar image. He called his colleague and subject matter expert, Mr. Derrold Holcomb of Intergraph Government Solutions.

Holcomb assisted Wilkerson with the process of interpreting the radar images to identify the flooded areas.

Once that was accomplished, Wilkerson highlighted the flooded boundaries with bright red. Next, he made the radar image transparent enough to overlap over an aerial image of the same area. The final product clearly marked all bodies of water in a bright red boundary.

Wilkerson distributed the final product to the United States Geological Survey, Air Force Intelligence, Surveillance and Reconnaissance (A2), Air National Guard Readiness Center and the state of Colorado Intelligence Staff (J2). The feedback he received was tremendous.

The Colorado J2, Lt. Col. Stephanie Patrick, was very appreciative and asked for any follow-up products. Mr. Glen Bethel, from the U.S. Department of Agriculture, has also asked for the images so that he can potentially identify any crop damage.

The Eagle Vision Program consists of five DoD-deployable, commercial satellite ground stations that are located in South Carolina, Alabama, California, Hawaii and Germany. They each provide customers with near real-time commercial, satellite imagery of locations within their 1,300 mile visibility circle. Eagle Vision stations are used to collect and disseminate imagery to various government agencies such as the Federal Emergency Management Agency and USGS during natural disasters. They also support mission planning, time-critical targeting and non-war related operations.

As Eagle Vision stations have the capability to quickly acquire near real-time unclassified satellite imagery, they are highly sought after and utilized during most natural disasters within their visibility circle.

The EV4 teams most often provide images for events such as fires, floods, tornadoes, hurricanes, etc.

They have supported first responder efforts during hurricanes Sandy and Katrina, the earthquakes in Japan and Haiti, as well as tornado and fires in the mid-west.

Other than hurricanes, these events usually occur quickly and with no warning. This requires the team to be prepared to react and work unplanned hours.

## USMC—SUPPORT DURING COCEX FOR LOGISTIC ELEMENTS

*Sergeant Christopher Phillips, a satellite communications operator with Communications Company, Combat Logistics Regiment 17, 1st Marine Logistics Group, operates a satellite terminal during a CLR-17 combat operations exercise aboard Camp Pendleton, California. Approximately 100 Marines with Communications Co. worked on setting up data, radio and wire communications systems at three sites to enable CLR-17's logistical elements to function and support other forward units with the 1st MLG. (U.S. Marine Corps photo by Lance Cpl. Shaltiel Dominguez/ Released)*

**The Marines of Communications Company, Combat Logistics Regiment 17, 1st Marine Logistics Group, have their work cut out for them.**

Electromagnetic interference, elevation, physical obstacles and the atmosphere were just a few of the factors they needed to consider to keep communications running smoothly during the CLR-17 combat operations center exercise at Camp Pendleton, California.

Approximately 100 Marines with Communications Company worked on setting up data, radio and wire communications systems at three sites to enable CLR-17's logistical elements to function and support other forward units with the 1st MLG.

Once the systems were set up, Communications Company Marines needed to ensure that their services remained functioning while they supported other elements of 1st MLG for the remainder of the exercise. This included units such as Combat Logistics Regiment 1, Combat Logistics Regiment 15, Combat Logistics Battalion 15 and 7th Engineer Support Battalion.

"We provide command, control, communications and computer services to the Marines on the ground from any location in the world," said 1st Lt. Michael R. Castaneda, operations officer with CLR-17, 1st MLG. "Radio, wire, technical control and data sections work together to make communications happen."

Although communications is a highly technical military occupational specialty, there was also a lot of basic groundwork that needed to be done. Different groups assembled field antennas and satellite dishes, dug up trenches for the fiber wires to run through and calibrated communications systems for optimum transmission during the first day.

The Command, Control, Communications, Computers and Internet systems (C4I) employed by Communications Co., CLR-17, are vital for Marine Corps expeditionary units to successfully coordinate, close with and destroy the enemy. It is crucial for them to maintain the utmost technical and tactical proficiency at what they do, especially in a challenging environment such as Camp Pendleton.

"Operating in Camp Pendleton is difficult for two reasons: the rolling hills make it challenging for high-frequency, line-of-sight communications and the electromagnetic interference from residential areas also affects transmissions," said Sgt. Jason Davis, an electronic key management systems custodian with Communications Co., CLR-17. "This equipment is used in smaller forward operating bases and can be quickly disassembled and assembled. It's important to be proficient with these systems so we can enable brigade level units to push forward."

However, Davis has complete faith in the effectiveness of his equipment, especially with regards to satellite communications, which are unaffected by the same challenges that sometimes encumber high-frequency radio communications.

"Satellite transmissions allow you to communicate anywhere in the world and use a lot of advanced technology, but we can operate it easily thanks to our equipment," said Davis, a native of Coeur d'Alene, Idaho.

*Lance Cpl. Daniel Jacob Sullivan, a field wireman with Communications Company, Combat Logistics Regiment 17, 1st Marine Logistics Group, digs a trench for wires to run through during a CLR-17 combat operations center exercise aboard Camp Pendleton, California.*

The exercise provided the Communications Marines with an immense amount of responsibility at all levels and a great deal of experience.

"I'm running and maintaining two generators so that data, technological control, wire and radio platoons can have power to operate their equipment," said Lance Cpl. Jayleen Rodriguez, a basic electrician with Communications Company, CLR-17. "Being the sole electrician with this group, it gets challenging because I'm tasked with a lot of responsibilities even as a lance corporal and you have to meet certain time frames."

"So far, I've been able to meet all the deadlines successfully," added Rodriguez, a native of Springfield, Massachusetts.

Ultimately, communications are vital to any exercise which rehearses command and control procedures.

"Communications company played a huge role," said 1st Lt. Tyler Morrison, executive officer with CLR-17, 1st MLG and the officer-in-charge of the Kilo-2 detachment during the exercise. "They were the ones who got there first and established our connectivity. Without the communications services, we wouldn't have been able to do the exercise."

***Story by***
***Lance Corporal Shaltiel Dominguez,***
***1st. Marine Logistics Group***

# DISPATCHES

## RAYTHEON—SHIPPING NUMBER 2,000


*The GPS MUE GPS receiver module is intended for platforms such as the Raven unpiloted aerial vehicle, show here in preparation for launch. U.S. Air Force photo/Senior Master Sgt. Don Senger*

**Raytheon Company has delivered its 2,000th Miniaturized Airborne GPS Receiver (MAGR) 2000.**

Three variants of the MAGR 2000 family of products are currently in service aboard 20 types of fixed-wing and rotary-wing platforms across 16 countries, with a well-established record of excellent performance and reliability.

The current MAGR 2000-S24 greatly improves navigation accuracy and integrity compared with legacy systems, while providing increased resistance to interference and jamming through incorporation of Selective Availability and Anti-Spoofing Module technology.

The open architecture and flexible design of the MAGR 2000-S24 allows for easy insertion of future GPS modernization enhancements, such as the new Military code (M-code) signal, without having to replace the unit itself.

"The MAGR 2000 is the preferred system for the U.S. military and its allies in Europe, the Middle East and the Asia Pacific region," said Sharon Black, director of GPS and Navigation Systems for Raytheon's Space and Airborne Systems business. "It represents the affordable path for acquiring and staying current with all GPS technology advancements envisioned for the next 15 years."

Raytheon is also under contract with the U.S. Air Force Space and Missile Systems Center to develop preliminary designs and conduct pre-Engineering and Manufacturing Development risk reduction for a common set of M-code capable GPS receiver products.

Next-generation M-code technology is required to provide significantly improved position/navigation/time performance against current and emerging threats, with an expected fielding in 2017-18.

# DISPATCHES

## USA, CANADA + UK—GRABBING THE COBB RING

*From left to right, Canadian Forces Joint Signal Regiment (CFJSR) member, Cpl. Trevor Reichet, U.S. Army Sgt. 1st Class Israel Perez and U.S. Army Sgt. Justin Evan, both members of the Joint Communications Support Element's 2nd Joint Communications Squadron, team up during a land navigation exercise during Cobb Ring at Camp Blanding, Florida. During the field training portion of the exercise, integrated teams executed and were evaluated on the same technical and tactical training skills JCSE members are tested on prior to deploying for real-world missions.*

*Two members from the UK's 30th Signal Regiment, U.K. Cpl. Tommy Bamford (center left) and a fellow team member, build familiarity on the Joint Communications Support Element's (JCSE) Hawkeye 2.4m multiband satellite terminal.*

**Due to increased global responsibilities, the Joint Communications Support Element (JCSE) participated in exercise Cobb Ring 2013 to effectively demonstrate available capabilities with likely coalition partners.**

Personnel from JCSE, the U.K. and Canada exercised point-to-point communications from each others' network systems to enhance interoperability and also see firsthand, the tactical pre-deployment training required from each military unit.

During this unique exercise, JCSE deployed three members to the 30th Signal Regiment headquarters, in Bramcote, U.K., and two JCSE personnel to the Canadian Forces Joint Signal Regiment (CFJSR) in Kingston, Ontario, Canada. Additionally, JCSE hosted 11 coalition partners from both the U.K. and Canada at JCSE headquarters at MacDill Air Force Base, in Tampa, Florida.

With simultaneous participation at each of the three locations, the first week of Cobb Ring focused on testing current communications systems and provided the communicators with hands-on experience and valuable insight on what the JCSE, U.K. and Canadian communications teams bring to a mission.

Cobb Ring ensured each team could employ their respective communications kits on the host nation's network infrastructure and built awareness of similarities in their deployable systems.

In particular, JCSE's expertise and ability to provide uninterrupted connectivity was validated at each site during practical exercises using their scalable, mission-tailored and highly mobile communications equipment sets, such as the Initial Entry Package (IEP) and the Early Entry Package (EEP).

By successfully connecting and employing their communications packages, the JCSE teams demonstrated the command's robust capabilities and strengthened their ability to use other network infrastructures to maintain connectivity.

"While in the U.K. we were able to set up our communication services within 15 minutes at various locations," said JCSE member, U.S. Army Staff Sgt. Bradley Riggs, who deployed to the 30th Signal Regiment headquarters during Cobb Ring.

Additionally, this year's Cobb Ring marked the first time the 30th Signal Regiment brought their communications kit, the Falcon, to an exercise outside of their home country.

Like JCSE's EEP, the U.K.'s Falcon system is a scalable all-Internet protocol system which provides voice, data and video communication services. By testing the Falcon's capabilities from Tampa, Florida, and connecting back to their home station, the 30th Signal Regiment was able to validate their communications services from abroad.

Similar to the training in Tampa, Florida, the JCSE team that deployed to the U.K. also built a greater understanding of the capabilities the 30th Signal Regiment brings to a mission while participating in a U.K.-led field training exercise. The exercise participants traveled throughout urban areas setting up their communications kits within minutes and providing reachback to the garrison headquarters.

"Overall, the exercise was a huge success as we provided the link through our IEP for the Falcons to communicate," said Riggs. "The 30th Signal Regiment now knows they can supply their U.K. networks through our kit if this capability is ever needed in the future."

Meanwhile, the CFJSR focused their training objectives more on radio transmission capabilities to maintain connectivity using high-frequency networks. From Tampa, and while deployed in Canada, the JCSE team worked with the CFJSR to maintain voice communication services on a variety of systems.

"We were able to tie each country's communication equipment sets together to see how they would interact," said JCSE member, U.S. Air Force Tech. Sgt. Brett Majesky, who participated from Canada. "By testing our IEP capabilities and using Canada's high frequency radio, tactical satellite radio and satellite communication systems, we were able to validate interoperability."

By working alongside the 30th Signal Regiment and the CFJSR during Cobb Ring 13, JCSE personnel gained a better understanding of each nation's capabilities This valuable insight will be a critical advantage in case these participating nations are required to rely on each other's capabilities during a future mission.

"It was great to work with such professionals from the U.K. and Canada who understand and value the support we provide to mission requirements and share similar challenges," said U.S. Army Capt. Ada Hernandez, a troop commander within JCSE's 2nd Joint Communications Squadron (2JCS), who hosted the coalition partners in Tampa during the exercise.

Riggs concurred with Hernandez adding, "We actually worked with a few of the guys who were previously deployed with JCSE communicators supporting U.S. Africa Command. This exercise was a great chance to bond with U.K. teams to see that they provide the same support we do and also hear that they work alongside us when deployed."

In addition to enhancing the technical expertise these joint communicators bring to real-world requirements, the Cobb Ring 13 participants also experienced firsthand how their counterparts prepare for deployments.

During the second week of Cobb Ring 13, the participants completed deployability training at each headquarters' location. By working alongside one another during tactical-level training including team building obstacle courses; the JCSE teams gained a valuable understanding of the training U.K. and Canadian communicators go through in preparation for real-world missions.

Likewise, to fully demonstrate JCSE's deployability training, the 30th Signal Regiment and CFJSR communication experts in Tampa, Florida, joined a team from the 2JCS at the Camp Blanding Joint Training Center during their squadron field training exercise.

Fully integrated teams completed survival, evasion, resistance and escape training, day and night land navigation, first aid buddy care and counter-improvised explosive training.

"While merged with the 2JCS personnel, the coalition partners were evaluated on the necessary skill sets to illustrate the proficiency required of JCSE teams prior to deployments," said Hernandez. "Working together in this training environment further prepares us when we have to do an actual mission."

***Story by Whitney Williams, Joint Enabling Capabilities Command***

# DISPATCHES

## ASTRIUM SERVICES—TAG, YOU'RE IT

**Astrium, Europe's space technology company, has been selected by the UK Ministry of Justice (MOJ) to provide sophisticated mapping and monitoring services for its new electronic monitoring program.**

Selected as preferred bidder for the contract, Astrium Services teams based in Farnborough, Hampshire, will provide the mapping and monitoring expertise to enable the movements of offenders released under license to be monitored.

As a mapping company originally established by the former UK Department of Trade & Industry in 1981, and now trading as Astrium Services, it will provide the critical location intelligence which will drive more effective and sophisticated monitoring, cost reductions in the program and ultimately reduce re-offending rates as required by the Ministry of Justice.

Phil Brownnett, Managing Director of Astrium Services' GEO-Information in the UK said: "Working closely with Capita who will run the Monitoring Centers and Buddi a supplier of ankle tag devices, Astrium Services will provide critical location intelligence services capable of identifying and tracking the location of offenders who violate license conditions for court orders for curfew or proximity to excluded zones. Using logic rules and advanced positioning technologies, Astrium Services is able to transmit alerts to the Monitoring Centers thereby helping achieve the strategic vision of the MOJ for reducing re-offending rates and prison sentences."

The new mapping and monitoring service will mean individual offenders, subject to location monitoring requirements, can easily be identified as having been at the scene of a crime or quickly eliminated from inquiries, delivering swifter justice and saving valuable police time and money. Existing technology only allows monitoring officers to see if a subject is within a short range of a base station installed in their home.

"We are delighted to have been selected for this prestigious program which leverages our online mapping, message gateway, tracking services and geospatial expertise. It is an example of world class British professional services being used to support HMG and revolutionize offender management," Phil Brownnett continued.

Astrium Services offers a location intelligence solution that uses the latest geospatial and real-time messaging technologies, applying its 30 years of geospatial service provision to support criminal justice in the UK.

Recognizing the huge efficiency savings of shared services, the solution also has the potential to benefit many other areas of central government in criminal justice, national resilience, land management, transport and environment.

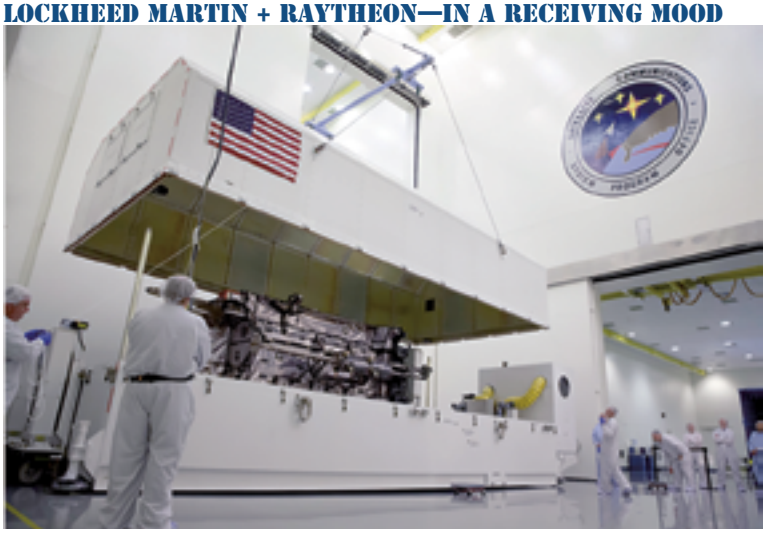
The electronic monitoring contract is expected to be awarded by the end of 2013 and will run for three years.

Through its GEO-Information business, Astrium Services is recognized as one of the leaders in the geospatial information market.

The company provides decision-makers with complete solutions enabling them to increase security, maximize oil & gas or mining operations, improve their management of natural resources, and protect the environment. It has exclusive access to data from the SPOT, TerraSAR-X, TanDEM-X and Pléiades satellites.

# DISPATCHES

## LOCKHEED MARTIN + RAYTHEON—IN A RECEIVING MOOD



*The GPS III Non-flight Satellite Testbed (GNST). Photo courtesy of Lockheed Martin*

**During recent compatibility and integration tests, Lockheed Martin's GPS III Non-flight Satellite Testbed (GNST)—a full-sized, functional satellite prototype currently residing at Cape Canaveral Air Force Station (CCAFS)—proved that it could connect with and receive commands from Raytheon's Launch and Check Out System, part of the next-generation Operational Control System (OCX) that supports the satellite and mitigates risks prior to launch.**

The GNST was delivered to CCAFS back in July so that facilities and pre-launch activities could be tested, further reducing risk and gaining efficiencies, prior the first GPS III flight satellite's expected delivery to the U.S. Air Force in 2014 and launch in 2015.

The prototype for Lockheed Martin's next generation GPS III satellite reached a major milestone on August 30 when it successfully established remote connectivity and communicated with the GPS Next Generation Operational Control System (OCX), being developed by Raytheon, during a series of pre-flight tests.

The GNST received commands from the LCC node at Lockheed Martin's facility in Newtown, Pennsylvania via the OCX servers at Raytheon's facility in Aurora, Colorado, the system then returned satellite telemetry to the control station. The tests mirror launch and early orbit testing planned for all flight vehicles.

"The GNST is essentially a non-flying, functional GPS III satellite. While we have connected OCX with ground-based simulators before, these C&I tests were the first time that OCX and a GPS III satellite have actually communicated," said Keoki Jackson, vice president for Lockheed Martin's Navigation Systems mission area.

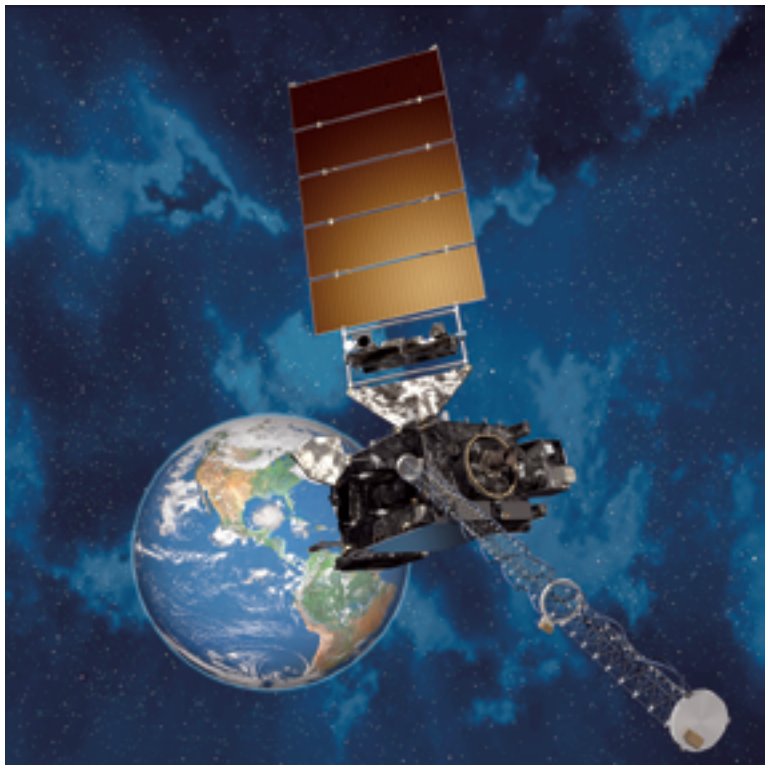
Matthew Gilligan, a vice president with Raytheon's Intelligence, Information and Services business and Raytheon's GPS OCX program manager, stated, "This was an invaluable early opportunity to demonstrate command and control of the GPS III satellite with LCS, proving the end-to-end system capabilities well before putting an actual GPS III in orbit. The positive results tell us that we are right on track for the first GPS III launch."

The LCS works hand-in-hand with Lockheed Martin's Launch and Checkout Capability (LCC) contract, which brings online some of OCX's GPS III-specific capabilities early to provide on-orbit checkout and control of the satellites.

The GNST has been at the Cape since July dry-running launch base space vehicle processing activities and pre-launch testing that all future flight GPS III satellites will undergo. The first flight GPS III space vehicle (SV-01) is expected to be available for launch in 2014, and launched by the U.S. Air Force in 2015.

Prior to shipment to the Cape, the GNST was developed and then completed a series of high-fidelity activities to reduce program risks, improve efficiencies and pathfind the integration, test and environmental checkout that all production GPS III satellites undergo at Lockheed Martin's new GPS III Processing Facility in Denver, Colorado.

An innovative investment by the Air Force under the original GPS III development contract, the GNST has helped to identify and resolve development issues prior to integration and test of SV-01.



Following the Air Force's rigorous "Back-to-Basics" acquisition approach, the GNST has gone through the development, test and production process for the GPS III program first, significantly reducing risk for the flight vehicles, improving production predictability, increasing mission assurance and lowering overall program costs.

The Lockheed Martin-developed GPS III satellites and Raytheon's OCX are critical elements of the U.S. Air Force's effort to modernize the GPS enterprise more affordably while improving capabilities to meet the evolving demands of military, commercial and civilian users worldwide.

GPS III satellites will deliver three times better accuracy; provide up to eight times more powerful anti-jamming capabilities; and include enhancements which extend spacecraft life 25 percent further than the prior GPS block.

The GPS III also will carry a new civil signal designed to be interoperable with other international global navigation satellite systems, enhancing civilian user connectivity.

The spacecraft bus and antenna assemblies for the first GPS III satellite have been delivered to Lockheed Martin's GPS III Processing Facility.

Lockheed Martin is currently under contract for production of the first four GPS III satellites (SV 01-04), and has received advanced procurement funding for long-lead components for the fifth, sixth, seventh and eighth satellites (SV 05-08).

OCX will revolutionize GPS command and control and mission management capabilities, controlling all legacy and new military and civil signals, providing protection against evolving cyber threats and ensuring continuity of operations during cyber attacks, and reducing operation and sustainment costs through efficient software architecture, automation and performance-based logistics.

OCX represents a quantum leap in capabilities over the current Operational Control System and provides flexibility and adaptability to meet future GPS mission needs.

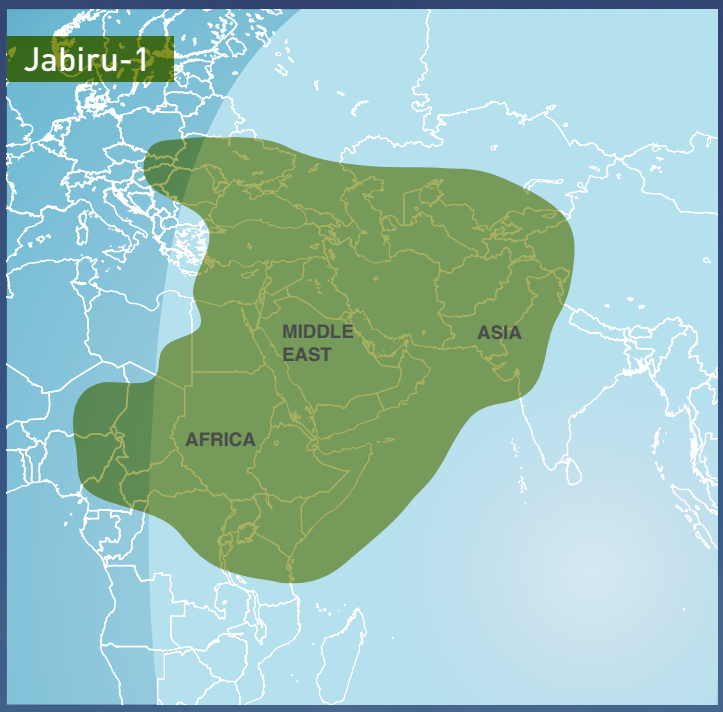
Raytheon is the OCX prime contractor and is on track to deliver the final Launch and Checkout System in 2014.

The GPS III team is led by the Global Positioning Systems Directorate at the U.S. Air Force Space and Missile Systems Center. Lockheed Martin is the GPS III prime contractor with teammates ITT Exelis, General Dynamics, Infinity Systems Engineering, Honeywell, ATK and other subcontractors.

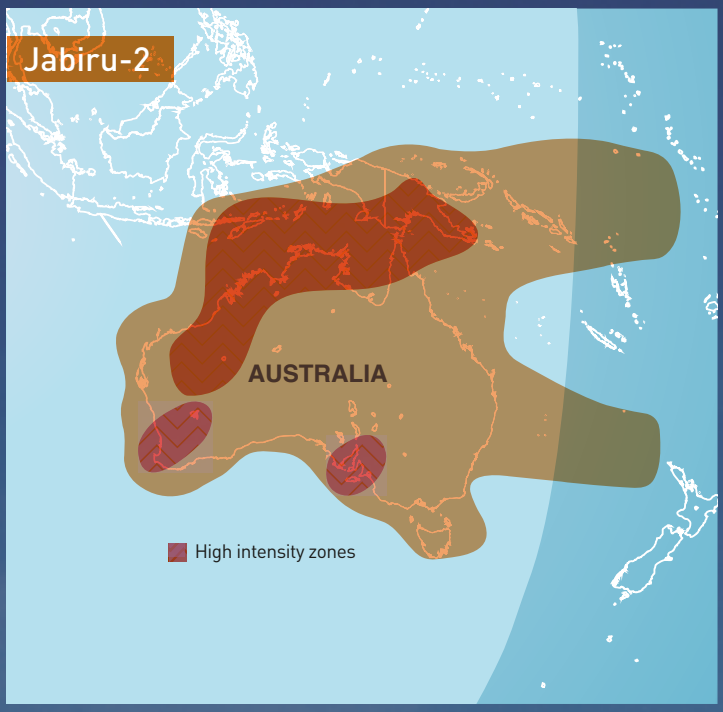
Raytheon is the GPS OCX prime contractor with teammates ITT Exelis, Boeing, Braxton, Infinity Systems Engineering, and NASA's Jet Propulsion Laboratory. Air Force Space Command's 2nd Space Operations Squadron (2SOPS), based at Schriever Air Force Base, Colorado, manages and operates the GPS constellation for both civil and military users.

# Jabiru Satellite Program

"NEW" CAPACITY TO HIGH DEMAND REGIONS
HIGH-POWERED KU- AND KA-BAND COVERAGE
"RAW" CAPACITY AND FLEXIBLE PAYLOADS




- 7.6 GHz Ka-band capacity
- 3 regional, 24 multi-spot and 2 steerable beams
- Provides "new" capacity over the MENA region




- 216 MHz Ku-band capacity
- High-powered Australasia regional beam
- Provides highly focused capacity over Western Australia's North West shelf, Timor Leste and Papua New Guinea

Scan for **Ka-band white paper**
or visit **newsat.com/ka-bandwhitepaper**



NewSat
Global Satellite Solutions

# DISPATCHES

## USAF—AFSSS NOW GONE DUE TO SEQUESTRATION

*Capt. Roland Rainey, commander, 614th Air and Space Operations Center, Det. 1, performs a flag casing ceremony during the Air Force Space Surveillance System and 20th Space Control Squadron, Det. 1 closing ceremony Oct. 1. Roland was assisted in the ceremony by current 20th SPCS, Det. 1 members including Kenneth St. Clair, Senior Airman Nicholas Mikelis, and Tech. Sgt. John McIntyre (not pictured). The 20th SPCS, Det. 1 manpower and resources have been realigned under the 614th AOC, Det. 1.*

*Grumpy, a stray dog turned 'mascot' for the crews at the AFSSS Gila River site, found a new home with a crew member after the AFSSS deactivation, October 1st. Each AFSSS site had a stray dog show up at their door and each time, a member of the crew adopted the homeless animal.*

**The 21st Space Wing closed the Air Force Space Surveillance System due to resource constraints caused by sequestration, marking the end of its 52 years of service to the Space Situational Awareness mission, October 1.**

The Air Force Space Surveillance System was designed to transmit a "fence" of radar energy vertically into space to detect all objects passing through that fence. It operated from three transmitters and six receiver stations located along the 33rd parallel in the southern portion of the United States. The three transmitter sites were located at Jordan Lake, Alabama; Lake Kickapoo, Texas; and Gila River, Arizona.

The six receivers were located at Tattnall, Georgia; Hawkinsville, Georgia; Silver Lake, Mississippi; Red River, Arkansas; Elephant Butte, New Mexico; and San Diego, California.

"The AFSSS mission was a cutting edge system when it was initially developed," said Col. John Shaw, 21st Space Wing commander. "Even to this day it complemented our SSA missions throughout the world, but due to sequestration, the decision was made to reconfigure some of our other assets and deactivate the AFSSS."

The radar had three distinct processes which were performed by three different organizations. The 20th Space Control Squadron at Eglin Air Force Base, Florida, oversaw the radar transmitter and receiver sites and also collected the observations. Observations from these sites were sent to the 20th SPCS, Detachment 1 at Dahlgren, Virginia, where the data was processed. Finally, the 614th Air and Space Operations Center, Detachment 1 at Dahlgren, analyzed the AFSSS data and distributed observations to the Joint Space Operations Center located at Vandenberg Air Force Base, California.

The two receiver sites at Tattnall and Silver Lake were deactivated in April of this year. The remaining sites, including the 20th SPCS, Det. 1, deactivated October 1.

With the exception of the 20th SPCS, Det. 1, all sites were staffed by contract personnel from Five Rivers Services. Government crews and resources from 20 SPCS, Det. 1, have been realigned under the 614th AOC, Det. 1.

Modified operating modes at Perimeter Acquisition Radar Characterization System at Cavalier AFS, N.D., and the space surveillance radar at Eglin AFB, Florida, as well as other 21st Space Wing SSA sensors, allowed for the discontinuation of AFSSS operations while maintaining solid SSA.

While network performance studies are ongoing, initial indications show better than expected performance of the Space Surveillance Network since discontinuing operations of AFSSS, and most metrics are indicating no noticeable impact. Additionally, Air Force Space Command will see a cost savings from the AFSSS de-activation of more than $14 million per year, beginning in Fiscal Year 2014.

As part of the AFSSS closing process Shaw and Chief Master Sgt. Richard Redman, 21st Space Wing command chief, visited one of the sites before its closure.

"It was an honor to be able to go and visit the contractors working at the Elephant Butte (New Mexico) site," said Shaw. "Some of these people have worked on the AFSSS their entire careers and it has served us well for the past 52 years. We were especially grateful we could go there and thank the crew for their dedication in person."

As the sun set on the final day of operations Sept. 30, AFSSS sites lowered the U.S. flag that flew over their locations one final time. The flag was folded and then presented to each site manager.

A formal ceremony, marking the closure of all sites and deactivation of 20th SPCS, Det. 1 was also held in Dahlgren, Va. The ceremony included a special guidon flag-casing ceremony, which is a military tradition used to recognize units that have deactivated or moved. The guidon was sent to the parent unit, the 20th SPCS located at Eglin AFB, Fla., for historical preservation.

"The contributions of the fence for 52 years, coupled with the dedication of the men and women who maintained and analyzed its data is a remarkable accomplishment," said Capt. Roland Rainey, commander, 614th AOC, Det. 1.

Oct. 1 meant more than just a day to take down a flag; it was also a day to celebrate the AFSSS's history.

"While we say 'farewell' to the AFSSS and its contributions to the Space Situational Awareness mission, it is equally important to remember all the operators, analysts and contractors, both military and civilian, who met the space race challenge over the years," said Rainey.

For some of those members who devoted their careers to the AFSSS mission, October 1 was a bittersweet day.

Kenneth St. Clair, 20th SPCS Det. 1 site supervisor and now the 614th AOC Det. 1 supervisory information technology specialist, has worked the AFSSS mission for more than 30 years. He experienced many unit name changes throughout his tenure but the mission always stayed the same. This time, that mission will change as well.

"(The closing ceremony) signified the end of 20th SPCS, Det. 1," said St. Clair. "It's going to be different but we will keep moving on."

However, not all sad news came out of these closing ceremonies. One member—or perhaps 'mascot' is a better term—seemed to create a bright spot to the closure of the AFSSS story.

His name — Grumpy.

Grumpy is a black and white stray dog that decided to call the Gila River space surveillance site home nearly four years ago. Too scared to approach the crew working at the site, Grumpy was never able to become 'friends' with the crew. The crew members still cared for and fed him, nonetheless.

As the AFSSS sites approached their closure date of October 1, many people were afraid Grumpy would be left at the site, uncared for and alone. That all changed when one of the crew members was finally able to warm up to Grumpy. The member has since adopted him and Grumpy has a new home.

***Story by 1st Lt. Stacy Glaus, 21st Space Wing Public Affairs Office***

# A satellite doesn't run by itself.

**It needs the right telemetry, tracking, and control system to do its job, and the right team of professionals to manage that system. With Harris Corporation's OS/COMET®, your mission gets a COTS scalable, customizable, and extensible TT&C solution and Harris people with unparalleled technical expertise to support you.**

**The OS/COMET® team has more than 30 years' experience in the satellite TT&C business. Put that experience and know-how to work for you, no matter what your satellite mission is.**

**OS/COMET®: BRINGING RESULTS DOWN TO EARTH.**

*www.oscomet.com*

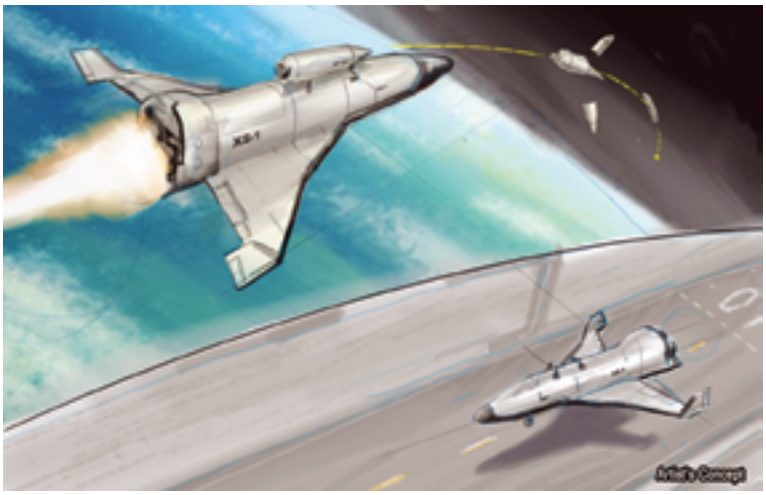
HARRIS®

assuredcommunications®

*harris.com*

# DISPATCHES

## DARPA—EXPERIMENTAL SPACEPLANE FOR ORBIT OPS



**A new DARPA program seeks to lower satellite launch costs by developing a reusable hypersonic unmanned vehicle with costs, operation and reliability similar to traditional aircraft**

Commercial, civilian and military satellites provide crucial real-time information essential to providing strategic national security advantages to the United States.

The current generation of satellite launch vehicles, however, is expensive to operate, often costing hundreds of millions of dollars per flight.

Moreover, U.S. launch vehicles fly only a few times each year and normally require scheduling years in advance, making it extremely difficult to deploy satellites without lengthy pre-planning.

Quick, affordable and routine access to space is increasingly critical for U.S. Defense Department operations.

To help address these challenges, DARPA has established the Experimental Spaceplane (XS-1) program. The program aims to develop a fully reusable unmanned vehicle that would provide aircraft-like access to space.

The vehicle is envisioned to operate from a "clean pad" with a small ground crew and no need for expensive specialized infrastructure.

This setup would enable routine daily operations and flights from a wide range of locations. XS-1 seeks to deploy small satellites faster and more affordably, while demonstrating technology for next-generation space and hypersonic flight for both government and commercial users.

"We want to build off of proven technologies to create a reliable, cost-effective space delivery system with one-day turnaround," said Jess Sponable, DARPA program manager heading XS-1. "How it's configured, how it gets up and how it gets back are pretty much all on the table—we're looking for the most creative yet practical solutions possible."

The DARPA Special Notice describing the specific capabilities the program seeks is available at http://go.usa.gov/DNkF. A Broad Agency Announcement (BAA) for XS-1 is forthcoming and will be posted on the Federal Business Opportunities website.

XS-1 envisions that a reusable first stage would fly to hypersonic speeds at a suborbital altitude. At that point, one or more expendable upper stages would separate and deploy a satellite into Low Earth Orbit.

The reusable hypersonic aircraft would then return to earth, land and be prepared for the next flight. Modular components, durable thermal protection systems and automatic launch, flight, and recovery systems should significantly reduce logistical needs, enabling rapid turnaround between flights.

Key XS-1 technical goals include flying 10 times in 10 days, achieving speeds of Mach 10+ at least once and launching a representative payload to orbit.

The program also seeks to reduce the cost of access to space for small (3,000- to 5,000-pound) payloads by at least a factor of 10, to less than $5 million per flight.

XS-1 would complement a current DARPA program already researching satellite launch systems that aim to be faster, more convenient and more affordable: Airborne Launch Assist Space Access (ALASA). ALASA seeks to propel 100-pound satellites into orbit for less than $1 million per launch using low-cost, expendable upper stages launched from conventional aircraft.

"XS-1 aims to help break the cycle of launches happening farther and farther apart and costing more and more," Sponable said. "It would also help further our progress toward practical hypersonic aircraft technologies and increase opportunities to test new satellite technologies as well."

## DEFENSE DEPARTMENT—ADIEU TO ASH

**Defense Secretary Chuck Hagel has announced that Deputy Defense Secretary Ash Carter will step down December 4.**

Carter has served in senior Defense Department positions since the start of the Obama administration including as undersecretary of defense for acquisition technology and logistics under Defense Secretary Robert M. Gates before becoming the department's number two official.

In a statement, Hagel said he met with Carter this morning and reluctantly accepted his decision to step down."

Hagel called Carter an extraordinarily loyal and effective deputy secretary who constantly provided outstanding support to service members fighting downrange.

"He possesses an unparalleled knowledge of every facet of America's defense enterprise, having worked directly and indirectly for eleven secretaries of defense over the course of his storied career," Hagel said.

Hagel thanked Carter for remaining his deputy and helping him get up to speed in the department during some unusual times. I have continually relied upon Ash to help solve the toughest challenges facing the Department of Defense, Hagel said. I particularly appreciate his work spearheading the Strategic Choices and Management Review, which put the department in a far stronger position to manage through unprecedented budget uncertainty."

As undersecretary, Carter led DoD's efforts to accelerate the fulfillment of urgent operational needs such as the mine-resistant, ambush-protected vehicles. He worked to increase the department's buying power, and worked to strengthen America's defenses against emerging threats, such as cybersecurity.

Deputy defense secretaries generally remain in the background, but Carter held some very visible portfolios including serving as the department's point man in defense relations with India. Most recently, he headed the department's investigation into the Washington Navy Yard shooting.

Hagel called Carter a brilliant strategist and an excellent manager. His compassion, love, and determination to overcome any and all bureaucratic obstacles earned him abiding respect and appreciation, he wrote. I am confident that the Department, and the country, will continue to benefit from Ash Carter's service in the months and years ahead."

Pentagon Press Secretary George Little said Carter's decision to leave was his and his alone.

Carter has moved back and forth between academia and government. He earned bachelor's degrees in physics and in medieval history from Yale University, and received his doctorate in theoretical physics from Oxford University, where he was a Rhodes Scholar.

Before joining the Obama administration, Carter chaired the International and Global Affairs faculty at Harvard University's John F. Kennedy School of Government and was Co-Director of the Preventive Defense Project.

During the Clinton administration, Carter served as assistant secretary of defense for international security policy.

Hagel thanked Carter for remaining on the job until December. He said the time will help smooth the transition. The department will miss him, Hagel wrote. I will miss him."

***Story by Jim Garamone, United States Department of Defense***

# Connect the Netcentric Battlefield

## with Gilat's Broadband Satellite Solutions

Today's netcentric battlefield demands rugged, field proven solutions to keep the front line in perfect synch with your command & control center. Fast and secure access to voice, data, and video are no longer luxuries - they can easily make the difference between victory and defeat. That's why leading military and defense organizations choose tactical broadband satellite communications solutions from Gilat.

Gilat delivers best of breed VSATs, modems, antennas and amplifiers for dependable, high-speed connectivity in the most challenging environments.

**Our military communications products for land, sea and air applications include:**

- RaySat low-profile, lightweight antenna systems for Defense-on-the-Move
- MLT-1000 battle-tested, fast to deploy military modems
- Wavestream low SWaP next-generation amplifiers (SSPAs and BUCs)
- Miniature, lightweight UAV terminals extend BLoS operations

To find out how you can use Gilat's high-performance broadband solutions to achieve total situational awareness, contact your local Gilat representative or visit us at:

GEOINT 2013, Florida, USA, October 13 - 16

Global MilSatCom 2013, London, UK, November 5 - 7

MILCOM 2013, San Diego, CA, November 17 - 20

Gilat

*VSATS - MODEMS - AMPLIFIERS - ANTENNAS*

**www.gilat.com**

# Resiliency + Disaggregated Space Architectures—Part One

*Article courtesy of Air Force Space Command and is the combined work of several subject-matter experts.*

**General William L. Shelton made the following statement to the Senate Armed Services Committee on April 24, 2013...**

*"Our satellites provide a strategic advantage for the U.S., and as such, we must consider the vulnerabilities and resilience of our constellations. My staff at Headquarters Air Force Space Command, alongside the team at the Space and Missile Systems Center, is leading efforts at balancing resilience with affordability. They are examining disaggregated concepts and evaluating options associated with separating tactical and strategic capability in the missile warning and protected communications mission areas. We are also evaluating constructs to utilize hosted payload and commercial services, as well as methods to on-ramp essential technology improvements to our existing architectures. Beyond the necessity of finding efficiencies and cost savings, we may very well find that disaggregated or dispersed constellations of satellites will yield greater survivability, robustness and resilience in light of environmental and adversarial threats."*

***Introduction***

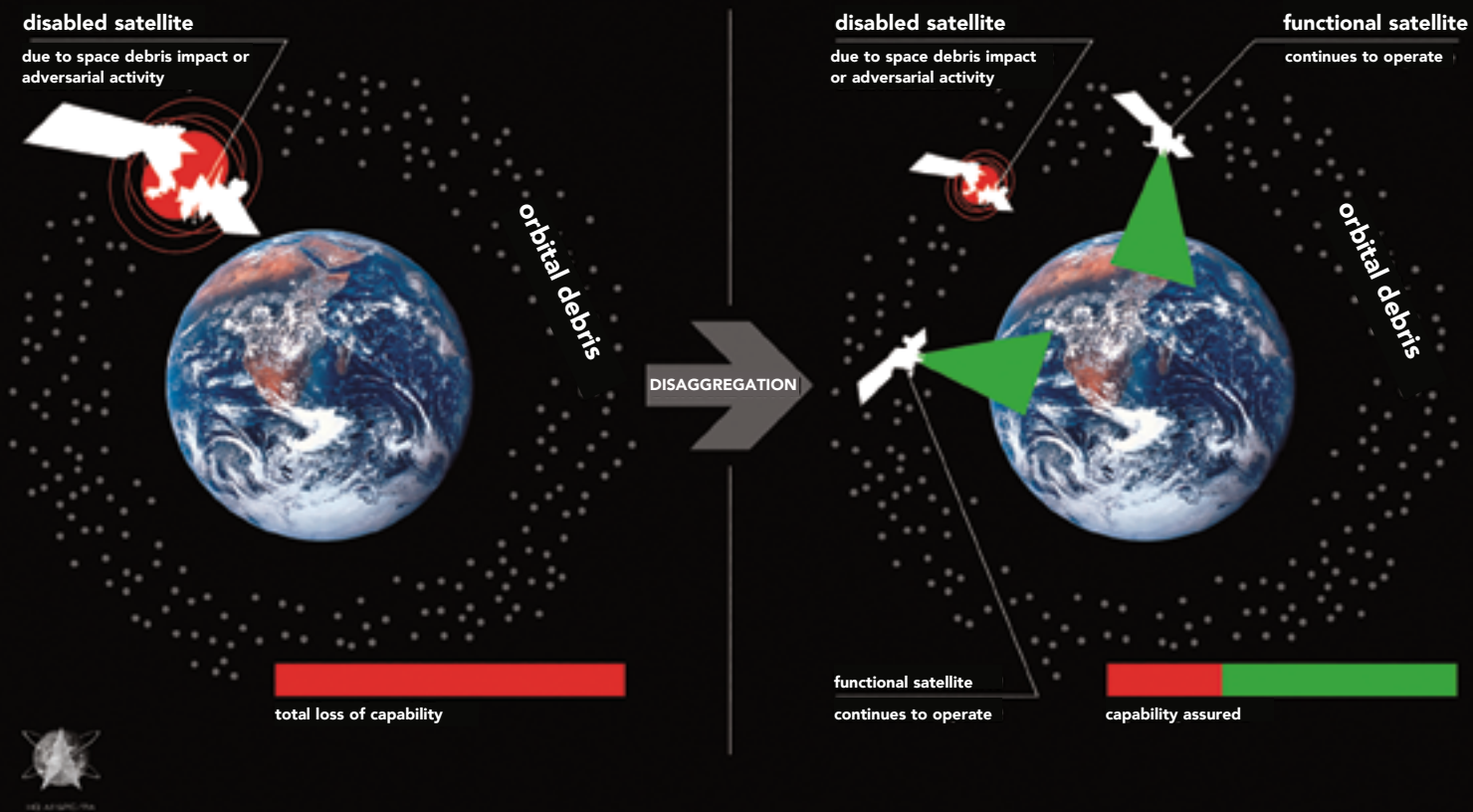
National security space assets provide Joint Warfighters and our nation with strategic warning, assured communication, and precision positioning, navigation and timing—an unrivaled advantage in today's security environment. Use of these capabilities has evolved considerably in recent years; however, the space systems themselves have not.

Many of these systems have designs that date back to the Cold War. Requirements in that era were driven by the compelling need for nuclear attack warning and the desire to maintain a bilateral balance of power. Threats to space systems were deemed a tolerable risk, since an attack in space would be provocative and escalatory and might be interpreted as a prelude to nuclear war.

However, the security environment of today is much different than in the past. Previous considerations led to satellite designs that maximized the

## RESILIENCY AND DISAGGREGATED SPACE ARCHITECTURE

**Complicating Adversary's Targeting Calculus = Reduced Environmental and Adversarial Threats.**



size, weight, and capability of every payload within the constraints of a given launch vehicle.[1] Performance was prioritized over protection as the threat of "mutually assured destruction" reduced any risk of an attack. System designs naturally evolved to become increasingly complex, integrated and expensive. Our current satellites are marvels of modern engineering, but their suitability is critically dependent on the strategic balance of a foregone era.

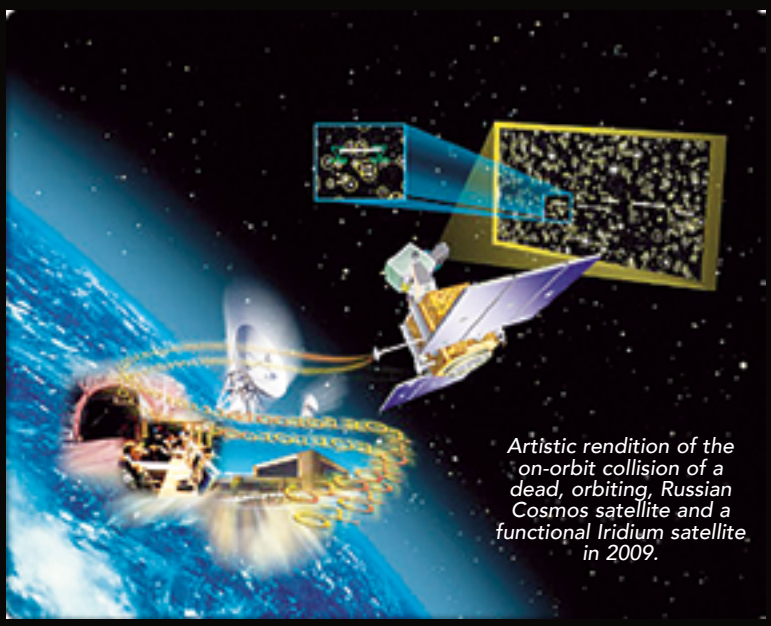
This article examines the need to provide resilient and affordable capabilities to preserve our operational advantage in space. The focus is on "disaggregating" space capabilities onto multiple platforms or systems. Disaggregation improves mission survivability by increasing the number and diversity of potential targets, thereby complicating an adversary's decision calculus and increasing the uncertainty of successful attack. Disaggregation is of value whether the threat is a hostile adversary, or an environmental threat, such as orbital debris.

### *A New Security Environment*

Warfighting requirements on the surface of the Earth have rapidly evolved. The rate of change continues to accelerate, virtually guaranteeing the future security environment will be different than today.[2] In Joint Force 2020, the Chairman of the Joint Chiefs of Staff echoes the defense strategic guidance for that environment, including two elements of crucial interest: Projecting power despite anti-access/area denial challenges, and deterring and defeating aggression. Considering the lengthy time required to develop and field our current space assets, almost by default, the space systems that met yesterday's challenges must address today's problems, and today's architectures must address the future security environment.

The overwhelming success of Desert Storm delivered a global wake-up call to our adversaries. State and non-state actors saw firsthand the advantages of networked command and control, overhead surveillance and precision targeting. Conventional forces gained prominence as the centerpiece of U.S. national power projection and began to slowly change our adversary's perception of nuclear power as the central focus of national deterrence. Meanwhile, space systems were increasingly viewed as critical to U.S. conventional power. Combined with the fact that space capabilities are provided by a few, relatively vulnerable satellite architectures, led to the assessment that U.S. reliance on space was a potential Achilles Heel.

These factors have contributed to rapid growth in threats to our space systems. Adversaries have had more than 20 years to react to Desert Storm and they have concentrated efforts on countering our space advantages.



*Artistic rendition of the on-orbit collision of a dead, orbiting, Russian Cosmos satellite and a functional Iridium satellite in 2009.*

In 2007, China successfully demonstrated the capability to destroy a satellite in low earth orbit, and open source reporting described their capability to interfere non-kinetically with optical space systems using laser dazzling.[3] While kinetic threats could obviously be devastating, non-kinetic threats, such as radio-frequency jammers and cyber attacks, can be equally destructive and are far more prevalent. Cyberspace threats, in particular, have exceptionally low barriers to entry and are growing rapidly. Space systems that rely on complex software and radio-frequency links could be susceptible to these attacks, despite robust cryptographic protection.

Not only man-made threats from state and non-state actors have increased; dangers inherent in the space environment itself have evolved, including increased amounts of debris, competition for electromagnetic spectrum and the sheer number of satellites in space.

While not the result of a hostile and intelligent adversary, the environmental hazard is no less real. In 2009, the first collision involving an active satellite occurred when COSMOS 2251 and Iridium impacted on orbit, creating thousands of pieces of debris.[4] In short, the threat environment has changed extraordinarily, and we must adapt critical U.S. capabilities if our operational advantage is to endure.

No discussion of the changing security environment is complete without addressing current fiscal challenges and budgetary trends. Continued funding of expensive space systems is no longer assured, and is in fact assumed to be impracticable. Large, complex systems that require many years of sustained investment to design, develop, field and operate may no longer be affordable. Moreover, given the growing threat environment, they may place a significant amount of national treasure at increased risk. While astute mission assurance measures have decreased launch failures to record lows, there is always the risk that a single launch failure, early-orbit anomaly, environmental event or hostile act could result in the loss of hundreds of millions, or even billions, of dollars.

### *Resilience + Disaggregation*

Given the challenges of a rapidly changing security and fiscal environment, new and innovative approaches to provide capability in an affordable way merit close examination. One response to these changes that secures capability for the Joint warfighter and the nation is to seek resilience in space systems. With respect to satellite constellations and space architectures, AFSPC/CC defined resilience as follows:

> *"Resiliency is the ability of a system architecture to continue providing required capabilities in the face of system failures, environmental challenges, or adversary actions."*

Disaggregating space architectures is one strategy to improve resiliency, offering a means to trade cost, schedule, performance, and risk to increase flexibility and capability survivability. To establish a common lexicon, we are proposing the following definition of space disaggregation:

> *"The dispersion of space-based missions, functions or sensors across multiple systems spanning one or more orbital plane, platform, host or domain."*

A disaggregated system design offers a means to avoid threats, ensure survivable capabilities despite hostile action, and develop the capacity to reconstitute, recover or operate through adverse events should robustness fail. Carefully pursued, disaggregation can lead to less costly and more resilient space architectures in the face of a rapidly evolving security environment.

**Editor's note**

*Part Two of this information AFSC article will be published in the November issue of MilsatMagazine.*

*Additionally, please read General Shelton's "Military Space: At A Strategic Crossroad" later in this issue of MilsatMagazine.*

**References**


1 *Lt Gen Ellen Pawlikowski, Doug Loverro, and Col Tom Cristler, "Space: Disruptive Challenges, New Opportunities and New Strategies," Strategic Studies Quarterly 6, no. 1 (Spring 2012): 27-54.*

2 *"Capstone Concept for Joint Operations: Joint Force 2020", Martin E. Dempsey, General, U.S. Army, Chairman, Joint Chiefs of Staff, 10 September 2012.*

3 *"Chinese ASAT Capabilities and ABM Capability, GlobalSecurity.org, viewed 7 Mar 2013, http://www.globalsecurity.org/space/world/china/asat.htm.*

4 *"Effects of Worst Satellite Breakups in History Still Felt Today," Space Insider, 28 Jan 2013. http://www.space.com/19450-space-junk-worst-events-anniversaries.html.*

# COMMAND CENTER

## STUART LINSKY VICE PRESIDENT COMMUNICATION PROGRAMS NORTHROP GRUMMAN AEROSPACE SYSTEMS

**The U.S. Air Force's Advanced Extremely High Frequency (AEHF) protected communications satellites have the most sophisticated communication payloads ever built in order to meet a top national priority mission: Provide assured communications to strategic nuclear and tactical forces that are protected against enemy jamming, spoofing, detection and interception.**

The third AEHF satellite launched in September carried a Northrop Grumman-built payload, as did Flights 1 and 2. The company is an integral part of a government and industry team that uniquely provides assured and protected satellite communications (SATCOM) capabilities for U.S. military forces and those of Advanced EHF's international partners.

Northrop Grumman delivered the payload for Flight 3 in 2009, and since that time, the government has focused on making anti-jam military SATCOM more affordable. This highly specialized capability historically has come with a price premium because of unusually stringent requirements.

Stuart Linsky, Vice President of Communications Programs for Northrop Grumman, is responsible for mission success and for on-time delivery of communication systems, including Advanced EHF payloads.

One of the company's leading inventors, Linsky holds 29 patents related to SATCOM. His experience with the company began with NASA's Tracking and Data Relay Satellite System and Milstar in the early 1980s. It has continued through Advanced EHF, Transformational Satellite Communications (TSAT) and most recently, Enhanced Polar System (EPS) payloads. Linsky spoke with MilSatMagazine about Northrop Grumman's role on the government and industry AEHF team following the successful launch of Flight 3 last month.

***MilsatMagazine (MSM)***

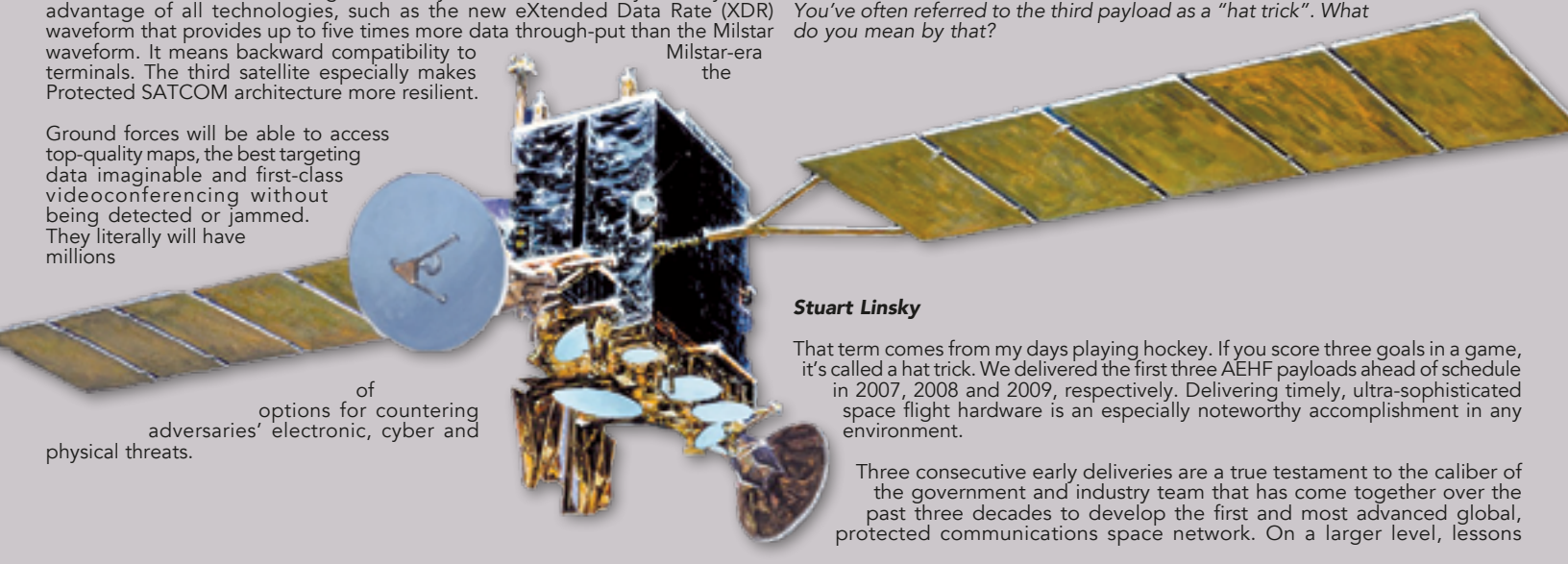
*Please explain what a third Advanced EHF satellite on orbit will mean for U.S. military services and those of the program's international partners.*

***Stuart Linsky***

A fully operational third AEHF satellite will substantially expand and enhance the "ring of protection" for space-based military communications. The ring is a constellation of seven protected communication satellites; five Milstar and two other AEHF satellites currently on orbit. When AEHF Flight 3 is cross-linked with those, it will mean more anti-jam capacity available for more users, as well as more coverage with new capabilities. Milstar gave the warfighter a taste of high-reliability Protected SATCOM. Advanced EHF—at 10 times the capacity—will change the way warfighters network.

Another AEHF satellite will give military services the ability to fully take advantage of all technologies, such as the new eXtended Data Rate (XDR) waveform that provides up to five times more data through-put than the Milstar waveform. It means backward compatibility to Milstar-era terminals. The third satellite especially makes the Protected SATCOM architecture more resilient.

Ground forces will be able to access top-quality maps, the best targeting data imaginable and first-class videoconferencing without being detected or jammed. They literally will have millions of options for countering adversaries' electronic, cyber and physical threats.



***MSM***

*These are very unique capabilities, obviously. Is Northrop Grumman responsible for inventing and implementing all of them?*

***Stuart Linsky***

We have provided all payloads that contain the unique technologies that make Protected SATCOM possible. Northrop Grumman is proud of its role on the Air Force and Lockheed Martin AEHF team. We've been together for more than 30 years, since the beginnings of Milstar in the early 1980s.

It's truly an honor to be a part of the only team anywhere that has been able to implement military SATCOM with this level of immunity to jamming, interference and detection. It gives our military forces an advantage no one else has.

***MSM***

*You've often referred to the third payload as a "hat trick". What do you mean by that?*

***Stuart Linsky***

That term comes from my days playing hockey. If you score three goals in a game, it's called a hat trick. We delivered the first three AEHF payloads ahead of schedule in 2007, 2008 and 2009, respectively. Delivering timely, ultra-sophisticated space flight hardware is an especially noteworthy accomplishment in any environment.

Three consecutive early deliveries are a true testament to the caliber of the government and industry team that has come together over the past three decades to develop the first and most advanced global, protected communications space network. On a larger level, lessons

learned drove manufacturing efficiencies and refined processes that paid off on the third payload.

***MSM***

*You have 29 patents under your belt. Please tell us about some of your innovations and how they were applied to Northrop Grumman projects?*

***Stuart Linsky***

The technical innovations are in the communication system and signal processing realms. They range from signal processing and coding algorithms to system architectures. My first patent was granted more than 20 years ago. It was a signal processing algorithm for communication signal acquisition. Back then, on-board processing was challenging to the power and size available. This algorithm accomplished the various correlations and comparisons in half the resources of existing algorithms. This was key to meeting the capacity requirements on the Milstar Medium Data Rate (MDR) payload system.

At the other end of the spectrum, there is a patent on adaptive coding schemes for satellite communications. This will improve the future of Protected SATCOM by more efficiently using bandwidth and reducing interference while maintaining the high-quality transmission required.

We are also proud of some process innovations we developed over the years. We are always pushing the boundaries of technology, so we had to develop risk management disciplines and techniques. As an example, since we were the first to develop significant on-board processing, we developed the first, but true, simulations of our complex signal processors. This greatly reduced risk and allowed first pass success on advanced processing chips. Today that is routine, but back then, the computers were much more limited.

I've learned through the years that it takes a lot of hard work to turn an initial inventive concept into something that is buildable, valuable and affordable. In today's fiscal climate, we need to expand innovation in order to embrace affordability, while retaining our technical lead.

***MSM***

*How did your hands-on experience as an inventor early in your career shape your approach to managing complex challenges like Protected SATCOM payload programs later in your career?*

***Stuart Linsky***

"Hands-on" probably is the best way to describe how that experience manifested itself. Being part of the invention of Protected SATCOM gives our team a deep understanding of the subtleties that enable such a challenging system to work. There are many technologies and algorithms required that are not available commercially. To respond to that, we had to create, develop and make affordable a number of technologies like broadband hopping phased arrays, nulling antennas and anti-jam modems, among others.

We had to vertically integrate for Protected SATCOM payloads. We operate our own proprietary semiconductor foundry, and we perform all design, test and verification on-site. The results have been better quality control and a stable employee base in this unique community.

***MSM***

*In what ways have your technology breakthroughs on AEHF payloads moved the state-of-art forward for the satellite industry overall?*

***Stuart Linsky***

Advances have been made in the product and manufacturing technologies that enable much more capability with improved reliability and quality. The program established new capabilities across the aerospace industry for space-based signal and data processors, low-noise high-frequency electronics, 60 GHz crosslinks, phased array antennas, protected communications waveform design and onboard, software-based communication networks.

As an example, the high-density 44 gigahertz (GHz) RF electronics have dramatically improved performance and reduced size and power requirements. We now get entire subsystems on a chip. A highly precise lithographic process for making that chip enables the phase tracking required to operate a phased array hopping over 2 GHz at EHF frequencies. Each of these capabilities has enabled technical advances and innovations across the Northrop Grumman portfolio and across the industry. These proven technologies can be used to provide a number of RF-based systems affordably.

***MSM***

*Is Protected SATCOM that much better than what is often called "secure communications?"*

***Stuart Linsky***

Protected SATCOM communication payloads are the most secure we have, they also provide a full range of Protected SATCOM features. Those include anti-jamming, low probability of detection and intercept, rapid recovery during a nuclear event, the ability to operate through scintillation, greatly reduced risk from physical attack to ground systems, and significant protection from cyber attack. Only Milstar and AEHF have the capability to provide true protected communications needed in peer and near-peer anti-access, area-denial environments.

***MSM***

*The AEHF 3Gen satellites will be protected against jamming, spoofing, detection and interception—how will they deal with the problem of interference?*

***Stuart Linsky***

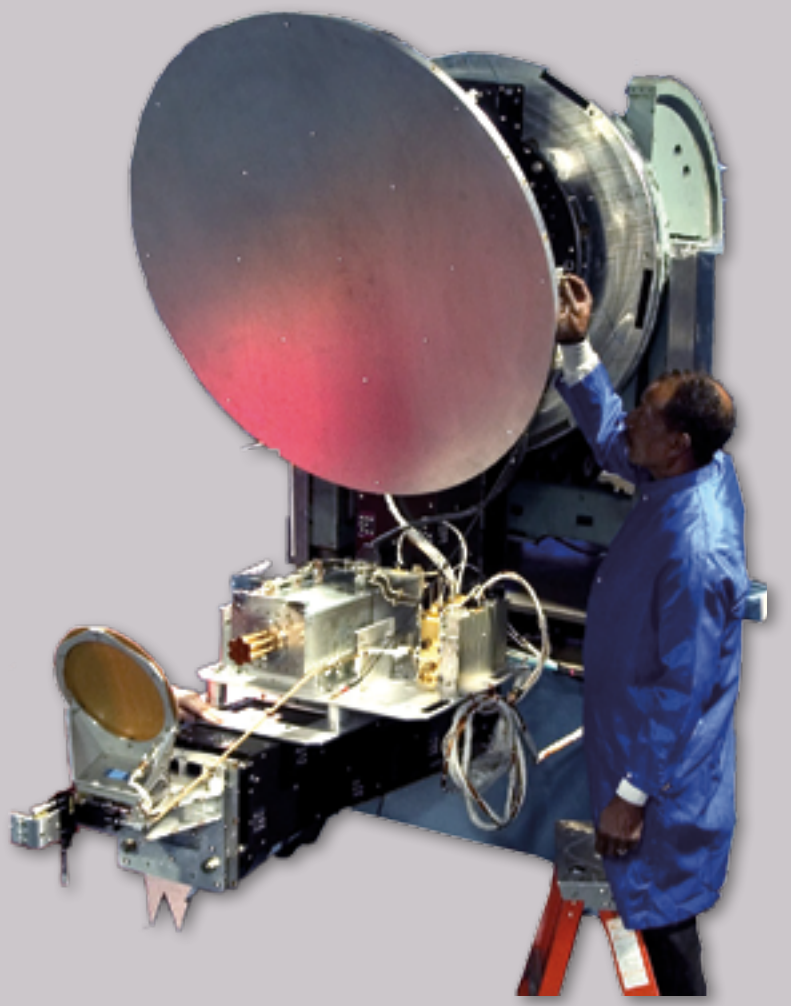
The same techniques and technologies that we employ to protect against jamming, spoofing and detection also thwart interference as well. The Protected SATCOM systems are inherently interference resistant.

***MSM***

*We're concluding more than a decade of combat in the Middle East, and satellite interference by adversaries wasn't a problem. Why is such a sophisticated capability needed?*

***Stuart Linsky***

That's a part of the world on the under-served side of the digital divide. We were fortunate to be able to communicate mostly unhindered. The ability to communicate showed time and again the value to the warfighter of being able to stay connected. Future adversaries will very likely target our communication satellites for that reason.



*A technician adjusts an Advanced EHF communications payload nulling antenna in a test chamber at Northrop Grumman's satellite manufacturing facilities. The nulling antenna is one of the technologies that prevent jamming and interference with the Air Force's AEHF satellites. (Northrop Grumman Photo)*

Growth in demand for government-owned, military SATCOM has been so huge that today we rely on commercial satellites to transmit more than 80 percent of all military communications. Getting the desired effects from the vast array of military systems our nation is investing in, is enabled by networking them together and with warfighters and leaders. The marginal investment in protecting the network is essential.

***MSM***

*There was a significant break in production between the third and fourth payloads. What were the effects of that and how did you deal with them?*

***Stuart Linsky***

With a break that large, there was time to see far enough ahead that we could begin making plans early on. That was the case with our employees. First, we have an extremely talented workforce that's very dedicated to the Protected SATCOM mission. We were able to retain these employees by deploying some to other programs during the interim. But there were some changes we didn't have any control over, such as parts that became obsolete and couldn't be replaced for several reasons. Those kinds of changes resulted in additional costs.

***MSM***

*The emphasis on affordability arrived during that period too. Historically, protected SATCOM has always come with a price premium. What are you doing to adjust for this?*

***Stuart Linsky***

There hasn't been a time when the team wasn't focused on cost and affordability. That was one of the big drivers for all the application specific integrated circuits that were designed specifically for AEHF payloads. They provide 10 times the warfighter capacity compared with a MILSTAR II Medium Data Rate payload at half the size and weight. Those reductions allowed the Air Force to save launch costs by launching on a smaller launch vehicle.

We worked for almost a decade on the TSAT program to advance Protected SATCOM further. When it was canceled in 2009, affordability came into sharp focus. Since then we have examined a number of different architectures and acquisition models to see if there were more cost-effective approaches

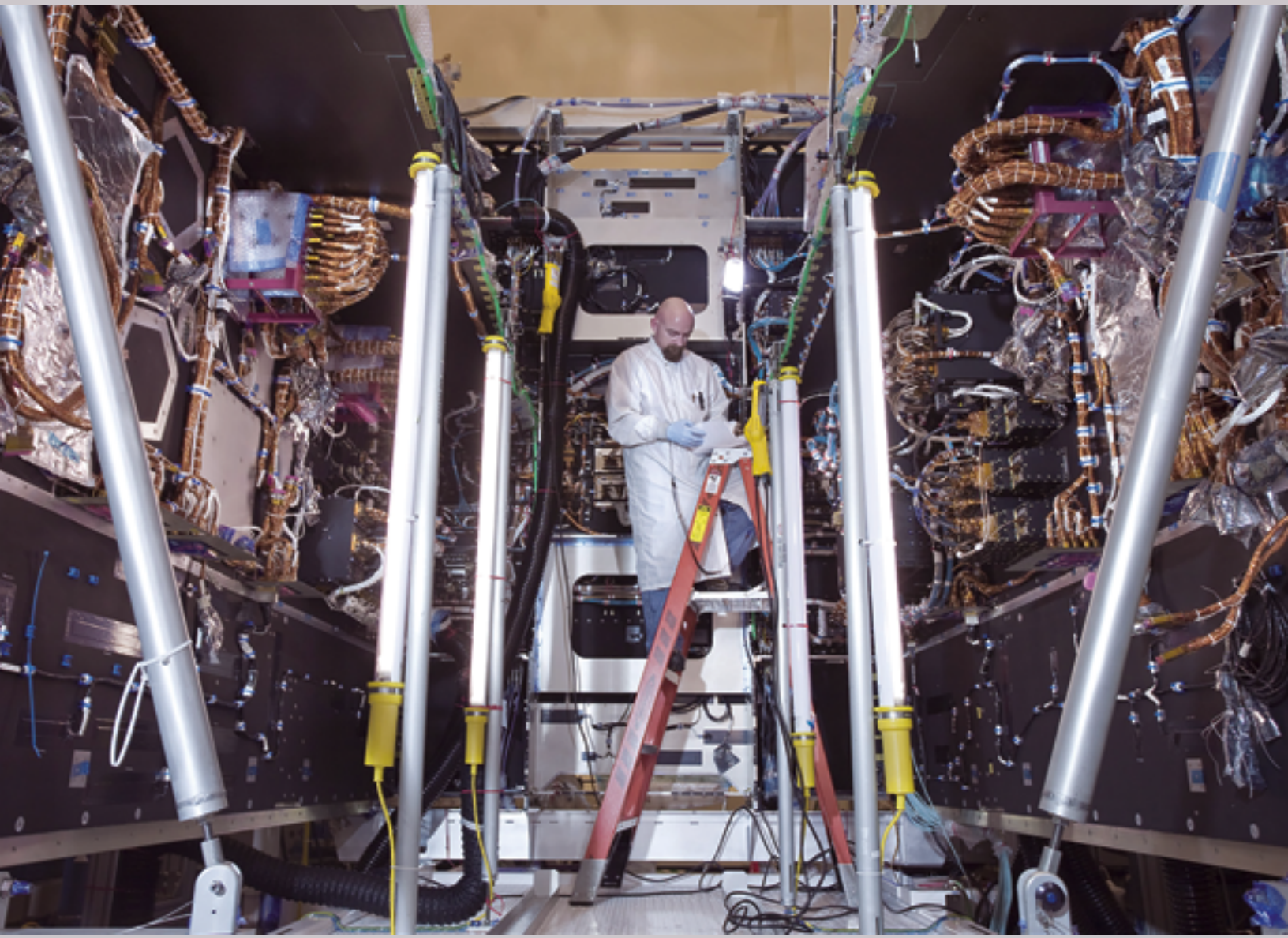
On AEHF, we have already begun changing to a fixed-price contract operating model. We worked closely with many programs throughout the Air Force and Northrop Grumman that have fixed-price contracts, leveraging their expertise to establish our current operating model.

***MSM***

*What results have that and other initiatives achieved so far?*

***Stuart Linsky***

The Air Force earlier this year was quoted as saying that the Northrop Grumman team is "steady as a rock" on cost performance for the AEHF Flight 4 payload currently in production. We'll refer you to Lockheed Martin, the AEHF prime contractor, and to the Air Force for any additional information they may want to provide.



*An Advanced EHF protected communications payload during integration and testing at Northrop Grumman in Redondo Beach, California. Photo courtesy of Northrop Grumman.*

Cost reductions are being facilitated by the government as well. The Air Force's block buys of AEHF 5 and 6 enabled management efficiency and efficiencies of scale. It also minimized parts obsolescence issues we experienced on Space Vehicle 4, saving even more money. The government and Lockheed Martin worked with us to eliminate requirements tied to development that were no longer needed in the production phase we're in now. Whatever the situation may be, the Air Force will work with us to achieve affordability.

***MSM***

*Northrop Grumman has boldly declared it can deliver "Protected SATCOM for the cost of unprotected." Can you outline your plan for accomplishing that—briefly?*

***Stuart Linsky***

As mentioned earlier, we have been looking at architectures and acquisition models designed specifically for affordability. Re-using the government's large investment in AEHF payload equipment means that we can use proven components to avoid costly and risky development. We then combine that with an architecture that maximizes commercial elements such as satellite buses and launch.

That gets us all to a low-risk system that is more resilient and costs no more than an Unprotected SATCOM system. We have already proven the approach with the EPS payloads delivered recently. We now have modular and scalable payload elements using the proven AEHF hardware.

The terminal segment is often overlooked when designing a system. We joined with Lockheed Martin and TeleCommunication Systems to develop a Low Cost Terminal (LCT) using innovative, proven commercial technologies with our own money. Our team is the first to develop an affordable satellite terminal for true communications on the move as well. This terminal will cost an order of magnitude less than many Protected SATCOM terminals.

***MSM***

*You're advocating disaggregation of the protected MilSatCom system. Is that the only way to make it more affordable?*

***Stuart Linsky***

The Air Force is considering alternative solutions for making Protected SATCOM capabilities more affordable, more resilient and more widely available. We have been working these options for years. We believe Protected SATCOM will be a competitive discriminator for our nation, and we are making it affordable and resilient.

***MSM***

*With the now ever-present and continuing, looming, sequestration hatchets hanging over company heads, what are your thoughts about hosted payloads for military and government customers? How do you see such as beneficial, or are they more "pie-in-the-sky" chatter?*

***Stuart Linsky***

Hosted payloads are certainly very real. There are clear benefits to government agencies looking to get the most from their space budgets. We have been flying hundreds of hosted payloads for decades. The company most recently delivered two protected communications payloads that will be hosted on government satellites. They constitute the Enhanced Polar System that will provide anti-jam communications in the North Polar Region.

Altogether, Northrop Grumman has delivered more than 500 payloads through all phases of development, integration, deployment and control, including restricted programs, during the last 50 years. Many of these have been multi-payload missions with primary and secondary payloads. Others have been payloads integrated into other contractors' space vehicles, such as Milstar, AEHF, plus various civil systems including the Clouds and Earth's Radiant Energy System (CERES) instrument, and restricted sensors. Hosted payloads should be an element of an affordable, resilient architecture, but if we want to realize a vision of a Global Standard Network, we will have to have free flyers as well.

***MSM***

*Given the somewhat urgent need to promote better science, technology, engineering and math (STEM) curricula available in our schools, how can our industry help make STEM training and careers in the satellite/space industry exciting and relevant for today's students? What specifically is Northrop Grumman doing to promote STEM education?*

***Stuart Linsky***

We are developing and inspiring the next generation of scientists, technologists, engineers and mathematicians and STEM activities are one of the main ways we're doing this. I'll mention several STEM programs, although there are many more.

Through the ECO Classroom, we collaborate with Conservation International to provide teachers with resources and learning opportunities in environmental sciences. This nationwide teacher development program seeks to inspire students to pursue STEM educations and also to become the next generation of environmental stewards and innovators.

We just completed our fourth consecutive year of sponsoring CyberPatriot, one of the country's largest high school cyber defense competitions. We hired 28 students last year who stood out in the local, regional and national competitions.

Northrop Grumman continues to increase its participation in the Vex Robotics competition that most recently involved 6,000 students from 20 countries on 600 teams. Through our High School Involvement Partnership program last year, company executives mentored nearly 700 students. Of course we also sponsor college scholarships, education grants and partner with universities and colleges on numerous levels.

***MSM***

*Mr. Linsky, you have been with Northrop Grumman for many years, what made you decide to spend so much of your career there?*

***Stuart Linsky***

When I joined the company, I had to move across the country to a whole new environment. I had no expectation of staying for this long. Once I got here, I was so delighted with the quality of my colleagues, and the exciting opportunities to exercise what I learned in school, that I had no reason to change. All these years later, I can look back and feel very satisfied that the work of my teams makes a difference. What else could you ask for?

***MSM***

*One last question before wrapping-up: As an inventor, you're obviously very creative. What's next on the horizon for Protected SATCOM?*

***Stuart Linsky***

We have been focusing our innovation on affordability and resilience. We also have some exciting upgrades we invented to dramatically increase resistance to jamming. We have to stay ahead of our adversaries and these upgrades will do that. Protected SATCOM that's the same cost as unprotected can serve as the Global Standard Network for our forces, something we don't have today. Anyone with one of these Low Cost Terminals will be able to connect to anyone else, anywhere in the world—from the President, down to the warfighter at the point. Stay tuned.

*Another photo of the Advanced EHF protected communications payload during integration and testing at Northrop Grumman in Redondo Beach, California. Photo courtesy of Northrop Grumman.*

# THE PAYLOADS FOR PROTECTED SATCOM

**Northrop Grumman builds and integrates the anti-jam communication payloads for the U.S. Air Force's next-generation Advanced Extremely High Frequency (AEHF) satellites. Payloads consist of the complete set of processing, routing and control hardware and software that perform the satellite's communications function, including critical features to protect the communications against interception or jamming threats.**

The company has built and delivered three payloads and (as of this writing) is currently integrating a fourth payload at its facilities in Redondo Beach, California. Northrop Grumman provides AEHF payloads to Lockheed Martin Space Systems, Sunnyvale, California, the system prime contractor.

Advanced EHF, the next generation of protected military satellite communications satellites, provides vastly improved global, survivable, highly secure, protected communications for strategic command and tactical warfighters operating on ground, sea and air platforms. The system also serves international partners including Canada, the Netherlands and the United Kingdom.

A single Advanced EHF satellite provides greater total capacity than the entire Milstar constellation that is currently on orbit. Individual user data rates will be improved 5x, and the higher data rates will permit two-way, jam-resistant transmission of tactical military communication such as real-time video, battlefield maps and targeting data.

In addition to its critical tactical mission, Advanced EHF also will provide the critical survivable, protected and endurable communications to National Command Authority including Presidential conferencing in all levels of conflict.

Each payload meets more than 3,000 specific requirements, which dictate a unique design delivering the flexible connectivity-on-demand needed to achieve swift, decisive outcomes based on information dominance. AEHF payloads are designed to be fully backward compatible with the Low Data Rate (LDR) and Medium Data Rate (MDR) capabilities of the previous generation of protected communication satellites, known as Milstar.

The unique AEHF payloads are the most advanced and complex communication payloads in the world to date. Each payload in the military satellite communications (MilSatCom) constellation acts as an on-board processed switchboard in the sky, with constellation interconnects provided through on-board satellite crosslinks, thus forming a truly global, flexible and protected communications network without the need for vulnerable overseas ground gateways or stations.

AEHF payloads include:

- *Nearly one million lines of software code*
- *25 computers*
- *Nearly 800 application-specific integrated circuits*
- *Almost 18,000 monolithic microwave integrated circuit chips of 70 unique designs*
- *More than 13,000 integrated microwave assemblies and hybrids of 50 unique designs*
- *14 antennas*

*Northrop Grumman technicians thread wiring and cabling through the fourth protected communications payload for the U.S. Air Force's Advanced Extremely High Frequency satellite system. (Northrop Grumman photo.)*

*AEHF lab tests being conducted at Northrop Grumman.*

Advanced EHF provides the only truly jam-, detection- and interception-resistant military communications, capable of operating through all levels of conflict including nuclear war. Extremely High Frequencies, onboard digital processing and highly directional antennas reduce the probability of jamming and intercept, assuring secure, reliable communications for the warfighter.

Development of AEHF payloads leveraged a unique skill and technology base grown over three decades of engineering for the Low Data Rate and Medium Data Rate Milstar payloads.

Starting in 2002, Northrop Grumman poured these lessons learned, and unique engineering skills, into developing the AEHF payloads, each of which provides 10x the warfighter capacity of a MILSTAR II MDR payload at half the size and weight.

Each AEHF payload meets more than 3,000 specific requirements, weighs in excess of 3,600 pounds, and uses 6,000 Watts of power. Northrop Grumman delivered the first three payloads ahead of schedule in 2007, 2008 and 2009, respectively. And just recently, the company delivered an electronics unit that precisely positions a highly sophisticated suite of antennas for the U.S. Air Force's fourth Advanced Extremely High Frequency (AEHF) satellite.

The sophistication of AEHF's communication system is unique. Payloads have interfaces to all portions of a global system-of-systems that provides tactical and strategic protected communications. An innovative blend of advanced, on-board digital signal processing hardware, firmware and software provides high throughput with flexibility to enable evolution.

The software-centric, configuration-table-uploadable payload design allows maximum flexibility in delivering protected communication for the nation's defense now and for decades to come, as the location, complexion and communication-bandwidth demands of the battlefield evolve as they have multiple times in the last two decades of providing this capability operationally through the Northrop Grumman-built Milstar payloads.

- **XDR**—*AEHF's payload flight software represents the first-ever flight qualification of the new Extended Data Rate (XDR) capability.*
  - » Using XDR and other advanced technologies and designs, AEHF will provide 10 times more communications capacity and six times higher channel data rates than the predecessor Milstar system that provides Low Data Rate (LDR) and Medium Data Rate (MDR) waveforms.
- **Phased array antennas**—*another AEHF 'first'—direct radio frequency beams electronically rather than by moving reflectors mechanically.*
  - » This allows one array to do the job of many reflectors, giving the flexibility to point-on-demand in fractions of a second, greatly improving warfighter access.
  - » Each AEHF satellite payload has three phased array antennas, consisting of one uplink antenna and two downlink antennas.
  - » AEHF's downlink phased array antenna, which sends signals to ground terminals, is the first of its kind to operate at 20 GHz in space.
  - » The uplink phased array antennas are the first of their kind to operate at 40 GHz in space.
- **An advanced semiconductor material**, *Indium Phosphide (InP), is a new technology for some of the UPA antennas' more than 10,000 monolithic microwave integrated circuits. InP ensures excellent low-noise, or clear signal, performance.*

NEW!

# RF SATCOM PRODUCTS

## Multiple Input Wideband Up and Down Block Converters

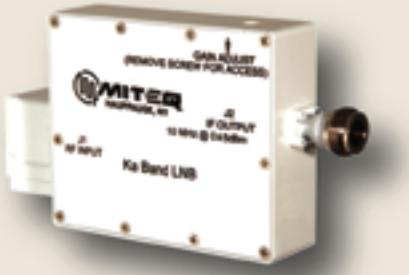
- Outdoor antenna mount
- Ku and Ka -Band Models

## New Addition to 1/3 Rack Block Converter Series

- Block Up and Down Converters with Internal Slope Adjustment over 1 GHz BW
- Available in all bands: C, X, Ku, and Ka

## 100K Noise Temperature Ka-Band LNB

- Small, reduced size package
- 5 models covering from 18.3 to 21.2 GHz




## 9800 Series Synthesized Converters with TT & C Bands

## New UPC2 Uplink Power Control Unit

- Improved User Interface with intuitive touchscreen display
- Ethernet Interface supports HTTP, Telnet and SNMPv1
- Site Diversity Switching - *Ideal for Ka-Band*

For additional information, please contact MITEQ's SATCOM Sales Department at satcomsales@miteq.com

MITEQ
www.miteq.com
100 Davids Drive, Hauppauge, NY 11788
Tel: (631) 436-7400 • Fax: (631) 436-7430

ANAB

CE

# THE HPA CORNER

## APPLAUDING THE USAF FOR HPA PROGRESS

*By Nicole Robinson,*

*Vice Chair, Hosted Payload Alliance*

**The Hosted Payload Alliance (HPA) commends the Air Force Space and Missile Systems Center (SMC) for its leadership and innovative spirit in the development of timely and cost effective means for accessing space.**

With the announcement of SMC's new hosted payload contracting vehicle, the Command reveals its intention to maintain the momentum generated by their progress in this area.

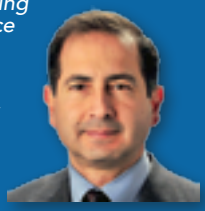
The contract vehicle is called **HoPS**, or *Hosted Payload Solutions*. HoPS is intended to provide a rapid and flexible means for the government to acquire commercial satellite hosting capabilities for payloads. Through this indefinite-delivery, indefinite-quantity vehicle, SMC will establish a pool of candidates that can provide commercial host capabilities and hardware at Geostationary Orbit (GEO) and Low Earth Orbit (LEO).

Considering the current fiscal environment, the timing couldn't have been better to embark on the HoPS effort. In the case of SMC's commercially hosted infrared payload (CHIRP) program, the payload was delivered to orbit roughly three years from signing the contract with the commercial host, and at 15 percent of the cost of a dedicated military spacecraft program. Innovations such as CHIRP will enable SMC and other federal departments and agencies to obtain communications and space capabilities more rapidly and cost effectively.

As a consortium of space industry players organized to increase awareness of the benefits of commercially hosted payloads, the HPA applauds SMC for this effort to save precious resources as well as deliver critical communications capability for our Nation at home and abroad.

***Question for HPA members***

*How do you foresee the HoPS contract vehicle affecting the way the government plans for, and acquires, space capability to meet future requirements?*



"The implementation of the HoPS contract vehicle both formalizes and legitimizes the use of hosted payloads by the U.S. Government in its space systems architectures. The USAF/SMC should be commended for developing this contracting mechanism and making it available to NASA and other U.S. Government agencies that will benefit from affordable space access on reliable commercial platforms."—**Al Tadros, Vice President, DoD and Civil Business, SSL**

"*I am going to assume that the solicitation generates numerous, compliant responses and establishes a rich set of hosting opportunities for the government. This might not be the case if HoPS' terms and conditions put too much risk on the private sector side of the partnership. With that caveat, HoPS will provide another arrow in a program's quiver as an approach to flying space experiments, demonstrations and operational capabilities. I don't think it's a panacea for all things space. Some payloads will be too large for cost-effective hosting. Some payloads may require platform or mission characteristics that cannot be achieved from a commercial satellite, for example non-geosynchronous orbits. The upside of HoPS is having another alternative to a free-flyer mission or a government satellite host. More flight opportunities are good for hosted payload programs.*"—**Tim Frei, Vice President – Communication Systems, Northrop Grumman Aerospace Systems**

# THE HPA CORNER

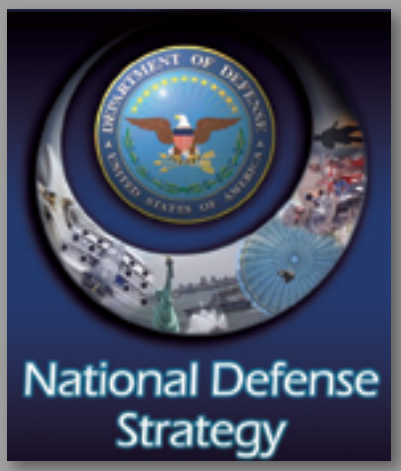
## A MEANS TO AN END

*By Chuck Cynamon,*

*Vice President, U.S. Government Business Development and Strategy, SSL*

**Joint military planners see the world through the lenses of "ends," "ways," and "means." Roughly speaking, ends are ultimate objectives, ways are actions needed to accomplish those objectives, and means are the resources necessary to execute the mission. In this context, I believe most can agree that hosted payloads (HPs) are a way to an end and not an end, themselves.**

Foundational documents, such as the National Security Space Strategy, provide the current desired objective for the Space Enterprise: affordable and resilient space systems (the ends). Due to the contested, congested and competitive state of the Space environment, the driving need is to achieve the end state before we find ourselves in the next major conflict against a highly capable adversary.




Whereas all the national security space mission areas are currently in production and sustainment phase, each is evaluating their next generation architectural choices. The prevailing thought is to consider disaggregated architectures to achieve more affordable systems, provide resiliency, and also expand the U.S. industry base. The enabling building blocks of disaggregated architectures are military-unique systems, commercial systems and services, and HPs.

Within disaggregated mission architectures, HPs are poised for a big pay-off in three areas:

- *Affordable augmentation for military unique systems*
- *Rapid reconstitution to build in resiliency*
- *Technology demonstrations for "try before you buy" acquisition approaches*

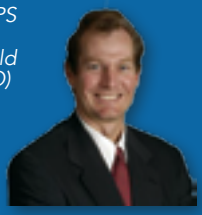
As they provide on-orbit diversification inherently resulting in resiliency, HPs actually link the ends, ways and means. However, on-going U.S. Government studies must ultimately conclude that disaggregated architectures employing HPs also result in affordable total ownership cost, when space, ground and terminal segments are all considered. The DoD has yet to prove the affordability case for the ground and terminal segments and industry will have to help with that.

One possible affordability approach is to seek the "aggregation" of the information infrastructure across all mission areas operating HPs (i.e., SATCOM, missile warning, weather, and more). Dedicated ground and processing systems within each mission area, or worse, for each HP is unlikely to yield a more affordable Space Enterprise.

Because all satellite payloads are information sources and their data outputs can be viewed as a commodity, the commercial telecommunications industry is well equipped to protect, transport and process this data without the need for the U.S. Government to own the entire transport and processing infrastructure. Every day, terabytes of highly protected commercial data is transported all around the globe at a reasonable degree of risk that, in many cases, equals the degree of risk acceptable within the national security arena.

Industry accomplishes this with ground gateways, secure cloud processing centers, and terrestrial telecommunications links. It's this author's opinion that a certified and space-qualified Internet protocol encryption device allowing for ubiquitous flow of HP data across commercial infrastructure is the most critical technology needed to realize the affordability and resiliency that HPs can offer disaggregated space architectures.

With this solution in place, HPs will become a more readily available way to achieve the ends of affordable and resilient space systems with a lower amount of means (i.e., dollars).



*"As the first civilian agency to take advantage of the HoPS contracting vehicle, NASA's $90 million Tropospheric Emissions: Monitoring of Pollution (TEMPO) mission would work in conjunction with the Hosted Payload Office (HPO) at Air Force Space and Missile Systems Center (SMC) in El Segundo, California. The IDIQ contract will facilitate United States Government (USG) procurement of available hosting space aboard commercial satellites. Intelsat General Corporation has heard for a number of years that leveraging of hosted payload space on commercial platforms by the USG has been impeded by arduous USG contracting processes. We are optimistic that the IDIQ approach will streamline this contracting process and yield benefits not only for the USAF, but also for civil agencies such as NASA and NOAA."*—**Dr. Bryan Benedict, Principal Program Manager, Business Development, Intelsat General Corporation**

*"We believe that the Hosted Payload Solutions solicitation and resulting contracts will provide the government with an effective and affordable contracting vehicle for hosting government and military payloads on a commercial spacecraft. We look forward to the prospect that this new process will become a routine part of government architectures during the next decade."*—**Dylan Browne, Vice President, Business and Market Development at Astrium Services Government, Inc.**

*"Harris commends the Air Force initiative of the HoPS contract and believes that it will transform and accelerate the hosted payload market. This vehicle will not only benefit the Government, but also attract commercial ventures that will be able to forecast and, therefore, leverage pre-planned hosting opportunities. HoPS will have the potential to feed a steady stream of hosted payloads into the market ensuring its vitality. With the assurance of future hosted payloads, excess capacity and the added revenue stream it affords can be pre-planned, creating a vibrant and healthy market for commercial operators. From the Government standpoint, HoPS promises an unprecedented level of agility and responsiveness. A rapid procurement cycle enables the Government to now move at the pace of the commercial market. And, from a financial perspective, HoPS will provide the government the visibility it needs into commercial launch planning, to realize tremendous cost savings for those programs and missions that do not require dedicated launch systems and space vehicles. For all parties involved, the HoPS contract vehicle will provide tremendous opportunity and will result in a true win-win proposition. And, that is very exciting news for our industry and our market."*—**Janet Nickloy, Director of Strategy and Business Development, Harris Corporation, National Systems**

For more information regarding the Hosted Payload Alliance, please access the organization's website: ***http://www.hostedpayloadalliance.com/***

*The Commercially Hosted Infrared Payload (CHIRP), a heat-detecting sensor installed on the SES-2 communications satellite—this mission demonstrated that commercial satellites can host military or intelligence sensor payloads without interference. Image is courtesy of Orbital Sciences Corp.*

***Question for HPA members***

*What do you believe are critical technology enablers to pave the way for HPs to become prevalent within affordable and resilient disaggregated space architectures?*

*"The two critical technology enablers for ubiquitous HPs in affordable and resilient disaggregated space architectures are acquisition reform and regulatory reform. The government acquisition cycle adds time and cost to government usage of technology and re-calibrating that cycle to align with the commercial acquisition processes will reduce schedule and cost and open technological opportunities for government consumers. The current regulatory requirements imposed on government communications acquisition, implementation and operation drive up cost and schedule and disadvantage the most effective technologies currently available. Re-aligning regulatory requirements with commercially and academically accepted views of communications architectures will reduce cost and schedule, and give government consumers the opportunity to make use of the latest, most effective technologies available to meet their needs. These two enabling factors are critical to immediate and affordable use of available technologies as means of supporting the HP way to the operational ends demanded by government consumers."*—**Jackson Kemper III, Vice President, Defense and Federal Solutions, Harris CapRock**

*"While considering disaggregated mission architectures employing hosted payloads (HPs) for affordable options to space, the U.S. government should always put the launch solution into the long-term equation. Chuck eloquently states that HPs 'link the end, ways and the means.' Given that commercial Proton vehicle has launched the majority of the HPs in the last two years, this is one of the critical "means" for HPs and is a proven technology enabler."*—**Dawn Harms, Vice President of Sales, Marketing and Communications, International Launch Services**

*"Hosted Payloads can be designed and built using flight-proven technology that has been developed on a wide variety of government and commercial programs. Technology issues have not been preventing the wider adoption of hosted payloads. Instead, the primary barriers have centered around the undefined combined commercial and government space architecture, lack of government-furnished requirements, long decision-making timelines, information assurance, lack of long term government commitments, and related issues. If those barriers can be resolved, future government and commercial technological investments can then be aligned with the entire process."*—**James F. Mitchell, Vice President, Boeing Commercial Satellite Services**

*"Hosted payloads are at an exciting crossroads within the satellite community. There remains a large opportunity for growth due to the desire for resiliency, availability of varying technology platforms, and overall cost. In order for hosted payloads to become a more prevalent option for access to space, the commercial space industry needs to remain robust, providing a continuum of scheduled launch opportunities for government and military sectors to take advantage. Furthermore, the commercial industry must continue to put in place the technical and operational processes and infrastructure to support hosted payloads. Aireon™ has been able to take advantage of Iridium NEXT's launch schedule, by keeping pace with the tempo and hosting opportunity afforded by a large scale constellation deployment."*—**Don Thoma, President and CEO Aireon LLC**

For more information regarding the Hosted Payload Alliance, please access the organization's website: ***http://www.hostedpayloadalliance.com/***

# IS A NEW SATCOM STANDARD RELEVANT FOR THE MILSATCOM MARKET?

*By Koen Willems, Market Director, Government and Defense, Newtec*

**As the release date for the new standard by DVB for satellite communications (S2 Extensions) approaches, all markets, including Government and Defense, are starting to assess the relevance of switching their operations towards the new standard.**

The question of how important the new standard will be for the Government and Defense market is now surfacing. We will try to find some answers to their concerns by having a closer look at the S2 Extensions technology and using the data from a market survey carried out at the beginning of 2013.

Back in 2005, the SATCOM community was convinced that DVB-S2 would be the ultimate satellite modulation standard and no significant upgrades would be possible. Since that time, the satellite communications market has certainly changed. Higher speeds, more efficient satellite communication technology and wider transponders are required to support the data and video hungry applications now transmitted over satellite. We drew lessons from other communication industries and benchmarked with cable and wireless technologies. Bright engineers came up with new ideas. Finally, the outcry from the market for more efficiency to ensure satellite operations remained profitable convinced DVB to start working on the standardization of S2 Extensions.

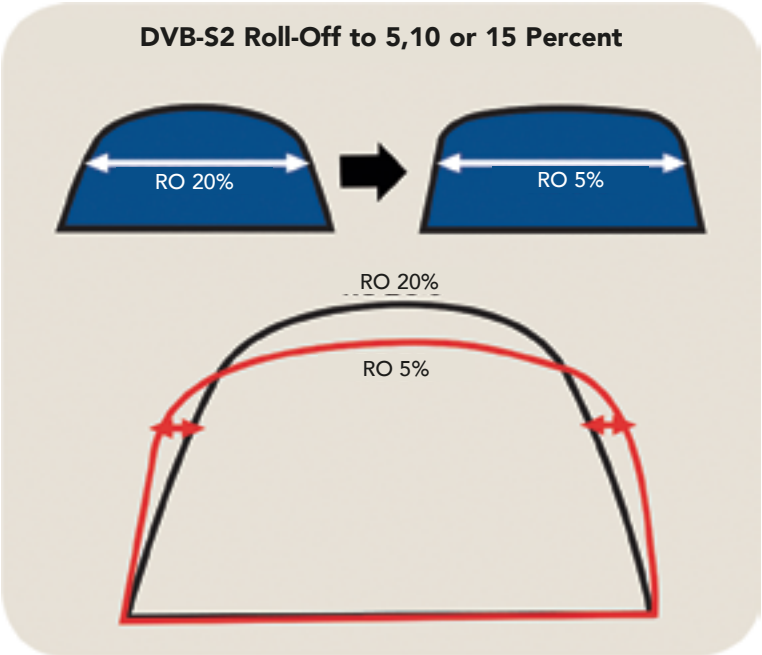
Newtec has taken the lead and teamed with other DVB members in order to define and develop the update of the DVB-S2 standard. At this point in time, the DVB organization has already approved the commercial and technical requirements for the new standard and is currently at the stage of formalizing the standard for publication. The successor to the DVB-S2 standard for satellite communications will be launched in the fourth quarter of 2013.

## *S2 Extensions Technology Improvements*

Newtec's contribution to the new standard (here referred to as S2 Extensions—however, the name of the standard is still to be decided by DVB) has resulted in a number of candidate technologies. For the satellite community, the creation and adoption of new S2 Extensions will translate into better efficiency, higher speed and improved service robustness. These extensions have the potential for as much as a 37 percent improvement on top of current standards. This jumps up to 64 percent or more with 72MHz wideband transponders. The new standard has seven main improvements when compared with DVB-S2.

### *Improvement 1: Lower Roll-Offs*

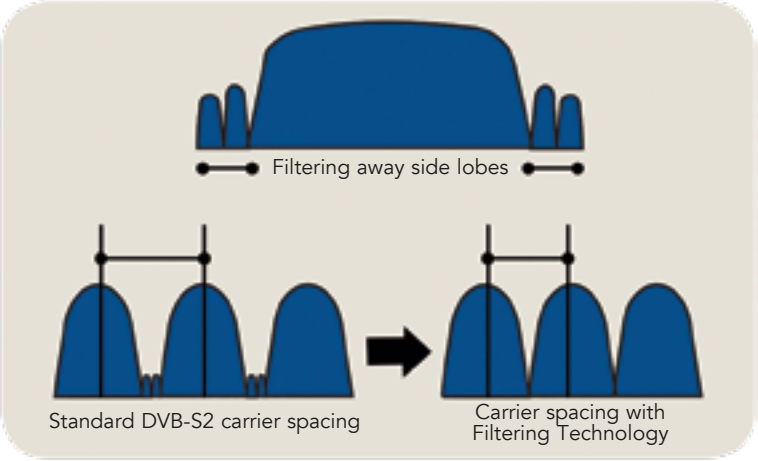
A first innovation inside the new standard implements a smaller Roll-Off (RO) percentage than is currently used in the DVB-S2 standard. In the DVB-S2 standard, the 20 percent and 25 percent RO percentages are common and are an integral part of the modulated carrier (i.e., symbol rate plus RO). Reducing RO to 5, 10 and 15 percent results in a direct gain in bandwidth. Looking at the spectral image when implementing smaller ROs, the slope of the carrier becomes steeper when compared to DVB-S2 but still fits nicely in the allocated bandwidth. The efficiency gain by implementing smaller ROs can go up to 15 percent.




**Low Roll-Off: 5/10/15%**

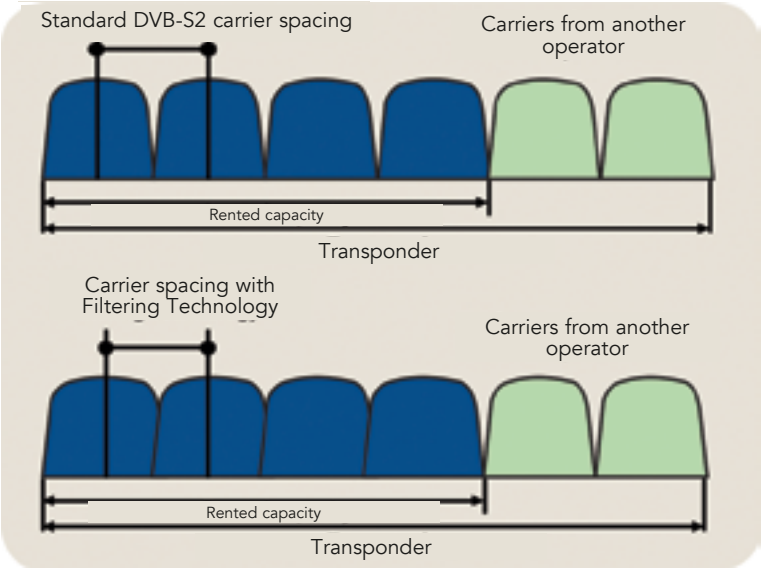
### *Improvement 2: Advanced Filtering For Improved Carrier Spacing*

The second innovation deals with noise levels (side lobes) on both sides of the carrier. These side lobes prevent satellite carriers from being placed close to each other. Applying advanced filter solutions in S2 Extensions has an immediate effect on bandwidth savings, as the spacing between carriers can be as close as 1.05 times their symbol rates (or even closer, in some specific use cases). Please note that even with 35, 25 and 20 percent ROs, better filtering results are obtained.



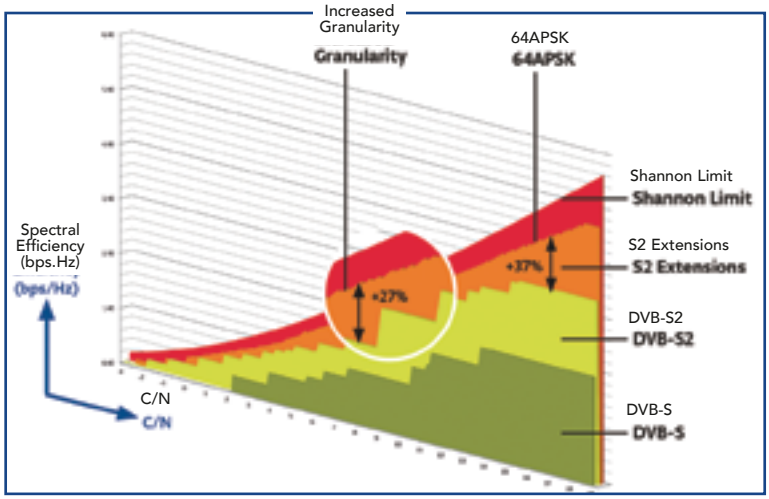

### *Improvement 3: Supporting Different Network Configurations*

The RO and filtering innovations within the new standard can be applied in satellite links with single carriers (mainly RO effect), multiple carriers (filtering and RO effects) or carriers sharing the same transponder with other providers. In the latter case, S2 Extensions carriers can easily co-exist with adjacent carriers from other operators within the same transponder. The improved ROs and filtering technologies are only applied on the allocated carriers. Neighboring carriers will not be affected and do not notice any form of interference.



***Improvement 4: Increased MODCOD Granularity***

The number of Modulation and Coding standards (MODCODs) has grown from 28 in DVB-S2 to as many as 87 in the S2 Extensions, bringing efficiency as close to the theoretical Shannon limit as possible. The Shannon limit is the maximum rate at which information can be transmitted over a communications channel of a specified bandwidth in the presence of noise. By introducing an increased granularity, the highest resolution for optimal modulation in all circumstances can be provided. The current DVB-S2 quantization steps are quite far apart. By adding granularity in the upcoming standard the service provider can further optimize the satellite link—depending on the application in use.




***Improvement 5: Higher Modulation Schemes Up To 64APSK***

Adding higher modulation schemes such as 64APSK (Amplitude and Phase-Shift Keying) proves to be useful, considering the professional applications that work with improved link budgets provided by, for example, bigger antennas (and more powerful satellites as they become available). Newtec sees the 32APSK boundary being reached frequently with its auto-adaptive FlexACM® technology during clear weather conditions. In these situations, 64APSK is highly beneficial. When combining the increased granularity (MODCODs and FECs [Forward Error Correction]) and 64APSK (higher order modulation and coding) immediate efficiency gains up to 37 percent can be achieved as compared to DVB-S2.

***Improvement 6: Better MODCOD Implementation***

Compared to DVB-S2, the MODCODs themselves have been improved in S2 Extensions to achieve even better efficiencies. S2 Extensions also have two different classes for linear and non-linear MODCODs. As the DVB-S2 MODCODs are focused on Direct-to-Home Broadcast (DTH), the constellations are well suited for distribution applications with quasi-saturated transponders. For high-speed data and video exchange applications, other constellations can be considered where the performance gain is larger than 0.2dB. Although the MODCODs might use the same code/name, the linear and non-linear MODCODs are not interchangeable.

***Improvement 7: Wideband Implementation***

The S2 Extensions support technology for typical wideband transponders that become/are available today hosting high-speed data links. The wideband implementation in S2 Extensions typically addresses satellite transponders with bandwidths from 72MHz (typically C-band) up to several hundred MHz (Ka-band, HTS [High Throughput Satellite]). In principle it would be possible to allocate several narrower channels inside the wideband transponders. However, such would require the operation of the satellite transponder with reduced downlink power and, therefore, at sub-optimal efficiency. The S2 Extensions demodulator will receive the complete wideband signal resulting in a very high data rate.

## *S2 Extensions Results and Efficiency Gains*

When comparing the current DVB-S2 standard against the full implementation of S2 Extensions (activating smaller ROs, advanced filtering, 64APSK), staggering efficiency gains up to 37 percent can be achieved for professional applications over satellite. In links using wideband transponders, an extra 20 percent gain can be added. These gains already exceed the results of proprietary systems in the market today.

Now that we have an idea about the involved technologies in the new DVB standard for satellite communications, we can discuss the benefits for MILSATCOM applications and draw conclusions on the relevance of S2 Extensions for the market.

Having a standard in the first place improves interoperability between different government and defense departments, increasing the effectiveness of operations in the field. Moreover, an open standard avoids vendor lock in and allows multiple vendors to enter the network, lowering the overall risk of high pricing, companies going bankrupt, or non-availability of spare parts.

Efficiency gains as demonstrated by the different technologies inside S2 Extensions provide more throughput in the same available bandwidth. With the increase of data, video and voice traffic over MILSATCOM links (example for ISR [Intelligence, Surveillance and Reconnaissance]; and MWR [Morale, Welfare and Recreation] applications) and a lack of available bandwidth over some 'hotspot' regions, technologies that cater for extra throughput are welcomed. By switching modulation schemes from DVB-S2 towards S2 Extensions, as much as a 37 percent gain can be achieved. The new standard does not only apply to high data rate applications. Even at lower modulation and coding (QPSK/8PSK) levels, 10 percent improvements can be achieved.

To mitigate the increase in MILSATCOM data rates, government and defense departments have invested in high throughput satellites such as the WGS constellation (Wideband Global Satellite). With Wideband implementation in S2 Extensions, large carriers can be received by the demodulators, adding an extra 20 percent efficiency.

Even in satellite links suffering from fading, interference or shadowing effects (partly blocking of antenna), better throughput can be obtained with S2 Extensions in combination with ACM (Adaptive Coding and Modulation). With the increase in granularity in MODCODs in S2 Extensions, the jumps between MODCODs are not as large as in DVB-S2. As such, the ACM can smoothly glide down in MODCODs when the satellite link encounters fading conditions and provide optimal throughput at all times.

Applying ACM in combination with S2 Extensions also helps to achieve maximum service availability. In deep fading scenarios where DVB-S2 normally would have dropped the satellite link, S2 Extensions provide additional, lower MODCODs with the exact objective of increasing the service availability and keeping satellite links alive. Robust MODCODs such as π/2 BSPK ¼ Spread 2 and very low SNR (Signal–to-Noise) implementations will avoid the satellite link to drop even in the harshest circumstances (e.g., partly shadowing of antenna by tail or wings in airborne ISR missions). As such, the ACM technology can make use of the very low MODCODs and maintain satellite link uptime in deep fading situations. The risk of endangering the mission will be greatly reduced by switching technology to the new DVB standard.

What effect does the new standard have on the operational (OPEX) and investment (CAPEX) costs? S2 Extensions do come with a price tag, as the standard is not backward compatible, but compared to the gains (more throughput in same available bandwidth) and savings (save on bandwidth with the efficiency gains) that can be achieved, the price discussion dissolves immediately. Moreover, switching to the new standard does not mean that the entire infrastructure needs to be immediately replaced. Different migration paths towards the new standard are possible.

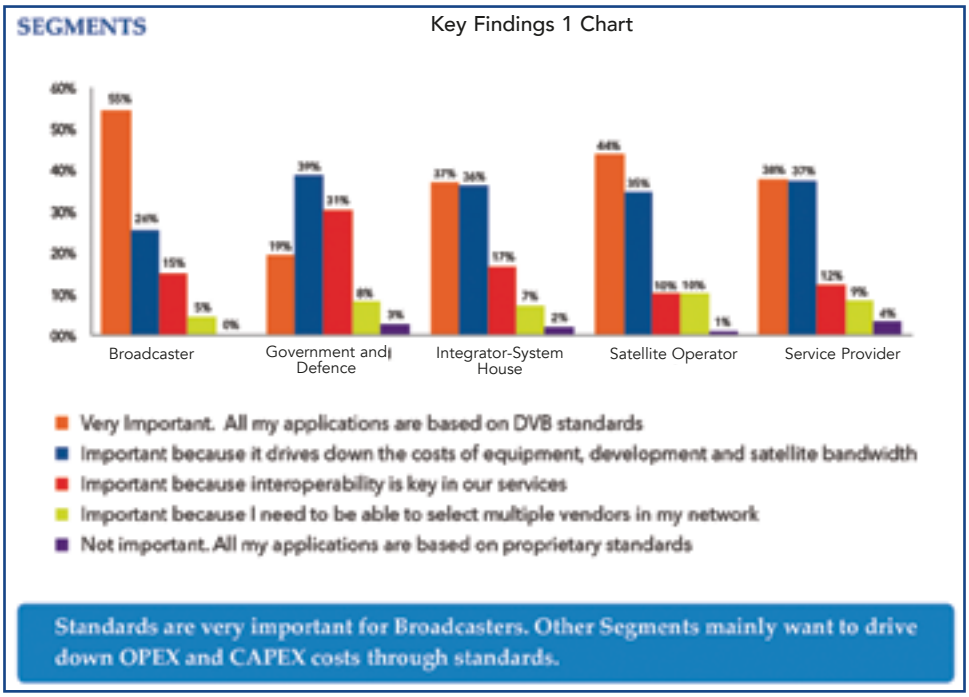
- First, it is possible to put a part implementation of S2 Extensions on existing Newtec equipment in the field. In that scenario, also called Clean Channel Technology, lower roll-offs (5, 10, 15 percent) next to advanced filtering technologies are activated through a software update. Gains up to 15 percent are now in reach of the MILSATCOM operator with this software only upgrade.
- The second option is to put a Newtec S2 Extensions modem with the Transmodulation technology enabled in front of the existing infrastructure. In that scenario, the satellite link is optimized with the S2 Extensions efficiency. The aggregated data is sent over a Multistream carrier from the uplink to the remote location and separated again based on the ISI (Input Stream Identifier) of the baseband frames. The Newtec modem trans-modulates the waveform from S2 Extensions towards DVB-S/S2 and sends it through to the existing infrastructure of IRDs, legacy receivers etc.

In conclusion, a new DVB standard that takes into account interoperability, allows more throughput in the same bandwidth and assures maximum service availability is definitely relevant to the MILSATCOM market. Moreover, S2 Extensions are ready to deal with the upcoming high throughput satellites and takes cost, plus savings, into account in these times of government budget cuts.

In order to gauge the temperature of the SATCOM sector, Newtec carried out an extensive industry survey at the start of 2013. More than 700 respondents from 400 companies and organizations answered questions on the launch of S2 Extensions for the satellite market. An important share of the answers came from experts involved in the MILSATCOM sector.

***Key Findings 1: How Important Are Standards?***

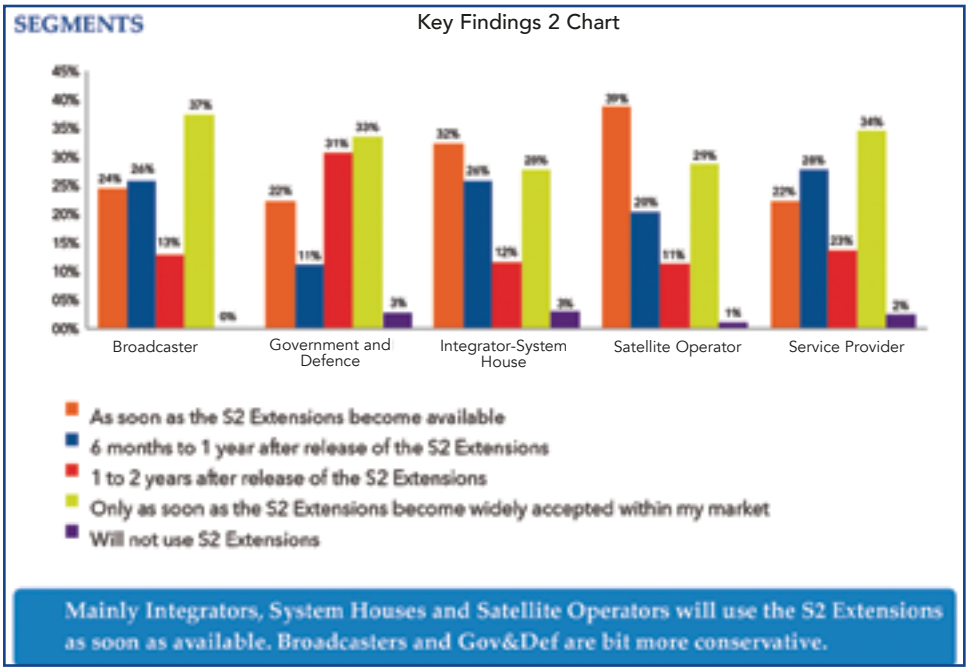
The first question polled the community on the importance of having standards in the satellite communications industry. The main finding that could be derived from the first question revealed that 97 percent of the MILSATCOM respondents consider having standards to be important or very important. The main motivation for the MILSATCOM experts was that standards, such as DVB-S2 and S2 Extensions, drive down the cost of equipment, development and satellite bandwidth. Secondly, interoperability is a key requirement for the majority of government and defense SATCOM networks.




***Key Findings 2: Switch-over Timeframe to New Standards***

In the second question of the survey, the satellite community gives a timing indication of when the industry will switch towards the new standard. As DVB-S2 is currently the widely accepted standard in government and defense markets for SCPC links, it will take a standardization process through governmental bodies (such as DISA) before the majority of the satellite links can be migrated towards S2 Extensions. Hence, the majority share of government and defense representatives answered that they would rather wait one or two years after the launch of the new standard before making the switch.

Still, 33 percent of the MILSATCOM survey takers would switch to S2 Extensions within one year of the launch when acquiring new equipment. The incentive of having higher throughput and better service availability are critical for some government and defense missions that lack satellite bandwidth to efficiently perform their activities, or those that cannot afford to lose satellite links during operations.




***Key Findings 3: Required Efficiency Level to Switch to New Standard***

Government organizations, MODs and companies in the satellite communications industry will not switch to a new standard just for the sake of making the switch. Of the respondents, 73 percent from the government and defense market will transfer their operations to the upcoming DVB standard if the combination of technologies would allow them to win 15 to 20 percent efficiency.

As described earlier in the article the diverse technologies inside S2 Extensions will bring satellite links up to a gain of 37 percent. The first candidates for migration are most probably the high-speed data and video MILSATCOM links for ISR, MWR or strategic satellite links. Still, the spectral efficiency improvements also apply to operations that have lower throughput demands with efficiency gains starting at 10 percent. (*Please see the corresponding chart on the next page.*)

***Key Findings 4: What Would your Organization/Company Do with the Extra Bandwidth?***

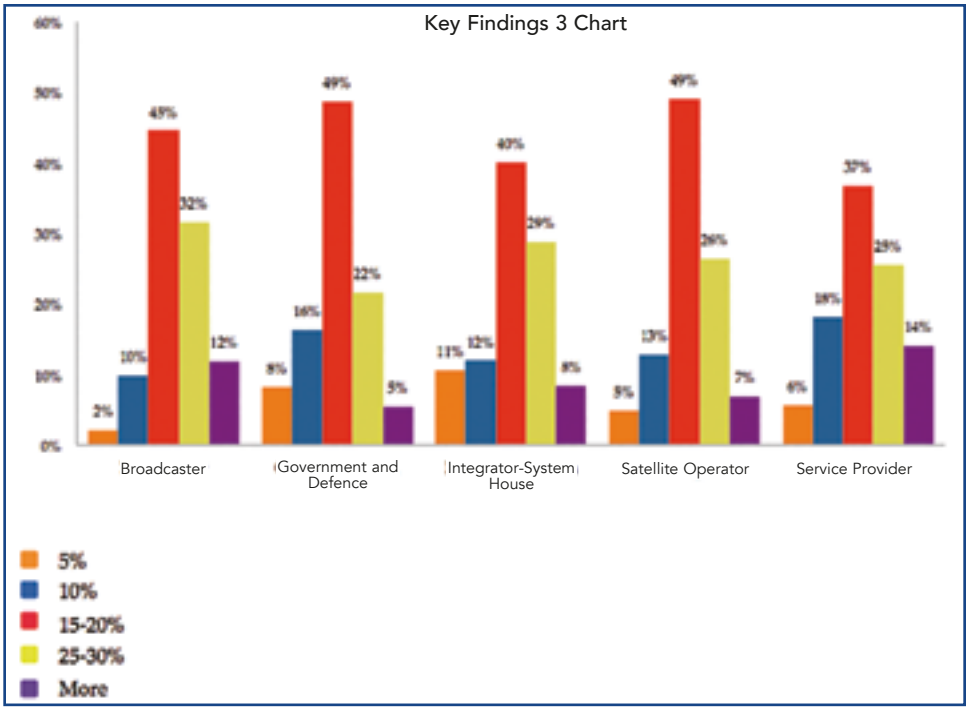
The final question polled what the different Government and Defense organizations would do with the extra-obtained bandwidth by implementing S2 Extensions. The majority (47 percent) of the satellite experts will use the extra bandwidth to increase their throughput. The second answer exposes the opportunity to grow their number of services. Interestingly, the desire to cut OPEX savings only represents 11 percent of the answers. (*Please see the corresponding chart on the next page.*)

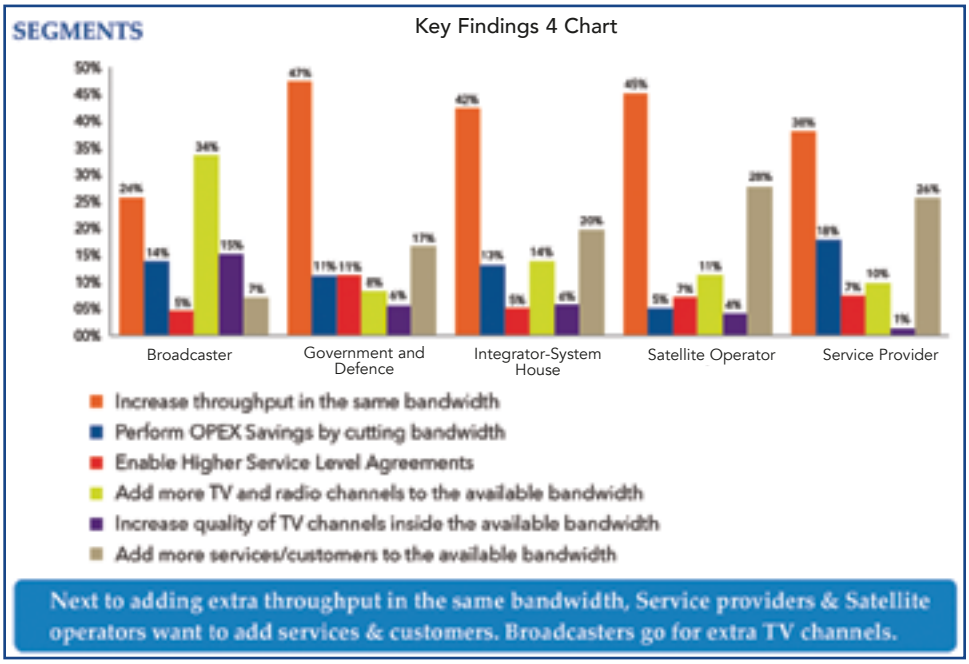
## *Conclusions*

The satellite industry has come to a consensus that a successor to the DVB-S2 standard is required to accommodate increased profitability, interoperability and growth in the professional satellite communications market. Throughout the article we have demonstrated that S2 Extensions will be relevant for the government and defense market as well.

The different technologies inside S2 Extensions will bring an efficiency optimization up to 37 percent in a MILSATCOM link. Adding wideband to the equation to support upcoming high throughput satellites provides another 20 percent gain. These gains will help MILSATCOM operations to obtain more throughput over the same available bandwidth to support their data hungry applications such as ISR, MWR or exchange of strategic information. Other benefits that go along with switching operations to the new standard are increased satellite link uptime and maximized service availability, as well as taking government budget-cut reality into account by achieving impressive savings with little capital investment costs.

The majority of the MILSATCOM community will migrate their operations as from one year after the launch of the new standard in Q42013. That is the exact timing to get S2 Extensions formalized by MILSATCOM authorities, such as DISA. Some operations that are already suffering for lack of bandwidth, or do not receive sufficient service availability to support their activities, will immediately switch to the new standard.




Newtec's contribution to the new standard consists of a number of technologies including:

- Smaller roll-offs
- Advanced filter technologies
- Increased granularity in MODCODs
- Higher Modulation up to 64APSK
- Better Implementation of MODCODs
- Wideband (72Mbaud)

The Newtec MDM6000 and MDM6100 modems and the HUB6000 Satellite Hub already integrate these technologies. In combination with Newtec efficiency technologies, such as FlexACM®, Automated Equalink®, Bandwidth Cancellation and Cross-Layer-Optimization, these S2 Extension ingredients bring the MILSATCOM links to full efficiency achieving barrier breaking throughputs at maximum service availability.

By downloading the Newtec S2/S2 Extensions Calculator (***http://www.newtec.eu/services-training/dvb-s2-calculator***), the MILSATCOM community can already compare DVB-S2 with the new standard and measure link budgets on existing and upcoming satellites. The calculator can be found on the Newtec website by following link: www.newtec.eu/services-training/dvb-s2-calculator. For further information on S2 Extensions, please download the white paper 'Demystifying S2 Extensions' for more technical insights and the S2 Extensions Survey results Ebook via the dedicated online webpage: ***www.newtec.eu/technology/s2-extension***s.

**About the author**

*Koen Willems started his career in 1998 with Lernout & Hauspie as a project manager in the Consulting and Services division. More recently, he joined Toshiba as a Product Marketing Manager for the Benelux and, later, for the European market. In a total of six years, Koen contributed to all of the major Toshiba Retail IT product releases. Mr. Willems is currently the Market Director for Government and Defense for Newtec, a Belgium-based specialist in satellite communications. Koen holds a degree in Germanic Languages (University Ghent, Belgium, 1997) and completed a Masters degree in Marketing Management program at the Vlekho Business School in Brussels (1998). He acquired a Six Sigma Black Belt for product development and process improvement in 2006. Koen is also a member of the Board of Directors for the Belgian Security & Defense Industry (BSDI).*

***Newtec Government and Defense SATCOM Seminar on October 23rd in Brussels, Belgium***


*On Wednesday October 23rd, 2013, Newtec will host a Government and Defense Seminar in Brussels on the topic of satellite communications, efficiency and best practices in the market.*

*As you read in this feature article, the Government and Defense SATCOM market are craving for more bandwidth in order to support their operations.*

*A key requirement for the satellite link in applications such as ISR (Intelligence, Surveillance & Reconnaissance) networks, airborne surveillance and MWR (Morale, Welfare and Recreation) is to get as much data and video as possible through the available bandwidth. The satellite link also needs to be available at all times during operations to insure mission critical communications and not endanger ground operations.*

*During the seminar, SATCOM experts from different companies and organizations (NATO, Intelsat, SES, SniperHill, Hitec and Euroconsult) will offer their views on the challenges, trends and solutions that exist in the Government and Defense market today.*

*You will have the opportunity to learn more from customer use cases, innovative SATCOM technology updates, and market views that will impart some bright new ideas to implement in your SATCOM network or solution offering.*

*Check the agenda and register for the Government and Defense Brussels event via the following link:*

***http://www.newtec.eu/event/government-defense-satellite-communications-seminar***

# INCORPORATING SATELLITE INTO COOP PLAN

*By Karl Fuchs, Senior Contributor*

**As hurricane season's peak approaches, and with Super Storm Sandy still fresh in everyone's mind, it seems appropriate to examine Continuity of Operations or COOP.**

Most forward-thinking businesses and government organizations have COOP plans. These plans can be quite extensive and often cover a wide range of outages from simple failures of IT email servers and order entry systems to continuity of operations through localized snow storms to widespread, long-term disasters, such as hurricanes and earthquakes.

One common mistake often found in COOP plans is reliance on perceived system redundancy or invulnerability where none exists. For example, most COOP plans rely on diverse path routing of terrestrial links. In fact, network planners take great pains in ensuring a building has east-west diverse paths of SONET rings and diversity across the entire route. However, there are many examples when a disaster or accident has proven route diversity to not be as robust as originally thought.

Take, for example, the fire in the Howard Street Tunnel, Baltimore, Maryland. In addition to rail traffic, the Howard Street Tunnel was a major conduit of fiber optic cables servicing the Northeast Corridor for Internet and telephone service.

On July 18, 2001, a CSX freight train derailed, and a chemical fire ensued. The fire burned through multiple bundles of fiber optic cable on both sides of the tunnel.

In many cases, fiber bundles on one side of the track were part of the redundant path for fiber bundles on the other side. Clearly, the path diversity was not as robust as needed.

*The Howard Street Tunnel fire in Baltimore, Maryland.*

Systems failures often include extended power outages. Even if local power can be restored and Central Offices are backed up by generators and batteries, extended power outages can cause the failure of telephone and Internet communications.

One solution for COOP networks is to provide redundancy over satellite. Satellite provides true diversity for terrestrial links and as long as local power can be restored, generators are not reliant on the national grid for power. However, satellite provides much more than just a redundant path. Incorporating satellite into a COOP plan provides disaster recovery personnel a great deal of flexibility.

For example, the City of Chicago wanted to devise a cost-effective yet robust means of providing COOP for its E-911 call center. Chicago needed to be able to recover from any number of scenarios, ranging from simple backhoe fade to the total loss of the facility housing the E-911 call center, to a wide area, extended disturbance.

Such E-911 outages are not as uncommon as one would wish, as evidenced by the three-day E-911 outage after Super Storm Sandy that was experienced by Fairfax County, Virginia. By incorporating satellite into the COOP architecture, the disaster recovery planners had the flexibility to build a mobile E-911 call center.

A mobile call center equipped with satellite can resume operations from any location within the satellite footprint. In addition, a mobile platform, properly equipped, can aid in recovery after the event. For example, many mobile units—in addition to having satellite backhaul capabilities—are equipped with cellular telephony, push-to-talk radio, 802.11, and other technologies which allow first responders to enable a canopy of connectivity to the affected area.

There are two major drawbacks of satellite communications as part of a COOP plan, the first being the limited bandwidth. To fully back up all the terrestrial fiber optic networks with satellite capacity would be completely impossible. It is feasible to select certain circuits and applications which must be protected and leverage satellite backup for those needs.

The number of circuits and applications which can be backed-up with satellite will be determined by the available budget. This leads to the second major drawback of satellite—cost per bit.

The cost per bit of satellite communications can be orders of magnitude higher than terrestrial fiber optic communications. This should not dissuade disaster recovery planners from looking at satellite as a viable option.

There are cost mitigation strategies and different satellite service offerings. In the case of the City of Chicago, the choice was made to lease sufficient dedicated bandwidth to meet the full call volumes of the E-911 service.

Other, more cost-effective solutions include leveraging a shared service with a robust prioritization mechanism to ensure a high quality of service during the recovery period. Another common cost mitigation technique used for satellite backup is to leverage a primary overlay. In a primary overlay, a large, geographically diverse organization uses satellite communications as its primary VoIP and data link for remote locations. All other locations are equipped with a satellite router and antenna but use terrestrial communications as the primary. In the event of a limited outage, the satellite bandwidth serves as an effectively free backup service.

Satellite communications advantages far outweigh any drawbacks as part of an organization's COOP strategy. Satellite's redundant communications and backhaul capabilities make it favorable to use for continuity of operations for organizations tasked with disaster.

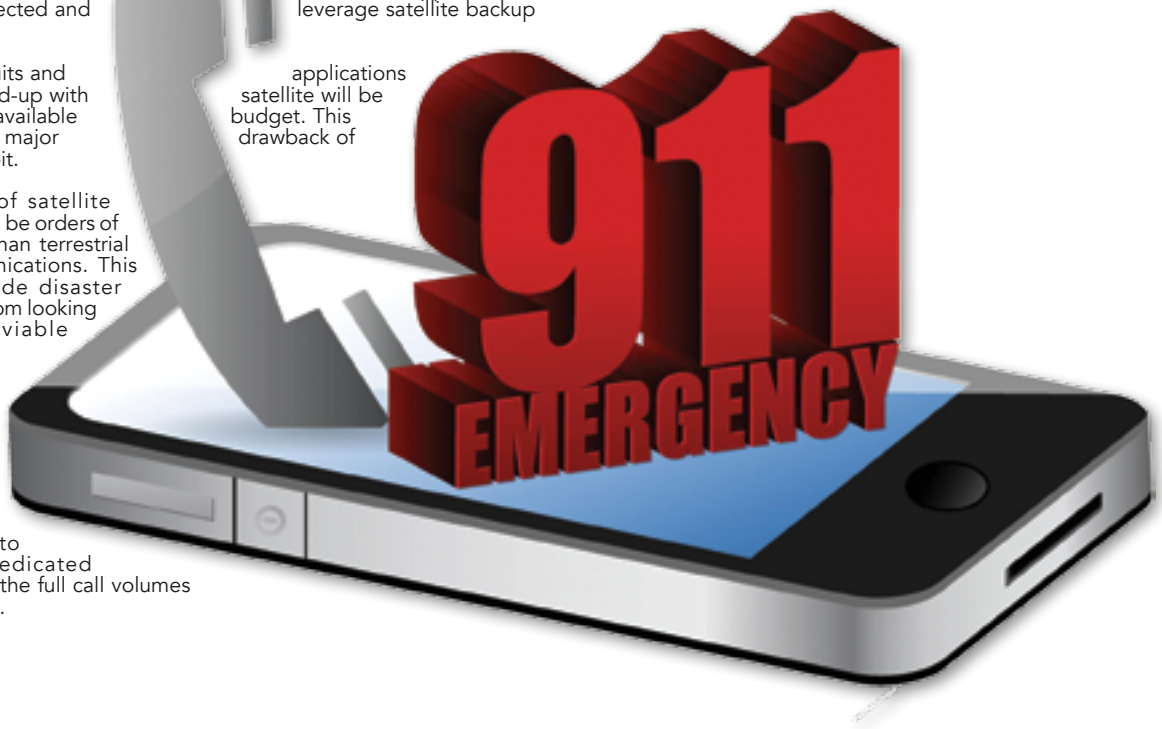
The key to successfully using satellite for COOP backup lies in network design and intelligent systems. The ability to prioritize data types and leverage shared services while still providing the quality of service required for essential traffic will ultimately make satellite a cost competitive and highly reliant COOP solution.

**About the author**

*Karl Fuchs is vice president of technology for iDirect Government Technologies (iGT). He joined iGT in 2004 as the director of sales engineering, just as the satellite-based IP communications company was expanding its very small aperture satellite (VSAT) market presence into the federal government and international Internet Protocol (IP) networking world. He now works as the vice president of technology. With more than 20 years of experience in technology and with the federal government, Fuchs leads iGT's team of federal systems engineers and serves as chief architect for new product integration.*

*Prior to joining iGT, Fuchs was director of systems engineering at Nortel Networks, where he oversaw the Verizon account team of systems engineers, leading the design of IP, frame relay, asynchronous transfer mode (ATM) and dense wavelength division multiplexing (DWDM) networks. Before joining Nortel, he designed IP and ATM networks for Sprint and the federal government.*

*Active in the satellite industry for more than 10 years, Fuchs has contributed editorial to numerous publications including Federal Computer Week, Institute for Defense and Government Advancement, COTS Journal, Military Information Technology, Via Satellite, MILSATCOM and Satellite Evolution Global. In addition, he has been a featured speaker at leading industry events including the DoD SATCOM User Workshop, ISCe, IBC, Pacific Telecommunications Council and Emergency Management Talks.*
*Fuchs holds a Bachelor of Science degree in electrical engineering from George Mason University, Fairfax, Virginia, and an MBA from Averett University, Danville, Virginia.*



# COMMAND CENTER

## ED SPITLER
## PRESIDENT
## ASTRIUM SERVICES GOVERNMENT, INC.

**Ed Spitler is the President of Astrium Services Government, Inc. and brings more than 30 years of experience in military, government and commercial satellite operations to his role as COO.**

In this capacity, Spitler is responsible for the overall business, technical and operations functions for Astrium Services Government, Inc. With extensive working knowledge of commercial and military satellite communications, and recognized for his expertise, Ed's efforts include building strategic relationships between the company and U.S. government agencies.

Prior to Astrium, Spitler spent more than a decade at ARTEL as vice president of managed network services, where he worked to develop strategies and solutions in sales, customer relations, procurement, and business development. He also served as the program director for DoD and DoS programs, including the DISN Satellite Transmission Services-Global (DSTS-G) and Future COMSATCOM Service Acquisition (FCSA) Contract.

Mr. Spitler has also held key leadership positions at several major corporations, such as ITT, Raytheon and MCI. He spent six years active duty in the U.S. Army as a cryptographic and telecommunications specialist. He is also the recipient of numerous industry awards and recognition that includes the Washington Technology's "Government Channel Leadership Award." He is a 3rd term Officer on the Mid-Atlantic Chapter SSPI Board and currently serves as the organizations' President.

***MilsatMagazine (MSM)***

*Mr. Spitler, how did you decide to enter the world of satellite communications?*

***Ed Spitler***

I started out as a specialist in the U.S. Army working with COMSEC and cryptographic technology for secure RF communications. At that time, we were required to troubleshoot to the circuitry and component level, which meant that we had to have a thorough understanding of the electronics. It was during my six years of active duty that I realized my passion not only for the field of communications, but also particularly for RF communications—both microwave and SATCOM.

***MSM***

*Given the need for well-prepared individuals to work within companies who supply the communication product and services so crucially needed by today's warfighter, how can the industry better promote such careers for today's youngsters? How do you see the need for enhanced STEM training in middle and high schools as well as college programs to better equip tomorrow's professionals for SATCOM and MILSATCOM?*

***Ed Spitler***

It is no secret that this country, and the world faces a shortage of people trained in science, technology, engineering and math. A recent report cited that STEM jobs are expected to grow by 17 percent through 2018 as compared with 10 percent for the rest of the U.S. labor market. According to Georgetown University, STEM employees also earn about 26 percent more than non-STEM employees.

Supporting efforts to strengthen STEM programs at the middle and high school level are imperative to ensuring the next generation of SATCOM and MILSATCOM professionals provide continuity and build upon the successes of the current generation.

Organizations such as the Society of Satellite Professionals International, Armed Forces Communications and Electronics Association, National Defense Industry Association and Satellite Industry Association among others are playing a significant role. For example, SSPI has launched a number of initiatives in support of STEM training, providing annual scholarships to deserving high school and university graduates to enable them to pursue satellite-related study. SSPI's Satellite Scholars program offers internships support or mentoring and helps them connect to employment opportunities with the industry. Local chapters of AFCEA are collaborating with public schools to prepare the next generation of scientists.

Finally, our industry has a role to play by expanding their efforts in the area of apprenticeships and mentoring. It is to the industry's benefit to support STEM training. Industry can enable students to continually broaden and deepen their knowledge and experience and to develop and acquire new competencies that will one-day lead to the type of innovation that the space and satellite industry is known for.

***MSM***

*With sequestration continuing to play a crushing role for the MAG environs, how can Astrium Services Government, Inc. best provide viable support in this time of reduced budgets?*

***Ed Spitler***

In a time of reduced budgets, it's clear that our military and government customers are working hard to meet their growing satellite communication requirements with their own assets. Whether used for routine day-to-day communications or to meet contingency operations, commercial satellite communications provide warfighters with a service that is critical to mission success at every level of military operations. A partnership between the military and commercial satellite communication providers is crucial.

For government customers, Astrium Services Government, Inc. provides COMSATCOM and MILSATCOM solutions through a one-stop-shop provisioning arrangement. The company's solutions are cost-effective, secure and scalable with QoS that support the most critical missions including COTM, asset tracking, troop welfare, infrastructure design and operation and civil security.


*The launch of SkyNet 5D. Photo courtesy of Arianespace.*

***MSM***

*Would you please tell us about your role with the U.S. Department of Defense and the application of the DISN Satellite Transmission Services—Global (DSTS-G) and Future COMSATCOM Service Acquisition (FCSA) programs? How did these projects prepare you for your role within the commercial communications world?*

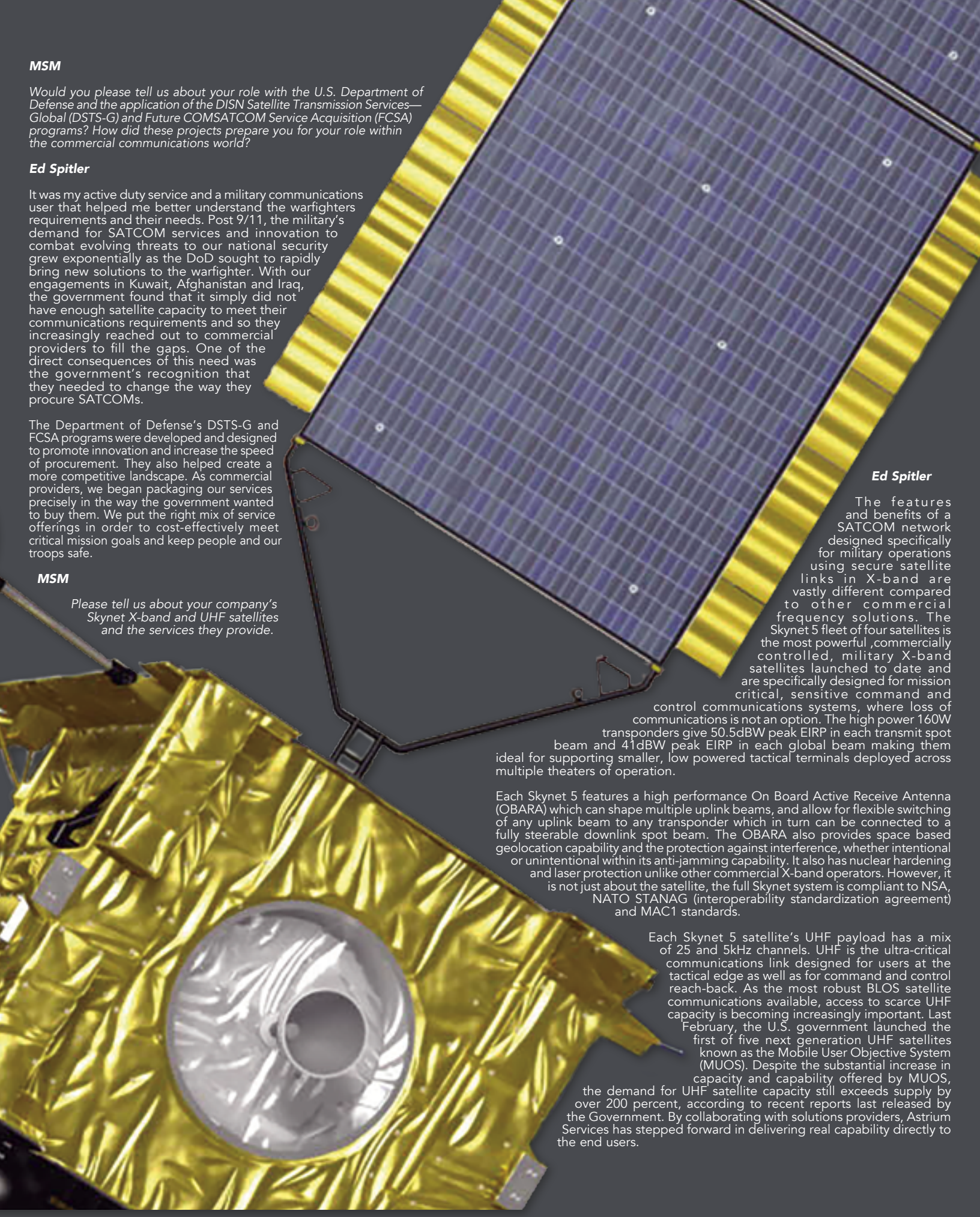
***Ed Spitler***

It was my active duty service and a military communications user that helped me better understand the warfighters requirements and their needs. Post 9/11, the military's demand for SATCOM services and innovation to combat evolving threats to our national security grew exponentially as the DoD sought to rapidly bring new solutions to the warfighter. With our engagements in Kuwait, Afghanistan and Iraq, the government found that it simply did not have enough satellite capacity to meet their communications requirements and so they increasingly reached out to commercial providers to fill the gaps. One of the direct consequences of this need was the government's recognition that they needed to change the way they procure SATCOMs.

The Department of Defense's DSTS-G and FCSA programs were developed and designed to promote innovation and increase the speed of procurement. They also helped create a more competitive landscape. As commercial providers, we began packaging our services precisely in the way the government wanted to buy them. We put the right mix of service offerings in order to cost-effectively meet critical mission goals and keep people and our troops safe.

***MSM***

*Please tell us about your company's Skynet X-band and UHF satellites and the services they provide.*

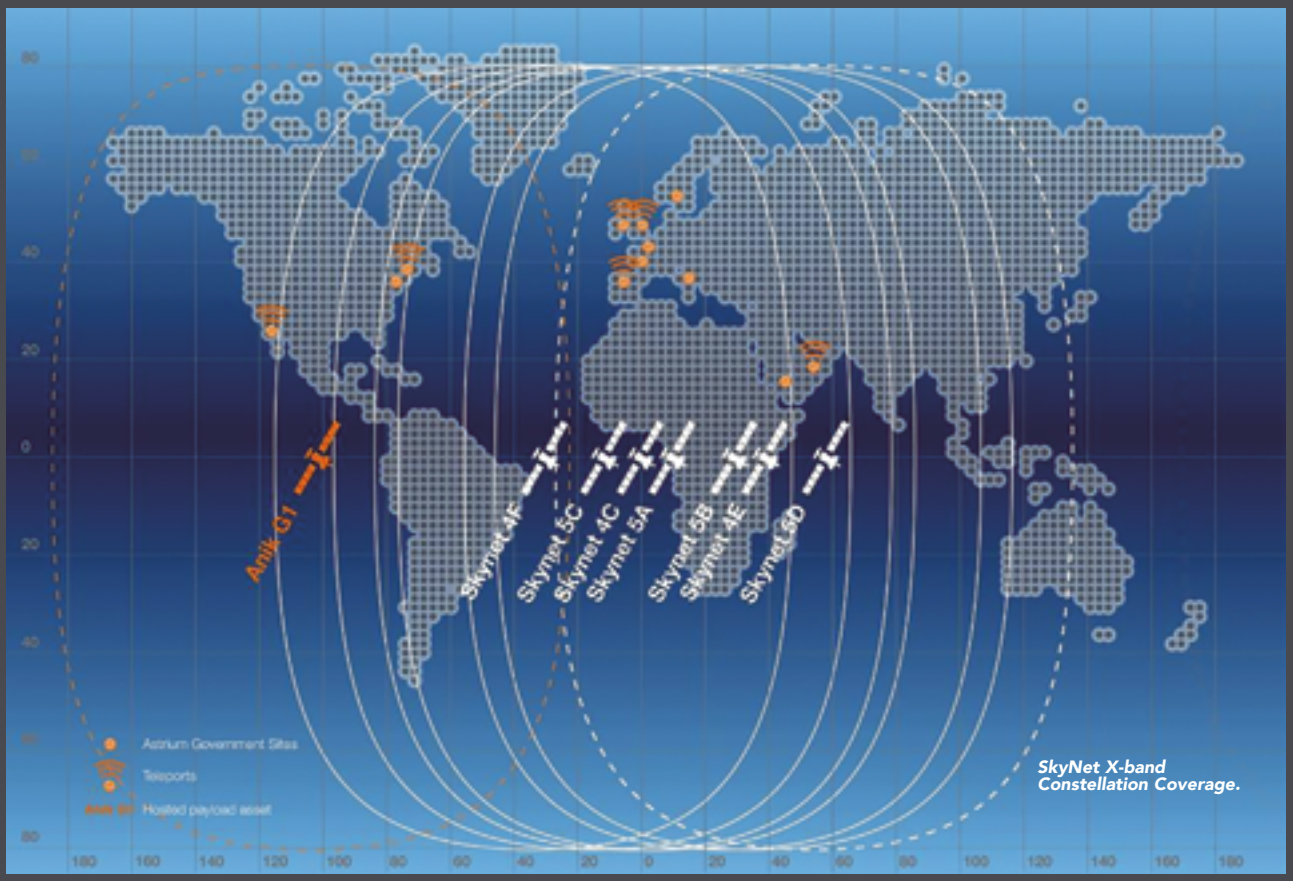


***Ed Spitler***

The features and benefits of a SATCOM network designed specifically for military operations using secure satellite links in X-band are vastly different compared to other commercial frequency solutions. The Skynet 5 fleet of four satellites is the most powerful ,commercially controlled, military X-band satellites launched to date and are specifically designed for mission critical, sensitive command and control communications systems, where loss of communications is not an option. The high power 160W transponders give 50.5dBW peak EIRP in each transmit spot beam and 41dBW peak EIRP in each global beam making them ideal for supporting smaller, low powered tactical terminals deployed across multiple theaters of operation.

Each Skynet 5 features a high performance On Board Active Receive Antenna (OBARA) which can shape multiple uplink beams, and allow for flexible switching of any uplink beam to any transponder which in turn can be connected to a fully steerable downlink spot beam. The OBARA also provides space based geolocation capability and the protection against interference, whether intentional or unintentional within its anti-jamming capability. It also has nuclear hardening and laser protection unlike other commercial X-band operators. However, it is not just about the satellite, the full Skynet system is compliant to NSA, NATO STANAG (interoperability standardization agreement) and MAC1 standards.

Each Skynet 5 satellite's UHF payload has a mix of 25 and 5kHz channels. UHF is the ultra-critical communications link designed for users at the tactical edge as well as for command and control reach-back. As the most robust BLOS satellite communications available, access to scarce UHF capacity is becoming increasingly important. Last February, the U.S. government launched the first of five next generation UHF satellites known as the Mobile User Objective System (MUOS). Despite the substantial increase in capacity and capability offered by MUOS, the demand for UHF satellite capacity still exceeds supply by over 200 percent, according to recent reports last released by the Government. By collaborating with solutions providers, Astrium Services has stepped forward in delivering real capability directly to the end users.



SkyNet X-band Constellation Coverage.

customers who need to support rapid deployments over a large geographic area or need high-speed transmissions from small land, sea or airborne terminals.

For critical command communications, Special Operations Forces, missile defense units and other users whose service must not be interrupted, our Skynet 5 X-band satellites are military hardened and have jam-resistant capacity ensuring secure communications. Military and government users are also assured of non-preemptible bandwidth to support their security requirements and for mission success.

***MSM***

*Astrium Services is already working with the United Kingdom Ministry of Defence and other governments. In your experience, what would be the best way for the U.S. military to work with commercial providers?*

***Ed Spitler***

It is no surprise that many of the new military satellite communications systems that the U.S. DoD are deploying and planning are adopting commercial business practices and technologies to improve cost, schedule and performance.

Partnership is key along with understanding the customer's requirements. Astrium Service's expertise and experience in providing MILSATCOM capability largely contributes to its success in building a trusted government and industry partnership with the U.K. MOD. The MOD benefits from the current space capacity on Skynet 5 with the option to surge its demand at short notice. These capabilities can be used for joint and combined operations through agreements and memorandum of understanding currently in place with other allied nations.

For example, an issue that continues to plague government users of DoD assets is prioritization, where a surge in military usage may override other government departments' requirements. Commercial X-band satellite communications assets can provide interoperability to accommodate re-allocated traffic in a cost effective manner.

Astrium Services has signed contracts and agreements with the U.S. DoD and other government agencies, as well as other nations. We have a 15-year contract to supply NATO with X-Band SATCOM and additional bandwidth for the International Security Assistance Force. We have direct contracts with the Netherlands, Portugal, Canada, Belgium, Australia, France, Germany, Slovenia. We also have inter-governmental memoranda of understanding arrangements with the United States and Australia, Poland, Norway, Czech Republic and Turkey.

***MSM***

*Interference is of prime concern during missions. What can be done to mitigate interference?*

***Ed Spitler***

Our Skynet 5 satellites are designed to be used by allied warfighters, including the United States and NATO, for their Anti-Access and Area Denial protection features, jam-resistance and high-power throughput. Skynet has been specifically designed to cope with this type of A2/AD scenario. The smaller zone beams of the X-band satellites can support speeds of up to 2Mbps transmitting from antennas as small as 18-inches (45cms) without interfering with adjacent satellites.

The greater spacing of X-band satellites and the less congested bandwidth reduces the possibility of adjacent satellite interference. This coupled with the smaller zone beams of X-band satellites enables us to limit the adjacent satellite interference issues.

***MSM***

*X-band is definitely a major area for Astrium Services —how well do military buyers understand X-band?*

***Ed Spitler***

X-band is not a new technology for the U.S. military and intelligence communities and has been in use since at least 1967 when the Defense Satellite Communications System (DSCS) Phase I satellites were first orbited. They used X-band and provided secure voice and data communications globally for the U.S. military, including limited communications from forces in Vietnam back to the U.S. The DSCS Phase II satellites began orbit in the early 1970s and used X-band exclusively up until the mid-1990s. Launched in 1982 and in contrast to its predecessors, DSCS III satellites once again used X-band for significantly greater capacity, longer life and improved resistance to hostile activities such as jamming.

With relatively few satellites in orbit in the X-band frequency, there is a wide separation between adjacent satellites, making X-band ideal for COTM applications. United States government agencies are currently using Skynet 5 X-band and UHF channels for naval, airborne and land-based operations primarily for its Beam-Forming-Network capability. This capability is a feature of the anti-jamming design that allows discreet micro spot beams to be instantaneously laid out via on-board software. These tightly focused beams enable disadvantaged terminals on naval or airborne platforms to transmit at data rates in excess of 2Mbps and in airborne platforms, Astrium Services has achieved data rates from air-to-ground of up to 20Mbps using Skynet 5 spacecraft. We also achieved 155Mbps on a single channel making X-band an ideal service choice for the military.

***MSM***

*What is the advantage of X-band for military and government needs? How does X-band address the increased security needs so crucial for MILSATCOM?*

***Ed Spitler***

Having access to satellite communications services in the right place and at the right time is critical to today's varied and often unpredictable operational needs. X-band satellite capacity is flexible enough to meet the needs of military and government users. Our Skynet 5 X- band constellation has been designed specifically to support smaller, low-powered tactical terminals deployed across multiple theaters of operation and in particular operations in harsh and remote locations. It has the advantage of being highly resistant to rain interference, unlike Ku and Ka-band. This makes X-band suitable for U.S. government and military

The U.S. government is faced with significant challenges to protect its ever-increasing communications needs. As part of the "Tilt to the Pacific" strategy, the threat of service denial attacks in this particular region has been recognized and various U.S. government parties are currently studying mitigation options.

***MSM***

*How is Astrium Services Government, Inc. ensuring that X-band is fit for today's mission? What future endeavors might we expect to see from Astrium Services concerning increased X-band coverage?*

***Ed Spitler***

With the launch of Skynet 5D and Anik G1, Astrium Services is the only operator in the world providing near-global coverage reserved exclusively for government and military use.

Currently, from 180 degrees West to 135 degrees East with 75 X-band transponders, our constellation has a total of 2.2GHz capacity. We now offer more available capacity for our customers and a continuous coverage at X-band than any other operator. This is crucial for our customers because it allows the end user to have seamless maritime operations, integrated transit and deployment CONOPS, all supported by our expert MILSATCOM operations.

More importantly, the new satellites give Astrium Services Government, Inc. the opportunity to provide unique and tailored customer solutions for the ultimate in secure SATCOM. This includes tailored beam and transponder leasing solutions that deliver significant benefits to our customers.

***MSM***

*What are your thoughts concerning hosted payloads? Would these be of any assistance to your firm in the launch of additional X-band payloads?*

***Ed Spitler***

We look forward to the prospect that hosted payloads will become a routine part of government architectures during the next decade.

Astrium has considerable expertise in the field of hosted payloads having worked on more than 20 hosted payloads over the last two decades for commercial and institutional users both civil and military missions. Sharing access to space offers large cost reductions for both the payload customer and the hosting spacecraft operator. In addition to payloads hosted on satellites built by Astrium, our affiliate Astrium Services, leased the full X-band payload on Telesat's Anik G1 satellite. Launched earlier this year, Anik G1's X-band, 3 channel, hosted payload is fully interoperable, compatible to NATO standards and provides continuous X-band coverage from a single satellite operator from 178°W to 135°E anchoring services over the continental United States and the Pacific Ocean region.

***MSM***

*Mr. Spitler, given your 30 plus years of experience, what project or projects truly bring a sense of satisfaction to you?*

Two projects come immediately to mind. Site Chief and Commander for 7 DCS Telecommunications Sites. Being part of the team that implemented the transition from analog to digital microwave communications throughout U.S. Army Europe certainly stands out for me. The impact was immediate—improved quality of service and reliability of the U.S. Army's communications systems. In some small way, we were all part of the digital revolution.

Another project I had the honor of being part of brought together parents, educators and community volunteers working together to bring Internet service to the students and schools of Shenandoah County and Harrisonburg City, Virginia. The project was part of a nationwide initiative championed by President Clinton designed to help bring schools online. Nine schools were wired for the Internet as part of the project. It provided an immense sense of satisfaction to all of us knowing that our efforts were helping children from rural, suburban and city schools have the same access to the same universe of knowledge.

**About Astrium Services Government, Inc.**
*Astrium Services Government, Inc., an EADS North America company, is a leading operator of customized and secure end-to-end satellite communications services. Headquartered in Rockville, Maryland, Astrium Services Government, Inc. delivers a full portfolio of fixed satellite solutions (X-Band, UHF, C-Band, Ku-Band and Ka-Band) and mobile satellite solutions (Inmarsat, Thuraya and Iridium) to the U.S. Government and military for their most critical missions. Formerly known as Vizada, Inc., Astrium Services Government, Inc. is the point of contact in North America for Astrium Services' Skynet solutions.*

*For further information, please access the company's website:*

**http://astriumservices.com/government-kcy-kkw/**

# The Changing Face Of MILSATCOM

*By Martin Deery, Business Development Director, Vislink*

**As has always been the case, dependable and secure communication is the most powerful weapon on today's modern battlefield. Combat success depends on the quick and reliable transfer of information—video, audio and data communications have become essential tools for military personnel at every level.**

Up-to-date intelligence from the front line can make all the difference for officials tasked with making challenging operational decisions. Vislink specializes in providing end-to-end solutions via microwave radio and 3G/4G but often, with the unavailability a radio path or secure cell networks, satellite technology will hold the answer.

Voice communications once accounted for the majority of traffic across military communications networks. However, making complex and potentially lethal decisions based on audio data alone may no longer be sensible.

The capability to transmit real-time video is now with us and is one of the key elements in delivering tactical decisions. Existing infrastructure networks are no longer viable for modern defence. Military personnel are demanding high definition (HD) video footage in order to ensure they have the most relevant and up to date information required to effectively combat increasingly sophisticated and widespread threats. A picture might be worth a thousand words, but high quality real-time video is worth so much more. As a result of this demand, data traffic on military networks has grown exponentially. The immediate delivery of HD video, imagery and large data files, as well as the ability to transmit this information on the move from remote locations, is often beyond their reach.

In light of this, the availability of fast, portable and reliable communications equipment is now of paramount importance. Indeed, staying connected on the move, at the data rates required for HD video, has become a fundamental concern for the armed forces. Military operations now require communications systems that can keep pace with the flow of combat, particularly as today's forces are increasingly operating in small, disparate teams that each relay information back to a central command HQ.

The ability to see live footage provides access to unprecedented amounts of information, and video has a vital role to play, making it quicker and easier to make decisions as events unfold on the front line.

Satellite technology is now essential for delivering an all-encompassing communications effort. Military grade, portable communications technology is now available from COTS (commercial off the shelf) suppliers and has become indispensable in recent years for theatre of war operations as well as for domestic training, data distribution and backhaul purposes. Satellite technology offers a hybrid communications solution that's designed to handle HD voice, video and high-bandwidth data traffic simultaneously. With modular functionality and high data transfer rates, modern satellite equipment is capable of exceeding even the most stringent of military requirements.

Due to these advances, satellite equipment has become an increasingly viable alternative to radio communications for the military. With no reliance on existing infrastructure, satellite technology is providing the armed forces with the ability to make mission critical decisions from anywhere, and at any time. Furthermore, it is now possible to tailor the specification and delivery of live video to meet even the most exacting standards and requirements.

Built to withstand even the harshest environments or most unpredictable terrain, modern satellite data terminals have been perfected for military use. Designed to be rugged and portable communications units, these data terminals are ideal for ensuring military personnel remain connected, whether that's from the middle of a coverage black-spot or set up for covert operations deep behind enemy lines. Capable of transmitting video footage from anywhere in the world, this equipment can also provide military officials with a real-time overview of the situation as it unfolds, empowering them with the information required to make crucial decisions.

Modern satellite hardware is also extremely mobile, versatile and easy to use, and can be deployed within minutes. Satellite communications technology allows disparate teams to work together in situations where normal lines of communications are either not present or not available at the time, providing a vital link for sharing video and voice communications between front line troops and the command center. Satellite data terminals are the perfect solution for connecting disparate teams of military personnel and transmitting high value content from the front line, as part of a larger defence effort.

Furthermore, it no longer matters where the decision maker is—whether they're in the command HQ, on the move, or deployed in the field, live footage from all relevant sources can be relayed to troops directly. Satellite technology has the ability to deliver video and data information from a variety of deployed assets to enable swift, accurate and intelligent decision making.

*Vislink's Motorized Mantis MSAT 120.*

**About the author**
*Martin Deery is the Business Development Director at Vislink. With a career spanning more than 30 years across the microwave radio and SATCOM industry, Martin's current role is to define the company's strategic direction in defence and security markets, making best use of a broad range of highly innovative products within the Vislink portfolio.*

For further information on Vislink, please respond to their website:

***http://www.vislink.com/***

# HOPE FOR THE BEST— HOWEVER, PREPARE FOR THE WORST

*By Tony Bardo, Assistant Vice President For Government Solutions, Hughes*

**We're in the middle of hurricane season—this year, meteorologists predict there is an above-average probability for major hurricanes making landfall in the Atlantic Basin, including the Caribbean Sea, the Gulf of Mexico and along the U.S. coastline.**[1]

That means businesses, governments and non-profits would do well to prepare by assuming there will be at least one hurricane that causes significant damage—enough to knock out terrestrial and wireless communications as happened with Superstorm Sandy. As proven then and in numerous other disasters, the only way to avoid ground-based network disruptions is to employ satellite-based emergency response and Continuity of Operations (COOP) solutions—providing the most robust communications option—which Hughes stands ready to deliver again, as needed.

It's difficult to think about preparedness when the weather is clear. However, as you put on your shades to block the glare of the sun, consider that it's satellites in the sky that are the key to enabling critical communications when storm clouds gather and a hurricane strikes. Recall that Sandy knocked out approximately 25 percent of all cell phone communications across 10 states.[2] New York City's telecommunications were some of the most affected, with countless landlines and cell towers out of commission. Adding to the problems, a key hub for a major telecom provider in lower Manhattan flooded, so they were unable to provide Internet or voice communications to their customers. In fact, thousands of people still had no service six months after the storm occurred.[3]

Unlike terrestrial technologies that rely on ground-based infrastructure—such as cell towers that are vulnerable to being disabled or knocked out when disaster strikes—satellite broadband provides a true alternate and robust communications path that is easy to deploy virtually anywhere using small antenna dishes. There are three primary types of solutions: Emergency Response, COOP and a blended approach that combines capabilities of both.

### *Emergency Response Solutions*

Hughes Emergency Response Solutions are designed to provide satellite broadband Internet for emergency response and recovery scenarios—even in the most remote locations. Powered by our advanced Ka-band satellites—Spaceway 3 and EchoStar XVII, with JUPITER high-throughput technology—Hughes solutions provide the industry's fastest satellite Internet speeds, up to 15Mbps.

In the days that followed Sandy, Hughes supported Habitat for Humanity of Westchester with an Emergency Response Solution in its efforts to rebuild over 100 homes that were lost in the Breezy Point area of New York. A command center was set up to help coordinate rebuilding efforts and Hughes joined in the recovery effort by providing key communications capabilities, including broadband services.

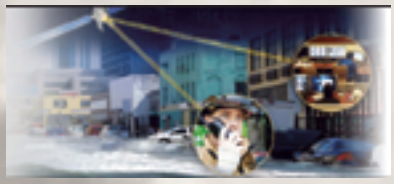
### *COOP Solutions*

Hughes COOP solutions are designed for emergency communications preparedness. These path-diverse solutions provide Internet connectivity when terrestrial or wireless primary networks fail. Hughes pre-positions a permanent terminal at a designated location. Featuring policy-based routing with automatic failure detection and switchover between primary and backup links, the solutions complement existing primary networks with 99.99 percent availability.

### *A Proactive + Reactive Approach*

Hughes Emergency Network Restoral (ENR) Solutions blend pre-disaster planning with rapid post-event deployment—offering a completely diverse Virtual Private Network (VPN) backup service for locations connected by Wide Area Networks (WAN). Hughes designs, configures, manages and integrates a private satellite network with a WAN. After an emergency occurs, Hughes ENR Solutions ensure communications restoral within 48 hours using its off-the-shelf satellite terminals.

### *Satellite Leveraging*



Hurricane Sandy caused approximately $20 billion in damage and an estimated loss of $50 billion in revenue from interruption to businesses.[4] We know at least some of that can be attributed to the loss of connectivity. There isn't a business, government agency or non-profit in existence that wants to try to serve its customers, citizens or partners again without connectivity, as so many were forced to do following Sandy. So, as we stand here with our shades on looking at the summer sun, let's not just hope for the best, but prepare for the worst—by leveraging those reliable satellites in the sky.

*References*


[1] *NOAA's National Weather Service Newport, Morehead City, NC Event Summaries/Case Studies, Oct. 29, 2012*

[2] *Peter Svensson, Sandy Takes Out 25 PCT of Cell Towers, AP, Oct. 30, 2012*

[3] *Phillip Dampier, Six Months Later, Still No Verizon Service in the Rockaways, Stop the Cap!, April 8, 2013*

[4] *NOAA's National Weather Service Newport, Morehead City, NC Event Summaries/Case Studies, Oct. 29, 2012*



**About the author**

*Anthony "Tony" Bardo has 20+ years of experience with strategic communication technologies that serve the complex needs of government. Since joining Hughes Network Systems in January 2006, Bardo has served as assistant vice president of Government Solutions, where he is focused on providing Hughes satellite broadband applications solutions to Federal, State, and Local governments. Bardo also recently served as Chair of the Networks and Telecommunications Shared Interest Group (SIG) for the Industry Advisory Council, an advisory body to the American Council for Technology (ACT). Before joining Hughes, Bardo was with Qwest Government Services for nearly five years where he served as senior director of civilian agencies sales and marketing, senior director of marketing, and senior director of business development. Prior to Qwest, Bardo spent 14 years with the government markets group at MCI where he held the position of executive director for civilian agencies. During his tenure, his teams managed programs with the Federal Aviation Administration's national air traffic control network, the Social Security Administration's toll-free network, the U.S. Postal Service Managed Service Network, and the U.S. General Services Administration's FTS2001.*


# Registration Now Open!

DoD Commercial SATCOM USERS WORKSHOP

Organized by SIA

## *Streamlining Commercial SATCOM Operations for Efficiency*

December 17-19, 2013

Crystal Gateway Marriott in Crystal City, VA

Co-sponsored by SIA and by U.S. Strategic Command

www.dodsatcom.com/ginfo.html

**Thursday Morning Keynote Speaker:**

**Lt Gen Ronnie D. Hawkins Jr.**

**Director, Defense Information Systems Agency (DISA)**

Don't miss the year's final opportunity to join Military and Government decision-makers and satellite industry professionals as they come together all under one roof. This is the industry's chance to exhibit their latest satellite-based solutions as they meet participants and speakers from DoD, Functional and Regional Combatant Commands, Military Services, DoD Agencies, and many more.

**REGISTER PRIOR TO NOVEMBER 1ST AND SAVE UP TO 25 PERCENT**

**OFF THE ONSITE REGISTRATION COST!**

To register, see the Workshop agenda, general and sponsorship information and a list of speakers, please visit http://www.dodsatcom.com/ginfo.html or contact SIA Communications Manager Dean Hirasawa at (202) 503-1562 and via email at dhirasawa@sia.org

**NOTE: U.S. Strategic Command co-sponsorship does not constitute federal endorsement of SIA or any other sponsors of this workshop**

# MILITARY SPACE—AT A STRATEGIC CROSSROAD

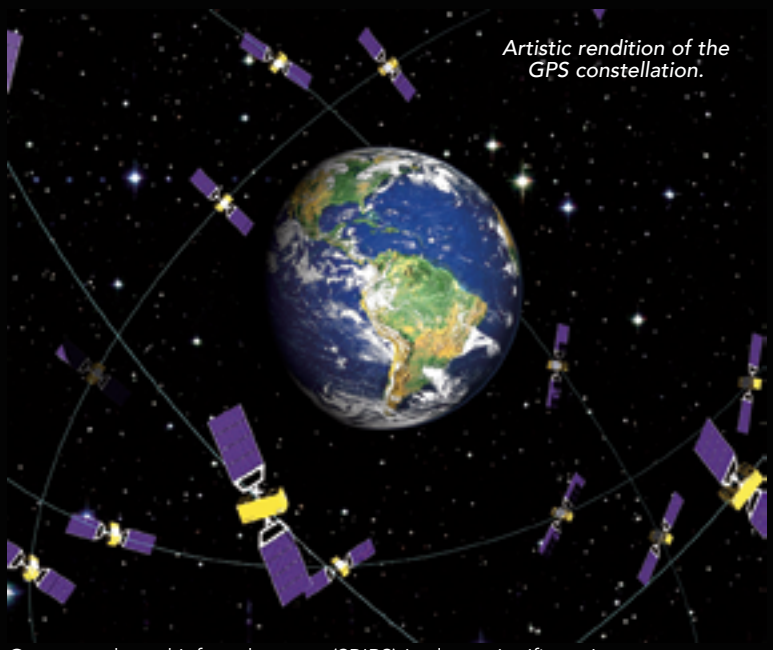
*By General William L. Shelton, Commander, Air Force Space Command, USAF*

**The future of space capabilities in the United States Air Force is at a strategic crossroad. A crossroad that requires us to address our means of protecting mission-critical constellations, to challenge traditional acquisition practices, to analyze new operational constructs, and to widen cooperative relationships both domestically and abroad.**

Our military satellites are technological marvels providing time-critical global access, global persistence, and awareness. These systems not only provide foundational, game-changing capabilities for our joint forces, they also have become vital assets for the global community and our world economy. Dependence on these space capabilities gives our nation a great advantage—an advantage some would like to minimize. Satellites designed and built for a benign environment are now operating in an increasingly hostile domain. The challenge before us, then, is to assure these vital services will be present in times and places of our choosing while simultaneously lowering the cost.

The Air Force has been in continuous combat operations since January 1991, when Operation Desert Storm commenced. It seems hard to believe now, but Global Positioning System (GPS) receivers were literally duct-taped to windscreens of helicopters to capitalize on the nascent navigation capability provided by the not-yet-completed GPS constellation. Similarly simplistic was the voice-only provision of missile warning data to our deployed forces and allies to warn them of Iraqi Scud missile launches. We learned much in the early 1990s about the need to further integrate space capability into tactical operations.

For example, the utility enhancements of our GPS constellation have enabled us to develop real-time integration with the war fighter. Our GPS User Operations Center provides more than 230 position accuracy assessments to our deliberate and contingency mission planners daily.



*Artistic rendition of the GPS constellation.*

Our space-based infrared system (SBIRS) is also a significant improvement over our capabilities in the first Gulf War. The infrared processing of SBIRS GEO-1 and -2 presents the warfighter with faster and more accurate launch information and impact-point predictions, and the SBIRS staring sensor will enable tremendous enhancements to our battlespace awareness.

The entire joint force is now dependent on space assets for all operations, ranging from humanitarian relief through major combat. Space-derived data, once the purview of strategic-level users only, now reaches to the lowest tactical echelons. But with this dependence comes a corresponding vulnerability.

As we learned in the crucible of combat, others were watching and learning lessons of a far different kind. As we continue to take significant strides in the integration of space-enabled data into all aspects of operations, our adversaries seek ways to disrupt this asymmetric advantage. The most obvious example of these counterspace efforts is the Chinese anti-satellite test in 2007. In this test, a kinetic-kill vehicle, successfully engaged a nonoperational Chinese weather satellite. Although China demonstrated its ASAT prowess to the world, the unfortunate by-product of this test is tens of thousands of pieces of space debris which will be a navigation hazard to manned and unmanned spacecraft for decades to come.

The growing debris problem is a concern to spacecraft operators in all sectors: military, civil, and commercial. The collision between an active Iridium communications satellite and a defunct Soviet-era Cosmos satellite produced yet another debris field. These were two relatively large objects coming together at precisely the wrong time.

Much smaller objects, which are much greater in number, also represent catastrophic risk to fragile spacecraft. Therefore, the potential exists for further collisions, creating a cascading effect of increasing debris in low Earth orbit. We must control debris creation, and we must increase our ability to track the debris to enable collision avoidance when possible.

Another troublesome development is the proliferation of jamming assets. GPS jammers are widely available, complicating our employment of GPS navigation and timing signals in weapons and platforms. Satellite communications jammers also are plentiful, which impairs our confidence in over-the-horizon communications when we would need it most.

Other threats to our space capabilities either exist or are being actively researched, so the broader point is that increasing counterspace capabilities, combined with a growing debris threat, make the space domain a much more hostile place. Therefore, it should be obvious that we cannot expect space assets designed to operate within a very permissive environment to operate effectively in this "new normal" of a challenged space domain.

*Artistic rendition of SBIRS.*

The other important factor defining the strategic crossroad is the downturn in the budget. While there is substantial uncertainty in the actual budget figures for the future, it is very safe to say the peak budgets are behind us. If we are to continue providing foundational space services for our warfighters, we must look for less expensive alternatives to our current systems.

It's instructive to look first at how we arrived at the decisions to build highly complex, expensive satellites. Because the cost of launch is so high, our business-case analyses told us that we gained highest efficiencies by packing as much capability as possible onto each satellite. Tightly packaged and integrated satellites, such as the SBIRS and the advanced extremely high frequency (AEHF), were borne of this design philosophy. Additionally, in both of these examples, we pushed hard on advancing certain technologies, resulting in significant, nonrecurring engineering costs—and corresponding program delays. Those development challenges are behind us, but even the production models of these spacecraft, bought under more efficient acquisition frame- works, still are very expensive.

Either of the two key factors cited—a radically different operating environment and a declining budget—should be a shouting mandate for change. When we combine these factors at this epoch in time, however, it should be obvious that a status quo approach is simply inadequate for our future. To sustain space superiority and the space services our joint force now takes for granted, we must consider future architectural alternatives. These alternatives must balance required capability, affordability, and resilience.

Resilience in the face of the previously discussed growing space threats is an imperative. If space assets come under attack, either as a precursor to conflict or as an integral part of terrestrial hostilities, our architectures must be resilient enough to assure mission accomplishment. Maintaining a fragile-by-design architecture, which is vulnerable to a golden BB, could result in the loss of a critical resource when we need that capability the most.

For example, the AEHF satellites are designed to operate in extremis—in a trans- and post-nuclear environment to enable the National Command Authority to command and control forces necessary to ensure national survival. As currently envisioned, we will procure just enough of these satellites to provide a minimal constellation with no resiliency to attack. Just as we would have trouble with a cheap shot, we also are not resilient to premature failure of a satellite in the constellation. Building replacement satellites takes years, and the high cost precludes spares on the shelf.

*Artistic rendition of an AEHF satellite.*

While we could merely buy more of the same designs to provide the needed resilience, we are studying much less expensive concepts. The first is called disaggregation. Again using the example of AEHF, both strategic and tactical protected communications payloads are hosted on the satellite. As a result, the satellite is both large and complex—and size and complexity are drivers of cost in both design and launch. Separating the two payloads on different satellites would accomplish three things: (1) the complexity would decrease, thereby driving down the cost; (2) the satellites would be smaller, enabling smaller boosters and driving down the cost; and (3) at a minimum, the adversary's targeting calculus would be complicated with more satellites, thereby producing at least a modicum of resilience in the face of intentional acts.

Another potential advantage of disaggregation is the ability to host payloads on other platforms, including commercial satellites. The Commercially Hosted Infrared Payload has been a trailblazer in this regard, and much more work with industry is already under way.

We have learned that the commercial enterprise, which can integrate military payloads and the acquisition process to get capability into space, is both flexible and affordable. We continue to look into other pathfinders and have engaged in industry outreach to discuss ways to better partner and apply synergies within this rapidly evolving domain.

A disciplined adherence to high technological readiness-level hardware also is required to make this approach affordable and achievable. Technological refresh will prove necessary in some areas as we approach these alternatives, but there is no reason today to push technology as hard as we have in the past. Space Modernization Initiative (SMI) funds will help mature sensor designs, communications pack- ages, and software, which then allows for wiser choices in the actual development programs for these alternatives. These SMI funds must be protected in future budgets to better equip program managers with design alternatives.

As we contemplate smaller satellites and smaller boosters, we can also consider using commercial, off-the-shelf satellite buses rather than building specialized buses for each of our spacecraft. This also opens the window for commercial software to fly those buses, avoiding software and ground station development efforts for each new spacecraft. Clearly, we would still require payload-related software, but the simplicity and cost-savings of buying both off-the-shelf buses and ground software are worthy of exploration.

Because spacecraft production timelines are long, the lead time on decisions is correspondingly long. The die is already cast for SBIRS 5 and 6 as well as AEHF 5 and 6. Assuming these spacecraft achieve their required lifetimes, replacement spacecraft are not needed until the mid-2020s. However, that also means decisions on these replacements must be made in the 2017–2018 time frame. Budgetary decisions on an architectural direction, then, must be made in 2015 or 2016.

Clearly, the theories of providing required capability with enhanced resilience at a reduced cost will be rightly debated in the coming months. The Space and Missile Systems Center has several study efforts under contract today to produce empirical data to inform this debate. A business case analysis is absolutely required. A technological feasibility determination is needed. However, the signs all point to a good marriage of affordability and resilience while procuring required capability.

Augmentation of some key mission areas through international partnerships can help relieve some of the budget pressure and strengthen strategic international ties. Building partnerships increases capacity and shares the responsibility for international security. For example, significant work in the area of protected and survivable satellite communications has been ongoing with Canada, the Netherlands, and the United Kingdom. Australia has committed to participating in the Wideband Global Satellite Communications program, as well as hosting sensors important to our Space Situational Awareness capability. Our international cooperation and partnership with industry increases our capacity, improves our capability, shares in the cost burden, and helps extend global presence.

Much work remains, but time is short. A fundamental restructuring of our space architecture is under consideration, and opinions will be offered from many quarters. But given the new normal in space, given the new budget climate, isn't it good common sense to look at alternatives to the status quo? Let's protect our SMI funds, let's do the hard study work, and let's have the data do the talking.

In this century, we face a growing number of nations with near-peer or peer capabilities, which may challenge our notions about space superiority. In order to maintain our edge, we must continue to lead in space innovation. Tomorrow starts with the vision we develop today.

We must capitalize on the present opportunity to reshape the space environment, sustain global capabilities, and continue our asymmetric advantage in space.

**About the author**

*General Shelton (USAFA; MS, Air Force Institute of Technology; MS, National War College) is commander of Air Force Space Command, Peterson AFB, Colorado. He is responsible for organizing, equipping, training, and maintaining mission-ready space and cyberspace forces and capabilities for North American Aerospace Defense Command, U.S. Strategic Command, and other combatant commands around the world. General Shelton not only oversees Air Force network operations and manages a global network of satellite command and control, communications, missile warning, and space launch facilities but also has responsibility for space system development and acquisition. He leads more than 42,000 professionals assigned to 134 locations worldwide.*

**Editor's note**

*Our thanks to the Air & Space Power Journal for their permission to republish General Shelton's article to our global readership. More information regarding the ASPJ is available at:* **http://www.airpower.au.af.mil/**

# EVENT
# MEET THE PLAYERS + UNCOVER SOLUTIONS @ MILCOM 2013

**MILCOM, the premier international conference and exposition for military communications, returns to San Diego, California, and runs from November 18-20, 2013.**

Gathering the leading actors within the government, military, industry and academia segments of our industry, MILCOM offers an interactive forum to further explore, define and leverage commercial and defense technologies.

This year's theme, "Balancing Commercial and Defense Technologies," is the focus for MILCOM 2013. The event will feature seven tracks of technical expertise as well as an impressive line-up of speakers for an estimated 3,000 attendees from more than 25 countries who are expected to attend this conference.

Senior leaders will interface with attendees on the latest in military and commercial communications. Among those confirmed to speak at MILCOM 2013 are:

- Lieutenant General John Toolan, Jr., USMC, Commanding General, I Marine Expeditionary Force
- Dr. Irwin Jacobs, Founding Chairman and CEO Emeritus, Qualcomm
- Larry Payne, Vice President—US Federal, Cisco Systems.

In addition to keynote addresses, decision-makers will share their perspectives during the daily VIP panel presentations.

*Conference attendees can see, touch and try out products and solutions from more than 300 exhibitor booths at the MILCOM exhibition.*

*The cornerstone of MILCOM 2013 is the strong technical program, with featured speakers, technical panels, tutorials, and more than 400 paper presentations in seven technical tracks.*

The cornerstone of MILCOM is the strong technical program that includes a broad array of topics that cover today's critical communications issues. New this year, the international perspectives track will highlight the interests of MILCOM's international audience. More than 400 papers will be presented, including:

- Waveforms and Signal Processing
- Networking Protocols and Performance
- Cyber Security and Trusted Computing
- System Perspectives
- Services and Applications
- Selected Topics in Communications
- International Perspectives on Communications

The technical program will also offer technical panels and tutorials for attendees. Many of the sessions are eligible for continuing education units (CEUs).

Complementing the technical program this year is an engagement theater on the exhibit floor, which offers an opportunity to participate in smaller, interactive sessions. Topics include small business, cybersecurity and innovation. In addition, conference attendees will have more than 300 exhibitor booths to visit throughout the three-day conference, as many of the world's leading providers of information, communications and defense technologies will be on hand to demonstrate their technologies, products and expertise.

Technical program registration is free for military, government, and student participants; breakfasts and lunches are available for a nominal fee.

MILCOM, now in its 32nd year, is co-sponsored by the Armed Forces Communications and Electronics Association (AFCEA) International and the Institute of Electrical and Electronics Engineers (IEEE) Communications Society. BAE Systems is serving as the conference's 2013 corporate host.

Visit ***milcom.org*** for a full conference agenda and information on registration.

# MILCOM'13

## Balancing Commercial and Defense Technologies

**18-20 November 2013 ■ San Diego Convention Center**

MILCOM, now in its 32nd year, is the premier international conference and exposition for military communications. **REGISTER TODAY!**

## TOP 6 REASONS WHY YOU SHOULD ATTEND MILCOM

1. Hear from senior military, government and industry leadership and get your questions answered

**CONFIRMED SPEAKERS INCLUDE:**

- **LtGen John Toolan, Jr., USMC**
  Commanding General, I Marine Expeditionary Force
- **Dr. Irwin Jacobs**
  Founding Chairman and CEO Emeritus, Qualcomm
- **Larry Payne**
  Vice President, U.S. Federal, Cisco Systems

2. Earn Continuing Education Units (CEUs) and maintain your DoD 8570.01-M credentials
3. Technical program with 300 papers, 25 plenary and technical panels, and 17 tutorials
4. Dialogue with the experts in panel sessions
5. See and touch the best and newest equipment and technologies industry has to offer
6. Engage and network with speakers, panelists, industry representatives, and other attendees

www.milcom.org

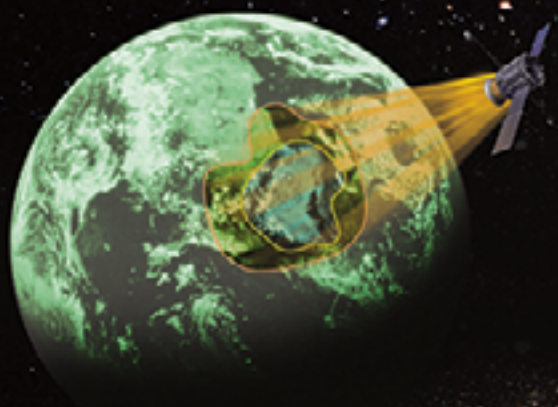
AFCEA

IEEE COMMUNICATION SOCIETY

MITRE

BAE SYSTEMS

SMi
LINKING BUSINESS *with* INFORMATION
*20th Anniversary*



SMi's 15th Annual

# Global MilSatCom

CONFERENCE & EXHIBITION 2013

## The Leading Military Communications Event for Satellite Professionals

**Tuesday 5th November - Thursday 7th November | Park Plaza Riverbank Hotel | London, UK**

### KEYNOTE SPEAKERS

**Air Vice Marshall Philip Osborne,** Director of Capability, **Joint Forces Command**

**Brigadier General Pitre R. R.,** Director General Space, **Canadian Forces**

### MILITARY AND GOVERNMENT SPEAKERS

**Colonel Christophe Debaert,** Head of Syracuse Program, **DGA France**

**Commander Louis Tillier,** Head of SATCOM from the French Joint Staff, **Ministry of Defence, France**

**Lieutenant Colonel Hans Stefan Suhle,** Head, SatCom Space Management Section, **Bundeswehr Communication and Information Systems Services Centre (CISSC)**

**Major Laura Smith,** C4ISR Capability Branch, **Ministry of Defence, UK**

**Lieutenant Colonel Roberto Pablo Peláez Herrero,** Head of SatCom Department, **Ministry of Defence, Spain**

**Deanna Ryals,** Chief International Military Satellite Communication Division, MilSatCom Systems Directorate, Air Force Space Command, **US Air Force**

**Colonel Mark Patterson,** J6 Division Chief, **USPACOM**

**Lieutenant Colonel Jim Dryburgh,** JSO1 CIS J6, **New Zealand Defence Force**

**Lieutenant Colonel Jose Everardo Ferreira,** Electronic Engineer, IEEE Member and OSA Member, **Brazilian Air Force**

**Sergiy Martyniuk,** Chief of Section, **Ministry of Defence, Ukraine**

**Captain Rommel Anthony SD Reyes,** Global Satellite Communication, **Philippine Navy**

**Captain David Greaves,** Royal Australian Navy, Commander Defence Strategic Communications for the **Australian Defence Force**

**Catherine Mealing-Jones CPFA,** Director Growth, Applications & EU Programmes, **UK Space Agency**

**PRE-CONFERENCE WORKSHOP HOSTED BY COBHAM | 4TH NOVEMBER 2013 | 13.00-17.30**

## Conquering Interference – The Next Big SatCom Challenge

In Association with: COBHAM, eutelsat, Global VSAT Forum, iRG

LEAD SPONSOR: SES your satellite company

GOLD SPONSOR: ASTRIUM AN EADS COMPANY

SPONSORS: COBHAM, eutelsat, HARRIS CAPROCK, HUGHES, iDIRECT, inmarsat, INTELSAT General Corporation, LOCKHEED MARTIN, Newtec, NORTHROP GRUMMAN, O3b Networks, ThalesAlenia Space, THALES, ViaSat, Rockwell Collins

**www.globalmilsatcom.com**

James Hitchen on +44 (0)20 7827 6054 | jhitchen@smi-online.co.uk

CPD CERTIFIED

# The Future of Military Ka-band Is Here

## Ground to Space & Everywhere Between

***Teledyne Paradise Datacom***
**delivers the most comprehensive Ka-Band Microwave RF solutions.**

***NEW!***
### *Ka-band MIL-BUC & MIL-LNB*
- *Suitable for terrestrial and airborne applications*
- *Interfaces directly to flat plate antenna or OMT*
- *Switch between any two 1 GHz Ka sub-bands (standard is 29-30 & 30-31GHz)*
- *Ultra-lightweight and power-efficient*
- *Hermetically sealed for high-reliability*

***NEW!***
### *500 Watt Ka-band Outdoor TWTA*
- *502W Peak Power*
- *IP/Serial M&C*
- *Built around Teledyne MEC-5530 TWT*
- *MIL Bands*
- *Integral L-band BUC Option*

### *Ka-band Compact Outdoor SSPA*
- *30-31 GHz*
- *Integral BUC*
- *Passes WGS certification*
- *Exported as EAR-99*

### *10 Watt Ka-band vBUC*
- *8 watts Linear Power*
- *10 lbs*
- *IP/Serial/FSK M&C*
- *MIL & Commercial Bands*
- *Optional AC Power Supply*

**TELEDYNE**
PARADISE DATACOM
Everywhere**you**look™

**Teledyne Paradise Datacom LLC**
328 Innovation Blvd.
State College, PA 16803, USA
T: +1 814.238.3450 F: +1 814.238.3829

***NEW Website...*** **www.paradisedata.com**
e: sales@paradisedata.com